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Attracting Foreign Investments for Green Energy Projects in Sub-Saharan Africa: Climate Change Policy & Innovation in International Legal Compliance

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ATTRACTING FOREIGN INVESTMENTS FOR GREEN ENERGY PROJECTS IN SUB-SAHARAN AFRICA:

CLIMATE CHANGE POLICY & INNOVATION IN INTERNATIONAL LEGAL COMPLIANCE.

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ABSTRACT

Sub-Saharan Africa must confront the dual problem of development coupled with the complexities surrounding climate change. The region's stagnated growth has been historically attributed to many factors, but the predominant thought from an international law perspective is that if the region modernizes its legal and regulatory structures this will engender the confidence of foreign investors. With this acknowledgement came the demand on developing nations to modernize local legal and regulatory systems initially focusing on globally harmonized intellectual property rights and then more recently their energy regulatory infrastructures and processes to attract foreign investments. Several international organizations and institutions including the WTO, World Bank and the UN have recommended energy policies to hasten sustainable development in the sub-Saharan region. The recommended policies have been implemented by many sub-Saharan African nations with little change in attracting foreign investors to fund these projects. Despite international commitments, sub-Saharan African nations have not been the beneficiaries of these initiatives, while countries like China, India and Mexico have received an influx of foreign investments within the green energy sector. Two main issues arise from the lack of foreign investments. First, do flexibilities need to be built into international trade and climate change Agreements to encourage developing countries down a sustainable development path? The second issue is whether there are local and regional factors that affect a country's ability to attract foreign direct investments ("FDI"), particularly those focused at climate change abatement projects? Sub-Saharan African countries like Ghana, West Africa have implemented new energy policies like the Feed-In Tariff ("FIT") model, but still have not enjoyed increase foreign investments in renewable energy projects. Will the energy sector mimic the pharmaceutical sector where promises of investments were made if countries harmonized their laws, but failed to deliver rewards for these "modernization" initiatives? Or are there lessons to be learnt regarding local practices, policies and structures that must be modified in order to attract foreign investments. This thesis will examine the local factors beyond modernization efforts within the energy sector that may negatively impact on foreign investors' willingness to undertake green energy projects within the region within the context of international trade and climate change Agreements. It will use Ghana as a case study to explore some of the issues and regional concerns that explain the reluctance of foreign investors to initiate green energy projects.

DEDICATION

To Indigo and Gabriel.

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"Introduction"

1.0 INTRODUCTION

A view of the earth from space at night displays a peculiar phenomenon. While North-America and Europe appear to be illuminated by flickers of light resembling one harmonious radiant bulb, the continent of Africa has few glimmers. This reality is not a result of a lack of energy potential on the continent, but rather untapped renewable resources resulting in low energy consumption, and broken promises of investments and development. Prior to the creation of the World Trade Organization ("WTO") and the enactment of *Agreement on Trade-Related Aspects of Intellectual Property Rights* ("*TRIPS*") in 1995, the treaty was touted as the solution to sub-Saharan Africa's development problem.[1] The advent of the WTO and the treatise emanating there-from, have had a revolutionizing effect on global trade regulation. The evolution of trade negotiations that resulted in the creation of the WTO has been one of the most profound enactments affecting global trade.[2] These new rules, as memorialized by the WTO, has been referenced as epochal in nature, as well as a colossal shift away from trade law being the primary prerogative of local states.[3]

The notion that countries could encourage development by implementing a globally harmonized system was popularized by a movement within the pharmaceutical sector that sought to unify intellectual property rights ("IPR"). In this conjecture, Agreements like *TRIPS* drew the connection between local modernization instruments and the ability to attract foreign investments via

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[1] *TRIPS*: 1994, "Agreement on Trade-related Aspects of Intellectual Property Rights", Appendix 1C of the *Agreement Establishing the World Trade Organization* (Marrakesh, Morocco, Apri15), online: http://www.wto.org/english/docs_e/legal_e/27-trips_01_e.htm. [hereinafter "TRIPS"].

[2] Ikechi Mgbeoji, "Trips and Trips-Plus Impacts in Africa" in Daniel J Gervais, ed., *Intellectual Property, Trade and Development: Strategies to Optimize Economic Development in Trips-Plus Era* (Oxford University Press, 2007) 259.

[3] *Ibid* at 259; V Chiappetta, "The Desirability of Agreeing to Disagree: The WTO, TRIPS, International IPR Exhaustion and a Few Other Things" (2000) 21 Michigan Journal of International Law 333; Section 301 of the *Trade and Tariff Act of 1974*; A Endeshaw, "The Paradox of Intellectual Property Law-Making in the new Millennium: Universal Templates as Terms of Surrender for non-industrial Nations: Piracy as an Offshoot" (2002) 10 Cardoza Journal of International and Comparative Law 47.

increased confidence in the local legal structures. The prevailing belief was that if developing countries updated their intellectual property regimes, this would be the solution to short and long-term economic growth through increased foreign direct investments ("FDI"). Corporations and the industrialized nations argued that the lack of harmonized global IPR stifled investments within territories harboring weak intellectual property ("IP") laws. Originally, it was thought that the initial negative economic impact of *TRIPS* on developing nations would emerge because of the cost of implementing a local IPR system. It was assumed that after this initial hurdle, developing countries would soon begin to reap the benefits of heightened intellectual property through FDI.[4] However, the promises of *TRIPS* and development have not materialized on the continent of Africa.[5] Similar promises are being echoed within the energy sector with reports from the World Bank that developing nations need to create enabling energy regulatory structures to attract FDI. This paper begins from the heuristic perspective that acknowledges the failed results of modernization efforts in the intellectual property realm, and argues that modernization efforts in the renewable energy sector may also be insufficient to entice FDI within the region. Many sub-Saharan African countries have implemented regulatory reforms that comply with the international guidelines, yet, they continue to face challenges in attracting foreign investors to build the necessary energy infrastructures that are necessary for development. Barriers faced by developing countries in implementing recommendations from international organizations like the World Bank and the WTO may be tied to systemic issues within these organizations and also local governments and policies.

[4] R Sherwood, "The TRIPS Agreement: Implications for Developing Countries" (1997) 37 IDEA 491.
[5] Mgbeoji, *supra* note 2.

1.1 Research Question & Problem

This research aims to understand why, despite the implementation of rigorous modernization practices and processes like an international compliant IPR system and the modernized energy regulatory infrastructures that were recommended by international organizations like the World Bank, sub-Saharan African nations like Ghana still have not benefited from increased foreign investments? Similarly, the United Nations conferences and treaties on climate change and energy have also produced anemic results among sub-Saharan African countries; these debates raise questions about whether national, cultural and geographical peculiarities affect and mitigate the anticipated outcomes of modernization processes with specific reference to the renewable energy sector. In 2015, 80% of renewable energy projects were funded by private sector funds (US$ 242 billion) versus 20% public finance (representing US$49 billion).[6] Domestic frameworks are also crucial to attracting FDIs as 92% of private investments were spent in the same country that the funds were raised.[7] The fact that countries like India, China and Brazil are receiving green energy investments in the form of FDI, while the sub-Saharan region has largely been neglected raises serious questions about regional facts in sub-Saharan Africa that act as barriers for foreign investors undertaking projects within the region.

Studies have shown that foreign investors prefer projects in regions where the risks of return are low and where there are enabling governmental policies and frameworks, along with guarantees and low political risk.[8] Sub-Saharan Africa is disproportionately underrepresented, being per capital, the least desirable region on the globe for private climate finance flows. Of the total US$ 391 billion investments in 2014, sub-Saharan Africa only yielded USD$ 12 billion (3%) of the total global

[6]Climate Policy Initiative, "Global Landscape of Climate Finance 2015" (November 2015), online: http://climatepolicyinitiative.org/wp-content/uploads/2015/11/Global-Landscape-of-Climate-Finance-2015.pdf at 6.
[7] *Ibid* at 10.
[8] *Ibid*.

climate change investments with Asian and the Pacific receiving the largest finance flows of USD $119 billion (31%), and China receiving USD$ 84 billion (22%).[9]

Despite promises made to Africa, the numerous COP Meetings and WTO Agreements,[10] the initiation of international Agreements like *TRIPS*, the *General Agreement on Tariffs and Trade* (*"GATT"*) and the *Subsidies and Countervailing Measures Agreement* ("*SCM"),* the sub-Saharan continent still struggles to attract foreign investments that will assist in achieving sustainable development. The new *Paris Climate Agreement* adds further complexities to the desire for development while meeting global climate change pledges and standards. International Agreements contain some flexibilities that recognize the obstacles that developing countries face in meeting this dual objective. This research will explore two primary questions: firstly, *are there factors, beyond creating locally enabling regulatory infrastructure, that act as barriers to attracting FDI for renewable energy projects in sub-Saharan Africa and more specifically Ghana? For example, do strict trade provisions that harmonize global standards create impediments for developing countries, or are flexibilities within the Agreements sufficient to overcome arising hardships? Secondly, are there local barriers that discourage foreign investments from undertaking projects in sub-Saharan Africa? Ghana has been chosen as a case study to assess, why, despite complying with international standards to modernize its energy infrastructure, it continues to struggle to attract foreign investments in high capital green energy projects*. Finally, are there any success stories in sub-Saharan Africa of countries that attracted foreign investments for renewable energy projects. The

[9] *Ibid*.
[10] Cancun COP 16, Cancun Decision 1/CP.16, Sixteenth session of the Conference of Parties (COP 16), November 2010; Doha Climate Change Conference, (COP 18) Decision 1/CP.18, Eighteenth session of the Conference of the Parties (COP 18), 16 November – 7th December, 2012; Lima Climate Change Conference, (COP 20), the 20th session of the Conference of Parties and the 10th session of the Conference of Parties serving as the Member of the Parties to the Kyoto Protocol, 14th December, 2014; Paris Climate Change Conference, (COP21), the Twenty-first session of the Conference of Parties (CO) and the eleventh session of the Conference of Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP), 30th November – 11the December, 2105, Paris, France.

lack of access to reliable energy has arguably impeded economic development and this barrier has primarily been attributed to local technical and financial factors on the sub-Saharan continent.

The resulting energy deficiency in sub-Saharan Africa highlights a scenario that is caused, in part, by a lack of investment in large scale commercialized renewable energy plants, which is primarily due to the unwillingness of financiers to invest in the form of FDI; this reluctance exist despite accession to WTO and the enactment of enabling legislation and incentivizing practices such as FIT. The problem arises because foreign investors require some assurance that they will receive a return on their investment. Governments have responded by creating a FIT system that guarantees the price that consumers will pay to purchase the energy from the developer. Still projects never pass the approval stage, primarily because countries like Ghana are asked by foreign investors to give sovereign guarantees. In addition, local governments often request domestic incentives like using local manufacturers as a concession for an agreement based on the FIT system. These concessions may be at odds with international treaties and the *GATT* requirement that all trade nations should be treated equally in adherence with the most favourable nation status. International organizations like the WTO and the World Bank support programs like FIT, however, international treaties may also pose inadvertent barriers for investments into green energy projects. Treatise including the *GATT* (MFN and Article XX), the *SCM Agreement* (non-actionable/actionable subsidies) and *TRIPS* (Article 8) may all contain provisions that create uncertainty for foreign investors who are concerned that their project may be subject to an international subsidy challenge. The incentives required to redirect choices from cheaper fossil fuel alternatives to green solutions may be in conflict with international law. This concern has not been addressed in the policies espoused by the WTO and World Bank that focus primarily on creating a locally enabling infrastructure.

1.2 Energy and Development

Energy and development in many sub-Saharan African countries have been guided by failed international policies that aim to implement macro structural changes while neglecting locally persisting factors. Many countries in sub-Saharan Africa radically transformed their regulatory framework in the energy sector. In 2011 this change occurred in Ghana with the enactment of Ghana's *Renewable Energy Bill*.[11] The Bill and the implementation of a feed-in-tariff system, was a part of a wider policy that the World Bank and the IMF maintained would make Ghana more attractive to FDI. The provision of energy through a photovoltaic solar source is a good example of how governments may adopt a preferential price tariff to encourage developers to invest large sums of capital in such plants.

It is also essential to understand that practices like feed-in-tariffs aim to ensure that solar energy producers are able to recoup the cost of development by guaranteeing profitability over the total contractual period. Despite these regulatory changes countries like Ghana find that while they have approved green energy initiatives, these projects still have difficulty attracting international funding. The problem arises because, despite having an enabling regulatory environment, a number of local barriers to finance have not been addressed. Consequently, an understanding of barriers to actualize green energy projects in sub-Saharan Africa requires analysis beyond the scope of international agreements to incorporate aspects of climate finance. For example, a foreign developer of a solar PV plant may receive all the government approvals along with a Power Purchase Agreement ("PPA") that contains a good feed-in-tariff rate, but is still unable to attract investors that are willing to risk their investment within the region. These corporations that receive project approval from governments like Ghana must raise the capital to finance projects. The motivation for

[11]The Ghanaian *Renewable Energy Act*, 2011 (Act 832), online: http://energycom.gov.gh/files/RENEWABLE%20ENERGY%20ACT%202011%20%28ACT%20832%29.pdf.

corporations to seek out FDI are therefore numerous, ranging from low labour costs to the provision of governmental services, tax havens or the provision of goods and services that are absent from the country. There are a host of problems that these corporations encounter when attempting to attract FDI, including political instability, cultural misunderstandings, infrastructural problems, skillfulness of the labour force environmental factors, lack of technology advancement in the region and most important, the ability of local governments to financially honour the contractual obligations. When the problem of climate change is compounded with development goals, the cost of development increases. It is for this reason that climate change has been referred to as the "super wicked problem" that robs currently impoverished communities of the ability to sustain themselves, often for the benefit of the industrialized world that was chiefly responsible, and benefitted from pollution.[12] The solutions to climate change are seen as "super wicked" because they require the least able (developing countries), which have contributed the least to the climate change problem by way of industrial pollution, to undertake expensive solutions to remedy the problem for future generations.

The United Nations ("UN") has acknowledged the importance of factors beyond a country's modernization of laws to attract foreign investments. More recently, the UN acknowledge the importance of a modernized energy infrastructure in contributing to sustainable development; the UN highlights that: "[t]he lack of modern fuels and electricity in most developing countries entrenches poverty, constrains the delivery of social services, limits opportunities for women, and erodes environmental sustainability".[13] The UN Framework Convention on Climate Change ("UNFCCC") also set a clear mandate to stabilize greenhouse gases ("GHG") and prevent its undue interference with the ecosystem, with the expressed recognition of the role of renewable energy technologies in

[12] Richard J Lazarus, "Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future" (2009) 94 *Cornell L Rev* 1153.
[13] UN-Energy, 2005. The Energy Challenge for Achieving the Millennium Development Goals (MDGs), United Nations, UN=Energy, 2005 at 5.

reducing the negative effects of climate change.

The important role that energy plays in development raises questions about whether energy production could incorporate environmental considerations. One impediment to adopting renewable energy alternatives is the costs and the inability for countries like Ghana to attract foreign investors for renewable energy projects. Countries like Ghana are still optimistic that the initiative of creating enabling legislative and regulatory structure to facilitate renewable energy projects is not in vain. However, clear investment barriers appear to exist to prevent foreign investors from initiating high capital projects such as solar PV plants within the region. For example, several green energy projects have been approved in Ghana (with an energy license being issued by the governing body), despite this approval, the projects have had difficulty acquiring construction financing. Since 2013, Ghana issued 65 licenses for solar projects, however, only one company has successfully commercialized and connected a 20 megawatt ("MW") solar photovoltaic plant to the grid.[14] The recent *Paris Climate Agreement* has devoted a substantial part of the Agreement to providing climate finance to under-represented regions. This raises questions about whether there are regional peculiarities that act as barriers to FDI and which can explain why some regions have experienced an influx of FDI while sub-Saharan Africa has not.

Other nations like China, Mexico and India appear to be attracting foreign investment for green energy projects. This reality raises questions about whether there are local factors that may discourage foreign investors from initiating projects in certain regions. Specially, Ghana has undergone changes to its regulatory process adopting a feed-in-tariff system and approving several energy licenses and projects, yet foreign investors are not readily investing in such initiatives. What are the local factors that may explain this reluctance on the part of foreign investors to undertake

[14] Electricity Company of Ghana: Provisional Wholesale Supply and Generation License Holders, online: file:///C:/Users/llewis/Downloads/Provisional_Wholesale_Supply_and_Generation_License_Holders%20(1).pdf.

costly green energy projects within sub-Saharan Africa? In addition, are there any success stories in the region that may serve as lessons for attracting foreign investors that will assist sub-Saharan Africa down a green path of development?

Concerns of sustainable development further complicate the issue of economic progress in Africa. For example, energy insecurity and the impact that Africa's development will have on the environment as it continues to grow and expand services, is an ongoing international law concern. Over the past decade, the United Nations convened General Assemblies to develop policies and mandates on energy in Africa. By April 14-15, 2004 a group of African delegates met in Rome to develop a framework for the creation of UN-Energy/Africa with a mandate to create a "collaborative framework with the objective to promote more efficient, coherent and coordinated actions of UN and non-UN organizations working in Africa on the issues of energy development."[15] The World Bank recognized as early as 1996 that "*[n]o country in the world has succeeded* in shaking loose *from subsistence economy without* access to the services that *modern energy* provides."[16] In 1993 the World Bank created an Electric Power Lending Policy with the mandate of creating reform of the power sector. The Policy set the requirement for the Bank to lend money to those developing countries that implemented the following four policy changes:[17]

i. Transparent regulatory processes;
ii. Commercialize and corporatize the power enterprises;
iii. Allow for the importation of power services; and,
iv. Encourage private investment in the power sector.

Thus, the *two barriers to the optimization of the African power sector* were of a *technical and*

[15] UN-Energy/Africa, *Energy for Sustainable Development: Policy Options for Africa.* Un-Energy/Africa publications to CSD15, undated at 53.
[16] World Bank, *A Brighter Future? Energy in Africa's Development* (World Bank, 1996). Emphasis added.
[17] United Nations Economic Commission for Africa, "Power Sector in Africa: Policy Guidelines for the Sustainability of the Sector" in UN-Energy/Africa. *Energy for Sustainable Development: Policy Options for Africa.* Un-Energy/Africa publications to CSD15, undated at 53 (noted the four points were extracted from this report).

financial nature. The Economic Commission for Africa (2004) noted that the lack of energy in Africa is not the only problem contributing to the availability of energy, but there is *also the lack of institutional infrastructures to facilitate the development of the energy sector*. The Commission noted that Africa needs to create "…institutions, rules, financing mechanisms, and regulations needed to make market work in support of energy for sustainable development."[18] Thus, while several international organizations and institutions including the WTO, World Bank and the UN have highlighted the importance of energy in development and the desire for Africa to adopt sustainable and environmentally sound development paths, the reality posed by the exorbitant costs of green technology may render the goal of sustainable development financially unattainable for sub-Saharan countries like Ghana.

1.2.1 Economic Growth, Climate Change and Development

Economic growth, climate change and sustainable development link governments, corporations, and individuals with the collective goal of mitigating greenhouse gas emissions while developing the economy. Economic growth measures annual per capital gross domestic product ("GDP") and consumption.[19] Thus, economic growth has often been linked with FDI because of the need for foreign investments in new technology. Similarly, it has been argued that "…the greater the technological-knowledge gap between their current practices and new technologies, the greater the need for external finance."[20] In addition, scholars have argued that emerging markets benefit from FDI because as new technology is introduced, it is diffused locally and some of the technological

[18] *Ibid*.
[19] World Bank, *Beyond Economic Growth* Student Book (2004), online: www.worldbank.org/depweb/English/beyond/global/glossary.html.
[20] Laura Alfaro *et al*, "FDI and Economic Growth: the Role of Local Financial Markets" (2004) 64 *Journal of International Economics* 89 at 91.

know-how is transferred to the local environment. Specifically, FDI are associated with economic growth in that they encourage "the incorporation of new inputs and technologies in the production function of the recipient economy."[21]

The issue of climate change complicates issues of development.[22] On the other hand, economic development has been defined in terms of a country's gross national product ("GNP") and the economic ability to generate growth.[23] Studies have demonstrated a positive correlation between economic development and the increased energy use within a nation.[24] Increased energy use is also indicative of the wealth of a nation.[25] Despite the outcome, it is generally agreed that Africa is in need of energy modernization and that this is only achievable through creating an "…environment conducive to attracting the huge financial requirement needed to address the energy problem."[26]

Sustainable Development considers development and economic growth in conjunction with the needs of the environment and the "public good". The concept of sustainable development was popularized by the Brundtland Report as the definition of development "that meets the needs of the present without compromising the ability of the future generation to meet their own needs".[27]

1.2.2 Creating a Renewable Energy Infrastructure to Attract FDI

A number of World Bank and United Nations Reports recognize that development requires,

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[21] Luiz R, de Mello Jr., "Foreign Direct Investment in Developing Countries and Growth: A Selective Survey" (1997) 34:1 *The Journal of Development Studies*.
[22] N Stern, *The Economics of Climate Change* (HM Treasury, London, 2006).
[23] World Bank, (2004) *supra* note 19.
[24] N A Burney, "Socioeconomic Development and Electricity Consumption: A Cross-Country Analysis Using the Random Coefficient Method" (1995) 17 *Energy Economics* 185.
[25] Some studies point to the diminished contribution of energy to economic growth and argue that any correlation is based on a false assumption that as energy use increases, so too will work in service industries also increase which has a minimal impact on the GDP of a nation. See: K H Ghali, M I T El-Saka, "Energy and Output Growth in Canada: A Multivariate Cointegration Analysis" (2004) 26 *Energy Economics* 225.
[26] Yemane Wolde-Rufael "Electricity Consumption and Economic Growth: A Time Series Experience for 17 African Countries" (2006) 34 *Energy Policy* 1106 at 1113
[27] Gro Harlem Brundtland *Report of the World Commission on environment and development:" our common future."* United Nations, 1987. Online: Our Common Future, ch 7 at: www.un-documents.net/wced-ocf.htm.

at minimum, that a nation have access to services that "modern energy provides."[28] As early as 1993, the World Bank recognized that development of Africa's power sector requires technical and financial infusion.[29] There was a clear acknowledgment by 2004 that the energy problem in Africa was related to "the lack of institutional infrastructures".[30] Ten years later, in 2014, the United Nations concluded that industrial development in Africa necessitates the implementation of "effective Industrial Policy Organizations (IPOs)"[31] However, these studies from leading international organizations demonstrate that many African countries will need to go beyond changes to their legal and regulatory infrastructure in order to attract FDI. The United Nations poses the question of how can countries like Ghana "build innovative, effective and flexible industrial policy institutions, processes and mechanisms to enhance industrialization and structural transformation in Africa"?[32]

Numerous international organizations have conceded that electricity is necessary for enhanced economic and social development and this local necessity is a precondition for development. This raises questions about the impact of electricity and its use on the gross domestic product of a nation (GDP).[33] The United Nations also investigated the causal relationship between electricity consumption and economic growth in 17 African countries.[34] More recently, the 2014 United Nations Report *Dynamic Industrial Policy in Africa*[35] highlighted the need for African economic development to be tied to the need to *formulate and implement effective industrial policy*

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[28] World Bank, *A Brighter Future? Energy in Africa's Development* (World Bank, 1996).
[29] United Nations Economic Commission on Africa. Economic Report on Africa 2014: *Dynamic Industrial Policy in Africa* online: https://www.uneca.org/sites/default/files/PublicationFiles/final_era2014_march25_en.pdf, last visited December 11, 2017 ["United Nations Economic Commission on Africa, 2014"].
[30] *Ibid.*
[31] *Ibid* at xii.
[32] *Ibid.*
[33] Wolde-Rufael, *supra* note 26.
[34] *Ibid*.
[35] United Nations Economic Commission on Africa. Economic Report on Africa 2014. *Dynamic Industrial Policy in Africa* at *Africa* at http://repository.uneca.org/unecawebsite/sites/default/files/page_attachments/final_era2014_march25_en.pdf last visited September 3, 2014 ["United Nations Economic Commission on Africa, 2014"].

within the region. The report explores the necessity of high–level political support in implementing effective industrial policy that will *change the landscape of industrial development* on the continent. The report sites as a cornerstone of development, the need to *implement effective Industrial Policy Organizations (IPOs)* that will create "incentive structures for firms to expand production and investment in vital and high growth potential industries".[36] This requires national adjustments in infrastructural gaps such as those existing in the energy sector. The report also recognizes a paradox that occurred on the African continent, namely, that while it has experienced unprecedented growth over the past decade, "[f]actors of production such as labour have shifted notably from agriculture and manufacturing to services—harming productivity and in some cases curtailing employment in both agriculture and manufacturing".[37] This shift in labour and production in the region has led to a surprising drop in the "contribution of manufacturing to the continent's GDP and employment over the last decade."[38]

Another economic observation yielded from the Report revealed that Africa's global trade over the last decade was around 3.3 per cent which was well below expectations.[39] The Report also attempts to answer some unresolved questions about economic development in the African region and the role of Industrial Policy Institutions in creating effective industrial policy. In this regard, the ERA 2014 Report highlights the importance of industrial policies and innovation through focusing on "how to build innovative, effective and flexible industrial policy institutions, processes and mechanisms to enhance industrialization and structural transformation in Africa."[40] The focus on industrialization and transformation in Africa recognizes the essentials of building policy and

[36] *Ibid* at xi.
[37] *Ibid* at xii.
[38] *Ibid* at xi.
[39] *Ibid* at xii.
[40] *Ibid* at xiii.

institutional infrastructures that will lay the legal and operational foundations for the development of a particular industry:

> "African government intervention through industrial policy can help spur structural transformation by addressing these market failures. The approach followed by policymakers, academics and other industrial stakeholders has been to identify key general constraints and devise broad policy interventions to alleviate them. Unfortunately, these responses have rarely focused on the institutions governing industrial policy, or on the impact that weaknesses in these institutions have on their own ability to operate in a coordinated, dynamic framework. Indeed, *weak institutional structures and poor policy design* have been at the root of Africa's industrial policy problem throughout its post-independence history."[41]

The Report also reveals the vast potential for the African continent to go down the "green" path to industrialization:

> "Climate change could hobble Africa's economic growth momentum as the continent attempts to switch to industrialization and economic transformation. But it could also provide an opportunity: Africa has vast renewable energy resources of hydropower, geothermal, biomass, wind and solar. And as Africa is not locked in any technology preferences, *it can follow a green and clean industrializing energy pathway and leapfrog old carbon-intensive models.*"[42]

The potential for "green" development is a viable course for Africa to pursue. The vast need of the continent related to energy supply makes this industry ideal for the study of the impact of intellectual property on sustainable development. This Report also acknowledged the uniqueness of Africa's economic development as experienced through "growth poles" which are defined as a "concentration of productive economic activity in a region that can foster growth in peripheral regions through positive spillovers and backward and forward linkages."[43] In the case of the African continent, *energy* has been identified as *a pre-requisite to economic growth and development* and would be an ideal industry to study from the perspective of a "growth pole". Recognizing that policies aimed at industrialization will require a great amount of capital infusion, the Report also emphasizes the

[41] *Ibid* at xiv. Emphasis added.
[42] *Ibid* at xvi. Emphasis added.
[43] *Ibid*.

importance of *generating external financing for these projects*. They note that the "success of industrial policy projects depends heavily on African countries securing public and *private finance in priority* areas, especially infrastructure, education and *technology*.[44]

Economic development and to some extent FDI in sub-Saharan Africa, and in Ghana specifically, are directly tied to energy availability within the region. Without reliable energy, development and even foreign investments can be severely halted. Therefore, it is not far removed to identify one of the most profound problems facing developing economies as one of energy deficiency. Amanda Kassaris argues that developing nations can develop their own domestic industries based on their strengths.[45] Given continental Africa's geographic location and optimal access to the equator, terrestrial photovoltaics ('PVs') are an optimal solution to achieving an environmentally friendly source of electrical energy while addressing some developmental issues that are intrinsically tied to energy deficiency and frequent blackouts.

Countries like Ghana that have the potential to choose a green path encounter the dual challenge of development and simultaneously adhering to the global climate change standards. The WTO's recognition of climate change as a public good has raised questions in the international legal community about how to shape a collective response to the problem. This may require new reflections and considerations around climate change and international initiatives, especially as these requirements may pose added burdens to developing countries. The costliness of green energy projects along with local conditions such as credit risks, political risks, currency risks create added burdens for financiers that are not solved by the market. Financiers often turn to governments to give guarantees that the financial commitments within their contracts will be upheld, however, these same

[44] *Ibid*.
[45] Amanda Perry-Kessaris "Socio-legal Approaches to International Economic Law: Text, Context, Subtext" (New York: Routledge, 2013).

governments are not willing to indebt the entire nation to satisfy an independent power producer that is investing in a privately owned project within the region. In this regard, climate finance may need to supplement FDI to eliminate some of the existing regional barriers to investments. Ghana is an example of a sub-Saharan nation that has undergone the necessary regulatory changes to attract FDI but is still left in a position of investors refusing projects that do not provide a sovereign guarantee.

Could the promises of modernizing the regulatory systems of local governments have been too literally tied to the promise of development, or is there a more tacit message about the need for countries to not only harmonize laws and processes, but create enabling institutional frameworks that are conducive for FDI? This study will seek to examine how sub-Saharan African can adopt a green path to development by choosing green energy projects as a method of electrifying the region. It will shed light on why, despite the attornment to various international laws, modification of the regulatory infrastructure and the approval of renewable energy projects, Ghana still is unable to attract FDI to finance these projects without a sovereign guarantee.

1.3 Methodology

This study will adopt a methodological approach entrenched in empirical research which aims to understand why, despite the rigorous implementation of modernization of regulatory frameworks in many sub-Saharan Africa countries like Ghana, foreign investors continue to shy away from green energy projects within the region. In addition, despite flexibilities incorporated in WTO treaties like *TRIPS* and *SCM Agreement*, and to a lesser extent the *GATT* to encourage industrialized countries and foreign corporations to undertake projects in the region, such initiatives fail to attract its share of foreign investors.

Sub-Saharan African countries like Ghana have adopted the FIT Program, but still lack the

ability to attract foreign investments in the renewable energy sector. Yet, regions like China, Mexico and India are successful in attracting foreign investors. Since the methodological approach herein is empirical in nature, case studies like India, China and Mexico may not provide useful observations due to regional, cultural economic and political peculiarities despite successes in those countries. As such, this study will use Ghana as a case study and will examine why, despite having approved 65 energy licenses for solar PV projects since 2013, only one (1) has reached the commercialization stage. It will also borrow from regionally similar success stories in other sub-Saharan African countries and attempt to uncover some of the strategies adopted to overcome local barriers in those projects. The study begins by recognizing the contributions of similar trade sectors that have attempted to implement harmonization practices to encourage development. It will examine factors beyond mere harmonization of laws, regulatory processes beyond adoption of international trade agreements that explain actual barriers in implementing green energy projects in sub-Saharan Africa. Despite strong energy policies emerging from international institutions like the World Bank as early as 1990, sub-Saharan African countries still struggle to attract investors for green energy projects. In addition, treaties have also been signed among United Nations and WTO Member States that attempt to address issues of development and climate change yield similar failing results in attracting green project financing. In this regard, questions will be raised about whether these international organizations and institutions create unintended barriers for developing nations to attract FDI for green energy projects. It will canvass the efficacy of climate finance flexibilities contained in international agreements that are designed to address the dual problem of financing sustainable development and attracting FDI to the sub-Saharan region.

The written portion of the PhD will be submitted in a Portfolio format. This thesis is in partial completion of the PhD by published works. The written requirements of this PhD will be completed

by publishing a minimum of three articles in peer-reviewed journals. Page 18 of the Graduate Program handbook outlines that "any student in the Graduate Program in law may seek to complete their degrees by publishing their scholarship in lieu of submission of a traditional thesis or dissertation". This portfolio is comprised of six published peer reviewed articles that are arranged in chapter format. Ghana, West Africa has been selected as a case study for these articles because it has already begun the process of energy reform,[46] and this jurisdiction is prime case study, as many of the issues of international law and sustainable development within the renewable energy sector that are outlined in this proposal are present in the Ghanaian energy reform process.

1.3.1 The Ghanaian Case Study

The Ghanaian case study attempts to reveal, why, despite Ghana's adherence to the modernization of the regulatory framework to entice energy investments, and the approval of 65 PV project license, it continues to struggle to attract FDI and commercialize green energy projects. This paper will outline the major issues that must be contemplated in solar photovoltaic projects in Ghana and elsewhere in the developing world by exploring some of the infrastructural concerns raised in the literature on FDI, and renewable energy projects. In the past two decades, Ghana's FDI has fluctuated initially dropping substantially from 1994 to 2004 by forty (40%), and later demonstrating a sharp increase between 2004 and 2012 of two thousand two hundred and sixty-five percent (2,265 %) (from 233,000,000 in 1994, reduced to 139,270,000 in 2004, and increased to 3,294,520,000 in

[46] *Renewable Energy Act, 2011*, Act 832 of the Parliament of the Republic of Ghana, Dec 31, 2011 ["*Ghana Renewable Energy Act*"] online: www.energycom.gov.gh/files/RENEWABLE%20ENERGY%20ACT%202011%20(ACT%2083Ghana; The *Ghana Renewable Energy Act* should be read in conjunction with the *Energy Commission Act, 1997* (Act 541).

2012).[47] Between 2012 to 2016 Ghana's FDI net flows only increased slight to 3,485,333.37.[48] Despite this increase, there is still a level of consternation among multinational enterprises in investing in various sub-Saharan African countries, and particularly in high capital ventures such as photovoltaic solar plants. Several scholars have explored the role of foreign investments in contributing to development in sub-Saharan Africa.[49] However, few studies have focused on Ghana, and there is a clear absence in the literature on scholarly work dedicated to FDI, PV projects.[50]

Many sub-Saharan nations did not have laws that facilitated sustainable economic development, especially in the renewable energy sector. For example, renewable energy legislation was needed to create the infrastructure that would govern these projects. Consequently, a part of the problem is that no market existed in the renewable energy sector, and in order for development to pursue this sustainable path, a number of market barriers need to be removed. One such barriers relates to the fact that renewable energy may cost the consumer more and some mechanism needs to be in place to make this alternative affordable. In addition, this cost savings cannot be passed on to the developer, so government off-takers need a mechanism by which they can assure payments for the energy produced. It is expected that the market will solve the problems of sustainable economic development, but in the case with renewable energy projects developing nations are expected to sign

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[47] World Bank, (2014) "Foreign Direct Investment, net flows (BoP, current US$"), Online: http://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD; Kofi Asante, Leslyn Lewis & Jon Sarpong "A Study of the Economic and Technical Analysis of Large scale Photovoltaic Plants in Ghana: A Model to Increase Foreign Direct Investments" (2014 July) 3:7 *International Journal of Engineering Research & Technology* 1415.

[48] *Ibid*, World Bank Group.

[49] Schneider, Friedrich & Bruno S Frey, "Economic and political determinants of foreign direct investment" (1985) 13:2 *World development* 161; David W Loree & Stephen E Guisinger, "Policy and Non-Policy Determinants on US Equity Foreign Direct Investment" (1995) *Journal of International Business Studies* 281; Addison, Tony & Almas Heshmati. *The new global determinants of FDI flows to developing countries: The importance of ICT and democratization*. No. 2003/45 (2003) 45 WIDER Discussion Papers//World Institute for Development Economics.

[50] Kofi Asante, Leslyn Lewis, and Jon Sarpong "A Study of the Economic and Technical Analysis of Large Scale Photovoltaic Plants in Ghana: A Model to Increase Foreign Direct Investments" 3:7 (2014) *International Journal of Engineering Research & Technology* (IJERT) 1415.

sovereign guarantees that end up indebting the entire nation. These guarantees have been rejected by developing nations for the simple fact that many renewable energy plants are owned by foreign entities and it would be imprudent to indebt an entire nation for the benefit of one foreign contract. Consequently, the desire to develop sustainably must be augmented by other financial mechanisms that address the existing market barriers.

The ways in which nations prepare for the infusion of foreign investments necessitates an understanding of the legal, regulatory and political framework to induce investors. Since solar projects often require an infusion of capital of sometimes 10s of millions of dollars in capital outlay, this industry is ideal for ascertaining the unique features that may go beyond regulatory reform that contribute to FDI and economic development in Africa.

Ghana's power sector is governed by seven public institutions: the Ministry of Power (MOP), Energy Commission (EC), Public Utility Regulatory Commission (PURC), Volta River Authority (VRA), Ghana Grid Company (GridCo), Electricity Company of Ghana Limited (ECG) and the Northern Electricity Department Company (NEDCo) which is a subsidiary of the VRA.Energy Foundation a private-public sector partnership promoting countrywide energy efficiency and conservation. [51] Ghana's electricity distribution remains dominated by the Electricity Company of Ghana ("ECG") which is a state-owned company which distributes 70% of the electricity in Ghana. Ghana recognized the need to incorporate Independent Power Producers into its power procurement strategy.

Currently, Ghana struggles to generate sufficient power for residential and commercial purposes,[52] but it is also unable to indebt the entire nation by providing sovereign guarantees for

[51] Electricity Company of Ghana, online: www.ecgonline.info/index.php/about-the-power-sector-in-ghana.html.
[52] Energy Commission of Ghana. *National Energy Statistics 2005 – 2014* (Strategic Planning Policy Division: 2015), online www.energycom.gov.gh/files/Energy%20Statistics_2015.pdf

projects owned by Independent Power Producers ("IPP"). IPP are essential entities that produce energy by first obtaining a contract (PPA) that is subject to the regulation that governs the parties. The fact that this entire relationship is governed by enabling legislation, the market for renewable energy products is often a new energy market, created by the enactment of local legislation.

In Ghana, IPP play a significant role in supplementing the energy produced by the state-owned power generation utilities (the Volta River Authority and Bui Power Authority). The GridCo, the ECG, and the Northern Electricity Distribution Company (NEDCo) are responsible for feeding government produced energy and by IPP into the same grid.[53] The PURC sets a guaranteed tariff rate which is supposed to act as an assurance to independent power producer that the price of energy will not fall below rate for a fixed period of usually 10 to 15 years. The FIT scheme is intended to provide some certainty to independent power producers that the high up-front financial outlays associated with renewable energy projects can be recouped with a profit over the contract period.

In the early 1990s the World Bank's demanded that developing countries that require funding from it undergo significant power sectors reforms which entails changing the legal and regulatory frameworks to improve transparency.[54] The World Bank's energy policy of the 1990s, that many sub-Saharan African nations followed, was borne out of controversy. In 1994 at the World Bank's annual meeting protestors held placards citing "Fifty Years is Enough," calling for the abolition of the Bank and the International Monetary Fund.[55] Many projects in developing countries were criticized as creating further impoverishment as countries were unable to afford the repayment on their debt and suffered devalued currencies as a result of structural adjustments.

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[53] Leslyn Lewis, "The WTO Canada Renewable Energy Feed-In Tariff Case and its Application to Green Energy Projects in the Developing World: The Abdication of the Subsidies and Countervailing Measures Agreement within Green Energy Conflicts" 16 (2016) *Asper Review of International Business and Trade* 98.
[54] World Bank, (1993) The World Bank's Role in the Electric Power Sector, Washington D.C., World Bank.
[55]The World Bank, online: http://www.worldbank.org/en/about/archives/history/past-presidents/james-david-wolfensohn.

In compliance with the World Bank's demand many developing countries adopted a transparent power sector model, in 2011 Ghana implemented a renewable energy framework that incorporated the Feed-In Tariff scheme under the *Ghana Renewable Energy Act* (2011) and the Renewable Energy Purchase Obligation ("RPO"). [56] This model is based on the government off-taker entering into a PPA with the developer. In this case, the electricity price and the revenue risks are shifted to the government off-taker. Other than the currency risk (which can also be addressed in the PPA), the only other financial risk relates to the inability of the off-taker to make payments on the electricity purchased. In such instances, the government off-taker could agree on a revolving bank guarantee security payment that would be replenished monthly. In this regard, rather than indebting the entire nation, the national government can provide a limited guarantee in the form of a payment security to the developer to offset the risk of defaulting on the obligations under the PPA. Currently Ghana does not have higher tariff rates for peak periods, so setting the default payment (bank guarantee) is easier than projecting an increase in energy prices.

The overwhelming majority of renewable energy projects in Ghana never passed the approval stage, primarily because of local barriers to finance. These are interpreted as investment risks to financiers, and include the following:

1. Commercial risks (engineering, procurement and construction (EPC), as well as development, operation risks);

2. Political risks (change in governments, dishonouring of contracts regulatory changes);[57]

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[56] *Renewable Energy Act, 2011*, Act 832 of the Parliament of the Republic of Ghana, Dec 31, 2011 ["*Ghana Renewable Energy Act*"] online: www.energycom.gov.gh/files/RENEWABLE%20ENERGY%20ACT%202011%20(ACT%2083Ghana; The *Ghana Renewable Energy Act* should be read in conjunction with the *Energy Commission Act, 1997* (Act 541), online: www.energycom.gov.gh/files/ACT.pdf.

[57] Pepukaye Bardouille, From Gap to Opportunity: Business Models for Scaling Up Energy Access. Washington DC: International Finance Corporate, 2012; In Kenya and Zambia large scale US $ bonds were issued in 2014 to mitigate political risk; see: Tomoko Matsukawa, Odo Habeck, Review of Risk Mitigation Instruments for Infrastructure Financing and Recent Trends and Developments. Washington DC: The World Bank, PPIAF 2007. Trends and Policy Options #4, online: www.worldbank.org.

3. Technological barriers including low grid capacity;[58]

4. High Sovereign Credit Risk (foreign exchange rate risk and inflation; or off-taker defaulting on payment, currency risk).

Investors are concerned with off-setting the above risks before a project can be deemed viable. The easiest solution is to request that countries like Ghana give sovereign guarantees to the developers. The above list is not exhaustive and certainly not authoritative, as such, barriers beyond those traditionally listed by the World Bank will also be considered. For example, local communities are concerned about the specific skills and training that will be required to implement renewable energy projects. This concern includes factors such as knowledge transfer, and policies that address specific stages of the project and not merely structural regulatory changes. Furthermore, the above risks are not exclusive to sub-Saharan Africa as countries like Russia identified capacity building as a primary barrier for energy policy.[59] Even with the more recently created international financial support mechanisms including the Global Environmental Facility, the Clean Investment Funds of the World Bank, and the Green Climate Funds, issues still arise at the local level relating to how to manage these climate finance tools. In addition, local governments often request domestic incentives like using local manufacturers (local content requirements) as a concession for an agreement based on the FIT system, and these provisions may run counter to international law. Thus, this research will consider issues beyond the traditional investor risk as listed above, to include questions about how the planning stage of a development should be approached, the enabling frameworks, offsetting early stage risks, and building a knowledge and technical infrastructure for future projects. This research

[58] A Chaurey, T C Kandpal, "Assessment and Evaluation of PV Based Decentralized Rural Electrification: An Overview. 15 (2011) Renewable and Sustainable Energy Reviews 2266.
[59] E Martinot, "Energy Efficiency and Renewable Energy in Russia: Transaction Barriers, Market Intermediation and Capacity Building" 26 (1998) *Energy Policy* 905.

is not limited to exploring investor risks as outline by the World Bank. It canvasses, whether certain international rules act as barriers to implementing renewable energy projects in sub-Saharan Africa. A solution to attracting foreign investments for green energy projects in sub-Saharan Africa requires consideration like protect patents, the most-favour nation status, subsidies on green products, and local policies and how these trade provisions impact on a country's ability to undertake green energy projects.

1.4 Structure of Study and Outline of Chapters

Foreign investments in green energy projects especially to combat climate change are required to encourage sub-Saharan African countries down a green development path. This study will examine local factors that may act as impediments for foreign investors within the context of energy, climate change and sustainable development.[60] This paper will also examine climate finance options as a potential solution to funding renewable energy projects in sub-Saharan Africa. Specifically, it will explore the requisite legal and regulatory infrastructure that will increase the viability and infusion of investments into the capital intensive, solar energy industry in Ghana in order to better understand the localized impediments on development in the renewable energy sector, and why foreign investors continue to shy away from this region. Specifically, it raises questions about whether the current international trade regime creates unintended impediments to trade, and the flexibilities that could be adopted to address potential barriers. Finally, this study is informed by the public policy debate on the impact that international environmental agreements have on

[60] For a distinction between "development", "sustainable development" and "sustainable economic development" see: John C Dernbach, "Creating the Law of Environmentally Sustainable Economic Development" 28:3 (2011) *Pace Environmental Law Review* 613 at 615.

sustainable economic development as it relates to energy insecurity and the mitigation of the negative effects of climate change. It raises questions about the role of international agreements in aiding or hindering development in the region like sub-Saharan Africa. Similarly, it looks at specialized means of encouraging financing for renewable energy projects.

This thesis is divided into three parts. The first section explores the literature in the area of international Agreements that guide a local country's implementation of enabling legislation that governs trade. For example, WTO Members that wish to upgrade their local laws to make it complimentary with international laws must adhere to minimum restrictions as dictated by international Agreements like *TRIPS, GATT* and the *SCM*. It explores the role of international treaties in encouraging the enabling framework to entice foreign investments in countries like Ghana. It will also examine whether corporate practices like "evergreening", that have been adopted by multinational corporations within the IP setting to prolong the patent life of a product, are applicable to the green energy sector.

The second part of the study incorporates a case study on renewable energy in Ghana. In providing necessary and essential services in sectors like energy, it seeks to understand some of the primary factors and concerns contributing to a company's ability to invest in these projects in sub-Saharan Africa? Specifically, regions like China, India and Mexico have received the lion's share of FDI in renewable energy, while sub-Saharan Africa has been neglected. Unfortunately, projects from China, India and Mexico may not be a suitable comparable cohort due to regional differences. The second section of this study will compare projects in sub-Saharan Africa that have been successful and highlight the distinction between those regional policies and those existing in Ghana. The third segment addresses the barriers to foreign investments within the region and examines climate finance as a possible solution.

Chapter 2 is a literature review that begins with the assumption that there are lessons to be learnt from sectors like pharmaceuticals that have attempted to link ascension to WTO Agreements with an increase in development and foreign investments; it examines the reasons why the implementation of renewable energy regulations have not led to greater FDI in renewable energy industries in Ghana. It specifically explores the literature on the relationship between increased harmonization of international law within sectors that purported assurance that such practices will increase trade within the region. It explores whether the harmonization of international law standards represent an impediment in the renewable energy sector in Africa, as it did with the pharmaceutical sector after the ratification of *TRIPS*. Several theories on economic development, sustainability and international agreements as "pull" or "push" factors in sustainable development are highlighted. The literature review canvasses the theories that explain the impact of the international legal regime on local factors like trade, technology transfer and affecting foreign investments from the perspective of climate change. From the vantage point of climate change, this chapter will explore international agreements such as the *SCM*, *TRIMS*, *TRIPS* and the *GATT* and assesses whether the subsidies and flexibilities contained therein are sufficient to facilitate the development of renewable energy industries in the developing world.

Chapter 3 builds on the literature review on the harmonization process that occurred within the intellectual property sector and the belief that this process would have led to increase investor confidence. This chapter produced a paper for publication titled "*The Applicability of TRIPS Flexibilities to the Developing World for Climate Change Mitigation as a Public Good in Green Technology Projects"*[61] which explores the various *TRIPS* flexibilities that can be adopted to achieve

[61] This paper has already been published in a double –blind peer review journal. See: Leslyn A Lewis, "The Applicability of *TRIPS* Flexibilities to the Developing World for Climate Change Mitigation as a Public Good in Green Energy Projects" (2015) 15 *Asper Review of International Business and Trade* 129.

climate change abatement in the developing world. This section also explores whether flexibilities in *TRIPS* that were previously adopted in the global health care crises can be transplanted to the energy sector? This raises questions around whether climate change can be treated as a globally "urgent" initiative in the same manner under *TRIPS* as "affordable medicines". Essentially, can climate change, as coupled with the desire for development, be viewed as an issue of nation urgency pursuant to Article 31 of *TRIPS*? Essentially, does the Declaration of the environment as a "public good" alter how *TRIPS* flexibilities are interpreted in relation to renewable energy projects as was the case with essential medicines and the Doha Declaration? Are the concessions related to affordable medicines and compulsory license feasible for addressing climate change? The theme of flexibilities and WTO treaties is also explored within the content of green energy initiatives like feed-in tariffs and the implications for this practice in relation to the *SCM Agreement*.

Chapter 4 recognizes the need for local climate change policies to be compliant with international laws and WTO treaties including the *SCM* Agreement, *Agreement on Trade-Related Investment Measures* ("*TRIM*s"), as well as pre-WTO treaties like the *GATT*. Local policies like FIT schemes implemented in Ghana to encourage PV plants and solar usage through fixed tariffs may infringe WTO trade agreements like the *SCM* Agreement, *GATT* and *TRIPS* if they are deemed to be subsidies. Renewable energy subsidies were first entertained by the WTO Dispute Settlement Body in 2010 when Japan brought a case against Canada's "FIT" program.[62] The W*TO Canada Renewable Energy* decisions[63] may be instructive in answering questions relating to international

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[62] *Canada – Certain Measures Affecting the Renewable Energy Sector* (WT/DS412/AB/R), *China – Measures Concerning World Power Equipment* (WT/DS419/1); *Canada – Measure Relating to Feed-in Tariff Program* (WT/DS426/AB/R); *European Union and Certain Member States – Certain Measures Affecting the Renewable Energy Sector* (WT/DS452/1), and *European Union and Certain Member States – Certain Measures on the Importation and Marketing of Biodiesel and Measures Supporting the Biodiesel Industry* (WT/DS459/1).
[63] *Ibid*.

trade-related treaties and local environmental policies that may impact on local incentive practices like FIT. The *Canada Renewable Energy* decision examined the viability of feed-in tariffs as a policy to encourage use of renewable energy sources. This decision raises concerns about the potential classification of feed-in tariffs as a subsidy and the future of green energy subsidies altogether. It also highlights the interconnection of international laws and regional environmental policies. In this regard, regional development needs may also necessitate "flexible" policies that contain domestic content requirements that may be in contravention of relevant and WTO treaties like *TRIPS,* the *GATT* and the *SCM Agreement*. The *Canada Renewable Energy Case* is instructive in outlining potential roadblocks that other countries may encounter in implementing a feed-in tariff system. For example, the Ghana Electricity Company's credit rating may not be strong enough to encourage foreign investors to invest 10s of millions of dollars in a renewable energy project. The feed-in tariff system that guarantees a fixed price to developers for the energy they produce may assist by minimizing the risk arising from a poor credit rating if the proper financial assurances are put in place. There may also be forces beyond mere local factors that may indirectly influence local governmental policies. For example, the feed-in-tariff system is aimed to create an incentive for foreign investors to invest in renewable energy projects.

This dispute raises questions about the viability of governmental policies that promote FITs as a method of encouraging renewable energy usage within the developing world. In this regard, do WTO Agreements impede the development of government climate change abatement policies because of the requirement that these programs meet a minimum standard of compliance? This article examines whether green energy programs like the FIT system should be classified as subsidies, and should these initiatives be granted an exemption under the *SCM* because of the public policy goal

of facilitating affordable renewable energy in the developing world?[64] It argues that climate change abatement strategies are linked to international law policies that encourage renewable energy alternatives. In this regard, this chapter queries whether *SCM Agreement* should be amended to include a non-actionable subsidy provision that recognizes the public policy goal of combating climate change. Chapter 4 generated a published paper titled "*The WTO Canada Renewable Energy Feed-In Tariff Case and its Application to Green Energy Projects in the Developing World: The Abdication of the Subsidies and Countervailing Measures Agreement within Green Energy Conflicts*".[65]

Chapter 5 explores corporate practices that impede renewable energy projects in sub-Saharan Africa that rely on technology transfer like solar PV projects. It will examine potential corporate abuses related to green technology patents that lead to the practice of evergreening. This chapter produced the third published paper which looks at the corporate practice of evergreening intellectual property and its impact on green technology transfer within the energy sector. This chapter was converted into a paper titled "*Evergreening Through Trade Secrets as an Impediment to Green Technology Transfer to the Developing World*"[66] which explores the impact of patent life extension practices like evergreening on climate change. While evergreening has been widely studied within the pharmaceutical sector, it has very limited attention within the area of climate change abatement strategies. While corporations promised that countries that adopted treaties like *TRIPS* would realize returns from foreign investments, there is concern that these agreements may lead to inequalities between the industrial nations and developing ones, especially for products like photovoltaic solar

[64] Lewis (2016), *supra* note 53.
[65] *Ibid*.
[66] This paper has passed two peer reviews and is in the final phase of review. I have been advised that the paper will most likely be published as follows: Leslyn Lewis, "Evergreening Through Trade Secrets as an Impediment to Green Technology Transfer to the Developing World" (2018) 18 *Asper Review of International Business and Trade* 23.

panels that rely heavily on trade-secret protection. In addition, this non-disclosure may also impact on green technology transfer and may impede climate change abatement strategies in the developing world. The efficacy of technology transfer provisions in international Agreements like the UNFCCC and *TRIPS* will be examined within the context of how trade secrets impact on actual green technology transfer. It will canvass whether trade secret protection of off-patent green technologies act as an inadvertent barrier to technology transfer within the developing world.

Chapter 6 highlights the reluctance of foreign investors to commence renewable energy projects in sub-Saharan Africa. In this regard, this chapter reviews the optimal investment model for foreign investors while taking into consideration technical constraints and the fixed feed-in tariff agreement. It explores the economic feasibility of energy generation projects by highlighting the practicability of the FIT scheme as a solution for the African energy insecurity problem. This chapter produced the fourth published paper titled "*A Study of the Economic and Technical Analysis of Large Scale Photovoltaic Plants in Ghana: A Model to Increase Foreign Direct Investments*".[67] A general model of a solar PV plant in sub-Saharan Africa will be adopted (utilizing common environmental and cost factors) to identify the break-even point at which investors will refuse to undertake a project if guarantees on return are not secured to cover their minimum out-of-pocket costs. Regional factors that have discouraged high initial investment projects like solar PV plants in sub-Saharan Africa will be explored: these include, political risk associated with the failure to provide sufficient bank guarantees along with the inability to secure sovereign guarantees for projects. Options for utilizing climate financing to mitigate these risks will be entertained. Recommendations of risk mitigation will be provided within the context of how to best address the infrastructural issues that previously

[67] This paper has already been published. See: Kofi Asante, Leslyn Lewis, and Jon Sarpong "A Study of the Economic and Technical Analysis of Large Scale Photovoltaic Plants in Ghana: A Model to Increase Foreign Direct Investments" 3:7 (2014) *International Journal of Engineering Research & Technology* (IJERT) 1415.

discourage private investments within the region.

Chapter 7 produced a publication titled "*Creating a Green Energy Infrastructure in Sub-Saharan Africa: Climate Finance as an Innovative Solution to the Under-Representation of Sub-Saharan Africa in Green Energy Projects*".[68] This chapter highlights some of the financial risks that are germane to green energy projects within the sub-Saharan African region, and proposes possible solutions for mitigating these investor concerns that explore the connection between public policy, finance and private investments. Various climate finance instruments designed to address the problem of sustainable development in sub-Saharan Africa are explored within the scope of analysis that focuses on renewable energy projects such as solar photovoltaic plants, and the barriers of private financing for this high investment initiative.

Chapter 8 looks at success stories within sub-Saharan Africa's renewable energy sector. It highlights regional strategies that sub-Saharan African countries have used to attract FDI to finance renewable energy projects. The genesis of this chapter emerged from a conference presentation at the Centre for International Governance Innovation, Four Society Conference where I presented a paper in 2016. Chapter 8 consists of a book chapter titled "*Innovative Policies for Overcoming Barriers to Financing Green Energy Projects in Sub-Saharan Africa*".[69] This chapter examines the regional financial impediments that may act as a primary barrier to the implementation alternative renewable energy choices. It explores whether the lack of FDI on the sub-Saharan continent is attributable to aspects beyond the implementation of an enabling regulatory framework. The inquiry seeks to understand the local obstacles that affect private climate financing and how these conditions

[68] Leslyn Lewis, "Climate Finance as a Solution to the Under-Representation of Sub-Saharan Africa in Green Energy Projects" 9:1 (2018) *The Journal of Sustainable Development, Law and Policy*. [publication pending]
[69] Leslyn Lewis, "Innovative Policies for Overcoming Barriers to Financing Green Energy Projects in Sub-Saharan Africa" in Neil Craik, Cameron Jefferies, Sara Seck, and Timothy Stevens (eds), *Global Environmental Change and Innovation in International Law* (Toronto: Cambridge University Press, 2018) [publication pending].

can be mitigated, thereby increasing the confidence of investors to undertake projects on the sub-Saharan continent. It highlights the local conditions that may explain the reluctance of private investors to undertake projects in sub-Saharan Africa. In this regard, this chapter highlights some of the climate change financial risks that are germane to the sub-Saharan African region, and proposes possible solutions for mitigating these investor concerns that explore the connection between public policy, finance and private investments. The scope of analysis focusses on renewable energy projects, such as solar photovoltaic plants, and the barriers of private financing for this high investment initiative. The chapter highlights the notion that innovative results-based funding schemes are needed to assist countries like Ghana in moving from the Power Purchase Agreement ("PPA") stage to the financial close stage for solar photovoltaic ("PV") plants. As such, private financiers will require some assurance that their investment is not unduly at risk. It will utilize Ghana, West Africa, as a case study that seeks to answer the following question: why, despite negotiating solid PPAs in Ghana, investors remain reluctant to invest the 10s of millions required to bring a solar PV plant to commercial operation?

Ghana has one such success story, but it may not serve as a model of success because the Chinese investor essentially gave up on the ability to obtain funding from local banks, and raise funds internationally for the project; BXC eventually self-financed. This is not a realistic expectation, and in fact, may serve as an example of a failure to attract foregoing investors to Ghana's renewable energy sector. As a result, the chapter will draw from lessons from other sub-Saharan countries that have been able to pass the PPA stage to attract foreign investors; one such country is Uganda which has recently implemented a system for addressing investor barriers to investing in renewable energy projects. What are some of the strategies and policies that Ghana can employ to attract financiers for these high-risk projects? The aim of this chapter is to also collect a series of best-practices that will

enhance the private investment climate for renewable energy projects among sub-Saharan African countries through implementing innovative industrial policies.[70]

The final chapter of this portfolio ties together the eight preceding chapters under the general theme that explores the role of international agreements like *TRIPS* and the *SCM* with the climate change goals of developing nations, specifically in sub-Saharan Africa. In addressing the general question of why, despite implementing recommendations from international organizations and institutions like the World Bank, the IMF, the UN and WTO, sub-Saharan nations still lag behind other developing countries in attracting FDI for green energy projects? The unintended barriers that are built into the international trade regime are highlighted. Local factors that impact on sustainable development by extracting lessons from the Ghanaian case study within the photovoltaic solar energy sector and the policy instrument of feed-in tariffs are also referenced in the concluding chapter. Generally, this chapter highlights why international agreements and local regulatory changes are insufficient to facilitate development especially from a sustainability standpoint. The chapter uncovers some of the struggles arising from the desire for sustainable development in the renewable energy sector in Ghana, and unearths some general issues and principles that must be contemplated by stakeholder, government regulators and foreign investors for the success of green energy projects in Ghana and elsewhere in the developing world.

[70] For series of best practices in sub-Saharan Africa, see: A Eberhard and K Gratwick, "IPPs in Sub-Saharan Africa: Determinants of Success" (2011) 39 *Energy Policy* 5541.

CHAPTER 2
"Literature Review"

2.0 LITERATURE REVIEW

In the past, development within sub-Saharan Africa and its connection to international law has been linked to modernization of local laws and regulatory structures to fit with international standards. This literature review will explore whether changes to the law and regulatory framework are necessary or sufficient to attract foreign investments and thus fuel sustainable development. This analysis will necessitate an exploration of development theories as they relate to modernizing local regulatory infrastructures and attracting FDI. The literature on economic growth, development and sustainable development will also be highlighted and will borrow from lessons gained from *TRIPS* and the harmonization process for IPR in understanding the role of new laws and regulatory process play in development. Finally, this literature review will attempt to emphasize some gaps in the literature on sustainable development and climate change.

2.1 Lessons from the Global Harmonization of IPRs and the Inability to Attract FDI.

Many sub-Saharan African countries are too familiar with the promises of harmonization made in sectors outside of renewable energy, that also failed to attract FDI. Similar to the reluctance in adopting energy policies like feed-in-tariffs, many developing and least-developed countries were also initially reluctant to sign on to international trade Agreements like *TRIPS*, but eventually concede with the optimistic outlook that having stricter IPR would attract FDI,[71] and contribute to regional economic development. However, many of these developing countries, especially those within sub-Saharan Africa are resource producing economies that may not rely heavily on IPR industries and products. This yields to the conclusion that intellectual property registered in

[71] Endeshaw, *supra* note 3.

developing countries would largely be for the benefit of foreigners.[72] On the other hand, the lack of intellectual property protection in developing countries is said to discourage FDI and contribute to brain drain (the migration of local researchers and scientists).[73] As developing countries lagged behind as producers of products requiring IP protection, many lamented over the benefits of IP harmonization. It appeared that the cost of complying with *TRIPS* outweighed the initial benefits for developing nations. However, *TRIPS* was touted as a trade-related initiative with compromises that could placate developing and least-developed nations that believed the Agreement was initially one-sided.[74]

Theoretically, *TRIPS* represented the solution to the development problem, that is, if developing countries updated the IPR regimes, this would be the solution to short and long-term economic growth in developing nations.[75] *TRIPS* and IPR harmonization led scholars to query the impact of the treaty on IPR protection in the developing world. Some scholars have found the "relationship between IPR protection and growth depends upon the level of development, as proxied by initial GDP per capita, but in a non-linear way."[76] Carlos Primo Braga and Carsten Fink concluded that *TRIPS* does not guarantee that a country that undergoes strengthening their IPR will yield the result of economic growth. In reviewing the literature on the subject matter, they note:

> "This brief review underscores the limitation of normative recommendations concerning changes in the rules of IPRs at the world level. The strengthening of IPRs protection will have different welfare implications depending on the characteristics of each country. Generalizations can only be made if strong assumptions are adopted. For example, if one

[72] Douglas F Greer, "The Case Against Patents System in Less-Developed Countries" (1973) 8 J. *Int'l L. & Econ* 223.
[73] Frederick M Abbott, "The WTO TRIPS Agreement and Global Economic Development" (1996-1997) 72 Chi.-Kent L. Rev. 385.
[74] *Ibid*.
[75] Carolyn Deere, *The Implementation Game: The TRIPS Agreement and the Global Politics of Intellectual Property Reform in Developing Countries* (Oxford: Oxford University Press, 2008); Christine Thelen, "Carrots and Sticks: Evaluating the Tools for Securing Successful TRIPs Implementation" (2006) Temp. *J. Sci. Tech. & Envtl. L.* 519 at 528-33
[76] Rod Falvey, Neil Foster, & David Greenaway, "Intellectual Property Rights and Economic Growth" (2006) 10:4 *Review of Development Economics* 700 at 700. Note that these scholars found evidence of positive effects of IPR and economic growth was observed for low and high-income countries, but not for middle-income nations.

> assumes that the supply of innovations in the South (i.e. in the developing world) is rather inelastic and the IPRs regimes are of limited relevance in influencing trade, foreign direct investment, and technology transfer, then it follows that the [TRIPS] Agreement is in essence an exercise in rent transfer. A much more optimistic view of its welfare implications for developing countries, however, can be put together if the opposite assumptions are held."[77]

For Braga and Fink, *TRIPS* is of primary benefit to countries belonging to the OECD whose assets are more closely tied to intellectual property protection. Accordingly, the world outside of the OECD nations, *TRIPS* represented "an exercise in rent transfer".[78] Thus, Carsten Fink, Keith Maskus and Carlos Primo Braga maintained that attracting FDI is largely dependent on the size of the domestic market with bigger markets benefitting more from IPR and FDI.[79] Maskus noted that shortly following *TRIPS*, he calculated that by 1995 the United States stood to gain the most financially from the Agreement:

> "Overwhelmingly the United States would gain the most income in terms of static rent transfers, with a net inflow of some $ 5.8 billion per year. This reflected the fact that U.S. – headquartered firms owned numerous patents in many countries that were required by TRIPS to upgrade their intellectual property protection, while U.S. law was subject to virtually no change. Germany would earn an additional net income of $997 million on its patent portfolio. Most countries would experience a rising net outflow of patent rents, both because of significant changes in their laws and because they tended to be net technology importers. The largest net outward transfer of some $ 1.3 billion accrued to Canada, in which many U.S. – owned patents would receive stronger protection. Developing countries also would pay more on their patent stocks, with Brazil experiencing a net outward transfer of around $ 1.2 billion per year."[80]

Specifically, many developing countries recognized that increased IPR were primarily beneficial to economies that were based on technological and pharmaceutical innovations.[81] Both Professors Keith

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[77] Carlos A Primo Braga & Carsten Fink, "The Economic Justification for the Grant of Intellectual Property Rights: Patterns of Convergence and Conflict" (1996) 72 *CHI.-Kent L. Rev.* 439 at 443.
[78] *Ibid* at 443.
[79] *Ibid*; Keith E Maskus, "Intellectual property rights and economic development."(2000) 32 *Case W. Res. J. Int'l L.* 471.
[80] *Ibid* at 493.
[81] P H Schneider, "International trade, economic growth, and intellectual property rights: a panel data study of developed and developing countries" (2005) 78 *Journal of Development Economics* 529-547. This study explores the role of high technology trade in IPRs and FDIs on economic growth and rate of innovation. For studies on patents and economic development see: Lee Branstetter *et al*, "Does Intellectual Property Rights Reform Spur Industrial Development?" (2011) 83:1 *Journal of International Economics* 27; Walter G Park, and Juan Carlos Ginarte, "Intellectual Property Rights and

Maskus and Daniel Gervais recognized that there is no formula for IPR and economic development, and that various polices need to be adopted depending on the level of development of a nation. [82] Essentially, development policies must take into consideration technology transfer, innovation, and human capital.

TRIPS promote "pull" over "push" factors.[83] It was projected that the implementation of international Agreements would "pull" foreign investments to the region and a natural companion would be technological transfer. In "*Does TRIPS Facilitate or Impede Climate Change Technology Transfer into Developing Countries?*" Cameron Hutchison examined the relationship between climate change technologies and *TRIPS*. He argues that "the international legal regime employs a mixture of "push" (encouraging technology transfer from developed countries) and "pull" (encouraging private sector trade and investment into developing countries) obligations."[84] Hutchison identifies push factors as being incorporated in international treaties obligating developed countries in "stimulating private sector transfer initiating government to government transfers, and increasing financial and technical support to enhance domestic capacities".[85] He views pull factors as generated by developing countries such as the implementation of strong local regulatory and legal

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Economic Growth" (1997) 153:3 *Contemporary Economic Policy* 51; See also: S Kanwar & R Everson, "Does intellectual property protection spur technical change?" (2003) 55 *Oxford Economic Papers* 235 where these authors found that weak IPR facilitates imitation while stronger IPR increases innovation in the developing country; Y K Kim, K Lee and W G Park, (2008) "Appropriate Intellectual Property Protection and Economic Growth in Countries at Different Levels of Development" *3rd Annual Conference of the EPIP Association*, Bern Switzerland; See additional studies on the positive relationship between R&D/GDP ratios: N Varsakelis, "The Impact of Patent Protection, Openness, and National Culture on R&D Investment: a Cross-Country Empirical Investigation" (2001) 30 *Research Policy* 105; Edwin Mansfield, "Intellectual Property Protection, Foreign Direct Investment, and Technology Transfer" (1994) *IFC discussion paper 19* (The World Bank and International Finance Corporation, Washington D.C.), online: http://www.bvindecopi.gop.pe/colec/emansfield.pdf,
wherein it was found that countries with weak IPRs created a deterrent for FDI and joint ventures especially in the research and development sector.

[82] Keith Maskus, "Incorporating a Globalized Intellectual Property Rights Regime into an Economic Development Strategy"(2007) 2 *Frontiers of Economics and Globalization* 497; Gervais, (2007) *supra* note 2.

[83] Cameron Hutchison, "Does TRIPS Facilitate or Impede Climate Change Technology to Developing Countries? (2006) 3 *University of Ottawa Law and Technology Journal* 517.

[84] *Ibid* at 517.

[85] *Ibid* at 521.

infrastructure such as intellectual property rights.

Hutchison highlights several ways by which technology is diffused including "government assistance programs, direct purchasing, licensing, foreign direct investment (FDI) and joint ventures."[86] Two consequential effects of *TRIPS* and IPR were identified. Firstly, Hutchison found that stronger intellectual property rights has a negative effect on innovation and technology transfer. In this regard, strong IPR were also identified as not having a positive effect on foreign direct investments. The second effect is that *TRIPS* is inadequate in dealing with the potential for compulsory licensing where countries refuse to license technologies.[87]

The connection between economic growth and IPR have long been considered by economists, especially as they relate to FDI. This "pull" factor is often viewed in terms of meeting a population's needs as in the case with renewable energy technology. The WIPO has also recognized the importance of policies and strategies beyond mere implementation of IPR and development strategies that requires the following:

> "*…strategic integration of intellectual property issues with other development policy issues*, such as those in the economic, trade, financial, educational, social, cultural, *environmental, and competition fields*."[88]

Few scholars have turned their minds to the importance of culture, or local factors in intellectual property issues and development.[89] Beyond culturally unique features, the literature acknowledges that IPR cannot substantively contribute to development without first addressing the basic needs of the citizens. Margaret Chon argued that intellectual property must address global public goods and that it:

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[86] *Ibid* at 517.
[87] *Ibid* at 517.
[88] K Idris & H Arai, *The Intellectual Property-Conscious Nation: Mapping the Path from Development to Developed* (2006) 16 (WIPO Publications No. 988).
[89]Sunder Madhavi, "Culture Dissent" (2001) 54 Stanford Law Review, 495 htpp://papers.ssrn.com/sol3/papers.cfm?abstract_id=304619>.

> "…can no longer afford to be insular, as if it does not affect or is not affected by the provision of other *global public goods*. *Explicit connections must be made between intellectual property and other global public goods addressing basic development needs*, including food, education as well as the already highly publicized health care sector. Intellectual property, after all, cannot "take root" absent the basic national capacity, which can only be developed with a population that has its essential needs met."[90]

In this process, old locally produced products are replaced by new FDI generated goods,[91] and development must consider the primary goal of meeting the basic needs of the local population. Foreign companies may also deem it necessary to invest in FDI where there is a significant amount of trade or a service to the local population is provided by the MNC and funded by governments who do not have the resources to invest in the initial infrastructural project. This is the case in the energy sector where an essential service is provided to the citizens as channeled through governments. Thus, theories have been devised to predict the optimum time for a foreign company to relocate and invest in domestic production.[92]

In almost 20 years post-*TRIPS*, even some of the most comprehensive scholarly dedications to understanding its impact on development have been largely confined to the explanatory realm of the Agreement.[93] The promise of development, that is, corporations investing in developing countries with strong IPR, seems to have fallen by the wayside especially on continental Africa.[94] At minimum it was expected that strong IPR regimes would yield some form of technology transfer. Even more surprising is the fact that the benefits of FDI promised for implementing stronger IPR,

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[90] Chon, Margaret, "Intellectual Property and the Development Divide" (2006) 27 Cadozo Law Review 2813 at 2877. Emphasis added.
[91] P R Krugman, "A Model of Innovation, Technology Transfer, and the World Distribution of Income" (1979) 87 *Journal of Political Economy* 253.
[92] P J Buckley & M Casson, "The Optimum Timing of Foreign Investment" (1981) 91 *Economic Journal* 75; E Borensztein, J De Gregorio & J W Lee, How Does Foreign Direct Investment Affect Economic Growth (1998) 45 *Journal of International Economics* 115. Borensztein, De Gregorio and Lee examines the flow of FDI, technology transfer and economic growth.
[93] Sherwood, *supra* note 4.
[94] R Sherwood, "Intellectual Property Systems and Investment Stimulation: The Rating of Systems in Eighteen Developing Countries" (1997) 37:2 *IDEA* 1.

have not received sufficient scholarly analysis, particularly in Africa. Ikechi Mgbeoji highlights this omission:

> "[s]ince the emergence of economic liberalism in the 1980s, industrializing countries have been fed with the message that attraction of foreign direct investment (FDI), with the attached conditions of strong IPRs will automatically yield economic development. Yet since the accession of African countries to the WTO, there is virtually no empirical work on the relation between IPRs and FDI in Africa."[95]

Studies conducted after the enactment of *TRIPS* in 1994 tended to conclude that stronger IPR can encourage multinational corporations to invest, thus contributing to industrial development,[96] through various means including economic growth,[97] economic development,[98] development policies,[99] climate change,[100] growth in the recipient's economy through innovation.[101] The issue climate change through green energy projects has not been developed in the literature. As such, the review will trace the relevant literature on IPR and development as it relates to Africa, and juxtapose

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[95] Mgbeoji, *supr*a note 2; See also: E Penrose, *The Economics of the International Patent System* (John Hopkins Press, 1951); H Grundmann, "Foreign Patent Monopolies in Developing Countries: An Empirical Analysis'(1976) 12 *Journal of Development Studies* 186.

[96] See also: Lee Branstetter *et al,* (2007) "Intellectual Property Rights, Imitation, and Foreign Direct Investment: Theory and Evidence" *National Bureau of Economic Research, Inc.,* NBER Working Papers; David Gould, M David, & William C Gruben, "The role of intellectual property rights in economic growth" (1996) 48:2 *Journal of Development Economics* 323; R T Rapp & R P Rozek "Benefits and Cost of Intellectual Property Protection in Developing Countries" (1990) 24 *Journal of World Trade* 75; R Falvey, N Foster & D Greenaway, "Intellectual Property Rights and Economic Growth" (2006) 10 *Review of Development Economics* 700; P Smith, "Are Weak Patent Right A Barrier to U.S. Exports?" (1999) 55 Journal of International Economics 411-439; K E Maskus, *Encouraging International Technology Transfer* (Geneva, Switzerland: ICTSD and UNCTAD Issue Paper No. 7, 2004); Kanwar & Everson *supra* note 81; Varsakelis, *supra* note 81; Lee Branstetter, R Fisman & F Foley, "Do Stronger Intellectual Property Rights Increase International Technology Transfer? Empirical Evidence from US firm-level data" (2006) 121:1 *Quarterly Journal of Economics* 321; Branstetter *et al*, (2011), *supra* note 81; A G Z Hu, & I P L Png, "Patent Rights and Economic Growth: Cross-Country Evidence", *CELS 2009 4th Annual Conference on Empirical Legal Studies Paper*, Los Angeles, CA.

[97] Primo Braga & Fink s*upra* note 77; Maskus (2007) *supra* note 81.

[98] Park, and Ginarte (1997), *supra* note 81; Kim, Lee and Park, (2008), *supra* note 81; *Ibid,* Branstetter *et al,* (2007) at xv.

[99] Maskus (2000) *supra* note 79; K E Maskus and M Penubarti "How Trade-Related are Intellectual Property Rights?" (1995) 39 *Journal of International Economics* 227; Daniel Gervais, *Intellectual Property, Trade and Development – Strategies to Optimize Economic Development in a TRIPS Plus Era* (Oxford University, 2007).

[100] E Derclaye, "Intellectual Property Rights and Global Warming" (2008) 12:2 *Marquette Intellectual Property Law Review* 264; E Derclaye, "Patent law's role in the protection of the environment – re-assessing patent law and its justification in the 21st century" (2009) *International Review of Intellectual Property and Competition Law* 4; Edwin Mansfield, *Intellectual Property Protection, Direct Investment, and Technology Transfer: Germany, Japan, and the United States*, International Discussion Paper, Discussion Paper 27 (September 1995), online: http://www.bvindecopi.gop.pe/colec/emansfield.pdf .

[101] M Boldrin and D Levine, *The Case Against Patents* (Federal Reserve Bank, Research Division, 2012) at 1-2.

this reality with the promises made to developing countries regarding enhanced energy infrastructures. The analysis will necessitate an exploration of development theories as they relate to modernizing local regulatory infrastructures and attracting FDI. The literature on economic growth, development and sustainable development will also be highlighted. Finally, this literature review will attempt to emphasize some gaps in the literature on sustainable development from a climate change perspective.

2.2 International Treaties and the Promise of Development

The notion that harmonized trade laws would entice foreign investors to a region was highly popularized by international institutions that sought increased membership in organizations such as the WTO:

> "The lure of membership to international treaties was often made more appealing by the work of international institutions such as the World Intellectual Property Organization (WIPO) and UNESCO, which espoused the conventional wisdom of western intellectual property scholars that enactment of European-style intellectual property laws is a necessary prerequisite to economic progress and development."[102]

The assumption of *TRIPS* and other WTO trade agreements was that as countries joined the WTO, and complied with *TRIPS,* that bilateral trade flows would increase.[103] Tim Bűthe and Helen Mine have argued that international trade agreements such as the *GATT* and WTO create the certainty needed by MNCs to engage in foreign investments. They found that developing countries that joined the WTO and participate in preferential trade agreements (PTAs) have higher levels of FDI inflows than compared to their counterparts. The argument is that Member States have their obligations enshrined in WTO treaties, thereby creating trade certainty and also increasing the cost of a country's

[102] Gana (Okediji), Ruth L, "The Myth of Development, in Progress of Rights: Human Rights to Intellectual Property and Development" (1996) 18 *Law and Policy Law Journal* 315 at 331.
[103] Tim Bűthe, Helen V Milner, "The Politics of Foreign Direct Investment into Developing Countries: Increasing FDI through International Trade Agreements?" (2008) 52:4 *American Journal of Political Science* 741.

potential breach of their commitments.[104] In this regard, it is argued that "trade agreements boost FDI precisely because they have not just economic but also political effects, most importantly because these international institutions enshrine commitments to open markets and liberal economic policies."[105] The rationale is that the WTO binds its Members thereby ensuring that these Member States refrain "from a range of interventions in the market that might affect foreign direct investors."[106]

Most empirical data on the role of FDI in sub-Saharan African development have focused on regression analysis that considers various infrastructural factors, including: political stability,[107]market size, labour cost, environmental costs, and national bankability for governmental projects, from a cross-national econometric perspective,[108] simultaneous equation model,[109] using econometric evidence on the role of patent and utility models in assessing levels of innovation[110] and the result of local innovation, patents and technology change on FDI in the developing world. The push factor of FDI towards certain countries has arguably led several developing countries to enter into bilateral investment treaties (BITs). Poulsen and Aisbett caution against these kinds of treaties that may yield dire consequences for unsuspecting developing nations. They argue that like *TRIPS*, BITs were signed by developing countries with the promise of attracting FDI, without a full comprehension of the legal ramifications.

The World Bank also acknowledged the importance of private finance by noting:

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[104] Robert O Keohane, *International Institutions and State Power: Essays in International Relations Theory* (Boulder, CO: Westview Press, 1989); Beth A Simmons, "International Law and State Behavior: Commitment and Compliance in International Monetary Affairs" (2000) 94:4 *American Political Science Review* 819.
[105] Bűthe and Milner, (2008) *supra* note 103 at 745.
[106] *Ibid*.
[107] Schneider & Frey, *supra* note 49; Loree and Guisenger, (1995) *supra* note 49; Addison, *supra* note 49.
[108] Juan C Ginarte & Walter G Park, "Determinants of Patent Rights: A Cross-National Study" (1997b) 26 *Res. Pol'y 283*.
[109] M A Thompson & F W Rushing "An Empirical Analysis of the Impact of Patent Protection on Economic Growth: an Extension" (1999) 24 *Journal of Economic Development* 67.
[110] Kim, *supra* note 81.

> "In many low-income countries in sub-Saharan Africa by contrast, internal cash generation as a source of investment funds is very limited because of low tariff levels and poor collection that result in utilities not covering even their O&M costs, much less generating profits that would allow them to invest in expansion of their networks. IFIs, ECAs and bilateral donors play an important role in financing new investments in these countries…"[111]

Despite the difference in findings related to international organizations, trade agreements and the impact on FDI, the consensus is that international institutions facilitate trade through enabling corporations to rely on government decisions and policies regarding trade and investments.[112] While the importance of international agreements and organizations in creating an environment that encourages FDI have been linked, the role of specific domestic policies still needs to be expanded. Inward FDI has been found to increase with a nation's participation in international organizations such as the WTO, but has also been determined that such participation reduces the nation's autonomy to deviate from certain policies.[113]

While writing for the World Bank in 1995, Professor Mansfield developed a study that attempted to uncover the relationship between IPR and FDI.[114] The Mansfield study was seminal in its survey of almost 100 U.S. multinational companies with branches worldwide.[115] The conclusion from the Mansfield studies demonstrates that FDI is closely connected to the perceived strength of IP protection in the host country.[116] Other studies have found that the probability of receiving FDI is linked to the strength of the local IP laws and protection. Beata Smarzynska Javorcik studied FDI levels in twenty-four Eastern bloc economies from 1989 to 1994. By utilizing the Ginarte and Park

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[111] The World Bank, "Investment in Electricity for Development" in UN-Energy/Africa. *Energy for Sustainable Development: Policy Options for Africa.* Un-Energy/Africa publications to CSD15, undated at 85.
[112] Simmons, (2000) *supra* note 104; Beth A Simmons, "The Legalization of International Monetary Affairs" (2000b) 54:3 *International Organization* 573; Bűthe & Milner, (2008) *supra* note 103. For a consideration of FDI from the perspective of mergers and acquisitions (M&A), see: Keith Head & John Ries, "FDI as an outcome of the market for corporate control: Theory and evidence" (2008) 74 *Journal of International Economics* 2.
[113] *Ibid*, Bűthe & Milner, (2008) *supra* note 103 at 759.
[114] Mansfield, (1995) *supra* note 100.
[115] *Ibid*.
[116] *Ibid*.

index, Javorcik's demonstrated a positive correlation in the high-tech sector between IP protection and receipt of FDI.[117] Andrea Fosuri (2004) examined IPR protection and other risk factors in seventy-five countries between 1981 and 1996.[118] This study identified risk factors beyond IP strength and enforcement that affect FDI. In particular, the *credit rating* of the country, *currency fluctuation* issues, and *other country risk factors* play a large role in FDI. The Fosfuri study revealed that there are *factors beyond IP strength and enforcement* that comprise FDI determinants.

In mid 1990s after large social unrest caused by the displacement of small farmers and tribal groups from a Dam project,[119] civil society organizations argued that the World Bank should not be at the forefront of climate finance funding if it continues to fund "dirty" energy projects.[120] The protestors called for the World Bank to adopt a new energy funding strategy that "promotes truly clean energy and energy access".[121]

The Sierra Club and Oil Change International produced a report that revealed that between 2011 and 2013 only 7 percent of the World Bank's energy portfolio went to increasing access to energy.[122] The report found that 84 percent of those who lack access to electricity are located in rural areas "where it is often costly to extend existing grids."[123] Based on this finding, the International

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[117] B Javorcik, "The Composition of Foreign Direct Investment and Protection of Intellectual Property Rights: Evidence from Transition Economies" (2002) 48:1 *European Economic Review* 39; See also: Walter Park & D C Lippoldt, *Technology Transfer and the Economic Implications of the Strengthening of Intellectual Property Rights in Developing Countries*. (2008) OECD Trade Policy Working Papers No 62.

[118] A Fosfuri, "Determinants of International Activity: Evidence from the Chemical Processing Industry" (2004) 33:10 *Research Policy* 1599.

[119]The World Bank Group: Independent Evaluation Group "Learning from Narmada", online: http://lnweb90.worldbank.org/oed/oeddoclib.nsf/DocUNIDViewForJavaSearch/12A795722EA20F6E852567F5005D8933.

[120] The Upstream Journal, "International Environmental Groups Want the World Bank to "Clean Up Its Act" Before it Expands its Role of Climate Finance" (May 2012), online: http://www.upstreamjournal.org/2012/05/international-environmental-groups-want-the-world-bank-to-clean-up-its-act-before-it-expands-its-role-in-climate-finance/.

[121] *Ibid*.

[122] Sierra Club Oil Change International, "Still Failing to Solve Energy Poverty: International Public Finance for Distributed Clean Energy Access Gets another "F" (April 2016), online: https://www.sierraclub.org/sites/www.sierraclub.org/files/uploads-wysiwig/1281%20Energy%20Scorecard_06_web.pdf.

[123] *Ibid* at 4.

Energy Agency (IEA) recommends off-grid solutions as an option to meet the 2030 energy access for all goal. The IEA estimates that to meet the 2030 goal the way energy is funded needs to be reallocated with 36 percent going to grid extension, 40 percent to mini-grids and 24 percent to off-grid solutions.[124] This recognition is based on a lack of confidence in the current grid system and its expansion capacity. While the projections foretell a scenario where 64 percent of investments should be directed to off-grid solutions, the reality is that in 2014 on 0.5 percent of the World Bank's funding through the African development Bank was directed towards mini-grid and off-grid solutions.[125] Non-access energy spending accounted for 94.4 percent and other energy access spending totalled 25.5 percent.[126] In addition, the Sierra Club study found that the African Development Bank reduced its 2014 spending on energy access from 38 percent to 26 percent.[127]

The World Bank's energy initiatives have not gone without criticism in sub-Saharan Africa.[128] The Bank is arguably the biggest lending energy source in the world today. Critics have argued that instead of shaping energy policy to address energy poverty, it has channelled investment to large-scale multi-national energy industries. Medupi coal plant in South Africa provides energy for the mining sector, and was labelled as contributing to climate change;[129] the World Bank funded this controversial South African coal plant project to the tune of US $3 billion loan.[130] Similar controversy followed the World Bank in Nigeria where privatisation of the state electric company did not result in increased access to the poor, but left the public saddled with debt and created an

[124] *Ibid* at 6.
[125] *Ibid* at 8. Note: no investments for mini-grid and off-grid solutions were reported from between 2011 to 2013, *ibid* at 9.
[126] *Ibid* at 8.
[127] *Ibid*.
[128] Bretton Woods Project: Critical Voices on the World Bank and IMF "Issue Overview: World Bank and Energy", online: http://www.brettonwoodsproject.org/2015/08/issue-overview-world-bank-and-energy/.
[129] The Guardian, "World Bank's $3.75 bn Coal Plant Loan Defies Environmental Criticism", online: https://www.theguardian.com/business/2010/apr/09/world-bank-criticised-over-power-station.
[130] *Ibid*.

electricity supply emergency.[131] Likewise, in the Democratic Republic of Congo 3 hydropower projects (Inga 1, 2 and 3 Dams) that failed to produce the projected energy output despite the Inga 3 Dam costing USD $12 billion.[132] In the end the Dams were said to enrich the mining companies and aluminum smelters.

More recently, the World Bank has implemented the Scaling Up Renewable Energy Program (SREP) through its climate investment funds sector an $839 million funding program to improve power through the renewable energy usage in the developing world.[133] The SREP Program in Ghana is designed to address the local problems around the inadequate grid capacity. The solar PV solution promoted by the SREP program resolves some immediate energy problems, but does not go as far as rectifying Ghana's low capacity grid problem which is a major factor in why financiers shy away from investing in the region.[134] Instead, the SREP program infuses rooftop and battery operated standalone systems that do not need to be fed into the grid. The SRED Ghana program identifies the main barriers to investment in renewable energy resources "limited experience and track record of utility-scale solar development, high perceived risk by private developers of a largely untested new FiT regime, and limited access to affordable financing."[135] However, the Ghanaian problem goes beyond affordable financing, because even if the project reaches financial close, the grid capacity issues may make it impossible for the new power station to feed its energy into the outdated grid.

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[131] African Energy "Nigeria Eyes $5bn-plus Power Sector Recovery Support from World Bank" (18 May 2017), online: https://www.africa-energy.com/article/nigeria-eyes-5bn-plus-power-sector-recovery-support-world-bank.

[132] Peter Bosshard, "The World Bank is Bringing Back Big, Bad Dams: A Renewed Focus on Mega-Dams Will Make Matters Worse in Africa and Benefit Companies, Not People" *The Guardian* (16, July 2013), online: https://www.theguardian.com/environment/blog/2013/jul/16/world-bank-dams-africa.

[133] World Bank, Climate Investment Funds "SREP: Scaling Up Renewable Energy Program", online: www-cif.climateinvestmentfunds.org/fund/scaling-renewable-energy-program.

[134] World Bank, Climate Investment Funds "SREP: Scaling Up Renewable Energy Program", online: www-cif.climateinvestmentfunds.org/fund/scaling-renewable-energy-program at vii.

[135] World Bank, Climate Investment Funds "SREP Investment Plan for Ghana" (Meeting of the SREP Sub-Committee, April 29, 2015), online: www-cif.climateinvestmentfunds.org/sites/default/files/SREP_13_4_SREP_Investment_Plan_for_Ghana.pdf at 33.

This adds another dimension to the reluctance of foreign investors to undertake renewable energy projects in Ghana.

It has also been argued that investors will be attracted to countries that also uphold investor rights in the form of strong treaties. Gus Van Harten critically discusses the justifications of investment treaty regimes that shift power "from states to multinational companies and from domestic courts to a private arbitration industry based in Washington, New York, London, Paris, The Hague and Stockholm."[136] Van Harten notes that the system of investment treaties and arbitration is often supported by common arguments that are tied to the system's role in encouraging foreign direct investments.[137] These entrenched justifications seem to be based on beliefs beyond the attraction of foreign investments. He concludes that "…if the aim of investment treaties is to encourage *foreign* investment between the states parties to the treaty – and not to extend special legal rights and privileges broadly to an international class of corporate owners of assets – then the expansive approach to forum-shopping that is enabled by broad language in many of the treaties and, in turn, by the permissive interpretations of some arbitrators makes no sense."[138] In fact, the UNCTAD also concluded that bilateral investments treaties have little or no impact on attracting FDI.[139]

Poulsen and Aisbett ascertained that treaties were overwhelmingly powerful in that they:

> "…grant foreign investors a right to file international arbitration claims directly against governments without first needing to exhaust local remedies. If governments refuse to participate in the proceedings or chose not to comply with an arbitral award, investors are allowed to confiscate their commercial property in most corners of the world, with only limited options for courts in the enforcing states to refuse execution."[140]

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[136] Gus Van Harten, "Five justifications for investment treaties: a critical discussion" (2010) 2:1 *Trade L. & Dev.* 1 at 2. Online: http://tradelawdevelopment.com/index.php/tld/article/view/2(1)%20TL%26D%2019%20(2010)/38

[137] *Ibid* at 4. For a discussion of how arbitration mechanism favours investors see: Gus Van Harten. "Arbitrator behaviour in asymmetrical adjudication: an empirical study of investment treaty arbitration" (2012) 50 Osgoode Hall LJ 211.

[138] Van Harten, (2010) *supra* note 136 at 5.

[139] UNCTAD, *Bilateral Investment Treaties in the Mid-1990s*, UN Doc. UNCTAD/ITE/IIT/7 (1998), at 141-2.

[140] Lauge N S Poulsen & Emma Aisbett, "When The Claim Hits: Bilateral Investment Treaties and Bounded Rational Learning" (2013) 65:2 *World Politics* 273 at 273.

Given the high costs of litigation, Poulsen and Aisbett surmised that most developing countries were unaware of the consequences of the treaty. In addition, with the recent downturn in the global economy, FDI has also declined. Poulsen and Hufbauer also cautioned against providing too many incentives to corporations in the form of rushing "into investment treaties."[141] For these authors FDI did not necessarily lead to development. They note that:

> "…not all FDI promotes development; larger quantities of FDI flows cannot be the sole indicator of successful development policy. To increase the positive impact of FDI for economic development, and avoid the adverse consequences, officials should instead consider a "sustainable FDI" strategy, which enhances not only the quantity of investments, but also the "quality"…"[142]

Poulsen argued that these treaties are entered into for the primary purpose of attracting foreign investors. In addition, the purpose of the treaties is to minimize risks to investors arising from political risks, bank and currency, insurance, and other market-based risks. He surmised that developing countries should consider other less encumbering means of addressing risk factors such as investor-state contracts.[143]

Ha-Joon Chang in *Kicking Away the Ladder* argues that advanced nations established their local industries by limiting competition. In addition, the free trade policies that are currently being imposed on developing countries were absent at the time that industrialized nations developed.[144] Chang argues that developed nations once favoured subsidies and controls to assist their once weak economies to develop and advance. This debate is ripe in the renewable energy industry that requires subsidies and concessions to compete with traditional energy sources. Developing nations seek the

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[141] Lauge N S Poulsen & Gary Clyde Hufbauer, "Foreign Direct Investment in Times of Crises" (2011) 20:1 *Transnational Corporations* 19 at 33.
[142] *Ibid* at 33.
[143] Lauge N S Poulsen, "Bounded Rationality and the Diffusion of Modern Investment Treaties" (2014) 58 *International Studies Quarterly* 1.
[144] Ha-Joon Chang, Kicking Away the Ladder (London: Anthem Press, 2002).

same favourable trade terms that existed in the past that favoured industrialized nations. Developed nations argue that there is no need to regress back to protectionist trade practices, as there are sufficient flexibilities built into international agreements and multilateral investment agreements to allow developing countries the room to set domestic policies and pursue a sustainable development path.[145] On the other hand, sustainable economic development scholars question the legitimacy of flexibilities by asking the question "if so much flexibility is allowed, why bother with an agreement?"[146]

2.3 Local Regulatory Reform and "Pull" Factors

The "growth theory", which is the most popular FDI theory, posits that externalities such as capital infusion, knowledge transfer, exports and technology combine to induce enhanced growth output.[147] This interaction between FDI, technology and growth is often referred to as *endogenous growth* models.[148] While endogenous growth models are often substantiated through employing statistical models including time series and cross-country growth equations, and economic and accounting growth models,[149] the effects of FDI are far reaching on the domestic economy:

> "Through knowledge transfers, FDI is expected to augment the existing stock of knowledge in the recipient economy through labour training and skill acquisition and diffusion, on the one hand, and through the introduction of alternative management practices and organisational arrangements on the other. Even without significant physical capital

[145] Ha-Joon Chang and Duncan Green. *The Northern WTO Agenda on Investment: Do As We Say, Not As We Did* (Geneva: South Centre, 2003) at 39.
[146] Ha-Joon Chang and Duncan Green. *The Northern WTO Agenda on Investment: Do As We Say, Not As We Did* (Geneva: South Centre, 2003) at 40.
[147] Borensztein *et al*, *supra* note 92.
[148] For a model for "evaluating multilateral inward and outward FDI" through the modeling bilateral trade flows, see: Keith Head & John Ries, "FDI as an outcome of the market for corporate control: Theory and evidence" (2008) 74 *Journal of International Economics* 2 at 2; P M Romer, (1990) "Endogenous Technological Change" (1990) *Journal of Political Economy* 98; L A Rivera-Batiz and P Romer "Economic Integration and Endogenous Growth" (1991) 106 *Quarterly Journal of Economics* 531; P Aghion & P Howitt, A Model of Growth Through Creative Destruction (1992) 60 *Econometrica* 323; G Grossman and E Helpman, *Innovation and Growth in the Global Economy* (Cambridge, MIT Press, 1991).
[149] R M Solow, "A Contribution to the Theory of Economic Growth" (1956) 39 *Quarterly Journal of Economics and Statistics* 312.

> accumulation, FDI can also be expected to promote knowledge transfer, in the case of, for instance, quasi-investment arrangements such a leasing, licensing and start-up agreements, management contracts and joint ventures in general."[150]

The spill-over of skills emanating from FDI is directly linked to the human capital factor and the ability of domestic markets to facilitate and engage in the *knowledge transfer* referred to above. In this regard, human capital and other externalities have been identified as important to the success of FDI.[151] Consequently, the theoretical approach to intellectual property rights protection and economic growth that is rooted in endogenous growth models,[152] recognizes that technology is produced in industrialized countries and imported to developing countries that will gain by imitating the innovations. This theory recognizes not just the quantitative nature of financial investments, but also the externalities resulting from the qualitative impact in the form of "new technologies and augmenting human capital stocks".[153]

2.3.1 Intellectual Property Rights and the Promise of Development

Some of the earliest studies on IPR and FDI showed a strong connection between more robust stronger IPR and increased FDI,[154] or at minimum the decision of multinational corporations to invest in a country through FDI.[155] Where a positive impact was identified between FDI and growth, this impact was found only in countries with educated workforces where the population had attained a

[150] de Mello, (1997) *supra* note 21 at 9.
[151] V N Balasubramanyam, M Salisu & D Sapsford, "Foreign Direct Investment as an Engine of Growth" (1999) 8:1 *The Journal of International Trade & Economic Development* 27.
[152] Romer, (1990) *supra* note 148; Grossman & Helpman, *supra* note 148; L A Rivera-Batiz & P M Romer (1991), *supra* note 148; Aghion & Howitt, (1991) *supra* note 148.
[153] de Mello, (1997) *supra* note 21 at 22.
[154] José L Groizard, "Technology Trade" 45:9 (2009) *Journal of Development Studies*" 1526. This study used panel data from eighty countries for 1970 and found that FDI increases and was higher in countries that had stronger IPRs.
[155] Maskus (2000) *supra* note 79. Note: this study also recognized that in countries such as India a good deal of technological development is devoted to jobs where technology is imitated. The introduction of IPRs actually displaces workers in these economies because jobs based on copy may decline.

minimum secondary education, and in advanced markets.[156] Thus, in order for FDI to have a positive impact on growth, the domestic recipient host nation must have experienced a minimum level of development. Branstetter *et al* also used confidential firm data to uncover 16 different periods in IPR policies in developing countries. The findings demonstrated that strong IPR have a positive effect on growth in developing countries through multinational corporate FDI.[157] For *Branstetter et al*.[158] the recognition of endogenous FDI in relation to IPR confirms Lai's[159] conclusion about the costliness of IPR to the South, by extending Lai's analysis to specifically show the detrimental impact of IPR on imitation industries and activities. The issue of whether the impact of IPR on growth is different depending on the level of FDI was also explored from a global perspective.[160] This conclusion rests on the fact that stronger IPR increases the cost of imitation because of potential litigation and sanctions. Edwin Mansfield also explored the role of IPR on FDI and joint ventures among 100 major U.S. firms in a cross-section of manufacturing industries.[161] The survey results indicated that countries with weak IPR created a deterrent for FDI and joint ventures especially in the research and development sector.

Between 1981 and 2001 Albert Hu and I.P.L. Png studied the relationship between patent-intense industries and economic growth in 54 manufacturing industries in up to 72 countries.[162] Their study reinforced the relevance of patents in industries such as pharmaceuticals and technology that

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[156] Borensztein *et al*, *supra* note 92; D Coe, E Helpman, & A Hoffmaister, "North-South R&D Spillovers" (1995) *ECPR Discussion Paper No. 1133*, found that a stronger positive statistical relationship between growth and FDIs was found where the host country was more developed.
[157] Branstetter *et al*, (2011) *supra* note 81; Branstetter *et al* (2007), *supra* note 96.
[158] *Ibid*, Branstetter *et al* (2007).
[159] Edwin L C Lai, "International Intellectual Property Rights Protection and the Rate of Product Innovation" (1998) 55 *Journal of Development Economics* 133.
[160] Mila Kashcheeva, "The Role of Foreign Direct Investment in the Relation Between Intellectual Property Rights and Growth" (2013) *Oxford Economic Papers* 699.
[161] Mansfield, (1994) *supra* note 81.
[161] *Ibid.*
[162] Albert G Z Hu and I P L Png, "Patent Rights and Economic Growth: Evidence from Cross-Country Panels of Manufacturing Industries" 65:3 (2013) *Oxford Economic Papers* (Oxford University Press) at 695. Emphasis added.

rely on patents to protect their products and recoup R&D investments. The Hu and Png study also confirmed the association between country wealth, IPR and economic growth, but primarily for patent-intensive industries. Branstetter *et al,*[163] and Hu and Png[164] found that strong IPR protection act as an incentive for multinationals, especially those with technological products to invest in developing economies. Thus, Hu and Png concluded that:

> "Our results bear upon the public policy debate regarding the role of intellectual property rights in economic growth and development. We found that patent laws and their enforcement do matter for economic growth. However, we also found that *stronger patent rights have less impact on economic growth in poorer economies and in less patent-intensive industries*. Our findings lend empirical support to arguments that patent laws be tailored to the particular circumstances of country and industry."[165]

The above quote reveals a clear public policy issue in acknowledging that IPR and development cannot be applied in a vacuum.[166] The ambiguity arising from the factors that cause differing correlations between IPR and economic development in developing and developed nations, still prevails.

Some scholars have found no impact of strong IPR on attracting FDI among poorer countries, but have identified a positive correlation for middle income and developed nations.[167] Specifically, Asian countries that adopted stricter IPR standards have been shown to attract more robust FDI. Other studies have found a strong connection between patent files and cross-border licensing fees and royalties. The data also demonstrates that patent activity and licensing is highly concentrated in the hands of a few countries.[168]

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[163] Branstetter *et al*, (2007) *supra* note 96.
[164] Hu & Png, (2009), *supra* note 96.
[165] Hu & Png, (2013) *supra* note 162 at 695. Emphasis added.
[166] D L Burk & M A Lemley, *The Patent Crisis and How the Courts Can Solve It*, Chicago: University of Chicago Press, 2009).
[167] Bernard M Hoekman, Keith E Maskus, & Kamal Saggi, "Transfer of Technology to Developing Countries: Unilateral and Multilateral Polity Options" World Bank Policy Research Working Paper 3332, (2004), www.http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-3332; Hutchinson, Cameron, "Does TRIPS Facilitate or Impede Climate Change Technology Transfer into Developing Countries? (2006) 3 *U. Ottawa L. & Tech J.* 517.
[168] Carlos M. Correa, "Can the TRIPS Agreement Foster Technological Transfer to Developing Countries" in Keith

Twenty years post *TRIPS* it is now clear that *IPR is insufficient to bring development* without some change in the legal institutions and policies of the host country.[169] The issue of whether the impact of IPR on growth varies is different depending on the level of FDI was explored from a global perspective. In her article, "The Role of Foreign Direct Investment in the Relation Between Intellectual Property Rights and Growth", Mila Kasheveeva used panel data techniques in a sample of 103 countries between 1970 and 2009 to assess the effects of FDI and IPR on growth and total welfare in developing countries.[170]

In Keith Maskus and Rugh Okediji's "Intellectual Property Rights and International Technology Transfer to Address Climate Change: Risks, Opportunities and Policy Options" the issue of climate change is addressed from legal, economics and technical perspectives.[171] The authors found that despite commitments in the UNFCCC and the Bali Action Plan calling for developed countries to take proactive steps to facilitate technology transfer the multilateral, legal and economic framework are not sufficiently entrenched to operationalize the process.

The level of IPR enforcement is not the only variable affecting technology transfer, but authors like Pamela Smith found that in relation to U.S. exports, the importing country's ability to imitate the invention also played an important role.[172] Consequently, patent holders are more reluctant to do business in countries with weak IPR enforcement and strong imitative capacity such as India and China.[173] Several studies of the wind, solar and biofuels industries have examined the

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Maskus & Jerome Reichman, *International Public Goods and Transfer of Technology Under a Globalized Intellectual Property Regime* (Cambridge: Cambridge University Press, 2005).

[169] Ruth L Gana (Okediji), "Copyright and Public Welfare in Global Perspective" (1999) 7 *Indiana Journal of Global Legal Studies* 122.

[170] Kashcheeva, *supra* note 160.

[171] Keith Maskus and Rugh Okediji "Intellectual Property Rights and International Technology Transfer to Address Climate Change: Risks, Opportunities and Policy Options" (ICTSD Programme on IPRS and Sustainable Development, Issue Paper No 2, December 2010).

[172] Smith, (1999) *supra* note 96; Maskus and Penubarti (1995) *supra* note 99; Maskus, (2004) *supra* note 96.

[173] T O Awokuse & H Yin, *Do Stronger Intellectual Property Rights Protection Induce More Bilateral Trade? Evidence from China's Imports (*Selected Paper prepared for the American Economics Association's Annual Meeting, Orlando,

role of IPR in transferring technology to emerging markets.[174] Many countries in the developing world have indicated that they experienced difficulty in obtaining technologies due to high licensing costs and the need to turn to off-patent alternatives.[175] These off-patent technologies may not be as technologically advanced as the products under patent has been proven in the Chinese photovoltaic products.

2.4 Power Sector Reforms and the Promise of Development

One of the goals of the United Nations Agenda 2030 is to "ensure access to affordable, reliable, sustainable and modern energy for all."[176] Access to electricity is an indicator of where a nation is on the development path,[177] and may portend economic growth as indicated by GDP calculations. According to the International Energy Agency ("IEA"), energy generation and usage contributes to more than 60% of greenhouse gas emissions.[178] In developing regions like sub-Saharan Africa where there is anticipated population and industrial growth, energy generation and usage is bound to increase. In this regard, renewable energy alternatives represent a means of meeting economic development needs, while providing the necessary energy needed to sustain infrastructural

Florida, July 29, 2008 at www.core.kml.opin.ac.uk.

[174] J Barton, *Intellectual property and access to clean energy technologies in developing countries: An analysis of solar photovoltaic, biofuels and wind technologies* (Trade and Sustainable Energy Series Issue Paper No. 2, 2007) Geneva: International Centre for Trade and Sustainable Development. Online: http://ictsd.org/downloads/2008/11/intellectual-property-and-access-to-clean-energy-technolgies-in-developing-countries_barton_ictsd-2007.pdf.; K Gallagher, *The globalization of clean energy technology: Lessons from China* (Cambridge, MIT Press, 2014); R Bryne, A Smith, J Watson, and D Ockwell, (2011) Energy Pathways in Low-Carbon Development: From Technology Transfer to Socio-Technical Transformation STEPS Working Paper 46, Brighton: STEPS Centre. Online: www.sussex.ac.uk/climatechange/research/beyondrio20/energy.

[175] *Ibid,* Watson *et al*.

[176]United Nations. *The Millennium Development*, Sustainable Development Goal7, online: www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E; World Bank, *World Development Indicators: Featuring the Sustainable Development Goals* (Washington: World Bank Group, 2016), online: www.openknowledge.worldbank.org/bitstream/handle/10986/23969/9781464806834.pdf.

[177] T Dinkelman, The Effects of Rural Electrification on Employment: New Evidence of South Africa, (2011) 101(7) *The American Economic Review* 3078.

[178] OECD/IEA, World Energy Outlook 2013. International Energy Agency, Paris, 2013. Executive Summary.

growth at environmentally sustainable levels. Demand for electricity in sub-Saharan Africa will indubitably increase as the population increases, with projections that it will double within the next 25 years.[179] The Millennium Development Goals as well as the *Paris Agreement* has made commitments to increasing affordable access to reliable electricity in sub-Saharan Africa. The climate change mitigation targets contained in the *Paris Agreement* and Agenda 2030 require innovative policies that mitigate the financial barriers encountered by investors that undertake projects in sub-Saharan Africa.

There is also consensus that energy is a quintessential ingredient for not only economic growth but also development,[180] and this development must be encouraged by an energy supportive political environment.[181] There are a number of studies that have explored developments in the finance sector that can illuminate funding for renewable energy projects in sub-Saharan Africa.[182] However, specific scholarly attention needs to be devoted to case-study successes and how they can be adapted to other countries within the sub-Saharan region.

The International Energy Agency (IEA) has estimated that approximately 75% of the population of sub-Saharan Africa (some 730 million people) do not have access to clean cooking sources,[183] and most of the energy is consumed within the residential sector with a high concentration

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[179] IRENA, 2015. Africa Power Sector: Planning and Prospects for Renewable Energy. IRENA, Abu Dhabi.
[180] M Toman and B A Jemelkova. "Energy and Economic Development: An Assessment of the State of Knowledge" 24(4) (2003) *Energy Journal* 93.
[181] Samuel Adams, Edem Kwame Mensah Klobudu, Eric Evans Osei Opoku, "Energy Consumption, Political Regime and Economic Growth in Sub-Saharan Africa" 96 (2016) *Energy Policy* 36
[182] Low Carbon Mini Grids. Identifying the Gaps and Building the Evidence Based on Low Carbon Mini-grids. Francheville: DFID/iED, 2013. Final report. Accessed October 2015 http://www.gov.uk/government/uploads/system/uploads/attachment_data/file278021/IE-green-min-grids-support-study1.pdf; Pepukaye Bardouille, From Gap to Opportunity: Business Models for Scaling Up Energy Access. Washington DC: International Finance Corporate, 2012; H Gujba, S Thorne, Y Mulugetta, K Rai, Y Sokona "Financing Low Carbon Energy Access in Africa. (2012) 47 *Energy Policy* 71; Chijioke Oji, Ogundiran Soumonni, Kalu Ojah "Financing Renewable Energy Projects for Sustainable Economic Development in Africa (2016) 93 *Energy Procedia* 113.
[183] International Energy Agency (IEA) "Measuring Progress Towards Energy for All – Power to the People? (Paris, France OECE/IEA: 2012).

of biomass used for cooking.[184] While the region comprises 13% of the world's population, it only uses 4% of the world's energy.[185] According to the World Health Organization, the CO_2 emissions from cooking are a major risk factor among women and children in sub-Saharan Africa for diseases such as pneumonia, respiratory and pulmonary diseases.[186] IEA estimate almost half of the world's 1.2 billion people who lack access to electricity reside in sub-Saharan Africa.[187] The causes of low access to electricity in sub-Saharan Africa are multifaceted. The literature on the subject attributes this shortcoming to various factors including the lack of sufficient infrastructure,[188] which has been attributed to the lack of investments in constructing and maintaining these facilities.[189] Economic development and to some extent FDI in sub-Saharan Africa, and in Ghana specifically, are directly tied to energy availability within the region. Without reliable energy, development and even foreign investments can be severely halted. Therefore, it is not far removed to identify one of the most profound problems facing developing economies as one of energy deficiency. Given continental Africa's geographic location and optimal access to the equator, terrestrial photovoltaics ("PVs") are an optimal solution to achieving an environmentally friendly source of electrical energy while addressing some developmental issues that are intrinsically tied to energy deficiency and frequent blackouts.

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[184] World Energy Outlook, "Energy in sub-Saharan Africa Today" 51 (2014) *Africa Research Bulletin: Economic, Financial and Technical Series* 20615A-20615B.
[185] International Energy Agency (IEA), 2014. Africa Energy Outlook: A Focus on Energy Prospects in Sub-Saharan Africa, online: www.iea.org/publications/free/publications/publication/weo2014_africaenergyoutlook.pdf>;
[186] World Health Organization (WHO) "Household Energy, Indoor Air Pollution and Health", in Rehfuess E ed. Geneva Switzerland: WHO: 2006 p 7-12.
[187] IEA (2014). *Africa Energy Outlook. A Focus on Energy Prospects in Sub-Saharan Africa. Fostering Durable and Inclusive Growth*. Paris: International Energy Agency.
[188] Gómez-Ibáñez (ed) (2009). Regulating Infrastructure: Monopoly, Contracts, and Discretion.
[189] G Robbins & D Perkins (2012), Mining FDI and Infrastructure Development on Africa's East Coast: Examining the Recent Experience of Tanzania and Mozambique (2012) 24(2) *Journal of International Development* 220.

2.4.1 Climate Finance and FDI

The vast energy needs of sub-Saharan Africa are heightened by the need for private investors to bridge the financing gap left by public financing. A common approach to private investing has been through Independent Power Producers (IPP) which undertake power-generating projects of a non-public utility, that are financed primarily through private funds and are privately developed, owned and operated often through a special purpose vehicle ("SPV"), with a binding Power Purchase Agreement (PPA) (a contract that binds the government off-taker and the developer). The solar IPP projects in sub-Saharan Africa often have a mix of financing ranging from one corporation funding the entire project to various debt and equity finance structures. Risk assessment is crucial in renewable energy projects and the creditworthiness of the off-taker is of paramount importance.

The vast majority of IPP projects in sub-Saharan Africa are concentrated in Kenya, Nigeria, South Africa, Tanzania and Uganda.[190] The emergence of IPPs has not resolved the barriers that financiers encounter in developing renewable energy projects in sub-Saharan Africa. Firstly, local financing is not an option in a majority of cases. For example, Nigeria is one of the few countries in sub-Saharan Africa that has the infrastructural banking system to finance these large investments, however, it often only finances such large-scale projects for up to 5 years (whereas solar PPAs are usually for 15 to 20 years).

Few sub-Saharan African countries have the sovereign wealth funds sufficient to finance large-scale, long-term projects. As such, renewable energy projects based on 20 year PPAs often have to find equity on the international market. With many sub-Saharan African countries low credit rating, raising the debt and equity to finance a project can be challenging. Some scholars have attributed the absence of renewable energy projects in sub-Saharan Africa to a decline in publicly

[190] Anton Eberhard *et al*., *Independent power projects in Sub-Saharan Africa: Lessons from five key countries* (World Bank Publications, 2016).

funded projects arising from the lack of sustainable management.[191] Ikejemba *et al* concludes that despite the implementation of many small and medium-size PV project in sub-Saharan Africa, "most of them have been left to deteriorate with no maintenance, no cleaning, no repairs and more importantly no sustainable management method that encompasses them all".[192] There is also the fear that the projects will not get off the ground. For example, one of Ghana's largest renewable energy projects by Blue Energy received a substantial amount of attention, but never materialized.[193] While Blue Energy received a PPA 2011, the project never reached financial close, much less commercial operation.[194]

2.4.2 The Lack of Financing for Renewable Energy Projects in Sub-Saharan Africa

In 2015, 80% of renewable energy projects were funded by private sector funds (US$ 242 billion) versus 20% public finance (representing US$49 billion).[195] Countries like India, China and Brazil are receiving green energy investments in the form of FDI, while the sub-Saharan region has largely been neglected, despite many countries implementing a FIT Program. Foreign investors prefer projects in regions where the risks of return are low and where there are enabling governmental policies and frameworks, along with guarantees and low political risk. Consequently, domestic frameworks are crucial to attracting FDIs as 92% of private investments were spent in the same country that the funds were raised.[196]

The IEA *World Energy Investment Outlook Report* examined energy financing and

[191] Eugene C X Ikejemba, Peter B Mpuan, Peter C Schuur, Jos Van Hillegerberg, "The Empirical Reality & Sustainable Management Failures of Renewable Energy Projects in Sub-Saharan Africa (Part 1 or 2) (2017) 102 *Renewable Energy* 234.
[192] *Ibid* at 235
[193] Blue Energy, Africa's Large Solar (PV) Power Plant, Blue Energy, Cheshire, UK, 2015.
[194] Blue Energy Website, online: http://www.blue-energyco.com/africas-largest-solar-pv-power-plant
[195] Climate Policy Initiative, "Global Landscape of Climate Finance 2015" (November 2015), online: http://climatepolicyinitiative.org/wp-content/uploads/2015/11/Global-Landscape-of-Climate-Finance-2015.pdf at 6.
[196] *Ibid* at 10.

investment for a period up to 2030. The report estimated that "$48 trillion of cumulative investment in energy supply and efficiency are required by 2035". Moreover, investments in alternative energy are estimated at $53 trillion.[197] These numbers raise serious financing concerns especially among developing nations that already struggle with the costs of creating a viable energy infrastructure to facilitate economic development. The goal of increasing energy generating capacity to resolve the underdevelopment issue will only be achieved if innovative financing schemes are adopted. Foreign investors have shied away from high capital renewable energy projects due to perceived investment barriers.[198] Attracting FDI to renewable energy projects in the developing world will require effort in reducing perceived risks including those of a regulatory and political nature.[199] The UNDP "De-risking Renewable Energy Investments" identified a number of investment barriers that result in higher financing costs for these projects in the developing world. There are a number of impediments such as those caused by political instability and inadequate regulatory frameworks that impact on the ultimate barrier of financing renewable energy projects in sub-Saharan Africa.[200] These barriers increase the risks associated with the high capital-intensive costs resulting in the initial risk often outweighing the financial gains.[201] A recent approach to mitigating risks bifurcate the burden so that "private international investors are exposed only to the general political risks while international development banks cover mainly the regulatory risk."[202] The capital-intensive feature of renewable

[197] IEA, World Investment Outlook, International Energy Agency, Paris France, 2014. Special Report.
[198] Elmar Steurer, David Manatsgruber, Esther Prudence Jouégo, "Risk Clustering as a Finance Concept for Rural Electrification in sub-Saharan Africa to Attract International Private Investors"93 (2016) *Energy Procedia* 183.
[199] UNDP, De-risking Renewable Energy Investments. A Framework to Support Policymakers in Selecting Public Instruments to Promote Renewable Energy Investment in Developing Countries. United Nations Development Programme, New York, 2013; N Komendantova, A Patt, K Williges, "Solar Power Investment in North Africa: Reducing Perceived Risks" 15 (2011) *Renew, Sustain, Energy Rev* 4829; N Komendantova, A Patt, L Barras, A Battaglini, "Perception of Risks in Renewable Energy Projects: The Case of Concentrated Solar Power in North Africa 40 (2012) Energy Policy 102; Thomas Schinko, Nadejda Komendantova, "De-risking Investments into Concentrated Solar Power in North Africa: Impacts on the Cost of Electricity Generation" (92 (2016) *Renewable Energy* 262.
[200] Steurer, Manatsgruber, Jouégo, *supra* note 198.
[201] *Ibid*.
[202] Steurer, Manatsgruber, Jouégo, *supra* note 198 at 183.

energy projects increases the financial risks and consequently limits the number of available financing tools. In addition, national factors including country-specific political and economic barriers,[203] must also be considered in project financial risks assessment especially for solar projects.[204] Many investors insist that a risk-mitigating solution is to have the host country guarantee the off-takers payments, should a default arise. These sovereign guarantees generally arise when the off-taker has a poor credit rating, or the risk of default on payments is high. These guarantees are recognized as government debts and as such may affect a nation's balance sheet.[205] For this reason governments are reluctant to indebt an entire nation in pursuance of one project.

2.5 Gaps in the Literature

The literature reviewed explored the theme that if developing nations modernize their regulatory infrastructures to protect foreign investors' assets, then this change will lead to increase FDI. This theory was initially postulated within the IP sector and has proven not to be a viable pull factor for FDI in sub-Saharan Africa. A United Nations study[206] found that there was no correlation between high levels of IPR protection and the degree of FDI. In fact, there appears to be a contraindication, whereby many countries that have received FDI's have very poor IPR, and countries like Nigeria with strong IPR have received a low level of FDI in certain areas such as pharmaceuticals[207], but high FDI in industries that are extractive and service providing such as oil

[203] Merce Labordena, Anthony Patt, Morgan Bazilian, Mark Howells, Johan Lilliestam, "Impact of Political Economic Barriers for Concentrating Solar Power in Sub-Saharan Africa" 102 (2017) *Energy Policy* 52.
[204] M Peters, T S Schmidt, D Wiederkehr, M Schneider, 2011 "Shedding Light on Solar Technology – A Techno-economic Assessment and its Policy Implications. 39 *Energy Policy* 6422, online: http://dx.doi.org/1016/j.enpol.2011.07.045.
[205] Mauro Mecagni *et al*, *Issuing International Sovereign Bonds: Opportunities and Challenges for Sub-Saharan Africa*. Washington, DC: International Monetary Fund.
[206] United Nations Transnational Corps. & Management Div., Dep't of Econs. & Soc. Dev., Intellectual Property Rights and Foreign Direct Investment, ST/CTC/SER.A.24 (1993).
[207] *Ibid.*

and gas, cell phone, satellite T.V., and other service industries that yield rent-like returns to corporate investors. The putative logical conclusion that IPR lead to economic development through FDI, have not be substantiated by empirical evidence.[208]

The focus on strict IPR as a contributor to economic development may not have thoroughly accounted for the various types of industries, political climates, environmental factors, and general needs of developing countries, especially those in sub-Saharan Africa. Similarly, much of the pertinent discourse on IPR and FDI is devoid of an analysis that would account for the cultural peculiarities that may be relevant in sub-Saharan African economic growth and prosperity. The Hu and Png findings challenge the traditional neo-classical economic approach that viewed IPR, development and innovation as one-dimensionally predicated on the assumption that IPR positively affects development and innovation. However, while there is an abundance of literature on sectors like IP that have also relied on modernization of regulatory infrastructures as a basis for enticing FDIs, there is an absence of scholarly focus on issues relating to whether modernizing the power sectors within developing countries will lead to increase FDI.

The primary literature on the subject still has not resolved whether there is a causal connection between modernizing regulatory processes and economic growth for poorer countries. Countries like Ghana that have created enabling legislation to facilitate renewable energy projects have found that this modernization process is insufficient to attract FDI. Other nations like India, Brazil and China have adopted similar regulatory infrastructural changes that have resulted in a positive influx of FDI. Despite this ambiguity, there is a clear adherence to the principle that harmonized regulatory processes will eventually have a positive effect on the developing world, without regional distinction.

The issue of energy insecurity in Africa and the reality that the continent's development could

[208] Keith E Maskus, "Trade-Related Intellectual Property Rights, in Commission of the European Communities" (1993) 52 *European Economy* at 172.

be linked to an environmentally sustainable path, has forced the United Nations, World Bank, and especially the WTO to reconsider the role of regulatory reforms as it relates to the issue of climate change in Africa. The World Bank drew the connection between the problem of energy insecurity and development as intrinsically linked to the growth of the energy infrastructure in areas such as sub-Saharan Africa.[209] Unfortunately, this connection between energy infrastructures and development has not been thoroughly explored in the literature on FDI and development. In addition, in 2004 The United Nations Economic Commission for Africa in noting that energy was a prerequisite to development, identified the need for "institutional infrastructures."[210] The majority of sub-Saharan African countries are on the cusp of immense industrial growth and development, and as such they have the ability to adopt a sustainable pathway. In this regard, the United Nations Framework Convention on Climate Change and the recognition of green technologies in mitigating the negative effects of climate change are particularly relevant to the development of sub-Saharan Africa. The issue of flexibilities in international treaties and this conversation is at an infancy stage in the literature, and requires deep analysis and consideration.

International agreements like *TRIPS, TRIMS, SCM,* and the *GATT* have not cured the reluctance of foreign investors to finance renewable energy projects in sub-Saharan Africa. Moreover, the World Bank policies that encouraged transparent energy sector policies among developing nations have resulted in many nations like Ghana expanding their regulatory regime to include schemes like FIT. While these regulatory changes were necessary, they were not sufficient to encourage foreign investments in the region. This research will expand the scope of analysis of FDI to include local factors that act as barriers to foreign investments within the energy sector within sub-Saharan Africa. Admittedly, this research will borrow from the vast body of literature on IPR

[209] World Bank (1996), *supra* note 16.
[210] *Ibid*.

and development, and apply those lessons to the renewable energy sector and its ability to attract FDI to sub-Saharan Africa.

2.5.1 Contributions of this Research to Existing Literature

The literature review illustrates that industries and the type of technological investment may be equally important to FDI as national characteristics and policies. The promises made via the pharmaceutical sector relating to IP protection and increased FDI did not materialize. It is likely that these same promises of increased FDI through enhanced power regulations will also fall short of drawing foreign investors, especially in the high capital renewable energy sector. Similarly, in additional to tacit externalities such as the human capital factor, FDI may be attractive to a particular nation because of factors beyond having an enabling regulatory framework. Such additional factors include favourable investment policies and industrial policy organizations to oversee and assist in addressing some barriers to investing in the region.

A number of studies have shown that there is no positive effect on joining the WTO and increase in trade and foreign investments.[211] This means that despite joining the WTO and implementing harmonized regulatory frameworks, other local factors are present that still represent a barrier for investors. There has been a myriad of scholarly approaches to assessing the relationship between IPR and sustainable development. Some studies utilize empirical research employing differing measures including patent laws, surveys, statistics and interviews. Despite the measure adopted, there are still little empirical studies on the impact creating enabling regulatory structure

[211] Judith Goldstein, Douglas Rivers & Michael Tomz, "Institutions in International Relations: Understanding the Effects of the GATT and the WTO on World Trade" (2007) 61:1 International Organizations 37; Andrew Rose, "Do We Really Know That the WTO Increases Trade?" (2004) 94:1 American Economic Review 98; Michael Tomz, Judith L Goldstein, and Douglas Rivers, "Do We Really Know That the WTO Increases Trade? Comment" (2007) 97:5 *American Economic Review* 2005.

such as harmonized IPR on development in sub-Saharan Africa. Moreover, the impact of these studies on sustainable economic development is also parsimonious in the literature. Furthermore, the effect of creating enabling regulatory structures such as those undertaken by Ghana in its energy sector and its connection to climate change, has been virtually ignored in the literature. In all fairness, the absence of literary focus may be related to the fact that the WTO recently (in 2014) announced that climate control mitigation was a "public good", making it an integral part of international trade.

The literature review demonstrates that the relationship between FDI and enabling regulatory environments differ depending on the industry. For example, the literature reveals that it may not be a correct conclusion to maintain that modernizing regulatory processes are important to FDI without identifying industry specific characteristics such as pharmaceuticals, computers, green technologies, and electronics.[212] While scholars like Gervais,[213] Maskus and Penubarti,[214] and Mansfield,[215] recognize that IPR and development issues will require an infusion of policy and regulatory changes to lay the foundation in the host country, the literature is devoid of studies that demonstrate how a sub-Saharan African country progresses from implementing an enabling regulatory environment (especially in the renewable energy sector) to attracting FDI. There is also a clear void in the literature in the area of FDI and local conditions that facilitate renewable energy projects in sub-Saharan Africa. Similarly, despite whether one concludes that a modernized regulatory infrastructure is important for FDI, the literature needs to more directly address other factors that may influence a

[212] Keith Maskus, "The Role of Intellectual Property Rights in Encouraging Foreign Direct Investment and Technology Transfer" (a presentation at the conference on Public-Private Initiatives after TRIPS: Designing a Global Agenda, Brussels. 16-19 July, 1997), http://siteresources.worldbank.org/INTRANETTRADE/Resources/maskus2.pdf; Magic, Peter. International Technology Transfer and Intellectual Property Rights (30 November 2003) Department of Computer Science at University of Texas as Austin, 5 See: http://www.mba.intercol.edu/Entrepreneurship/UT%20Computer%20Science%20Course/Peter_Magic_International_IP_Rights.pdf.
[213] Gervais (2007), *supra* note 99.
[214] Maskus & Penubarti (1995), *supra* note 99.
[215] Mansfield (1995), *supra* note 100.

multinational company investing abroad.[216]

[216] Fosfuri, *supra* note 118.

CHAPTER THREE:

THE APPLICABILITY OF *TRIPS* FLEXIBILITIES TO THE DEVELOPING WORLD FOR CLIMATE CHANGE MITIGATION AS A PUBLIC GOOD IN GREEN ENERGY PROJECTS

(2015) 15 *Asper Review of International Business and Trade.*

L E S L Y N L E W I S [*]

Abstract

A view of the earth from space at night displays a peculiar phenomenon. While North-America and Europe appear to be illuminated by flickers of light resembling one harmonious radiant bulb, the continent of Africa has few glimmers. This reality does not reflect a lack of energy potential on the continent, but rather a pool of untapped renewable resources. The result is low energy consumption, dependency on fossil fuels, and broken promises of investments and development. The World Bank has recognized that no "*country in the world has succeeded* in shaking loose *from a subsistence economy without* access to the services that *modern energy* provides."[217] Energy is a precondition for development and, as fossil fuels are cheaper than renewable energy, poorer countries will likely gravitate towards the more affordable choices. Unfortunately, these choices result in high greenhouse gas emissions. Given the magnitude of developing countries undergoing economic growth and development, the potential exists for a colossal impact on the environment. While the responsibility for climate change mitigation belongs to developing as well as developed nations, the latter group is still able to choose a sustainable path towards development. In this regard, the fundamental issues are the transfer of green technologies to the developing world and the financial viability of the technologies themselves The transfer of green technology transfer is complicated by patents. *Trade Related Aspects of Intellectual Property Rights* (*TRIPS*) is the international agreement recognizing the importance of technology transfer in development treaties like the United Nations Framework Convention on Climate Change (UNFCCC). Discussions around the applicability of *TRIPS* to climate change have been limited, and numerous questions still need to be addressed about the intersection of *TRIPS* and climate change. Do *TRIPS* and intellectual property rights act as a barrier to green technology transfer? Can the flexibilities in *TRIPS* that were previously adopted for the global health care crisis be transplanted to the global public good of climate change mitigation?

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[217]World Bank, *A Brighter Future? Energy in Africa's Development* (World Bank, 1996), cited in Chien-Chiang Lee & Yi-Bin Chiu, "Modeling OECD Energy Demand: An International Panel Smooth Transition Error-Correction Model" (2013) 25 Intl Rev Economics & Finance 372 [emphasis added].

1.0 INTRODUCTION

The existential debate over climate change seems to be settled. What remains unresolved is how this global issue will be collectively addressed by individual nations. The Intergovernmental Panel on Climate Change (IPCC) has identified that rising greenhouse gases continue to destabilize the environment, causing a rise in global temperatures, sea levels, weather extremes and climate disasters.[218]Developing countries have fewer resources to deal with this change and, as such, may be more negatively affected by climate change than other regions.[219]Moreover, the susceptibility to natural disasters arising from global warming is disproportionately high in developing countries owing to a lack of technology to offset such changes. This is especially true for those relying heavily on fossil fuels to meet their basic needs.[220]Considering that developing countries have so much to lose from climate change and that they can choose their path to development, substituting green technologies seems to be a pragmatic option. However, the costliness of green choices and the acquirement of renewable energy technology may prove to be serious impediments.

Historically, Western nations, especially the United States and the United Kingdom, have been identified as the main global polluters. It follows that they should bear their share of the burden associated with reducing greenhouse gases (GHGs). Industrialized nations also possess the "know how" to adopt environmentally sustainable choices, especially in the renewable energy sector. In that context, developing countries have argued that, given the necessity of climate change mitigation, intellectual property (IP) barriers should be removed to allow easy transfer of green technology that will reduce dependency on fossil fuels. The complexities associated with this global problem are

[218] Intergovernmental Panel on Climate Change, *Climate Change 2014: Mitigation of Climate Change, Working Group III Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2014), online:<http://mitigation2014.org/> [IPCC].
[219] World Bank, *World Development Report 2010: Development and Climate Change* (Washington DC, 2010).
[220] *Ibid*.

highlighted by scholars: "Reducing GHG emissions is a global public good that is difficult to achieve because there are extensive free-riding incentives, cross-border effects that are hard to value, and political failures to price the use of carbon appropriately."[221] Consequently, countries like India and Ecuador have argued that patented green technologies should be made available, via compulsory licensing, to the rest of the world as a means of achieving the public good of environmental sustainability and climate change mitigation through the use of environmentally sound practices and technologies.[222]

As it would apply to climate change abatement technologies, a public good can be defined as a resource that belongs to everyone equally and without exclusion. Based on this definition, it may be posited that if such resource is abused, the effect will be on the entire globe, as each citizen would lose the benefit of that resource. If the resource is for the equal benefit of all, those who are responsible for diminishing it should bear the costs of any required abatement measures. In this regard, preserving the environment is for the benefit of the entire globe and the technologies that facilitate that may also be regarded as beneficial to all.

Some scholars have found a paradoxical outcome in climate change abatement technologies and the public good of environmental preservation as it relates to industrialized and developing countries. In "Effects of Technology Transfer on the Provision of Public Goods," Tae-Yeoun Lee found that "the advanced country, in spite of transfer, sees its economic welfare improved while the developing country sees it worsen."[223] This paradoxical outcome has been attributed to the fact that industrialized nations have been given the liberty to develop and grow without the imposition of

[221] Maskus and Okediji (2010), *supra* note 171.
[222] Robert Fair, "Does Climate Change Justify Compulsory Licensing of Green Technology?" (2009) 6:1 Intl L & Management Rev 21.
[223]Tae-Yeoun Lee, "Effects of Technology Transfers on the Provision of Public Goods" (2001) 18:2 Environmental & Resource Economics 193.

costly environmental and technological requirements. In *Eco-Imperialism: Green Power, Black Death,* Paul Driessen argues that Western nations have forcibly imposed environmental values on developing countries and have placed the well-being of the environment above that of human beings, a disproportionate number of whom are people of colour.[224] In this conjecture, the WTO and its protectionist approach has also been blamed for keeping the developing world impoverished. The infusion of green technology may arguably change the negative outcome so that the developing country may benefit from the new technology, further development and make a contribution to the environmental public good. Naturally, those countries that have been affected by WTO policies aimed at strengthening IPRs without incorporating mechanisms to facilitate green technology transfer also argue that treaties like *TRIPS* should define objectives to address the indirect advantage that industrialized nations have over developing ones.

This paper examines the impact of the *Agreement on Trade Related Aspects of Intellectual Property Rights* (*TRIPS*)[225] on the transfer of environmentally sustainable technology in the energy sector. It begins with a comprehensive exploration of the relevant provisions in *TRIPS* that may facilitate climate control. It questions whether *TRIPS* need to be modified to incorporate climate change principles or other policy initiatives and declarations (such as those obtained in the health care sector through the Doha Convention). It also addresses whether the unique international law *TRIPS* flexibilities that were conceded for the provision of "affordable medicines" can be utilized for climate change abatement strategies that treat climate change mitigation as a "public good." Specifically, can climate change and the need for affordable, environmentally-sound technologies in the developing world be addressed through compulsory licensing? Alternatively, can it be responded

[224] Paul Driessen, *Eco-Imperialism: Green Power, Black Death* (Bellevue: The Free Enterprise Press, 2003).
[225] World Trade Organization Agreement on Trade-Related Aspects of Intellectual Property Rights, 15 April 1994, Marrakech Agreement Establishing the World Trade Organization, Annex 1C, 1869 UNTS 299, 33 ILM 1197, online: WTO <www.wto.org/english/docs_e/legal_e/27-trips_01_e.htm> [*TRIPS*].

to as an issue of national urgency pursuant to Article 31 of *TRIPS*? Is the flexibility of compulsory licensing that was obtained for essential medicines plausible or efficacious for addressing climate change? This paper further considers the incorporation of affordable medicines concerns into *TRIPS* and the potential for such expansion to the climate change debate. The final segment of this chapter questions whether *TRIPS* needs to be modified or supplemented to address issues of climate change, or whether there are other, more viable solutions for addressing issues of development, climate change and the transfer of affordable green technologies to the developing world.

1.1 Background to the Climate Change Debate

TRIPS is a WTO agreement that governs Member-States and their citizens in relation to not only consumer products, but the sale of equipment and processes as well. The legislation covers trademarks, copyright, industrial design, geographical indications, layout designs of integrated circuits, new plant varieties and patents.[226]The focus herein will be solely on patents and, in particular, green energy technologies. *TRIPS'* engagement with the developing world has been largely confined to the HIV/AID affordable medicines crisis.[227] This racialization of HIV/AID and its application to *TRIPS* and Africa have engulfed the debate of the application of the treatise to development issues.[228] Environmental concern shave now shifted the focus of *TRIPS* to another "public good"—the environment and mitigating the effects of climate change. The global "public good" nature of both affordable medicines and climate change abatement should be an inherent feature of the debates.

The climate change question is as old as the industrial revolution. The discovery that fossil fuel usage may lead to the warming of the planet occurred in 1896 by Svante Arrhenius, a Swedish

[226] *Ibid* at Overview.
[227] See e.g, Gervais, ed, *Intellectual Property, Trade and Development, supra* note 99.
[228] Mgbeoji, "Trips and Trips-Plus Impacts in Africa", *supra* note 2 at 259.

scientist.[229] Arrhenius connected the carbon dioxide emissions produced when fossil fuels are burned to consequential atmospheric changes. Almost a hundred years later, sustainable development was clearly defined as development "that meets the needs of the present without compromising the ability of the future generation to meet their own needs."[230] This definition was reinforced through a similar concept central to the United Nations Framework Convention on Climate Change (UNFCCC), which emerged from the 1992 Rio Earth Summit.

The Stern Review on Economics and Climate Change,[231] which was commissioned by the British government in 2006, calls for immediate action on climate change. It concludes that "[o]ur actions over the coming few decades could create risks of major disruption to economic and social activity, later in this century and in the next, on a scale similar to those associated with the great wars and economic depression of the first half of the 20th century."[232] By 2007, just one year after the Stern Review, the Bali Action Plan solidified the international commitment to mitigate climate change.[233] Negotiations continued beyond Bali—in 2010, a conference held in Cancun resulted in the development of a new Technology Mechanism to facilitate the transfer of environmentally sound technologies to the developing world.[234] The two main divisions of the Mechanism are the

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[229] David Archer, Raymond Pierrehumbert, eds, *The Warming Papers: The Scientific Foundation for the Climate Change Forecast* (Chichester UK: Wiley-Blackwell, 2011).

[230] *Report of the World Commission on Environment and Development: "Our common future"* UNGAOR, 42nd Sess, Annex, UN Doc A/42/427(1987), online: Towards Sustainable Development, Chapter 2 <www.un-documents.net/wced-ocf.htm>.

[231] Nicholas Stern, *The Economics of Climate Change: The Stern Review* (Cambridge: Cambridge University Press, 2007), online: http://mudancasclimaticas.cptec.inpe.br/~rmclima/pdfs/destaques/sternreview_report_complete.pdf

[232] *Ibid* at Executive Summary, ii. See also: William D Nordhaus, *Managing the Global Commons: The Economics of Climate Change* (Cambridge, Mass: MIT Press, 1994); William D Nordhaus, "A Review of the Stern Review on the Economics of Climate Change" (2007) 45:3 *J Economic Literature* 686.

[233] *Report of the Conference of the Parties on its thirteenth session, held in Bali from 3 to 15 December 2007.Addendum. Part Two: Action taken by the Conference of the Parties at its thirteenth session,* UNFCCCOR, 13thSess, UN Doc FCCC/CP/2007/6/Add.1 (2008) [Bali COP Action Plan].

[234] *Report of the Conference of the Parties on its Sixteenth Session, held in Cancun from 29 November to 10 December 2010, Addendum. Part Two: Action taken by the Parties at its sixteenth session*, UNFCCCOR, 16th Sess, UN Doc FCCC.CP/2010/7/Add.1 (2011), at para 117, online: <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf> [Cancun COP Report].

Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN).[235] The launch of the Green Fund was also hailed as "one of the significant decisions that nations reached in Cancun, which show that governments can take repeated steps forward."[236] The Green Fund attempts to "meet the financial needs and options for the mobilization of resources to address the needs of developing country Parties with regard to climate change adaptation and mitigation."[237]

The 2014 Intergovernmental Panel on Climate Change report identified, as in previous years, the continued goal to keep climate change at a 2% level as compared to pre-industrial levels.[238] The IPCC report highlighted the following global mitigation requirements:

> Scenarios reaching atmospheric concentration levels of about 450ppm CO2eq by 2100 (consistent with a *likely* chance to keep temperature change below 2°C relative to pre-industrial levels) include substantial cuts in anthropogenic GHG emissions by mid-century through large-scale changes in energy systems and potentially land use (high confidence).[239]

The IPCC report identified changes in our energy choices as a means of reducing anthropocentric GHG emissions. The report also recognized the need for industrialized nations to share the costs borne by developing nations to adopt a green path of development through technology transfer. The UNFCCC, through the Kyoto Protocol, attempted to incorporate the transfer of environmentally sound technologies to the developing world by ensuring that the financial costs of acquiring these technologies do not act as a barrier to sustainable development.

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[235] *Ibid.* See also the UNFCCC Technology Mechanism of the Convention, online: <http://unfccc.int/ttclear/templates/render_cms_page?TEM_home>.
[236] United Nations, Press Release, "UN Climate Chief Tells Green Climate Fund Designers They Have Historic Task, Says Progress Can Encourage New Success in Durban" (29 April 2011), online: <www.unfccc.int/files/press/press_releases_advisories/application/pdf/pr20112904tcgreenfund.pdf>.
[237] Cancun COP Report, *supra* note 234 at para 101.
[238] IPCC, *supra* note 218.
[239] *Ibid* at 10.

1.1.1 The UNFCCC and its Kyoto Protocol

The issue of whether *TRIPS*-flexibilities can be adapted to climate change calls for both an understanding of the UNFCCC and *TRIPS*. UNFCCC was enacted in 1994 and its Kyoto Protocol in 2005.[240] The transfer of environmentally sound technology to emerging markets is a cornerstone of the UNFCCC mandate on climate change. Specifically, Article 4.1(c) of the Convention references the diffusion of environmentally sound technologies to mitigate climate change and is followed by Article 4.5, which stipulates that developed countries should "take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to environmentally sound technologies and know-how to other parties, particularly developing country parties to enable them to implement the provisions of the Convention."[241] In its report, the UNFCCC identified a number of barriers to the transfer of green technology to the developing world. Such barriers were identified as:

> (a) Institutional: lack of legal and regulatory frameworks, limited institutional capacity, and excessive bureaucratic procedures;
> (b) Political: instability, interventions in domestic markets (for example, subsidies), corruption and lack of civil society;
> (c) Technological: lack of infrastructure, lack of technical standards and institutions for supporting the standards, low technical capabilities of firms and lack of a technology knowledge base;
> (d) Economic: instability, inflation, poor macroeconomic conditions and disturbed and/or non-transparent markets; and,
> (e) Information: lack of technical and financial information and of a demonstrated track record for many ESTs.[242]

Similar to the UNFCCC, the Kyoto Protocol has attempted to eliminate barriers to climate change,

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[240] *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, 11 December 1997, 2303 UNTS 148 (entered into force 16 February 2005), online: http://unfccc.int/essential_background/kyoto_protocol/items/1678.php [*Kyoto Protocol*].
[241] UNFCCC, *United Nations Framework Convention on Climate Change*, UN Doc FCCC/INFORMAL/84 (1992), online: <http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf> [UNFCCC].
[242] UNFCCC, *Technical Paper on Terms of Transfer of Technology and Know How: Barriers and Opportunities Related to the Transfer of Technology*, UN Doc FCCC/TP/1998/1 (1998), online: <http://unfccc.int/resource/docs/tp/tp0198.pdf> at 6 [UNFCCC, *Technical Paper on Terms of Transfer*].

and is an essential part of international climate control mitigation involving energy resources. The protocol contemplates Clean Development Measures that focus on the transfer of renewable energy technologies.[243] This mechanism allows polluters in developed countries to obtain Certified Emission Reduction credits for projects carried out in the developing world that reduce emissions. The benefit of the Clean Development Mechanism is that developed countries can continue to engage in their activities and seek credits for projects in developing nations where it would be cheaper to implement these projects. Dechezleprêtre *et al* examine the prevalence and effectiveness of projects undertaken under the Clean Development Mechanism. The study found that while these projects were successful in the aim to reduce CO_2 emissions, they were not as effective in transferring technology (with only forty-three percent of the project including technology transfer).[244] This study also found the technology transfer was occurring among the same developing nations Brazil, India, China and Mexico leading to the conclusion that countries that benefit from CDM are usually at the more advanced stages of development.

The Kyoto Protocol clearly identifies the role of the private sector as facilitating technology transfer. Article 10(c) of the Protocol specifically aims to create an "enabling environment for private sector."[245] Despite the Protocol's good intentions, industrialized nations were not ready to commit to an international treaty that bound them to externally imposed targets. Three years post-adoption, a conference was held in Bali, Indonesia with the aim of creating a climate control treaty.[246] Leading up to the conference, the United States of America opposed the mandate of the meeting and "regularly sought to eliminate or dilute proposals describing climate change as a serious threat and advocating

[243] Antoine Dechezleprêtre, Matthieu Glachant, & Yann Ménière, "The Clean Development Mechanism and the International Diffusion of Technologies: An Empirical Study" (2008) 36:4 *Energy Policy* 1273. This study found that the adoption of this mechanism was largely practiced in four countries: Brazil, China, India and Mexico.
[244] *Ibid* at 1276.
[245] *Kyoto Protocol*, *supra* note 240.
[246] Bali COP Action Plan, *supra* note 233.

specific targets for reducing greenhouse gasses."[247] Despite America's steady opposition, 192 countries initially signed on to the UNFCCC and pledged to employ trade measures to mitigate climate change by reducing GHG emissions. The international community soon realized that development was intrinsically linked to carbon dioxide emissions which would only increase as developing countries grew their economies and industrialized nations maintained their standard of living.

1.1.2 From Kyoto to Paris 2015

There are dozens of international agreements that address the issue of technology transfer,[248] yet a concise international treaty committed to by all WTO members has still not materialized.[249] Prior to 2014, environmental agreements like the Kyoto Protocol set top-down targets. This deterred some countries, like the United States, from signing on and caused Canada to pull out for fear of not meeting externally imposed targets. Since Kyoto, the UNFCCC Conference of Parties (COP)[250] decided that a new voluntary approach should be adopted.

As recently as December 2014, the "Lima Call to Action" decision implemented a voluntary outlook that recognizes differing contributions of nations, working collectively for the future of the environment. In Lima, nations recognized "common but differentiated responsibilities."[251] The

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[247] John R Crook, "Contemporary Practice of the United States Related to International Law" (2008) 102 Am Intl L 155 at 165.

[248] See e.g. *Montreal Protocol on Substances that Deplete the Ozone Layer*, 16 September 1987, 1522 UNTS 3, 26 ILM 1541 (entered into force 1 January 1989); *Kyoto Protocol*, *supra* note 240; Bali COP Action Plan, *supra* note 233; *Copenhagen Accord*, United Nations Climate Change Conference 2009 in Copenhagen; *Convention on Biological Diversity*, 5 June 1992, 1760 UNTS 79(entered into force 19December1993); United Nations Sustainable Development, "Agenda 21: Earth Summit – The United Nations Programme of Action from Rio" (June 1992); *TRIPS*, *supra* note 1.

[249] The Paris Convention in 2015 is anticipated as being the forum for the drafting of an international treaty on climate change.

[250] The UNFCCC is governed by the COP which is the decision-making body of the Climate Convention. Member-states that are Parties to the Convention are each represented at the COP. The COP meetings address decisions that affect how the Convention is administered and implemented. See UNFCCC website: United Nations Framework Convention on Climate Change website: <http://unfccc.int/bodies/body/6383.php>

[251] *Lima Call for Climate Action,* FCCC Dec 1/CP.20, UNFCCCOR, 20th Sess, UN Doc FCCC /CP/2014/10/Add.1, 2 at 6, online: <http://unfccc.int/resource/docs/2014/cop20/eng/10a01.pdf#page=2>.

resulting 37-page document may embody the foundation for the first international environmental agreement ratified by all WTO members; the first international agreement on climate change is expected to emanate from the December 2015 Paris Climate Change Conference. Each country was given until March 2015 to submit their "intended nationally determined contributions" (INDC)—a voluntary national pledge for climate change mitigation.

2.0 THEORETICAL PERSPECTIVES ON *TRIPS*, CLIMATE CHANGE & ENVIRONMENTALLY SOUND TECHNOLOGY.

The impact of IPR on green technology transmission to the developing world fits into the larger *theoretical debate* on IPR and development— climate change and technology transfer are directly related to the issue of development in the energy sector. The provision of energy through alternative and renewable sources, such as solar energy, brings together governments, corporations, and individuals with the collective goal of mitigating greenhouse gas emissions through technology. Since the enshrinement of *TRIPS* in 1995, most of the scholarly debate has been confined to the explanatory realm of understanding its impact on development.[252] Studies conducted after the enactment of *TRIPS* in 1995 tended to conclude that stronger IPR can encourage multinational corporations to invest[253] by providing an incentive for multinationals to invest in developing economies.[254] Other studies show no conclusive connector between *TRIPS*, strong national IPR and economic growth;[255] the impact of strong IPR has been shown to vary across nations in relation to

[252] Robert M Sherwood, "The TRIPS Agreement: Implications for Developing Countries" (1997) 37:3IDEA 491.
[253] Branstetter, Fisman & Foley, *supra* note 96; Lee Branstetter *et al*, *supra* note 81.
[254] Albert Guangzhou Hu& Ivan Png, "Patent Rights and Economic Growth: Cross-Country Evidence"(2009) National University of Singapore Working Paper, online: <http://papers.ssrn.com/sol3/JELJOUR_Results.cfm?form_name=journalBrowse&journal_id=1354754>.
[255] Carlos A Primo Braga & Carsten Fink, *supra* note 77; Keith Maskus, "Incorporating a Globalized Intellectual Property Rights Regime into an Economic Development Strategy" in Keith Maskus, ed, *Intellectual Property Growth and Trade* (Bingley, UK: Emerald Group Publishing, 2007); Keith E Maskus, "Intellectual Property Rights and Economic Development"(2000) 32 *Case W Res J Intl* L 471; Maskus & Penubarti, *supra* note 99; Gervais, *Intellectual Property, Trade and Development, supra* note 99.

economic development.[256] Despite the various concatenations of IPR and development, the literature connecting the patent system with the promotion of green technologies to the developing world, is parsimonious at best[257] and almost silent as it relates to climate change, *TRIPS* and green technologies specifically within the renewable energy sector in developing and least-developed economies.

2.1 Green Technology, Environmentally Sound, Friendly, Sustainable Technology

The terms "green" technology and "environmentally sound technologies" ("EST") refer to technologies that are "climate friendly," "green" or that minimize environmental harm.[258] They also consist of processes and varying innovative methods, such as energy storage, recycling and waste management, industrial processes, and greenhouse gas reduction methods.[259] Clearly, as many technologies of this nature exist, it is difficult to adopt one holistic definition. The United Nations has defined environmentally sound technologies as follows:

> Environmentally sound technologies protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes… Environmentally sound technologies in the context of pollution are "process and product technologies" that generate low or no waste, for the prevention of pollution. They also cover "end of the pipe" technologies for treatment of pollution after it has been generated.[260]

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[256] Park & Ginarte, "Intellectual Property Rights and Economic Growth" (1997), *supra* note 81; Yee Kyoung Kim, Keun Lee & Walter G Park, "Appropriate Intellectual Property Protection and Economic Growth in Countries at Different Levels of Development" (2008) 3rd Annual Conference of the EPIP Association, Bern Switzerland, online: <www.epip.eu/conferences/epip03/papers/KIM_LEE_PARK.pdf>; Branstetter, Fisman & Foley, *supra* note 96; Lee Branstetter*et al*, *supra* note 96; Smith, *supra* note 96; Maskus (2004) *supra* note 96; Kanwar & Evenson, *supra* note 81; Nikos Varsakelis, "The Impact of Patent Protection, Openness, and National Culture on R&D Investment: A Cross-Country Empirical Investigation" (2001) 30:7 Research Policy 1059.

[257] Estelle Derclaye, "Intellectual Property Rights and Global Warming" (2008) 12:2 *Marq Intell Prop L Rev 264* [Derclaye, "Intellectual Property Rights"]; Estelle Derclaye, "Patent Law's Role in the Protection of the Environment – Re-assessing Patent Law and its Justification in the 21st Century" (2009) Intl Rev Intellectual Property & Competition L 4 [Derclaye, "Patent Law's Role"]; Mansfield, *supra* note 100.

[258] United Nations Environment Program (UNEP), *Transferring Environmentally Sound Technology, Co-operation and Capacity Building*, online: <www.unep.org/Documents.multilingual/Default.asp?DocumentID=52&ArticleID=84&l=en> [UNEP].

[259] David Popp, "Innovation and Climate Policy" (2010)National Bureau of Economic Research Working Paper No 15673, online: <www.nber.org/papers/w15673> [Popp].

[260] UNEP, *supra* note 258.

Furthermore, the availability of "clean energy" technologies is hampered by the fact that, even after patents expire, they do not contain enough information to facilitate technology transfer.[261]Matthew Littleton concluded that: "Despite numerous international commitments to promote transfer of climate change related technologies to developing countries, such transfers are not occurring at a sufficient rate to aid these nations in mitigating and adapting to the effects of climate change."[262] The virtual absence of EST transmission to Africa in general raises serious questions about *TRIPS* and technology transfer.

The ownership of green technologies by industrialized nations and the need to utilize such technologies within developing nations creates the inevitable outcome that technology transfer will occur from countries like the U.S. to emerging markets like those in sub-Saharan Africa. Consequently, green technology transfer will involve the transfer of these technologies from industrialized countries that own the patent rights, like the U.S., to developing or lesser-developed nations. The World Intellectual Property Organization (WIPO) is a United Nations agency that mandates international standards for intellectual property rights. It governs the facilitation and "transfer of technology related to industrial property to the developing countries."[263] WIPO patent filings are evidence that corporations of the industrial world dominate patent ownership: the United States is the largest holder of green technology patents comprising wind and solar photovoltaic. Of the 215,000 "clean energy" patents filed between 2000 and 2008, the majority are concentrated in the hands of OECD nations.[264] While not only are green patents controlled by OECD countries,

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[261] Matthew Littleton, "The TRIPS Agreement and Transfer of Climate-Change-Related Technologies to Developing Countries" (2008) United Nations Department of Economic and Social Affairs Working Paper No 71, online: <www.un.org/esa/desa/papers/2008/wp71_2008.pdf>.
[262] *Ibid* at Abstract.
[263]*Agreement Between the United Nations and the World Intellectual Property Organization*, UNGAOR, 29th Sess, Annex, Agenda Item 12, UN Doc A/RES/3346(XXIX) 71.
[264] Third World Network (TWN), "WTO discusses intellectual property and green technologies transfer"(28 February 2014), online: Third World Network <www.twn.my/title2/climate/info.service/2014/cc140201.htm> [TWN]; See also:

climate change technologies by virtue of their ownership would have to be primarily be transferred from developed countries to developing ones if such transfers were to occur at all.[265]

International disputes and the regulation of intellectual property rights are governed by the WTO under the *TRIPS* treaty. Thus, any inequities that arise from the implementation of *TRIPS* between industrialized, developing and least-developed nations must be brought before the *TRIPS* Council before they can be adequately addressed. The new problem of addressing the inequities arising from industrialized nations' control of green technologies has once again brought *TRIPS* to the forefront of the debate on development and intellectual property rights. *TRIPS'* role and impact on development has required developing countries to engage the WTO (as the governing body of *TRIPS*) in a discussion of intellectual property, technology transfer, and climate change. The topic "Contribution of intellectual property to facilitate the transfer of environmentally rational technology" was included as an agenda item at the WTO *TRIPS* Council as requested by Ecuador.[266]Various Members chastised the evolution of *TRIPS* and its failure to address issues of development. India argued in support of Ecuador's position, that:

> It is high time that the role of intellectual property is addressed in a constructive and balanced manner to address the issue of greenhouse gas emissions and climate change adaptation and mitigation efforts. Since any effort in this direction is dependent on the diffusion of environmentally sound technologies in the developing countries, it is essential that barriers in accessing these technologies are suitably addressed.[267]

United Nations Environment Programme, European Patent Office & International Centre for Trade and Sustainable Development, "Patents and Clean Energy: Bridging the Gap Between Evidence and Policy: Final Report" (Geneva, Munich: UNEP, EPO, & ICTSD, 2010), online: <www.ictsd.org/sites/default/files/research/Patents%20and%20clean%20energy%20bridging%20the%20gap%20between%20evidence%20and%20policy_0.pdf> at 22.

[265]Jean Olsen Lanjouw & Ashoka Mody, "Innovation and International Diffusion of Environmentally Responsible Technology" (1996) 25:4 Research Policy 549.

[266] TWN, *supra* note 264.

[267] WTO, General Council, *Minutes of Meeting* (held on 25-26 February 2014), WTO Doc IP/C/M/75/Add.1 at para 284, online: <www.wto.org/english/tratop_e/trips_e/february2014_on_climate_e.pdf>.

Specifically, according to India and Ecuador, it is unlikely businesses will implement policies to ameliorate the purported negative effects of IPR on "green technologies."[268] As such, developing countries are looking to the WTO to address the problem of IPR and sustainable development, specifically as it relates to the transfer of "green technologies."

On February 25th and 26th, 2014, a *TRIPS* Council meeting was held wherein a number of countries raised a connection between IPR and development. The issue of IPR as a barrier to environmentally sound technology transfer — initially brought before the WTO by Ecuador in 2013— resurfaced. Ecuador advocated a position that considered "adopting at the Bali Ministerial Conference a declaration in which Members would enshrine the principle that 'nothing in the TRIPS Agreement can minimize or impair the flexibilities provided for in the Agreement, nor prevent or limit Members from taking measures they consider necessary to protect their population from the effects of climate change and to make use of 'environmentally sound technologies.'"[269]

The WTO considered Ecuador's position and, relying on Carlos Correa, a renowned *TRIPS* and public health scholar, arrived at the conclusion that, "in the case of environmentally sound technologies linked to adaptation and/or mitigation of climate change caused by CO_2, we consider that these must be considered a 'public good.'"[270] The WTO found that if the goal of environmentally sound technologies is to "promote global social welfare through adaptation and/or mitigation of the

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[268] TWN, *supra* note 264.

[269] World Trade Organization, TRIPS Council, "Contribution of Intellectual Property to Facilitating the Transfer of Environmentally Rational Technology Communication from Ecuador" 27 February, 2013 at 6, online: <www.wtocenter.org.tw/SmartKMS/fileviewer?id=131645> [TRIPS Council, "Contribution of Intellectual Property"]; See also TWN, *supra* note 264; Thiru Balasubramaniam, "WTO TRIPS Council (February 2014) – Ecuador's interventions on the contribution of IP to facilitate the transfer of green tech" (27 February 2014), *thiru's blog* (blog), online: Knowledge Ecology International <www.keionline.org/node/1964>

[270] *Ibid*, TRIPS Council, "Contribution of Intellectual Property" at para 15. See also the WTO's reference to: Carlos M. Correa, "Mechanisms for International Cooperation in Research and Development in the Area of Climate Change" in *Technological Cooperation and Climate Change: Issues and Perspectives* (Paper presented at the Ministry of Environment and Forests, Government of India – UNDP Consultation on Technology Cooperation for Addressing Climate Change, 23-24 September 2011) 37, online: <www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Change/climate_change_report_30-11-2011.pdf>.

effects of climate change," then an "evaluation and possible revision of the framework for the protection of intellectual property rights for technological applications would be one of the most important options for developing countries with regard to climate change."[271] The 2014 recognition of green technologies as "public goods" that are required to combat climate change may completely alter the landscape of sustainable development and the transfer of green technology to the developing world.[272] The recognition of EST and efforts to mitigate climate change by designating green technologies as public goods will influence the scholarly focus on *TRIPS* to concentrate more on environmental issues.

Generally, pollution levels and environmental damage has been attributed to past decisions that affect present generations. For instance, Robert Stavins defines this polluting activity as "an unintended consequence of market decisions which affect individuals other than the decision maker."[273] A number of scholarly approaches have been adopted in the debate on development and climate change. Some connect the patent system with the promotion of green technologies.[274]Others highlight the merits of technology transfer as directly linked to the strength of patents in the importing country.[275] The level of IPR enforcement is not the only variable affecting technology transfer; some authors, including Pamela J. Smith, have found that, particularly in relation to the United States exports, the importing country's ability to imitate the invention also played an important role.[276]

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[271] TRIPS Council, "Contribution of Intellectual Property", *supra* note 269 at 4.
[272] See e.g. Margaret Chon, "Intellectual Property and the Development Divide" (2006) 27:6 Cardozo L Rev 2821at 2878.
[273] Robert N Stavins, "Environmental Economics" in Steven N Durlauf & Lawrence E Blume, eds, *The New Palgrave Dictionary of Economics*, 2nded, (London, Palgrave Macmillan, 2008) at 1.
[274] Derclaye, "Intellectual Property Rights", *supra* note 257; Derclaye, "Patent Law's Role", *supra* note 257.
[275] Smith, "Weak Patent Rights", *supra* note 96; Pamela Smith, "How Do Foreign Patent Rights Affect U.S. Exports, Affiliates Sales, and Licenses?" (2001) 55:2 J Intl Economics 411 [Smith, "Foreign Patent Rights"]; Maskus & Penubarti, *supra* note 99; Maskus, "Encouraging International Technology", *supra* note 96.
[276] *Ibid*, Smith, "Weak Patent Rights"; *Ibid*, "Foreign Patent Rights"; Maskus & Penubarti, *supra* note 255; Maskus, "Encouraging International Technology", *supra* note 256; Titus O Awokuse & Hong Yin, "Do Stronger Intellectual Property Rights Protection Induce More Bilateral Trade? Evidence from China's Imports" (Paper prepared for the American Agricultural Economics Association's Annual Meeting, 29 July 2008), online: <http://econpapers.repec.org/paper/agsaaea08/6143.htm>.

Another scholarly approach recognizes granting favourable tax incentives to companies that undertake research and development in developing countries as a means of transferring technological knowledge.[277] In particular, William D. Nordhaus argued that environmentally sustainable practices can only be fostered if a global carbon tax, which is very difficult to implement, is pursued.[278]

In 1994, Edwin Mansfield drew the connection between FDI, IPR and technology transfer. The Mansfield study was seminal in its survey of almost 100 American multinational companies with branches worldwide. His research identified three essential intellectual property requirements of host nations to attract foreign investments: protecting imported technology, good legal infrastructure, and the equal treatment of foreign and domestic firms.[279] The conclusion from the Mansfield studies demonstrates that FDI is closely connected to the perceived strength of intellectual property protection in the host country.[280] It was recognized that some kind of incentive is required to entice to substitute cheaper energy options with more costly renewable energy solutions some kind of incentive is required to entice foreign investors.

Many scholars have connected the patent system with the transfer of green technologies.[281] Analyzing endogenous growth models, Acemoglu *et al* recognize the need for technology transfers to facilitate green choices.[282] As far back as 1990, Robert Sherwood identified a positive relationship between IPR and economic development, and concluded: "it is now well understood that the introduction of new technology into an economy accounts for a great portion of the economic growth

[277] *Ibid*, Maskus, "Encouraging International Technology", *supra* note 96.
[278] William D Nordhaus, "Economic Issues in Designing a Global Agreement on Global Warming" (Keynote Address delivered at the Climate Change Conference, Copenhagen, Denmark, 10-12 March 2009), online: <www.econ.yale.edu/~nordhaus/homepage/documents/Copenhagen_052909.pdf>.
[279] Mansfield, *supra* note 100.
[280] *Ibid*.
[281] Derclaye, "Intellectual Property Rights", *supra* note 257; Derclaye, "Patent Law's Role", *supra* note 257.
[282] DaronAcemoglu et al, "The Environment and Directed Technical Change" (2009) National Bureau of Economic Research Working Paper No 15451.

of that economy and produces a very high social rate of return."[283] Juan Carlos Ginarte and Walter Park created an index that presented a strong statistical foundation for research in technology transfer and IPR.[284] Park and Lippoldt expanded on the Ginarte-Park data and constructed a measure of IPR and technology transfer as it relates to inward FDI.[285] According to Park and Lippoldt's findings, a strong correlation between IPR and technology transfer was associated with high tech transfers, chemicals[286] and pharmaceuticals.

In 2003, Kanwar and Evenson utilized the Ginarte and Park study to explore research and development ("R&D") spending among a sample of thirty-two countries and found a positive correlation between stronger IPR regimes and increases in R&D spending.[287] However, while an intuitive conclusion would be to increase incentives as the most viable way to promote diffusion of existing technology,[288] scholars like Popp argue that the most efficient means of achieving technology transfer is through the implementation of favourable regulatory policies.[289]

2.1.1 Technology Transfer and Climate Change Mitigation

Technology transfer is a necessary part of climate change mitigation. The patents associated with green technologies are owned by developed countries. In order to modify the dependency of developing nations on fossil fuels, environmentally friendly technologies must be substituted. The high cost of these technologies will require partnerships between developing and developed countries, including, but not limited to, foreign direct investments, joint ventures and licensing

[283] Robert Sherwood, *Intellectual Property and Economic Development* (Boulder: Westview Press, 1990) at 7.
[284] Park & Ginarte (1997), *supra* note 81.
[285]Walter Park & Douglas C Lippoldt, "Technology Transfer and the Economic Implications of the Strengthening of Intellectual Property Rights in Developing Countries" (2008) Organisation for Economic Co-operation and Development Working Paper No 62, online: <www.american.edu/cas/faculty/wgpark/upload/Tech-Transfer-w-Doug-Lippoldt.pdf>.
[286] For a study of IPR and FDI in the chemical industry see: Andrea Fosfuri, "Determinants of International Activity: Evidence from the Chemical Processing Industry" (2004) 33:10 *Research Policy* 1599.
[287] Kanwar & Evenson, *supra* note 81.
[288] Popp, *supra* note 259.
[289]*Ibid.*

agreements to facilitate green technology transfer.

Environmentally sound technology,[290] environmentally friendly/sustainable technology and climate mitigating technology all fall within the scope of green technology. The Vienna Convention for the Protection of the Ozone Layer defines environmentally friendly equipment as "technologies or equipment the use of which makes it possible to reduce or effectively eliminate emissions of substances which have or are likely to have adverse effects on the ozone layer."[291] The IPCC defines "technology transfer" as "a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, NGOs and research/education institutions."[292] Developed countries' commitment to transferring technologies to developing nations is contained in Article 4.5 of the UNFCCC which states that:

> The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention. In this process, the developed country Parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties. Other Parties and organizations in a position to do so may also assist in facilitating the transfer of such technologies.[293]

The primary treaty governing environmentally sustainable technologies and IPR is the *TRIPS* Agreement. While patents must be filed in every local jurisdiction requiring protection, *TRIPS* creates mandatory minimum international standards for these patents which are followed by WTO

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[290] This term was first used in the *Kyoto Protocol.* See *Kyoto Protocol*, *supra* note 240 at art 2(1)(a)(iv).
[291] *Vienna Convention for the Protection of the Ozone Layer*, 22 March 1985, 1513 UNTS 293, art 1(3) (entered into force 22 September 1988), online: <http://ozone.unep.org/new_site/en/Treaties/treaties_decisions-hb.php?sec_id=155>.
[292] Intergovernmental Panel on Climate Change, *Summary for Policy Makers:Methodological and Technological Issues in Technology Transfer*, Bert Metz el al, eds, (2000) at 3, online:<www.ipcc.ch/pdf/special-reports/spm/srtt-en.pdf>.
[293] UNFCCC, *supra* note 241 at Article 4.5.

signatories. As the majority of WTO members were required to support *TRIPS* in order to ratify the treaty, multinationals were forced to submit to some exceptions to Article 27(2) that would recognize the right for countries to provide necessary health care for their citizens. This exception is found in Article 31 of *TRIPS* and is known as the compulsory licensing exception.

2.1.2 Licensing As a Tool for Green Technology Transfer

Licensing green technology is perhaps the most commonly utilized method of technology transfer, especially in the renewable energy sector. Arora and Ceccagnoli examined the relationship between firm licensing behaviour and patent protection by utilizing the 1994 Carnegie Mellon Survey on American manufacturing firms. They found that licensing practices depend on the extent to which the firm's assets are specialized.[294] Since there is a unidirectional transfer of green technologies from the industrialized world to the developing world, those with the patents and intellectual property will require some assurance that the receiving regimes will respect their proprietary interests. Some countries or companies may be reluctant to facilitate green technology transfer if they feel that their intellectual property may be infringed. Pamela Smith studied whether the level of service provided by American firms to foreign markets differs depending on the strength of the foreign patent regime and concluded that U.S. firms are more likely to license to countries with stronger patent laws and enforcement mechanisms.[295] Smith's conclusion supports the supposition that firms are more likely to transfer technologies through licenses to countries with stronger patent regimes. Lei Yang and Keith Maskus also found that stronger intellectual property regimes provide incentives to license technologies to developing nations.[296]

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[294] AshishArora& Marco Ceccagnoli, "Patent Protection, Complementary Assets, and Firms' Incentives for Technology Licensing" (2006) 52:2 Management Science 293.
[295] Smith, "Weak Patent Rights", *supra* note 96.
[296] Lei Yang & Keith E Maskus, "Intellectual Property Rights, Technology Transfer and Exports in Developing Countries" (2009) 90:2 J Development Economics 231.

In Keith Maskus and Ruth Okediji's "Intellectual Property Rights and International Technology Transfer to Address Climate Change: Risks, Opportunities and Policy Options," the issue of climate change and IPR in relation to technology transfer was addressed from a legal, economic and technical perspective.[297] The authors found that, despite commitments in the UNFCCC and the Bali Action Plan calling for developed countries to take proactive steps to facilitate technology transfer, the multilateral, legal and economic frameworks are not sufficiently entrenched to operationalize the process. Several studies of the wind, solar and biofuels industries have examined the role of IPR in transferring technology to emerging markets.[298] Many countries in the developing world have indicated that they experienced difficulty in obtaining technologies due to high licensing costs and the need to turn to off-patent alternatives.[299] These off-patent technologies may not be as technologically advanced as the products under patent.

The literature review on IPR, climate change and technology transfer illustrates that the industrial sector and type of technological investment may be as important as national characteristics and policies. In addition to tacit externalities such as the human capital factor, investors may be attracted to a particular nation because of favourable investment policies. Relaxing the standards of patents under *TRIPS* for public policy reasons has been considered for green technology transfer.[300] Advocates such as Derclaye have argued that high CO_2 emission technologies should be discouraged

[297] Maskus & Okediji (2010), *supra* note 171.
[298] John H Barton, "Intellectual Property and Access to Clean Energy Technologies in Developing Countries: An Analysis of Solar Photovoltaic, Biofuels and Wind Technologies" (2007) International Centre for Trade and Sustainable Development Issue Paper No 2, online: Trade and Sustainable Energy Series<www.ictsd.org/sites/default/files/research/2008/11/intellectual-property-and-access-to-clean-energy-technologies-in-developing-countries_barton_ictsd-2007.pdf > [Barton, "Intellectual Property"]; Kelly Gallagher, *The Globalization of Clean Energy Technology: Lessons from China* (Cambridge: MIT Press, 2014); Jim Watson et al, "Low Carbon Technology Transfer: Lessons from India and China" (2010) Sussex Energy Group Policy Briefing No 9*,* online: <http://sro.sussex.ac.uk/53027/1/SEG_Policy_Briefing_9.pdf> [Watson et al].
[299] *Ibid*, Watson et al.
[300] Derclaye, "Intellectual Property Rights", *supra* note 257; Matthew Rimmer, "The Road to Copenhagen: Intellectual Property and Climate Change" (2009) 4:11 J Intellectual Property L & Practice 784.

by the patent system and that green technologies should receive more favourable treatment, including expedited patent examinations.[301]

The cost of adopting green technologies are increased owing to the protection of intellectual property rights under the *TRIPS* Agreement. However, *TRIPS* contains some flexibilities that could be adopted by Members to reduce the prohibitive cost of patent use. In particular, this could apply in situations where the patent is needed in furtherance of a public good: these include "public goods" such as public health and sustainable economic development. Since 1995, developing and least-developed countries have achieved at least partial success in carving out declarations such as Doha Round, that bind *TRIPS* to a consideration of "public goods" issues associated with patents. This is evident in the copious literature on HIV/AIDS and the affordable medicines debate. The 2001 Doha Ministerial Declaration on *TRIPS* and Public Health laid the groundwork for the modification of Article 33 to include the compulsory license exception; the Bali WTO Ministerial Conference of December 2013 may have sparked a debate on *TRIPS* and climate change.

The issues regarding *TRIPS* and its flexibilities have inspired a new debate emerging out of the Bali Ministerial *TRIPS* Council Conference of 2013. The effect of patents on a particular industry, such as one attempting to address the negative impact of climate change, has been virtually ignored in the literature. In all fairness, the absence of commentary may be related to the fact that the WTO only recently (in announced that climate change mitigation was a "public good," making it an integral part of international trade.[302] While scholars like Gervais,[303] Maskus and Penubarti,[304] and Mansfield,[305] recognize that IPR and development issues will require an infusion of policy and

[301] Derclaye, "Patent Law's Role", *supra* note 257.
[302] TWN, *supra* note 264; WTO TRIPS Council, *supra* note 269.
[303] Gervais, *Intellectual Property, Trade and Development*, *supra* note 99.
[304] Maskus & Penubarti, *supra* note 255.
[305] Mansfield, *supra* note 100.

regulatory changes to lay the foundation in the host country, the literature is devoid of studies on how IPR specifically affect green technologies and sustainable development in sub-Saharan Africa. This paper aims to enhance the literature on *TRIPS*, the role of IPR in development, and the transfer of green technologies for the mitigation of climate change within the renewable energy sector of emerging markets.

3.0 ***TRIPS* FLEXIBILITIES FOR THE GLOBAL PUBLIC GOOD**

In 1986 a series of international trade negotiations known as the Uruguay Round on the *General Agreement of Tariffs and Trade* (*GATT*) were held. The negotiations brought together international parties to discuss how intellectual property standards could be harmoniously maintained in the international forum. The negotiations commenced in September 1986 in Punta del Este, Uruguay and concluded in Marrakesh, Morocco on April 15, 1994. The WTO was created in 1995 as a result of the eight-year Uruguay Round and Marrakesh negotiations. On January 1, 1995 the *TRIPS* Agreement came into effect to facilitate trade by creating international patents, trademarks and copyright standards. *TRIPS* aims to harmonize global intellectual property protection and access by securing the global rights of innovators while affording public access to the innovations. The WTO administers *TRIPS* through the *TRIPS* Council, comprised of WTO Members. The effect of *TRIPS* is not to negate national laws; rather, it provides procedures for complying with international intellectual property requirements and resolving disputes between nations and multinational corporations. Balancing the developing nations' need for sustainable development against IPR and the promotion of further research and development is a growing concern for *TRIPS*, especially in light of the climate change debate.

3.1 General *TRIPS* Flexibilities for the "Public Good"

A number of *TRIPS* flexibilities can be applied to green technology transfer. As stated in Article 7, *TRIPS* requires a balance between the obligations and the promotion of social and economic welfare. It recognizes that the promotion of intellectual rights "should contribute to the promotion of technological innovation and to the transfer and dissemination of technology."[306] This definitive right should be examined in conjunction with Article 8, which establishes Members' rights to protect public interests (arguably against IPR abuses). Specifically, Article 8 upholds the rights of all Members to act in a manner that advances the public interest and ensures the protection of public health in a way that is "consistent with the provisions" of *TRIPS.* This *includes avoiding practices that would negatively impact on technology transfer*.[307] Article 40 also recognizes that patents may impede technology transfer.

TRIPS uniforms international patent protection by conferring, under Article 28, exclusive rights for both the patented "product" and the subject matter of a patent "process." Notwithstanding the right of the patent owner to "assign, or transfer by succession, the patent and to conclude licensing contracts," Article 28 prohibits third parties from "making, using, offering for sale, selling, or importing"[308] both the process by which the product is made and the product itself without the consent of the patent holder. There are limited exceptions to Article 28, found in Article 31 "limited exceptions."

Prior to *TRIPS,* laws protecting intellectual property were based on individual national initiatives. The dispute over exclusivity and the unfairness grew from the concern that universal patent rights could have a negative impact on "public goods." In particular, this concern was that the

[306] *TRIPS*, *supra* note 225, art 7.
[307] *Ibid,* art 8.
[308] *Ibid,* art 28. This right, like all other rights conferred under this Agreement in respect of the use, sale, importation or other distribution of goods, is subject to the provisions of Article 6.

high cost of patented pharmaceuticals could pose a barrier to accessing life-saving medicines for citizens in developing and least-developed countries. Many developing nations with the technological know-how were producing generic patented medicines in their countries and refusing to grant a patent to multinationals for their products.[309] Under Article 27 of the *TRIPS* Agreement, a WTO Member-State could not refuse to grant a patent, and international patents were recognized "in all fields of technology."[310] This provision allows developing nations to import cheap generics from countries like India.

As the majority of WTO members were required to support *TRIPS* in order to ratify the legislation, multinationals were forced to incorporate some exceptions to Article 27(2) that would recognize countries' right to provide necessary health care for their citizens. Article 31 of *TRIPS*, known as the compulsory licensing exception, allows nations to restrict or override exclusive rights to patents. This restriction was obtained only with the concession that there must be "*mutual advantage of producers and users*"[311] of the technology. Thus, exclusivity is checked by Article 7 of *TRIPS*:

> The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to *the mutual advantage of producers and users* of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations.[312]

These concessions were achieved by developing nations that promoted the need for a *balance* in the legislation to facilitate public health goals. Article 8 of the Agreement attempts to balance the potential for abuse of power by patent holders against the ability to promote the free trade in

[309] F M Scherer, "The Pharmaceutical Industry and World Intellectual Property Standards," 53:6(2000) Vand L Rev2245 at 2247.
[310] *TRIPS*, *supra* note 225, art 27.
[311] *Ibid* [emphasis added].
[312] *Ibid* [emphasis added].

technology:

> Members may, in formulating or amending their laws and regulations, adopt measures necessary to protect public health and nutrition, and to promote the public interest in sectors of vital importance to their socio-economic and technological development, provided that such measures are consistent with the provisions of this Agreement. Appropriate measures, provided that they are consistent with the provisions of this Agreement, may be needed to prevent the abuse of intellectual property rights by right holders or the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology.[313]

Article 8 is the backdrop that permits *TRIPS* to create legislation that attempts to mitigate the potentially negative impact of patents on the preservation of public goods within developing nations. In the case of pharmaceuticals, the public health concern was addressed by allowing developing nations to produce their own medications or import these drugs from nations capable of producing them. Compulsory licenses were a trade-off that, under certain conditions, permit a nation to license local production of a product currently under an international patent. However, nations without the manufacturing capacity (least-developed nations) were precluded from taking advantage of this provision.

The HIV/AIDS crises highlighted the effect of patents on access to life-saving medicines. It required the WTO to respond in a compassionate manner or risk its legitimacy in the eyes of the developing world and least developed countries ("LDC"). International access to essential medications was addressed at the Doha Ministerial Conference in 2001, from which emerged the Doha Declaration on the *TRIPS* Agreement. Developing nations that were members of the WTO decided to form an alliance on advancing issues aimed at balancing the inequities inherent in the international trade legislations.[314] The reality of the global HIV/AIDS crises led to the

[313] *Ibid,* art 8.
[314] Carlos A Primo Braga, Trade Note, 32110, "Agricultural Negotiations: Recent Developments in the Doha Round" (5 November 2004), online: The World Bank Group <www-

Implementation of Paragraph 6 Decision in the WTO General Council's Decision of August 30, 2003[315] (Paragraph 6 Waiver) on the use of compulsory licensing for export to eligible countries. The Implementation of Paragraph 6 Decision on the use of compulsory licensing for export to eligible countries created a temporary "waiver" to the export requirement under Article 31(f). The Paragraph 6Waiver was reached and permitted those countries without manufacturing capacity to utilize compulsory licensing via countries that are able to produce the product for them. This practice is known as the "Waiver" provision and permitted countries to issue licenses in special circumstances under Article 31.

Developing and least-developed countries also raised concerns about the impact of *TRIPS* on trade and technology transfer at the 2001 General Council:[316]

> Technology is a key global resource for job and wealth creation and for shared prosperity in an interdependent world. The impact of technology on economic growth and development is well recognized. This impact results from a complex process involving the interaction of both national and international actors, including governments, businesses, academia and international institutions. Appropriate international arrangements particularly can facilitate the efficient and effective generation, application, transfer, and diffusion of technology. As knowledge increasingly becomes a key strategic resource for national economic development, there is a need to identify means to facilitate the transfer of technology to the presently technology-poor developing countries.[317]

This commitment to technology transfer has infused concerns regarding *TRIPS*' inequitable inhibition of technology transfer and its negative impact on the environment. In a manner very similar to that in which developing and least-developed countries raised concerns about the inequities

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wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2005/04/22/000090341_20050422132552/Rendered/PDF/321100TradeNote19.pdf> [Primo Braga, "Agricultural Negotiations].

[315] *Implementation of Paragraph 6 of the Doha Declaration on the TRIPS Agreement and Public Health*, WTO Doc WT/L/540 (2003), online: <https://www.wto.org/english/tratop_e/trips_e/implem_para6_e.htm> [*Implementation of Paragraph 6*].

[316] WTO, *Preparations for the Fourth Session of the Ministerial Conference: Proposal for the Establishment of a Working Group for the Study of the Inter-relationship between Trade and Transfer of Technology,* WTO Doc WT/GC/W/443 (2001), online: <www.wto.org/english/thewto_e/minist_e/min01_e/proposals_e/wt_gc_w443.pdf>.

[317] *Ibid* at para 1.

inherent in *TRIPS* and its impact on health care, such concerns were echoed a decade later in relation to climate change mitigation.

The negative impact of *TRIPS* on technology transfer was an issue at the forefront of the 2001 Doha, Qatar Fourth WTO Ministerial Conference.[318] As a result, the WTO General Council established the Working Group on Trade and Transfer of Technology (WGTTT). The Doha Round negotiations and the resulting flexibilities intended to address very serious problems that universal intellectual property rights impose upon developing and least- developed countries. Potentially, these flexibilities may be adopted by sectors other than the pharmaceutical sector to encompass clean energy and environmental initiatives. Whether flexibilities such as compulsory licensing and the Paragraph 6 Waiver that were created to address the affordable medicines issue could be adapted and applied to climate change, was previously uncharted. The fundamental problem raised by the Working Group on Trade and Transfer of Technology is the transfer of climate change abatement technology to the developing world at an affordable cost. This raises questions as to the applicability of compulsory licensing and, in particular, whether flexibilities could be applied to the export provision in Article 31(f) of *TRIPS*.

The classification of the environment and climate change mitigation as a "public good" invokes Article 27(2), which states that:

> Members may exclude from patentability inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect *ordre public* or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment provided that such exclusion is not made merely because the exploitation is prohibited by their law.[319]

Economic development that incorporates environmental sustainability must make a consideration of

[318] WTO, *Doha Ministerial Declaration*, WTO Doc WT/MIN(01)/DEC1 (2001), 4th Sess at para 37, online: <www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_e.pdf>.
[319] *TRIPS, supra* note 225 art 27(2).

climate change a requisite guiding principle. *TRIPS* also attempts to balance the inequality that would result from requiring LDCs to adhere to patents where their economies were technologically delayed. The concessionary Article 66(2) created a positive obligation for developed countries to assist in the technological development of LDCs through technology transfer. Article 66(2) reads as follows: "Developed country members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least developed country Members in order to enable them to create a sound and viable technological base."[320]

The positive obligation imposed on developed countries was reaffirmed in 2003 by the WTO Working Group on Trade and Transfer of Technology which required developed countries to submit a detailed annual report on Article 66(2).[321] The public good associated with climate change increases the obligation for technology transfer. The problem arises because, while Article 66(2) is obligatory, the mechanisms that would facilitate, support and monitor its implementation have not been fully developed within the WTO. Although it is recognized that *TRIPS* and its requirements may impede the transfer of technology, there are no affirmative practices that WTO must abide by to comply with Article 66(2). Moreover, while *TRIPS* sets minimum national intellectual property requirements that each WTO Member must maintain, Article 66(2) provides no such minimum obligations.

4.0 THE APPLICATION OF *TRIPS* TO CLIMATE CHANGE AND GREEN TECHNOLOGIES

A number of ambiguities, long identified in the context of affordable medicines, complicate

[320] *Ibid,* art 66(2).

[321] It should be noted that this "requirement" was not enforced and many countries failed to submit reports. See *Integrating Intellectual Property Rights and Development Policy* (London: Commission on Intellectual Property Rights, 2002), online: <www.iprcommission.org/papers/pdfs/final_report/CIPRfullfinal.pdf>.

the interpretation of *TRIPS.*[322] Terms and phrases such as "national emergency,"[323] "circumstances of extreme urgency,"[324] "adequate remuneration"[325] and "authorized predominantly for the supply of the domestic market of the Member authorizing such use"[326] were not clearly defined. NGOs maintained that *TRIPS* should be interpreted judiciously to permit parallel imports and compulsory licensing.[327]

The flexibilities in *TRIPS* should be equally applicable to all public goods irrespective of the category from which they originate (affordable medicines or climate change). The fundamental issue is ascertaining whether these flexibilities are transferable from health care to climate change. The precedent for a compulsory license in areas of public goods or national urgency was established in the affordable medicines conflict. The WTO responded to the HIV/AIDS crises in many developing and "least-developed" nations by addressing international access to essential medications. The issues pertaining to technology transfer were also contemplated in Doha; a number of developing and least-developed countries initiated the Working Group on Trade and Transfer of Technology.[328] Since 2002, the Working Group continues to meet about four times per year and submits annual reports to the General Council "on the functioning in practice of the incentives provided to their enterprises for the transfer of technology" as required under Article 66(2) of *TRIPS*.[329]

The provisions of *TRIPS*, and the various "flexibilities" emanating from Ministerial Conferences like Doha, could be interpreted so as to apply to any "public good" in need of urgent

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[322] *TRIPS, supra* note 225.
[323] *Ibid,* art 31(b).
[324] *Ibid.*
[325] *Ibid,* art 31(h).
[326] *Ibid*, art 31(f).
[327] Oxfam, Press Release, "The Right to Medicines, or the Right to Profit" (11November 2002), online: Scoop Politics <www.scoop.co.nz/stories/PO0211/S00066.htm>.
[328] *Declaration on the TRIPS Agreement on Public Health,* WTO Doc WT/MIN (01)/DEC/2, 4th Sess (2001), online: <www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_trips_e.pdf> [*Doha Declaration*].
[329] *Implementation-Related Issues and Concerns,* WTO Doc WT/MIN(01)/17, 4th Sess (2001), s 11.2 online: <www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_implementation_e.pdf>.

intervention. The *Vienna Convention on the Law of Treaties* states that "a treaty shall be interpreted in good faith in accordance with the ordinary meaning given to the terms of the treaty in their context and in the light of its object and purpose."[330] Much of the issue of green technology transfer depends on whether GHG emissions may constitute a "national urgency" under *TRIPS*.

4.1 Affordable Medicines: The Doha Flexibilities

The fourth Ministerial Conference in Doha, Qatar provided an opportunity for WTO nation-states to negotiate issues concerning the interpretation and implementation of certain international trade agreements. The *Doha Declaration* received unanimous support by the WTO members in attendance. Regarding the interpretation of *TRIPS*, it was emphatically confirmed that "the TRIPS Agreement does not and should not prevent members from taking measures to protect public health."[331] Developing nations who were members of the WTO decided to form an alliance intent on balancing the inequities inherent in the international trade legislations.[332]

The 1995 *TRIPS* Agreement contained transition periods that granted developing countries (but still exempted LDCs) a grace period in which they were not compelled to adopt *TRIPS'* standards for the production of patented products.[333] Developing countries were given an extension that pushed the original compliance deadline from January 1, 2000 (Article 65, 2-3), back to January 1, 2006. Least-developed countries[334] were originally given until January 1, 2010, a deadline that was later extended to 2016, to comply with *TRIPS* as it related to health care issues.[335] The burden that

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[330] *Vienna Convention on the Law of Treaties*, 23 May 1969, 1155 UNTS 332, art 31.1, online: <https://treaties.un.org/doc/Publication/UNTS/Volume%201155/volume-1155-I-18232-English.pdf>.
[331] Doha Declaration, *supra* note 318 at para 4.
[332] Primo Braga, *supra* note 314.
[333] *TRIPS, supra* note 225, arts 2-3.
[334] For a list of Least-Developed Countries: See WTO, "Least-Developed Countries", online: <https://www.wto.org/english/thewto_e/whatis_e/tif_e/org7_e.htm>.
[335] *Extension of the Transition Period under Article 66.1 of the TRIPS Agreement for Least-Developed Country Members for Certain Obligations with Respect to Pharmaceutical Products,* WTO Doc IP/C/25 (2002), online: < www.wto.org/english/tratop_e/trips_e/art66_1_e.htm>.

intellectual property law compliance placed on least-developed countries was also recognized in the area of technology transfer and transitionary periods were extended from 2013 to 2021 under Article 66(2) of *TRIPS*.[336]

4.1.1 Compulsory License Exception (Article 31 of *TRIPS*)

The *Doha Declaration* emphasized that "each member has the right to grant compulsory licenses and the freedom to determine the right upon which such licenses are granted."[337] Paragraph 5(b) also confirms the right of each member to determine the grounds on which compulsory licenses are granted. The risk of circumventing patents to access green technology is governed by Article 31 of *TRIPS*, which stipulates when a compulsory license can be issued to a third-party/non-patent holder. A compulsory license is the legal use of a patent by a third party, without the expressed consent of the patentee holder after the third party has unsuccessfully attempted to secure a voluntary license from the patent holder. A compulsory license essentially allows a third party to copy a product or process that is currently patented and protected by exclusivity. This exception is only granted in very limited situations involving national urgency and public goods like affordable medicines and, potentially, climate change mitigation. Article 31 of *TRIPS* only permits each nation to authorize the use of compulsory licenses on grounds listed in (a) to (l) with the most pertinent items summarized below:

> (a) authorization of such use shall be considered on its individual merits;
> (b) prior to use, the proposed user has made efforts to obtain authorization from the right holder … [t]his requirement may be waived by a Member in the case of a national emergency or other circumstances of extreme urgency;
> (c) the scope and duration of such use shall be limited to the purpose for which it was authorized …
> (d) such use shall be non-exclusive;
> (e) such use shall be nonassignable;

[336] *Extension of the Transition Period Under Article 66.1 For Least Developed Country Members,* WTO Doc IP/C/64 (2013), online: <www.wto.org/english/tratop_e/trips_e/ldc_e.htm>.
[337] *Doha Declaration*, *supra* note 328, at para 5(b).

(f) any such use shall be authorized predominantly for the supply of the domestic market of the Member authorizing such use;
(g) authorization for such use shall be liable, subject to adequate protection of the legitimate interests of the persons so authorized, to be terminated if and when the circumstances which led to it cease to exist and are unlikely to recur…;
(h) the right holder shall be paid adequate remuneration.[338]

Note the significance in *TRIPS'* recognition of exclusive rights —even if compulsory licensing is invoked, the patent holder must still be paid adequate remuneration (royalties to the patent holder), usually 0.5%.[339]

Nations are required to begin the process of compulsory licensing by contacting the patent holder and negotiating usage terms. Article 31(b) clearly states "such use may only be permitted if…the proposed user has made efforts to obtain authorization from the right holder."[340] However, the notification provision may be waived in cases of "a national emergency or other circumstances of extreme urgency."[341] In this case, the only stipulation is that, upon utilizing compulsory licensing on an emergency or urgency basis, the nation is required to notify the patent holder as "soon as reasonably practicable."[342] While *TRIPS* does not provide a definition of "national emergency," the *Doha Declaration* confirmed that each country has the sovereign right to "determine what constitutes a national emergency or other circumstances of extreme urgency."[343]

The *Doha Declaration* laid the foundation for discussions on technology transfer by pronouncing that countries are free to adopt measures for the "protection of human, animal or plant life or health, or of the environment."[344] Any such measures should be adopted with the genuine aim

[338] *TRIPS*, *supra* note 225, art 31. Note that Article 31 lists requirements from (a) to(l).
[339] *Ibid*.
[340] *Ibid.*
[341] *Ibid.*
[342] *Ibid.*
[343] *Doha Declaration*, *supra* note 328 at para 5(c).
[344] WTO, *Ministerial Declaration*, WTO Doc WT/MIN(01)/DEC/1 (01-5859), (2001), online: <www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_e.htm> [Ministerial Declaration]; *Doha Declaration*, *supra* note 328 at Article 30.

of protecting these public goods and not to circumvent international trade laws. While compulsory licenses were a trade-off that permitted a nation to utilize a patent under certain conditions, those nations without the manufacturing capacity were precluded from taking advantage of this provision. Thus, another concession reached in this international treaty permitted countries without sufficient manufacturing capacity to utilize compulsory licensing via countries that are able to produce the product for them.[345] This practice is known as the "Waiver" provision and permits countries to issue compulsory licenses for products produced locally or by another country for their benefit.

4.1.2 The Limited Exception (Article 30 of *TRIPS*)

While the *Doha Declaration* legitimized the rights of developing and LDC to utilize compulsory licensing, paragraph 6 sparked debate, particularly regarding which country could produce a drug for export to a developing or LDC nation under compulsory licensing. In 2003, the WTO Decision on the "Implementation of Paragraph 6" ruled that developing and LDC countries could import drugs produced elsewhere (such as India and even from developed countries such as Canada) under the "Waiver" provision of compulsory licensing.[346]There was a host of optimism that settling the debate over paragraph 6 would remove the "final patent obstacle to cheap drug imports."[347]

Article 30 of *TRIPS* provides "limited exceptions" that allow a Member to import a patented product from someone other than a patent holder; this provision was utilized by Rwanda, who enlisted Canada to produce HIV/AIDS drugs pursuant to the Waiver. This was a novel decision: not only was Rwanda the first nation to utilize the Waiver to import generics, but it represented the first time that

[345] *Ibid, Doha Declaration*, at Article 30.
[346] *Implementation of Paragraph 6, supra note* 315.
[347] WTO, Press Release, Press/350/Rev.1, "Decision removes final patent obstacle to cheap drug imports" (30 August 2003), online: <www.wto.org/english/news_e/pres03_e/pr350_e.htm>.

a developed nation (Canada) utilized the Waiver provision for the export of generic products. The Rwandan-Canadian experience is unique as the only known legal case utilizing the Article 30 "limited exception" provision. Thus, Canada and Rwanda tested the applicability and functionality of the Waiver. The Director of Public & Government Affairs of Apotex Canada stated in a press release that the process "in its current form [is] not workable for us and, it appears, …doesn't work easily for developing countries."[348] According to Apotex representatives, the requirement that a generic company must negotiate a voluntary license from the brand name manufacturer prior to issuing a compulsory license was a significant obstacle. In their case, it took one year to negotiate. Since the Waiver has been extended to 2016 for LDCs, it is unlikely that its application to climate change will be relevant, especially given the complexities of using it for affordable medicines.

4.1.3 The Waiver Decision (Predominant Use for Domestic Markets Article 31(f))

While the "Waiver" is available and has been utilized in the affordable medicines case involving Rwanda and Canada, its application to climate control may prove to be impractical. Since the Rwandan-Canadian case, there has not been another attempt to use the Waiver provision to export medicines for humanitarian purposes. Apotex, the generic company that exported HIV/AIDS medication to Rwanda, has commented on the process, stating that is extremely frustrating because the Canadian *Patent Act*[349] was not crafted in a way to effectively operationalize *TRIPS*.[350] By its very nature, green energy technology requires some local manufacturing or technological interaction. Moreover, unlike pharmaceutical products that can be imported and distributed, renewable energy products such as solar panels require continued cooperation of the patent holder and manufacturer

[348] Apotex, Press Release, "CAMR Federal Law Needs to be Fixed if Life-Saving Drugs for Children are to be Developed" (14 May 2009), online: <www.apotex.com/global/about/press/20090514.asp>.
[349] *Patent Act*, RSC, 1985, c P-4.
[350] *Ibid*.

for installation and maintenance. Even in cases where the requisite local legislations are in place, developing nations endure immense pressures from wealthier governments to not utilize compulsory licensing.

The case of climate change technology differs substantially from affordable medicines in a number of ways. The technology has to be transplanted in the non-enabling country. The cost of this technology transfer is exorbitant and requires funding from foreign investors for various local energy projects. The royalty required to access a patent through compulsory licensing is not a viable option for green technology patents. Many climate control technologies are subject to multiple patents and processes, which would make the cost of accessing them prohibitive. In addition, unlike health problems no one singular technology "will be necessary or sufficient on its own to solve climate change."[351]

Meeting the test of "national" urgency may also pose a problem for green technology transfer pursuant to Article 31. Climate change may not quality as a national urgency such that it satisfies the urgency component under Article 31. Climate control mitigation is not confined to *national* urgency issues, but encompasses the concern and public good of the entire planet. The subject matter of climate control is more complexly tied to multinational rather than solely national concerns.

Aside from the general application of *TRIPS* to climate change mitigation, the issue of green technology transfer through compulsory licensing remains unresolved. Consequently, even if a Declaration were invoked that relaxed Article 31(f)'s prohibition against issuing a compulsory license for an export market, the very nature of climate control technology necessitates that the product be produced and installed locally. Unlike pharmaceutical products that disclose the steps

[351] Sidney A Rosenzweig, "Inside Views: PFF on Cooling the World By Misappropriating Patent Rights" (1 April 2009), online: Intellectual Property Watch <www.ip-watch.org/weblog/2009/04/01/cooling-the-world-by-misappropriating-patent-rights/>.

required to make a medicine, green technologies like solar panels are often made in the country of origin and shipped for assembly. Many of these products are off-patent but have been improved via trade secrets that are retained by the inventing corporation. Thus, assembling green technologies like solar panels requires technical knowledge to accompany patents. This knowledge may not be within the public domain and may be protected by trade-secrets. Similar impediments encountered under the Waiver for pharmaceutical products will be present for green technology transfer. This includes proving that the need qualifies as a national urgency, requesting a voluntary license and, finally, obtaining a compulsory license. Even if a compulsory license is obtained, the solar panel patent may be so outdated that it would not be financially viable to utilize that product. Technologies change and improve so rapidly that, quite often, new patents are not filed and enhancements are contained in trade secrets. A fundamental problem rests with the fact that neither *TRIPS* nor the patent regimes of industrialized nations require the disclosure of trade secrets.

In order for *TRIPS* to facilitate the flow of environmentally sound technology, it needs to address the issue of licensing technology and also incorporate provisions on foreign direct investments that attempt to address the costs prohibitions inherent in green technology transfer. Green technologies can remain protected by maintaining technological knowledge within trade secrets which creates an "anti-commons" effect. The effect of this non-disclosure is to curtail innovation and technological diffusion.[352] In 2007, Sierra Leone and Uganda addressed the disadvantages faced by developing and least-developed countries owing to low technology bases and human capital in the area of scientific technology at the *TRIPS* Council.[353] Both nations raised issues

[352] John J Barton & Keith E Maskus, "Economic Perspectives on a Multilateral Agreement on Open Access to Basic Science and Technology" in Simon J Evenett& Bernard M Hoekmaneds, *Economic Development and Multilateral Trade Cooperation* (Washington, DC: The World Bank & Palgrave Macmillan, 2006); Michael Heller, *The Gridlock Economy: How Too Much Ownership Wrecks Market, Stops Innovation, and Cost Lives* (New York: Basic Books, 2008).
[353] *Priority Needs for Technical and Financial Co-operation: Communication from Sierra Leone*, WTO Doc IP/C/W/523 (2008), online: <www.wto.org/english/tratop_e/trips_e/ta_docs_e/7_2_ipcw523_e.pdf>.

relating to intellectual property policy, financial and technical support, along with suggested improvements to the legal frameworks and regulations that have hindered development and the diffusion of technology.[354] These concerns were echoed throughout the continent and prompted questions about the efficacy of technology transfer as a standalone tool for change.[355] Overcoming these barriers to development and technology transfer are essential for Article 66(2) of *TRIPS* to be put into full effect. Authors like Daniel Gervais and Jerome Reichman have also recognized that even if technology transfer exists, it must be accompanied by an enabling technological base and localized knowledge for diffusion and innovation to follow.[356]

By their very nature, technologies associated with solar panels—or clean energy technologies in general—may limit the applicability of the "Waiver" in providing these technologies to least-developed countries. In the pharmaceutical sector, generic drug manufactures are already established and are often producing off-patent generics. Once the patent is revealed to these companies and the compulsory license secured, the rest is merely a matter of production and, in cases involving the Waiver, shipment. Solar panels and other green products have fewer producers able to mimic the product. In addition, since many of the improvements and enhancements are achieved via trade secrets, disclosure would be required to facilitate production. As stated earlier, even if a compulsory license is available, the license does not compel the disclosure of trade secrets. This problem is true for both compulsory licenses affected under Article 31 for developed countries and under the Waiver

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[354] *Ibid*.

[355] See also the submissions of Tanzania and Rwanda: *Priority Needs for Technical and Financial Co-operation: Communication from Tanzania*, WTO Doc IP/C/W/552 (2010), online: <www.wto.org/english/tratop_e/trips_e/ta_docs_e/7_2_ipcw552_e.pdf>; *Priority Needs for Technical and Financial Co-operation: Communication from Rwanda*, WTO Doc IP/C/W/528 (2010), online: <www.wto.org/english/tratop_e/trips_e/ta_docs_e/7_2_ipcw548_e.pdf>.

[356] Jerome H Reichman, "From Free Riders to Fair Followers: Global Competition Under the TRIPS Agreement" (2007) 29:11 J Intl L & Politics 11, online:<http://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=1073&context=faculty_scholarship>; Gervais, *Intellectual Property, Trade and Development*, *supra* note 99.

for least-developed nations.

4.2 Transfer of Green Technology and its distinction from Affordable Medicines

The primary method of accessing affordable medicines for critical illnesses under Article 31 of *TRIPS* requires the filing of a voluntary license and negotiation with the patent holder. If a voluntary license is not approved, then a compulsory license can be requested. If the compulsory license is granted, royalties are still payable, but at a reduced rate. In the case of national emergencies or cases of extreme urgency, a voluntary license is not required. Thus, medicines are transferred under Article 31 primarily through the right to utilize the patent in the form of a license. Green technology, on the other hand, is often transferred exclusively through the licensing process in a commercial setting. *TRIPS* promotes technology transfer pursuant to Article 7, which sets standards on the exclusivity of these rights.[357] The phrase, "transfer and dissemination of technology" will be as important to the climate change debate as "national urgency" was to affordable medicines. Unfortunately, *TRIPS* is silent on the topic beyond Article 7 and the UNFCCC has not stipulated how this transfer will take place.

There are other hurdles facing the transfer of green technologies through compulsory licenses. Firstly, many developing countries "lack the requisite institutional, regulatory and legal policies necessary to issue" a compulsory license.[358] Secondly, while patented technologies are often licensed, the vast majority of them are off-patents and require "know-how" in order to replicate them. In this regard, some scholars have argued that renewable energy technologies differ tremendously from those in the pharmaceutical sector as the latter may have few substitutes,

[357] *TRIPS*, *supra* note 225, art 7.
[358] Maskus & Okediji, *supra* note 171 at 31.

whereas green technologies have various off-patent alternatives.[359] Barton studied the IPR and technology transfer in three renewable energy sectors (photovoltaic, biomass, and wind energy) and found the following regarding the pharmaceutical and renewable energy industries:

> In the politically-sensitive pharmaceutical sector, patents often have a substantial impact on price, as there may be no substitutes for a new product. In contrast, in the renewable energy sectors considered in this article, the basic technological solutions have long been off-patent. Usually, only specific improvements or features are patented. Thus, a number of competing patented products exist – and as a result of the competition, prices are usually brought down as compared to the royalties and the price increases that would be charged under a monopoly. In addition, there is competition not only between firms within a specific renewables sector, but also between the sectors and alternate sources of fuel or electricity. As a result, much of the benefit of the technologies is shared with the ultimate customers.[360]

Even patented renewable energy products are often only enhancements on prior patents.[361] Thirdly, the developing world needs the requisite knowledge to assemble the technologies, which is contained in the form of trade secrets. Whereas pharmaceutical patents contain the requisite information to reproduce a drug, the same cannot be said of green technology patents especially in the area of energy. In addition, the developing country would have to possess the requisite human capital that could enable domestic production.

4.3.1 Trade Secrets and Green Technology Transfer: Article 39 and 40

While compulsory licensing is an option available under Article 31 of *TRIPS* to gain access to various technologies, the need for technological "know-how," an existing technological base and sufficient human capital compromises its effectiveness as a practical alternative in the renewable energy sector. Blueprints, test protocols and various "know-hows" are required to actualize the

[359] John H Barton, "Patenting and Access to Clean Energy Technologies in Developing Countries" (2007) 1:2 *BioRes*8, online: <www.ictsd.org/sites/default/files/review/bioresreview/biores1-2.pdf> [Barton, "Patenting and Access to Clean Energy Technologies"].
[360] *Ibid.*
[361] *Ibid*.

technology. Recall that revealing trade secrets and "know-how" is not a requisite part of complying with the treaty. In general, *TRIPS* sets out a number of flexibilities that could be adopted in order to facilitate technology transfer in furtherance of climate control. Article 40 empowers countries to label certain practices as anti-competitive and invoke *TRIPS* as a means to "prevent and control" such practices.[362] Article 40 is particularly important in the field of renewable energy as many of the patents have expired and what remains proprietary are the enhancements and technological "know-how." For this reason, trade secrets as discussed in Article 39 are an essential element in technology transfer and climate change mitigation. Bronwyn Hall and Christian Helmers' article, "The Role of Patent Protection in (Clean/Green) Technology Transfer," summarizes the reality of undisclosed improvements on off-patent technology:

> A large range of different technologies can achieve emission reductions, and for a significant share of these green technologies, the underlying technology is mature and in the public domain. Most technological progress is expected to come from incremental improvements of existing off-patent technologies. While such incremental innovation may be patentable, it leaves ample scope for competing technologies and therefore limits the role specific patents may play for technological progress in this area.[363]

Thus, while many patents in renewable technology are in the public domain, the existence of trade secret data may make it difficult to utilize them.[364] With a requirement to comply to minimum standards, and given the exorbitant cost of financing solar projects, *TRIPS* alone, without the infusion of foreign investments would not remove the impediment to technology transfer.

The very cost of *utilizing* some green technologies may be exorbitant and requires a foreign

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[362] *TRIPS*, *supra* note 225, art 40.
[363] Bronwyn Hall & Christian Helmers, "The Role of Patent Protection in (Clean/Green) Technology Transfer" (2009) 26:4 *Santa Clara Comp & High Tech LJ* 487at 493; see also: Daniel Johnson & Krista Lybecker, "Innovating for an Uncertain Market: A Literature Review of the Constraints on Environmental Innovation" (2009) Colorado College Working Paper No 2009-06.
[364] Paul J Heald, "Mowing the Playing Field: Addressing Information Distortion and Asymmetry in the TRIPS Game" (2003) 88:2 *Minn L Rev* 249; Surinder Kaur Verma, "Protection of Trade Secrets Under the TRIPS Agreement, and Developing Countries" (1998) 1:5 J *World Intellectual Property* 723.

infusion of capital. A request for a compulsory license may be perceived as a lack of respect for intellectual property rights and may have a negative impact on foreign investments. Even for LDCs that may contemplate the "Waiver," this option is not feasible as these technologies are expensive to manufacture and ship. In addition, owing to the costliness of renewable energy sources, some form of subsidy or financing is required in order to make the green choice more attractive. John Barton explains this cost dilemma: "Another characteristic of the PV, biomass and wind sectors is that some of the renewable energy technologies, particularly PV technologies, are not yet inexpensive enough to compete without some form of subsidy or regulation (such as a feed-in law requiring that a portion of the electricity on a grid be supplied from renewable sources)."[365] Thus, local policies on how energy will be purchased from the grid, how a country adapts to foreign investment demands and general trade policies may be a greater impediment to development and the transfer of green technology than intellectual property rights. The Intergovernmental Panel on Climate Change noted that "returning global energy-related CO_2 emissions to 2005 levels by 2030 would require a large shift in the pattern of investment."[366] The UNFCCC Subsidiary Body for Scientific and Technological Advice identified the most serious needs for technology transfer as stemming from "energy generation, dominated by renewable energy technologies."[367]

Finally, even if products such as solar panels are manufactured abroad and shipped, they would be used solely for commercial purposes (the sale of energy). This use is prohibited under Article 31(b) of *TRIPS.* The "public non-commercial use" requirement in Article 31 may be problematic in the renewable energy sector. These contracts are tied to governments being the off-

[365] Barton, "Patenting and Access to Clean Energy Technologies", *supra* note 359.
[366] Intergovernmental Panel on Climate Change, *Climate Change 2007 – Mitigation of Climate Change,* Bert Metz et al, eds (Cambridge, UK: Cambridge University Press, 2007) at 13, online: <www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4_wg3_full_report.pdf>.
[367] *Ibid*, at 660-661.

takers of the energy with a promise to purchase energy at the stipulated tariff rate.

5.0. CONCLUSION

At first glance, the *TRIPS* legislation appears capable of resolving much of the conflict over the global distribution and access to affordable medicines with the potential of transferring these flexibilities to climate change. However, far from being the great equalizer, the focus on *TRIPS* and compulsory licensing may prove to be illusory and an unnecessary distraction. The pharmaceutical case of compulsory licensing for affordable medicines revealed that while it is possible to obtain access, a host of problems have arisen in operationalizing the treaty within the legal structure of nation-states. The Waiver process available to LDCs—used for HIV/AIDS medicines in Rwanda—is fraught with imperfections. Consequently, the Waiver cannot be practically applied to compulsory licensing of green technologies. The potential of compulsory licensing has proven non-efficacious for other public goods such as the provision of affordable medicines to address health epidemics. Similarly, it will prove to be of limited value in the area of climate mitigation through technology transfer.

This paper explored the relevant provisions of *TRIPS* in light of the potential that certain flexibilities adopted for affordable medicines could be transferable to climate change. Specifically, the issue of compulsory licensing and the possibility that climate change may be an issue of national "urgency" was also canvassed. It was found that the requirements that the product of a compulsory license be for "non-commercial" and domestic use would also eliminate many green technologies from consideration by their very nature. Even where the Waiver could be applied to export products that were approved under a compulsory license to LDCs, the limited number of companies able to produce these products as well as the undisclosed nature of trade secrets complicates the applicability of compulsory license to climate change abatement.

Changes in international laws have created conflicts because of the increasing influence of these laws on national agendas. States are now forced to respond to national issues, including healthcare, sustainable development and climate change, from a global standpoint. Consequently, both the UNFCCC and the IPCC recognize that the "public good" aspect of green technologies may warrant different treatment under international patent law because they serve the interest of the global populous. While there has been an immense focus on patents and *TRIPS* in the area of the transfer of green technology to the developing world, this is by no means the only policy mechanism that facilitates this end. The literature on IPR strength and economic development demonstrates that there is very little impact of IPR on low income nations, especially in relation to technology transfer. In addition, this research has found that the parallels drawn between *TRIPS* flexibilities that were granted in the pharmaceutical sector and green technology transfer are unmerited; in fact, the application of pharmaceutical flexibilities to climate change would be non-efficacious.

The large investments required for clean energy products such as solar, wind and biofuels coupled with the fact that the technology is required to be locally transferred and operationalized, distinguishes this industry from the pharmaceutical industry. Whereas concessions could be implemented in *TRIPS* to address LDCs' inability to produce a life-saving drug under compulsory licensing, similar concessions are not easily applied to the renewable energy industry or green technology transfer. The lessons from affordable medicines and *TRIPS* cannot effortlessly be transplanted to the energy industry, as the role of patents and intellectual property in the dissemination and diffusion of technologies varies from industry to industry.

In the energy sector, technologies and financing required for large scale renewable energy projects create added complexities that require legal, economic and institutional solutions that are industry-specific. The lessons learnt from the affordable medicines dispute have taught that

flexibilities can be legally incorporated into *TRIPS*, however, the efficacy of those flexibilities is not guaranteed at the implementation stage. Since the financial cost of green technology transfer is clearly an impediment, perhaps financial flexibilities that operationalize the technology transfer provisions of *TRIPS* could be negotiated in a future international treaty on climate change or Ministerial declaration. In a manner similar to that of the Waiver created to address LDC's inability to manufacture products and subsequently take advantage of compulsory licenses, a technology finance mechanism be created to enable developing nations to engage with technology transfer opportunities that would otherwise be financially unviable. Clearly, operationalizing the technology transfer goals of *TRIPS* requires the implementation of financial measures in the fight to mitigate climate change. *TRIPS* and IPRs are not inherent impediments to technology transfer or sustainable development if the financial mechanisms to facilitate technology diffusion are in place. While only a surface consideration of the financial elements relating to green technology transfer and climate change could be entertained in this paper, it is an area that requires considerable focus.

The UNFCCC identified the primary barrier to adopting renewable energy choices in the developing world as being intrinsically tied to infrastructural issues related to local political, technological and economic instability. While regulatory measures can be implemented to address the political and technological barriers, it is clear that the economic costs of technology transfer cannot be adequately addressed without some infusion of foreign capital in these costly renewable energy projects. Consequently, mechanisms related to foreign direct investment will need to be considered to create economic security to protect investments in these projects. Any shift from reliance on coal as a source of energy in the developing world must address other local factors of energy insecurity (political, legal and financial). Accordingly, the burning desire to adopt renewable energy substitutes in the developing world is intrinsically tied to creating secured environments for

technology transfer. The security goes far beyond intellectual property rights and *TRIPS* to energizing international economic policies that will facilitate technology transfer.

CHAPTER FOUR:

The WTO Canada Renewable Energy Feed-in Tariff Case and its Application to Green Energy Projects in the Developing World: The Abdication of the Subsidies and Countervailing Measures Agreement within Green Energy Conflicts.
16 (2016) *Asper Review of International Business and Trade* 97

ABSTRACT

Climate change abatement strategies are intrinsically linked to policies that encourage the use of alternative energy sources such as renewable energies. The importance of these strategies has been entrenched in various World Trade Organization (WTO) treaties including the *Agreement on Subsidies and Countervailing Measures* ("*SCM Agreement*"), *Agreement on Trade-related Aspects of Intellectual Property Rights* ("*TRIPS*"), *Agreement on Trade-Related Investment Measures* ("*TRIMs*"), as well as pre-WTO treaties like the *General Agreement on Tariffs and Trade* ("*GATT*").[368] The issue of environmental subsides, specifically renewable energy subsidies, have resurfaced in a number of disputes before the WTO Dispute Settlement Body since its first green subsidy case, brought in 2010 by Japan against Canada's Feed-In Tariff Program ("FIT Program").[369] In the initial case, Japan alleged that the Ontario FIT Program's local content requirement was discriminatory against foreign renewable energy products. Moreover, discrimination amounted to a prohibited subsidy under the *SCM Agreement* and was simultaneously contrary to the most-favourable nation status ("MFN") under the *GATT*. This decision raises concern about whether the *SCM Agreement* poses a barrier to governmental policies promoting FIT Programs to encourage renewable energy usage and its impact on the developing world.[370] Specifically, do treaties like the *SCM Agreement* impede the development of government climate change abatement policies by

[368] *Agreement on Trade-related Aspects of Intellectual Property Rights*, Appendix 1C of the *Agreement Establishing the World Trade Organization* (Marrakesh, Morocco, Apri15), www.wto.org/english/docs_e/legal_e/27-trips_01_e.htm. [hereinafter "*TRIPS*"]; *General Agreement on Tariffs and Trade*, Oct. 30, 1947, 61 Stat. A-11, 55 UNTS 194, online: www.wto.org/english/docs_e/legal_e/gatt47_02_e.htm, at Article XX(b), [hereinafter "*GATT*"]; Agreement on Subsidies and Countervailing Measures, Apr 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1867 UNTS 14 online: https://www.wto.org/english/docs_e/legal_e/24-scm.pdf [hereinafter " *SCM Agreement*"]

[369] *WTO Canada – Certain Measures Affecting the Renewable Energy Sector* (2013) WTO Doc WT/DS412/AB/R (Appellate Body Report), online: https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds412_e.htm; *China – Measures Concerning World Power Equipment* (2012) WTO Doc WT/DS419/1 (Request for Consultation) online: https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds419_e.htm; *Canada – Measure Relating to Feed-in Tariff Program* (2013) WTO Doc WT/DS426/AB/R (Appellate Body Report) online: https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds426_e.htm; *European Union and Certain Member States – Certain Measures Affecting the Renewable Energy Sector* (2012) WTO Doc WT/DS452/1 (Request for Consultation) online: https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds452_e.htm; and *European Union and Certain Member States – Certain Measures on the Importation and Marketing of Biodiesel and Measures Supporting the Biodiesel Industry* (WT/DS459/1).

[370] WTO, Committee on Trade Related Investment Measures, *Minutes of Meeting* (held on June 24, 2014)United States: Certain Local Content Requirements in Some of the Renewable Energy Sector Programs – Questions by India to the United States, online: file:///C:/Users/llewis/Downloads/M36%20(3).pdf; WTO, Committee on Trade Related Investment Measures, *Minutes of Meeting* (held on April 18, 2013) Subsidies questions posed by India to the United States under article 25.8 of the Agreement on Subsidies and Countervailing Measures – State Level Renewable Energy Sector Subsidy Programs With Local Content Requirements. WTO Committee on Subsidies and Countervailing Measures, online: file:///C:/Users/llewis/Downloads/USA59.pdf.

requiring these programs to meet a minimum standard of trade compliance? Should WTO treaties like the *SCM Agreement* be amended to include flexibilities to combat climate change, especially in light of the goals set in the 2015 *Paris Agreement* on climate change? This paper will review the WTO subsidy rules and query whether flexibilities need to be entertained within the area of non-actionable subsidies. This mode of inquiry questions whether FIT Programs be classified as subsidies under the *SCM Agreement*. If FIT Programs are properly classified as subsidies, should these initiatives be granted an exemption under the *SCM Agreement* on the basis of public policy— with the goal of facilitating affordable renewable energy and climate change abatement in the developing world?

I. INTRODUCTION

Global interest in green energy subsidies continues to grow as governments attempt to implement policies that displace reliance upon high carbon-emitting fossil fuels and encourage environmentally sustainable consumption and industrial practices. Green energy programs may adopt various forms ranging from taxes on carbon to subsidies and price incentives for using renewable energy services and products.

A "green subsidy" has been defined as an "allocation of public resources for the purpose of improving sustainability over what would otherwise occur via the market."[371] The aim of green subsidies has been identified as developing "clean energy industries, phasing out fossil fuels, arresting climate change, and promoting sustainable production and consumption."[372] Green subsidies may also be viewed as an attempt to correct environmental market failures through fiscal policies.[373] The issue of subsidizing renewable energy technologies are often considered in response to the reality that many renewable energy alternatives are commercially inaccessible due to the high cost of production that cannot always be passed on to consumers.

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[371] Steve Charnovitz, "Green Subsidies and the WTO" World Bank Group: Office of the Chief Economist (2014) Policy Research Working Paper No 7060, online: www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2014/10/14/000158349_20141014095048/Rendered/PDF/WPS7060.pdf at 2.
[372] *Ibid*.
[373] *Ibid* at 2.

Feed-In Tariffs ("FIT"), which fix the minimum price per kWh within a contract payable to generators of electricity for renewable energy, is a commonly selected policy method of encouraging renewable energy usage.[374]

FIT Programs are the most commonly used renewable energy policy mechanism by governments worldwide, and arguably the most important policy tool in addressing climate change.[375] In 2012, renewable energy FIT programs were adopted in over 90 jurisdictions, 65 countries, and 27 states around the world.[376] By 2015, a total of 108 jurisdictions utilized FIT Programs.[377] Photovoltaic solar plants are often governed by government-owned entities that act as industry regulators and purchase the energy from independent power producers. Article XVII (the Most Favoured Nation Treatment) of the *General Agreement on Tariffs and Trade ("GATT")* regulates state-owned enterprises to ensure non-discrimination of Member States. This paper will explore the impact of the *Subsidies and Countervailing Measures Agreement* ("*SCM Agreement"*) on the implementation of green energy initiatives like FIT Programs in the developing world in general, and on a country specific level by utilizing Ghana, West Africa as a case study. It will assess the WTO decision in the *Canada Renewable Energy/Feed-in Tariff* case ("*Canada Renewable Energy/FIT* case") and its impact on renewable energy programs in sub-Saharan Africa, with specific focus on Ghana. It is important to ascertain whether the issue of subsidies as addressed in the *Canada*

[374] UNEP (2012), *Feed-in Tariffs as Policy Instruments for Promoting Renewable Energies and Green Economies in Developing Countries*, Geneva, online: www.unep.org/pdf/UNEP_FIT_Report_2012F.pdf.
[375] Kenina Lee, "An Inherent Conflict Between WTO Law and Sustainable Future? Evaluating the Consistence of Canadian and Chinese Renewable Energy Policies with WTO Trade Law" (2011) 24 *Geo Int'l Envtl L Rev* 57.
[376] REN21: Renewable Energy Policy Network for the 21st Century. 2012. *Renewables 2012: Global Status Report* (Paris: REN2 Secretariat), online: www.ren21.net/Portals/0/documents/Resources/GSR2012_low%20res_FINAL.pdf. Note: the distinction between regions arises because some FIT schemes are implemented nationally for independent power producers through the Public Utilities Commission (PURC) as in the case with Ghana (despite having a state-owned utility scheme), others countries divide energy regulation by state or province (as in the case with Canada which adopts jurisdictional approach based on provincial region tariffs) or Nigeria where tariffs are implemented on a state level.
[377] REN21, *ibid*.

Renewable Energy/FIT case would be similarly applicable to developing countries like Ghana. This analysis will be limited to the impact that the WTO *Canada Renewable Energy/FIT* decision would have on a photovoltaic solar plant projects that contain a feed-in tariff.

The current regulatory structure of the Ghanaian energy sector reflects significant influence from the World Bank's goal, in the early 90s, to halt funding of power sectors in the developing countries until sector reforms were implemented.[378] Reforms entailed changing the regulatory and legal framework in the power sector to improve transparency. Ghana's power industry is comprised of state-owned power generation utilities (the Volta River Authority and Bui Power Authority). However, independent power producers (IPP) also play a role in energy production in Ghana. Energy that is produced by IPP is transmitted by the Ghana Grid Company (GRIDCo), the Electricity Company of Ghana (ECG), and the Northern Electricity Distribution Company (NEDCo) into the same grid as government produced energy. By 2011, the Ghanaian government adopted a renewable energy framework aimed at providing fiscal incentives to independent power producers through the FIT scheme.[379] The *Ghana Renewable Energy Act* (2011) established both the FIT system and the Renewable Energy Purchase Obligation ("RPO"). The FIT rate is set by the Public Utilities and Regulatory Commission ("PURC"), which guarantees a tariff to the independent power producer for a fixed period of usually 10 to 15 years. This guarantee provides an assurance to independent power producers that they will be able to recoup the high cost of investments in renewable energy by having the purchase price of their energy fixed in the form of a tariff. The FIT system was developed from the "Ghanaian Sustainable Energy for All Action Plan," which was born out of the *Renewable Energy*

[378] World Bank, (1993) The World Bank's Role in the Electric Power Sector, Washington D.C., World Bank.
[379] *Renewable Energy Act, 2011*, Act 832 of the Parliament of the Republic of Ghana, Dec 31, 2011 ["*Ghana Renewable Energy Act*"] online: www.energycom.gov.gh/files/RENEWABLE%20ENERGY%20ACT%202011%20(ACT%2083Ghana; The *Ghana Renewable Energy Act* should be read in conjunction with the *Energy Commission Act, 1997* (Act 541), online: www.energycom.gov.gh/files/ACT.pdf.

Act.[380]

The *Ghana Renewable Energy Act* is similar in form and substance to Ontario's *Green Energy Act*[381], rendering Ghana a useful case study of the applicability of the WTO *Canada Renewable Energy/FIT* decision on countries in the developing world that have adopted similar FIT programs. An assessment of the *Canada Renewable Energy/FIT* case is crucial to understanding the impact of subsidy classification on green energy projects in the developing world. It will explore whether the Appellate Body decision is sufficient to guide international disputes arising from green energy initiatives, or if the *SCM Agreement* needs to be revised to provide legal parameters for defining the limits of green subsidies within the sphere of international trade. It will look at the treatment of the term "subsidy" as it relates to the *SCM Agreement* and its application to FIT schemes, especially in light of the new requirements under the Paris Agreement on climate change.[382]

The *Canada Renewable Energy/FIT* cases raise questions about the viability of WTO treatise such as the *SCM Agreement* in addressing national environmental climate change goals similar to those arising from green energy initiatives. While the *Canada Renewable Energy/FIT* case is the first of its kind to be considered at the WTO, it gives rise to a number of Request for Consultations, some of which are still in the pipeline. The *Canada Renewable Energy/FIT* case raises concern over green energy initiatives that may be under attack[383] and how this will impact developing nations. This is particularly relevant in sub-Saharan Africa, where sustainable development may be tied to

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[380] International Renewable Energy Agency, *Ghana Renewables Readiness Assessment* (2015) online: www.irena.org/DocumentDownloads/Publications/IRENA_RRA_Ghana_Nov_2015.pdf.

[381] *Green Energy Act*, 2009, SO 2009, c 12, Sched A.

[382]UNFCCC, Paris Climate Change Conference – 2015, online: http://unfccc.int/meetings/paris_nov_2015/meeting/8926.php.

[383] "World Trade Organization Attacks Successful Canadian Clean Energy Program: Sierra Club and Public Citizen Express Disappointment", Public Citizen, Eyes of Trade, Public Citizen's Blog on Globalization and Trade (21 November 2012), online: www.citizen.typepad.com/eyesontrade/2012/11/world-trade-organization-attacks-successful-canadian-clean-energy-program-.html.

green initiatives like renewable energy FIT schemes. Specifically, how will the *Canada Renewable Energy/FIT* case impact on sub-Saharan nations like Ghana that have adopted energy policies that rely on FIT schemes to incorporate renewable energy alternatives in their development path? Does the climate change dilemma call for a resurrection of Article 8 of the *SCM Agreement* (non-actionable subsidies), which would protect subsidies associated with national environmental protection goals? These questions raise concerns about whether the treatment of climate change necessitates a modernization of the WTO *SCM Agreement* to account for environmental subsidies and development goals of disadvantaged regions.

The *Canada Renewable Energy/FIT* case was the first WTO challenge of discriminatory subsidies in the renewable energy sector. The European Union requested consultation with Canada on August 11, 2011 regarding its FIT Program. The European Union alleged that Canada's FIT Program breached its obligations under Article III:4 and III:5 of the *GATT 1994*; Member States were not offered the same favourable trade terms on renewable energy equipment, suppliers, and services as Canadian companies.[384] It was further alleged that the FIT Program constituted a trade-related investment measure and was therefore inconsistent with Article 2.1 of the *TRIMs Agreement* and with Article III of the *GATT 1994*.[385] Finally, the request alleged that the FIT Program constituted a subsidy pursuant to Article 1 of the WTO *SCM Agreement* as a financial contribution was conferred to the energy producer, contrary to Articles 3.1(b) and 3.2 of the *SCM Agreement*.[386]

The Appellate Body in the *Canada-Renewable Energy/FIT* decision adjudicated on whether

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[384] The World Trade Organization, *Canada – Certain Measures Affecting the Renewable Energy Sector* (2012) WT/DS412/AB/R, (Panel Report) Dispute DS412, online: www.wto.org/english/tratop_e/dispu_e/cases_e/ds412_e.htm ["*Canada Renewable Energy/FIT* (Panel Decision)"]; The World Trade Organization, *Canada –Measures Relating to the Feed-in Tariff Program* (2013) WTO Doc WT/DS426/AB/R (Appellate Body Report) Dispute DS426, online: www.wto.org/english/tratop_e/dispu_e/cases_e/ds426_e.htm ["*Canada Renewable Energy/FIT Case* (Appellate Body Report)"].

[385] *Agreement on Trade Related Investment Measures*, online: www.wto.org/english/tratop_e/invest_e/invest_info_e.htm ["*TRIMs*"].

[386] *Canada Renewable Energy/FIT Case* (Appellate Body Report), *supra* note 369.

a FIT scheme that guaranteed payments to renewable energy producers while setting local content requirements for Canadian products was a subsidy under Article 1 of the *SCM Agreement* and, thus, a violation of Article III.4 of the *GATT* and 2.1 of the *TRIMs*. Domestic content requirements are sometimes used to encourage communities to transition to more expensive green energy alternatives in exchange for more jobs and community economic growth. While the issue of local content requirements will not be directly addressed in this paper, the distinction between subsidies that do not address market failures, and may result in a discriminatory effect, from those subsidies that address specific societal concerns such as the environment will be explored within the broader context of climate change.

With the absence of a "non-actionable" subsidy provision in the *SCM Agreement*, a major concern for green energy developers is whether measures aimed at encouraging green technologies within the renewable energy sector can withstand the scrutiny of international trade laws. A number of these programs, including the Ontario FIT Programs, have come under fire, primarily for local content requirements.[387] The issue of subsidies and renewable energy arises in international law as national environmental strategies such as the solar energy feed-in tariff program may be inconsistent with WTO rules. This inconsistency results from a failure to clearly distinguish distorting subsidies from correcting ones. Note that scholars have advocated for subsidies to be subject to one of two classifications: non-actionable, which have a public policy goal like environmental preservation, and actionable subsidies, which are designed to address protectionist measures.[388] By failing to address such a distinction, the *Canada Renewable Energy/FIT* decision renders the viability of the FIT

[387] *Canada Renewable Energy/FIT* (Panel Decision), *supra* note 369; The World Trade Organization, *China – Measures Concerning World Power Equipment* (2010) WTO Doc WT/DS419/1 Request for Consultations, online: www.wto.org/english/tratop_e/dispu_e/cases_e/ds419_e.htm; *Canada – Renewable Energy/FIT Case* (Appellate Body Report), *supra* note 369.

[388] Simon Lester, "The Problem of Subsidies as a Means of Protectionism: Lessons from the WTO EC-Aircraft Case" (2011) 12 *Melbourne Journal of International Law* 1.

Program as a means of providing alternative energy and technology transfer to the developing world highly uncertain. Furthermore, the growth in trade disputes has raised questions about whether the WTO Agreements and *GATT* are sufficient to address environmental issues while preserving the rights of least-developed and developing nations to pursue development. This question is of even greater concern where countries can be penalized for promoting policies that replace traditional energy that emits higher GHG, with renewable energy programs that are subsidized by governments.[389]

A. The Connection Between Climate Change and Subsidies in sub-Saharan Africa

Climate change will have profound effects on continental Africa.[390] The issue of energy insecurity in sub-Saharan Africa is clearly linked to regional development goals (such as infrastructural development, technology and knowledge transfer), and these initiatives can be combined with climate change abatement strategies. This dual initiative which recognizes energy as a precondition for economic development is being addressed by a group of nations known as the Economic Community of West African States (ECOWAS) which is comprised of 15 sovereign nations: Benin, Burkina Faso, Cabo Verde, Cộte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mail, Niger, Nigeria, Senegal, Sierra Leone and Togo. [391] The combined population of ECOWAS exceeds 334.6 million people.[392] Three Member States comprise more than two-thirds

[389] Aaditya Mattoo & Arvind Subramanian, "Four Changes to Trade Rules to Facilitate Climate Change Action" (2013) 13:10 *Peterson Institute for International Economics Policy Brief*, online: www.piie.com/publications/pb/pb13-10.pdf.
[390] United Nations Economic Commission on Africa. Economic Report on Africa 2014. *Dynamic Industrial Policy in Africa* at xiv.
[391] The Economic Community of West African States (ECOWAS), the United Nations Industrial Development Organization (UNIDO), *ECOWAS Renewable Energy and Energy Efficiency Status Report 2014* (Paris, Renewable Energy Policy Network for the 21st Century, 2014) online:www.ren21.net/Portals/0/documents/activites/Regional%20Reports/ECOWAS_EN.pdf [hereinafter "*ECOWAS Renewable Energy Status Report*"].
[392] *Ibid.*

(67.5%) of the entire region's population (Côte d'Ivoire 6.8%, Ghana 7.7%, and Nigeria 52.9%).[393] Of 346 million people, only 8 per cent of rural residents and 42 per cent of the total population have access to electricity.[394] This number is severely reduced when one considers those whose access to electricity can be said to be reliable and consistent.

The volatility in energy may arguably be at the root of underdevelopment, poverty, and even health issues within the region. Currently, cooking via wood and charcoal accounts for 85.7 per cent of the population's solid fuel usage. The inhalation effects of these methods of energy have a more profound impact on women and children, who are most often required to tend fires and prepare meals.[395] A clear correlation has been established between "energy access and human economic development", which heightens the priority for energy security in the ECOWAS region.[396] In general, the sub-Saharan region has the highest concentration of peoples without access to electricity on the planet, totaling at 599 million (47.6%), followed by Asia at 309 million (24.6%) and India at 306 million (24.3%).[397]

Lack of energy is also directly correlated to human health and the environment. While more than 85.7% of the ECOWAS population currently use traditional biomass and solid fuels for cooking and heating.[398] Reliance on high carbon dioxide emitting energy sources have had a negative health impact on the population in the region and it is estimated that "more than 257.8 million people [are] being affected by household air pollution from indoor smoke, small particle pollution, carbon monoxide, and nitrogen oxides" along with unnecessary burns and increased cancer threats.[399] There

[393] *Ibid* at 19 online: www.ren21.net/Portals/0/documents/e-paper/ECOWAS/epaper/ausgabe.pdf?rnd=54ca63edd2684.
[394] *Ibid* at 22-23. Note the electricity rates in the region vary tremendously with some areas like Cabo Verde having full access, while others like Niger only have a 9 per cent electrification rate.
[395] *Ibid* at 26.
[396] *Renewable Energy Global Status Report 2015*, *supra* note 376 at 12.
[397] *Ibid* at 22.
[398] *Ibid* at 13.
[399] *ECOWAS, supra* note 391 at 13.

is also concern that this region may be less able to respond to the effects of climate change due to the lack of "resilience in energy planning."[400]

Population growth projections of 2.5 per cent per year, and increased urbanization, also heighten the need to consider renewable energy sources within the region. In fact, sub-Saharan Africa is optimally positioned to take advantage of renewable energy sources like solar photovoltaic energy production that can be optimized due to close proximity to the equator. The region's renewable energy potential has been identified as immense and reported as follows:

> An estimated 23,000 MW of hydroelectric potential is concentrated in 5 of the 15 member States, of which only about 16 per cent has been exploited. According to preliminary estimates, small hydropower potential in the region amounts to around 6,000 MW. There is good potential for all forms of bioenergy. There are considerable wind, tidal, ocean, thermal and wave energy resources available in some ECOWAS countries. The region also has vast solar energy potential with very high radiation averages of 5 to 6 kWh/m throughout the year.[401]

The vastness of the renewable energy resources in the region makes green energy options a viable and logical inclusion in development goals. In addition, the region has also set renewable energy goals as a part of the ECOWAS Renewable Energy Policy (EREP) that aims for an "overall electricity mix to 35 per cent by 2020 and 48 per cent by 2030."[402]

II. TRADE, THE *GATT, SCM* AGREEMENT & INTERNATIONAL LAW

Governments are increasingly attempting to incorporate environmental targets in their economic strategies. With new nationally determined pledges emerging from the Paris 2015 World

[400] *Ibid* at 13.
[401] Karin Reiss, "Developing Renewable Energy Sectors and Technologies in West Africa" (2015) 3 *UN Chronicles* 33 at 33-34.
[402] *Ibid*.

Environmental Summit,[403] countries must be free to implement policies that will encourage investment in renewable energy projects. This means that flexibilities, like those previously included for non-actionable subsided in the *SCM Agreement* and national urgency and economic development flexibilities in *TRIPS,* must be considered not only as a national strategy, but also as a contribution to the global policy goal for climate change abatement. The costliness of green energy alternatives such as photovoltaic solar plants may require some form of government assistance to entice energy producers to invest, especially in developing nations. This raises question of whether public policy concern for climate change abatement could also warrant similar flexibilities as emerged from other social debates like the affordable medicines conflict?[404]

There are a number of flexibilities that can be extracted from the *GATT* that would affect green energy projects. Specifically, Article XX(b) of the *GATT* creates exceptions allowing a Member State to introduce measures that are "necessary to protect human, animal or plant life or health".[405] A specific exception also exists for the environment relating "to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption".[406] Thus, where Articles XX(b) and (g) of the *GATT appear* to support environmental subsidies, the *SCM Agreement* no longer contains exceptions for such flexibilities.

There are a number of flexibilities in several international agreements, including the *GATT 1994*, that would support national environment and climate change goals. These climate change abatement initiatives have been contemplated for decades and were raised at the Doha Round

[403]UNFCCC, Paris Climate Change Conference – 2015, online: http://unfccc.int/meetings/paris_nov_2015/meeting/8926.php.
[404] Leslyn A Lewis, "The Applicability of *TRIPS* Flexibilities to the Developing World for Climate Change Mitigation as a Public Good in Green Energy Projects" (2015) 15 *Asper Rev of Int'l Bus & and Trade* 129.
[405] *GATT 1947, supra* note 368 at Article XX(b).
[406] *Ibid* at Article XX(g).

negotiations.[407] These negotiations essentially stalled and were not resuscitated, failing to result in an international agreement on renewable energy or WTO policy on the issue.[408] As such, the *SCM Agreement* is the most relevant document governing renewable energy subsidies and trade. The flexibilities that pertained to the *SCM Agreement* expired on January 1, 2000 and have not been renewed.[409] Under Part IV of the *SCM Agreement*, a number of subsidies were previously deemed "non-actionable", including certain programs for adopting new governmental environmental requirements as well as programs for disadvantaged regions.[410]

A. Actionable and Non-Actionable Subsidies

The *SCM Agreement* is the primary international agreement on how a "subsidy" should be defined and it recognizes two types of subsidies: prohibited, which, if successfully challenged, must be removed,[411] and actionable, which, if successfully challenged, may require an amendment to the infringing portion.[412] Further, there are two types of prohibited subsidies: export subsidies and local content subsidies.[413] Even if a subsidy is not prohibited, it can be actionable if it is "specific to an enterprise or industry or group of enterprises or industries within the jurisdiction of the granting authority"[414] and adversely affects another Member. This raises questions about whether FITs, which are specific to the renewable energy industry, constitute a subsidy under the *SCM Agreement*. FIT schemes are usually long term, fixed price contracts between renewable energy producers and

[407] WTO Doha Ministerial Meeting, Ministerial Declaration November 2001, adopted on 14 November 2001, WTO Doc 20 WT/MIN(01)/DEC/1, online: www.wto.org/english/wto_e/minist_e/min01_e/minfrvl_r.htm#tradeenvironment>.
[408] David A Gantz, "World Trade Law after Doha: Multilateral, Regional, and National Approaches" (2011-2012) 40 *Denv J Int'l L & Pol'y* 321.
[409] Sadeq Z Bigdeli, "Resurrecting the Dead? The Expired Non-Actionable Subsidies and the Lingering Question of "Green Space", (2011) 8 *Manchester Journal of International Economic Law* 2; Sadeq Z Bigdeli, "Incentive Schemes to Promote Renewables and the WTO Law of Subsidies" in *International Trade and Mitigation of Climate Change* (Thomas Cottier, Olga Nartova & Sadeq Z Bigdeli eds. 2009).
[410] *SCM Agreement, supra* note 368.
[411] *SCM Agreement*, *supra* note 368, Article 3 recognizes export and importation subsidies as prohibited.
[412] *Ibid*, Article 5.
[413] *Ibid*, Article 3.
[414] *Ibid* at Articles 1.2, 2 and 5.

governmental or quasi-governmental entities to provide energy in exchange for feeding into the grid system that is usually operated and maintained by another government or quasi-government entity. The question is couched in the notion that FITs create a dual pricing scheme which discounts renewable energy sources by setting fixed tariffs, a form of "government support" deemed to be a subsidy. In this regard, WTO rules and the *SCM Agreement* do not distinguish between subsidies that attempt to correct environmental distortions and those that distort trade. A country that objects to a Member's practice can either challenge the activity, as in the case of actionable subsidies like FITs, or request countervailing measures be imposed on imports for other actionable subsidies. In cases of prohibited subsidies like local content or export subsidies, infringing provisions must be removed.[415] In contrast, only the adverse effects need to be removed from an actionable subsidy.[416] Failure to remedy the infringing portion can result in countermeasures by the Complainant against the offender pursuant to Article 7.9 of the *SCM Agreement.*[417]

As most subsidies fall under the actionable category, rectification is often limited to an amendment of the practice bearing the adverse impact. While the *SCM Agreement* does not specifically define a "prohibited" or "actionable" subsidy, Mitsuo Matsushita, Thomas Schoenbaum, and Petros Mavroidis recognize a catch-all classification of an actionable subsidy—"by default: all government schemes which qualify as subsidies, and which are neither prohibited nor non-actionable, are, in principle, actionable subsidies."[418] It has been argued that the original purpose of the *SCM Agreement* was to provide assistance for the cost of adapting to new environmental requirements and for costs associated with upgrading old facilities to environmentally friendly ones.[419] The very

[415] *Ibid* at Article 4.7.
[416] *Ibid* at Article 7.8.
[417] *Ibid* at Article 7.9.
[418] Motsuo Matsushita, Thomas J Schoenbaum, and Petros C Mavroidis (2006) *The World Trade Organization: Law, Practice and Policy* (2nd ed.)
[419] Patrick J McDonough, "Subsidies and Countervailing Measures", in Terence P Steward (ed), *The GATT Uruguay Round: A Negotiating History* (1986-1992) (Boston, Mass: Kluwer Law, Deventer, the Netherlands, 1993) 803-1008.

existence of the now lapsed third class of a non-actionable subsidy, is evidence of the original intent of the *SCM* as it relate to having a separate category for subsidized environmental and development activities. However, in light of the *Canada Renewable Energy* case, the *SCM*'s impact on FITs as a policy tool is yet to be tested among the ECOWAS Members and many regions in the developing world and sub-Saharan Africa. Specifically, it is uncertain whether the WTO Dispute Settlement Body would interpret the *Canada Renewable Energy* case in the same manner for a developing nation as it did for a developed economy like Canada. Essentially, a strict interpretation of the domestic content restrictions and other prohibitions could potentially be in conflict with the flexibilities within governing Agreements like the *SCM* and *GATT* which encourages regional development by recognizing the unique circumstances surrounding underdevelopment and trade. This raises questions about whether environmental subsidies should be deemed as actionable, prohibited or whether the third class of non-actionable subsidy should be resurrected.

The *SCM Agreement also provided for* "non-actionable" subsidies existed between 1995 and 1999.[420] As noted above, there are now only two categories of subsidies. Prior to 1999, Article 8 of the *SCM Agreement* provided that no actions could be taken against subsidies that promoted research and development, technology, industrial policies like technology transfer and facility upgrades, as well as environmental protection and regional aid.[421] Provisions pertaining to "non-actionable" subsidies also permitted "assistance to disadvantaged regions within the territory of a Member given pursuant to the framework of regional development".[422] The *SCM Agreement* also recognized subsidies that further environmental adaptation pursuant to Article 8.2(c), which required it to "promote adaptation of existing facilities to new environmental requirements imposed by law and/or

[420] *SCM Agreement*, *supra* note 368 at Articles 8 and 31.
[421] *Ibid* at Article 8.2(b)
[422] *Ibid* at Article 8.2(c).

regulations".[423]

The *SCM Agreement* was preceded by the 1979 *Subsidies Code*, which recognized subsidies as "important instruments" in the promotion of "social and economic policy objectives".[424] The *Subsidies Code* listed the following important objectives of non-actionable subsidies:

> "(a) the elimination of industrial, economic and social disadvantages of specific regions,
>
> (b) to facilitate the restructuring, under socially acceptable conditions, of certain sectors, especially where this has become necessary by reason of changes in trade and economic policies, including international agreements resulting in lower barriers to trade,
>
> (c) generally to sustain employment and to encourage re-training and change in employment,
>
> (d) to encourage research and development programmes, especially in the field of high-technology industries,
>
> (e) the implementation of economic programmes and policies to promote the economic and social development of developing countries.
>
> (f) redeployment of industry in order to avoid congestion and environmental problems."[425]

The *Subsidies Code* was also the predecessor to the Uruguay Round *Subsidies Agreement* and the *Subsidies and Countervailing Measures Agreement*. During the Uruguay Round negotiations, the United States strongly opposed the inclusion of non-actionable subsidies related to research and development, environmental and also regional aid policies.[426] Opposition to the non-actionable class was based on the potential abuse that could result where no action could be taken for discriminatory practices. In response, it was agreed that the provision would be reviewed five years after the conclusion of the Uruguay Round in 1994. Instead of conducting a review in 1999, the non-

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[423] *Ibid*.
[424] See: GATT Subsidies/Countervailing Measures Code, Article 11.1, online: https://ecampus.wto.org/admin/files/Course_385/Module_1594/ModuleDocuments/SCM-L2-R1-E.pdf ["*Subsidies Code*"].
[425] *Ibid*.
[426] *Elements of the Framework for Negotiations, Submission by the United States*, MTN.GNG/NG10/W/29 (22 November 1989).

actionable subsidies category was not addressed and therefore lapsed. It should be noted that during the five years of its existence, it was never invoked or relied on by a Party.[427] It is not clear that it was the intention of the *SCM Agreement* to completely remove the non-actionable subsidy category under Article 8, and there was concern among States that its removal sent the wrong signals in relation to international environmental law.[428]

The original Article 8.2(c) set limits on environmental subsidies by limiting them to the following:

> "assistance to promote adaptation of existing facilities to new environmental requirements imposed by law and/or regulations which result in greater constraints and financial burden on firms, provided that the assistance:
>
> (i) is a one-time non-recurring measure; and
>
> (ii) is limited to 20 per cent of the cost of adaptation; and
>
> (iii) does not cover the cost of replacing and operating the assisted investment, which must be fully borne by firms; and
>
> (iv) is directly linked to and proportionate to a firm's planned reduction of nuisances and pollution, and does not cover any manufacturing cost savings which may be achieved; and
>
> (v) (v) is available to all firms which can adopt the new equipment and/or production processes."[429]

The restrictive nature of Article 8.2(c) may explain why it was not invoked during the five year period over which it existed. However, despite its non-use, the spirit of this lapsed section was incorporated in the *Canada Renewable Energy/FIT* decision. The requirement of a "one-time non-recurring measure" in Article 8.2(c)(i) is similar in reasoning to the "new industry" approach that

[427] Rios Herran and Pietro Poretti, 'WTO - Trade Remedies'. in Rudiger Wolfrum, Peter Tobias Stoll and Michael Koebele (eds), *WTO - Trade Remedies: Max Planck Commentaries on World Trade Law* (Leiden, Boston: Martinus Nijhoff Publishers, 2008) vol. 4, 545-552 at 552.
[428] Bigdeli (2011), *supra* note 409.
[429] *SCM Agreement*, *supra* note 368 at Article 8.2(c) (notes deleted).

was adopted by the Appellate Body decision in the *Canada Renewable Energy/FIT* case and which will be reviewed later in this paper.

B. Subsidies and Green Energy Programs

Globally, the energy sector is one of the most heavily subsidized, with an estimated annual subsidy of US $ 100 billion in 2012;[430] it is arguably one of the most heavily subsidized industries in the world.[431] The International Energy Agency ("IEA") has estimated that removing fossil fuel subsidies could lower greenhouse gas emissions by the 2 degrees Celsius climate change targets.[432] Whereas it is estimated that global fossil fuel subsides totaled $ 523 billion in 2011, renewable energy subsidies only amounted to $ 88 billion in the same year.[433] An energy subsidy is defined as "any government action that concerns primarily the energy sector that lowers the cost of energy production, raises the price received by energy producers or lowers the price paid by energy consumers."[434] The IEA recognizes the need to form a comprehensive global energy strategy that will address transition to renewable energy sources and the irreplaceable role of subsidies in this endeavor. The IEA does, however, caution the use of subsidies by governments, noting the:

> following Governments need, though, to be attentive to the design of their subsidies to renewables, which surpassed $100 billion in 2012 and expand to $220 billion in 2035. As renewables become increasingly competitive on their own merits, it is important that subsidy schemes allow for the multiple benefits of low carbon energy sources without placing

[430]IEA, *World Energy Outlook 2013* (Paris: International Energy Agency, 2013), available at www.worldenergyoutlook.org/publication/seo-2013/.
[431] *United Nations Secretary-General's High-level Panel on Global Sustainability, Resilient People, Resilient Planet: A Future Worth Choosing* (New York: United Nations, 2012) at 52.
[432] Duncan Clark, "Phasing out fossil fuel subsidies could provide half of global carbon target" *The Guardian*, January 19, 2012; See also IEA, World Energy Outlook 2012 1, online: www.worldenergyoutlook.org/resources/energysubsidies/.
[433] *Ibid*, *World Energy Outlook* at 6. For a detailed assessment of green energy policy instruments. See also: Pablo Benitez, "Policy Instruments for Renewable: An Introduction" ESMAP/IFC Renewable Energy Training Program, World Bank (18 September 2012), online: World Bank Institute www.esmap.org/site/esmap.org/files/ESMAP%201FC%20Training%20World%20Bank%20Benitez.pdf.
[434] IEA, World Energy Outlook 1999: Looking at Energy Subsidies: Getting the Price Right (Paris: OECD/IEA, 1999).

> excessive burdens on those that cover the additional costs. A carefully conceived international climate change agreement can help to ensure that the energy-intensive industries in countries that act decisively to limit emissions do not face unequal competition from countries that do not.[435]

The issue of subsidies is still contentious when weighed against the merits of the Polluter Pays Principle. The Polluter Pays Principle was adopted by the OECD in 1972 and has been argued to stand for a no subsidy principle,[436] wherein the cost of the externality is borne by the polluter. With respect to feed-in tariffs, changes to the local regulatory framework, and the adoption of the FIT system, may not necessarily constitute a subsidy. Robert Howse, among other scholars, argue that renewable energy schemes like feed-in tariffs are not "financial contributions" under Article 1.1(a) of the *SCM Agreement*.[437]

International law has no singular treatise to regulate energy law.[438] Moreover, the tools utilized by various countries to promote renewable energy technologies differ in scope and breadth. The *GATT* and several WTO[439] treaties are particularly relevant in governing international energy law. The issue of subsidies and renewable energy is closely connected to how the Most Favoured Nation ("MFN") Principle of the *GATT* applies to local environmental policies and projects. This principle ensures that countries offer the same treatment to foreign industries as they offer to local businesses. The MFN Principle stipulates that all trading partners must be treated equally and free of discrimination. Article III:4 of *GATT* stipulates the following:

> "The products of the territory of any contracting party imported into the territory of any other contracting party shall be accorded treatment no less favourable than that accorded to like

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[435] IEA, World Energy Outlook 2013: Executive Summary, online: www.iea.org/Textbase/npsum/WEO2013SUM.pdf. at 3.
[436] Charles S Pearson, "Testing the System: GATT + PPP = ?", (1994) 27 *Cornell International Law Journal* 553.
[437] Robert Howse, "Post-Hearing Submission to the International Trade Commission: World Trade Law and Renewable Energy: The Case of Non-Tariff Measures" (2005) 3(2) *Oil, Gas & Energy L Intelligence* 2.
[438] Cottier *et al*, *supra* note 409.
[439] There are a number of WTO Agreements that apply to international energy law: *General Agreement of Tariffs and Trade*; the G*eneral Agreement on Trade in Services*; the *Trade Related Investment Measures*; the *Subsidies and Countervailing Measures Agreement*; the *Technical Barriers to Trade Agreement*; and the *Agreement on Government Procurement*.

products of national origin in respect of all laws, regulations and requirements.…"[440]

An exception exists under III:8(a) of *GATT*, which exempts government procurement initiatives from the effects of Article III:4.[441] Accordingly, the primary issue in the *Canada Renewable Energy/FIT* Appeal was whether government procurement programs such as the FIT could be exempt from the MFN requirement under Article III:8(a) of *GATT*. Article III:8(a) of the *GATT* may be applicable to subsidies that are specific to the public good they are attempting to uphold, if they contain the minimal trade distortion.

Several scholars in the area of subsidies have argued that Article XX of the *GATT* actually permits non-actionable subsidies where the goal is environmental sustainability.[442] The *SCM Agreement* was contemplated in the *GATT* Council Meeting, 1991 Secretariat documents on Trade and the Environment.[443] The reference in the *GATT* document reads:

> The text of the draft Agreement on Subsidies and Countervailing Measures under negotiation in the Uruguay Round contains some modifications to the subsidy rules. The draft has attempted to define "non-actionable" subsidies as those related, under certain conditions, to research and development, structural adjustment assistance, environmental protection and regional aids.[444]

While the above Article 8(b) and (c) provisions of the *SCM Agreement*, referenced in the *GATT* document, have expired, these flexibilities, if operable, could act as a means to promote green subsidies. Arguably, the framers of the *SCM Agreement* may not have intended to have non-

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[440] *GATT*, *supra* note 368.
[441] *Ibid*, Article III:8(a) and III:4.
[442] Robert Howse, "Do the World Trade Organization Disciplines on Domestic Subsidies Make Sense? The Case for Legalizing Some Subsidies", in Kyle W Bagwell, George A Bermann, and Petros C Mavroidis (eds), *Law and Economics of Contingent Protection in International Trade* (New York City, NY: Cambridge University Press, 2010) 85-102; Luca Rubini, *The Definition of Subsidies and State Aid: WTO and EC Law in Comparative Perspective* (Oxford, UK: Oxford University Press, 2010) 2012; Alan O Sykes, "The Economics of the WTO Rules on Subsidies and Countervailing Measures", in Patrick F J Macrory, Arthur E Appleton, Michael G Plummer (eds), *The World Trade Organization: Legal, Economic and Political Analysis*, vol I (Springer Verlag: New York City, New York, 2005).
[443] GATT Council Meeting, 1991 Secretariat Documents on Trade and the Environment, GATT Doc. L/6896 of 18 September 1991 at 4, online: www.wto.org/gatt_docs/English/SULPDF/91530963.pdf ["GATT Council Meeting"].
[444] *Ibid* at 16.

actionable subsidies aimed at addressing environmental distortions and development issues to be permanently removed from *the SCM Agreement.*

I. Climate Change Abatement Subsidies

The 1947 *GATT* was the first international treaty to explicitly prohibit subsidies that distort trade. After the creation of the WTO in 1995, the possibility of encouraging positive behavior through the subsidization of renewable energy technologies was vigorously entertained.[445] The United Nations Environment Program also acknowledged the role of green subsidies as necessary, "justified by the positive externalities expected from a green economy and … important for leveraging private investments".[446] As it has already been acknowledged, subsidies are required, as renewable energy projects are often not suitable capital ventures and investors are often cautious about the riskiness of their return on investment.[447] While subsidies attempt to create an incentive for the investor or energy producer, local content requirements aim to stabilize and enhance development in the local economy. While these requirements may amount to a subsidy to an industrialized country, the same may not be true in the developing world that struggles with industrialization.

The ban on subsidies that distort trade was initiated by the *GATT* in 1947 and was specified by the WTO in its *SCM Agreement*.[448] The current legal landscape may not fully account for the role

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[445] Philippe Menanteau, Dominique Finon, and Marie-Laure Lamy. "Prices versus quantities: choosing policies for promoting the development of renewable energy" (2003) 31:8 *Energy Policy* 799; M L Weitzman, "Prices vs Quantities" (1974) 41:4 The Review of Economic Studies 477; R Wiser, S Pickle, "Green marketing, Renewables, and Free Riders: Increasing Customer Demand for a Public Good) Ernest Orlando Lawrence Berkeley National Laboratory, 1997, online: www.eren.doe.gov/greenpower/wiser-free.pdf; N Wohlgemuth, *Renewable Energy Promotion in Competitive Electricity Markets* (Solar Energy Society, London, 1999).

[446] United Nations Environmental Programme 2011, *Towards A Green Economy: Pathways to Sustainable Development and Poverty Eradication, UNEP, 2011*, online: www.unep.org/greeneconomy/Portals/88/documents/ger/ger_final_dec_2011/Green%20EconomyReport_Final_Dec2011.pdf at 613.

[447] Michael Levi, "The Hidden Risks of Energy Innovation" (2013) 39:2 *Issues in Science and Technology*.

[448] *Ibid.*

of subsidies in correcting market failures like those caused by environmental externalities such as pollution. The WTO and its Dispute Body has been the main international regulator on subsidy disputes. The problem arises from the *SCM Agreement*'s failure to clearly distinguish between distorting and correcting subsidies. This quagmire obscures the role of the WTO as a regulator of trade and questions its assistance in redefining trade laws to incorporate climate change objectives.[449] In this regard, it has been maintained that the WTO Dispute Body should not be a regulator of trade, but should be expected to form a global "consensus on renewable energy support measures".[450] Consequently, international trade law recognizes the public good value associated with climate change abatement strategies, despite this, the solution of recapturing environmental externalities by subsidizing practices that minimize pollution continues to be at odds with the definition of what traditionally constitutes a subsidy. As Sykes argues, WTO law and international trade treatise, in particular, do not engage the question of "whether the ostensible 'subsidy' addresses some legitimate problem."[451] Essentially, this brings into question the applicability of current international trade laws to the current day problem of climate change. Thus, for Sykes, the competitive "disadvantage" that governmental measures confer should also be calculated in the determination of a subsidy.[452] Measures that relieve the polluter of the cost of pollution are said to be distorting irrespective of whether they are targeted environmental abatement initiatives (recognizing that not all abatement initiatives are pollution free), owing to a violation of the Polluter Pays Principle.[453]

There are two schools of thought as to whether a WTO exception should be meted out for

[449] Sykes (2003) *supra* note 442; Howse, *supra* note 437.
[450] Aaron Cosbey "Renewable Energy Subsidies and the WTO: The Wrong law and the Wrong Venue" 2011 IISD, 19 June 2011, online: www.iisd.org/gsi/news/renewable-energy-subsidies-and-wto-wrong-law-and-wrong-venue.
[451] Sykes, *supra* note 442 at 28.
[452] Allen O Sykes, "The Questionable Case for Subsidies Regulation: A Comparative Perspective" Standford University School of Law, Law and Economics Research Series Paper No 380 (2009).
[453] David W Pearce and R Kerry Turner, *Economics of Natural Resources and the Environment* (Baltimore: John Hopkins University Press, 1990).

climate change abatement strategies. Some economists view climate change abatement trade strategies as fundamentally "protectionist" and are unsupportive of creating exceptions under the WTO.[454] Alternatively, national policies and strategies are also touted for promoting environmental goals associated with climate change.[455] The WTO's Dispute Settlement Body clearly recognizes that protectionism constitutes any domestic law and regulation favouring national industries over foreign ones. The role of international environmental law includes the facilitation of environmental protection and global sustainable development while upholding the rights of States to pursue trade free of arbitrary and discriminatory trade practices, and where policy imposes a minimal trade distortion.

There is clear recognition in the literature that international trade treatise need to be reconceived to account for climate change abatement goals. In this regard, it has also been argued that there should be some sort of "environmental goods" legislation that eliminates environmental tariffs.[456] Similarly, there is support for WTO treaties that balance environmental needs with international trade law.[457] Other scholars propose a solution that creates international environmental governance administered through the United Nations, replacing the existing "toothless treaties" currently in existence.[458] Authors like James Speth view the past environmental treaties, such as Kyoto, as lacking substance and devoid of enforcement and implementation provisions. Instead, Speth advocates for movement away from voluntary environmental treaties towards more substantive

[454]Aaron Cosbey & Petros C Mavroidis, *A Turquoise Mess: Green Subsidies, Blue Industrial Policy and Renewable Energy: the Case for Redrafting the Subsidies Agreement of the WTO* (2014) Robert Schuman Centre for Advanced Studies Global Governance Programme, EUI Working Paper RSCAS 2014/17, online: www.cadmus.eui.eu/bitstream/handle/1814/29924/RSCAS_2014_17.pdf?sequence=1.
[455] IPCC, *Renewable Energy Source and Climate Change Mitigation,* Special Report of the Intergovernmental Panel on Climate Change (Cambridge University Press, 2012), online: www.srren.ipcc-wg3.de/report.
[456] B G Janzen, "The Cleantech Subsidy Wave: A New Source of Trade Conflict?" (2010) 39:3 *International Law News*.
[457] Andrew Guzman, "Global Governance and the WTO" (2004) 45 Harv Int'l LJ 303.
[458] James Gustave Speth, *Red Sky at Morning and the Crisis of the Global Environment* (New Haven: Yale University Press, 2004) at 116.

agreements with strong economic implementation measures.[459] This transition requires assistance for local governments to address global environmental problems. In opposition to an international governance structure under the United Nations, some pundits argue that such a structure gives rise to splinters of interest groups that will further complicate the regulatory process. The issue of energy has been viewed as so crucial to development that some scholars advocate for a separate international agreement that addresses global energy issues.[460]

The issue of pricing environmental externalities in trade raises questions about the classification of subsidies. Cosbey and Mavroidis extrapolate on the problem of full costing in their example of wind production, and note the following:

The price paid to the conventional producers typically does not factor in the environmental damage done by their production, and the price paid to the wind power producer would not factor in the social benefits of avoided environmental damage. As such, from society's perspective the free market solution would see a sub-optimal level of wind power production. Subsidies such as FITs can remedy this by working to equate the social benefits derived from wind power to the private returns going to the producer.[461] Thus, to determine whether a true subsidy exists, and whether there is a trade distorting effect, the environmental cost of production must be considered. This means accounting for the environmental damage caused by traditional high fossil fuel production, as well as the damage avoided by green energy products. There is also a body of literature suggesting that a subsidy is an effective instrument to address market failures associated with environmental externalities.[462]

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[459] *Ibid*.
[460] Thomas Cottier *et al*, 2009. *Energy in WTO and Policy* (Geneva, Switzerland: NCCR Trade Regulation), online: www.wto.org/english/res_e/publications_e/wtr10_forum_e/wtr10_7may10_e.pdf.
[461] Cosbey & Mavroidis, *supra* note 454 at 44.
[462] Aaron Cosbey, "Green Industrial Policy and the World Trading System" (2013) ENTWINED Issue Brief 17, online: www.iisd.org/sites/default/files/publications/entwined_brief_green_industrial.pdf.

Further, subsidies could be analyzed from a micro level, examining each national project and incentive, or from a macro level which explores the overall global impact of pollution. Nobel laureate economist Joseph Stiglitz suggests that countries that fail to price the cost of pollution in their products are effectually subsidizing producers and their products.[463] According to Stiglitz, a subsidy may result from a failure to tax externalities. He explains this omission as follows:

> Except in certain limited situations (like agriculture), the WTO does not allow subsidies obviously, if some country subsidizes its firms, the playing field is not level. A subsidy means that a firm does not pay the full costs of production. Not paying the cost of damage to the environment is a subsidy, just as not paying the full costs of workers would be.[464]

Stiglitz argues that the issue of costing externalities is so serious that charges should be brought by signatories of the Kyoto Protocol against the US for unfair subsidies emanating from subsidizing pollution.[465]

The efficacy of environmental subsidies has also been brought into question by several governmental authorities.[466] Prior to the WTO and its dispute settlement system, environmental sustainability was often addressed through the Polluter Pays Principle which maintains that the polluter should internalize the cost of pollution in their product and production costs. [467] Thus, the 1970s focused on governmental policies that discouraged government intervention in assisting with the cost of pollution prevention. Under the *GATT*, the focus was more on taxing the bad behavior as a form of punishing the cost of environmental externalities.[468] The Organization for Economic

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[463] Joseph E Stiglitz, "A New Agenda for Global Warming", (July 2006) 3 Economist's Voice 1; See also: Jagdish Bhagwati and Petros Mavroidis, "Is Action Against US Exports for Failure to Sign Kyoto Protocol WTO-Legal?" (2007) 6:2 *World Trade Review* 299.
[464] *Ibid* at 2.
[465] *Ibid*.
[466] Joe Kirwin, "EU Energy Executives Blame High Prices on Wind, Solar Subsidies, Seek to End Them" (2013) 15 *Bloomberg BNA Daily Report for Executives*, (2013) 15 at A-3; David Levine and Pam Walter, "Wave of Trade Disputes Complicates Global Market for Renewable Energy Firms, Particularly Solar Sector" 19 February *Bloomberg BNA Daily Report for Executives*.
[467] Sanford E Gaines, "The Polluter-Pays Principle: From Economic Equity to Environmental Ethos," (1991) 26:3 *Texas International Law Journal* 463.
[468] Pearson, *supra* note 436.

Cooperation and Development ("OECD") also supported the principle that the government should not bear the cost of environmental externalities by invoking tax incentives and subsidies.[469] The view that governments should not attempt to intervene in the market, in a way to offset the costs of environmental pollution, was prevalent for decades until the early 1990s.[470]

Fossil fuels remain the cheaper alternative and the environmental externalities caused by this choice are not factored into the price. It has been argued that the difference in pricing of renewable energy and fossil fuels is attributable to the "the lack of internalization of these positives and negative externalities", causing renewable energy to become "less competitive than fossil fuel".[471] Subsidies, therefore, act as a correction for the distortion causing renewable energy to be priced higher than fossil fuels; in this regard, subsidies merely "level the playing field."[472] However, projects that support the income of profits that green energy producers make from high capital investments like photovoltaic solar energy plants could be under attack. Without a specific reference to the non-actionable subsidy, the *SCM Agreement* would likely classify a FIT Program as an "income price support" or as a financial contribution giving rise to a subsidy. Since this matter was not addressed by the Appellate Body in the *Canada – Renewable Energy* case, the future of feed-in tariffs and the prices set to encourage renewable energy usage may be subject to future WTO challenges.

In December 2015, the Paris Climate Change Conference (COP21) was held and participating States were required to submit their own voluntary pledges, known as Intended Nationally

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[469] Organization for Economic Cooperation and Development, Recommendation on the Implementation of the Polluter-Pays Principle, 14 Nov. 1974, para III(I), (2).
[470] Energy Charter Protocol on Energy Efficiency and Related Environmental Aspect, 17 December 1994, 2080 UNTS 100, Art. 6(3), online: www.energycharter.org/fileadmin/DocumentsMedia/Legal/1994_PEEREA.pdf.
[471] Luca Rubini, "The Subsidization of Renewable Energy in the WTO: Issues and Perspectives" (2011) NCCR Working Paper 2011/32l at 6.
[472] *Ibid*; See also: C Beaton & T Moernhout, "A Literature Review on Subsidies to Electricity from Renewable Energy Sources: (2011)" NCCR Working Paper No 2011/63, 8, online: www.nccr-trade.org/fileadmin/user_upload/nccr-trade.ch/wp5/5.5a/A%20literature%20review%20on%20subsidies%20to%20electricity%20from%20renewable%20energy%20sources._01.pdf.

Determined Contributions (INDC). These pledges later formed the Nationally Determined Contributions (NDC) that countries would be bound to under the Agreement. These voluntary targets emerged out of the "Lima Call to Action," wherein "common but differentiated responsibilities" were recognized over the top-down approach of the Kyoto Protocol.[473] The Paris Agreement goes beyond previous international climate change regimes in its recognition of both mitigation and adaptation mechanisms. Article 7.2 recognizes the that developing nations are "particularly vulnerable to the adverse effects of climate change"[474] and therefore encourages the enhancement of "adaptive capacity, strengthening resilience and reducing vulnerability to climate change".[475] Given the financial challenges that developing countries currently face under existing climate regimes, additional requirements may exacerbate already pre-existing pressures.

The *Paris Agreement* also contains flexibilities that respond to the hardship that developing countries may encounter in meeting their climate change commitments. These hardship provisions include: a finance mechanism (Article 9), technology transfer mechanism (Article 10), capacity building (Article 11), education and knowledge transfer (Article 12), and an enhanced transparency provision (Article 13). Specifically, the language of the *Paris Agreement* includes references to "incentives", which may also raise questions about whether environmental initiatives constitute a "subsidy" under international law. For example, the Reduced Emissions from Deforestation and Degradation ("REDD") initiatives in Article 5 of the Agreement, explicitly states the following:

> Parties are encouraged to take action to implement and support, including through **results-based payments**, the existing framework as set out in related guidance and decisions already agreed under the Convention for: policy approaches and **positive incentives** for activities relating to reducing emissions from deforestation and forest degradation, and the role of

[473] Lima Call for Action (Decision -1-CP.20), online: https://unfccc.int/files/meetings/lima_dec_2014/application/pdf/auv_cop20_lima_call_for_climate_action.pdf
[474] UNFCCC (COP21), *Paris Agreement*, www.unfccc.int/paris_agreement/items/9485.php, Article 7.2 ["*Paris Agreement*"]
[475] *Ibid.*

conservation, sustainable management of forests and enhancement of forest carbon.…[476]

Despite the specific reference to REDD in Article 5.2, renewable energy projects easily fit into the REDD scheme in their aim to alter reliance upon fossil fuels that deplete forest resources by encouraging the use of alternative energy sources. Therefore, the *Paris Agreement* does not resolve issues around whether programs like FIT will be deemed a subsidy, especially if they are addressing regional disparity issues that are exacerbated by international climate change regimes.

The *Paris Agreement* is also replete with language that may be interpreted as supportive of subsidies; such terms include references to "contributions," "incentives," and "support" mechanisms not yet tested against the *SCM Agreement* and the *GATT* 1994. For example, Article 2 of the *Paris Agreement* establishes the goal of holding "the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels".[477] There are several mechanisms, incentives and supports that are touted as means of achieving this objective. Some of the provisions under consideration are highlighted below in Table 1.

Table 1: *Summary of the Paris Agreement Subsidies Reference*

Paris Agreement	Provision
Article 5.2	"Parties are encouraged to take action to implement and **support, including through results-based payments**, the existing framework as set out in related guidance and decisions already agreed under the Convention for: policy approaches and **positive incentives** for activities relating to reducing emissions from deforestation and forest degradation, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries; and alternative policy approaches, such as joint mitigation and adaptation approaches for the integral and sustainable management of forests, while reaffirming the importance of **incentivizing**, as appropriate, non-carbon benefits associated with such approaches."

[476] *Ibid* at Article 5.2, emphasis added.
[477] *Ibid* Article 2.

Article 4.6	"A mechanism to **contribute** to the mitigation of greenhouse gas emissions and **support** sustainable development is hereby established… to the Paris Agreement, and shall aim: (a) To promote the mitigation of greenhouse gas emissions while fostering sustainable development; (b) To **incentivize** and facilitate participation in the mitigation of greenhouse gas emissions by public and private entities authorized by a Party;"
Article 7.6	"Parties recognize the importance of **support** for and international cooperation on adaptation efforts and the importance of taking into account the needs of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change."
Article 9.1	"Developed country Parties **shall provide financial resources** to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention."
Article 9.3	"As part of a global effort, developed country Parties should continue to take the lead in mobilizing climate finance from a wide variety of sources, instruments and channels, noting the **significant role of public funds**, through a variety of actions, **including supporting country-driven strategies**, and taking into account the needs and priorities of developing country Parties. Such mobilization of climate finance should represent a progression beyond previous efforts."
Article 10.6	"**Support, including financial support**, shall be provided to developing country Parties for the implementation of this Article, including for strengthening cooperative action on technology development and transfer at different stages of the technology cycle, with a view to achieving a balance between support for mitigation and adaptation. The global stocktake referred to in Article 14 shall take into account available information on efforts related to support on technology development and transfer for developing country Parties."

These provisions raise questions regarding the applicability of the *Paris Agreement* to existing WTO obligations. Under Article 1.1 of the *SCM Agreement*, a scheme that is deemed to be a "financial contribution by a government or a public body within the territory of a Member", or "any form or income or price support", is deemed to be a subsidy if (1) a "benefit is conferred" and (2) it bears the following attributes:

> "(i) a government practice involves a direct transfer of funds (e.g. grants, loans, and equity infusion), potential direct transfers of funds or liabilities (e.g. loan guarantees);
>
> (ii) government revenue that is otherwise due is foregone or not collected (e.g. fiscal incentives such as tax credits);

(iii) a government provides goods or services other than general infrastructure, or purchases goods;

(iv) a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above which would normally be vested in the government and the practice, in no real sense, differs from practices normally followed by governments;"[478]

Thus, while the *Paris Agreement* incentivizes cooperation, financial supports, contributions from developed nations to developing ones, as well as from governments, in furtherance of mitigation and adaptation policies, there are no guarantees that these provisions will not be challenged under the *GATT* and the *SCM Agreement*.

III. THE *CANADA RENEWABLE ENERGY/FIT* CASE STUDY

The *Canada Renewable Energy/FIT* Case is the only WTO dispute that has adjudicated the issue of green energy subsidies within the context of the *SCM Agreement* and international trade laws. While the conditions that give rise to an industrialized nation's reliance on subsidies to facilitate renewable energy production differ from those of the developing world, the *Canada Renewable Energy/FIT* case has far reaching implications for international law.

The dispute in this case arose from regulatory changes facilitating a FIT scheme in Ontario, Canada. The Ontario *Green Energy and Green Economy Act* established the FIT Program in 2009 under the auspices of the Ontario Power Authority.[479] The energy policy was created pursuant to the *Electricity Act* of 1998, as amended by the *Green Energy and Green Economy Act* of 2009.[480] The Ontario FIT Program guaranteed the price in kWh at which the Ontario government would purchase power under a 20 to 40 year Power Purchase Agreement. The issue for the Panel and the Appellate

[478] *SCM Agreement*, *supra* note 368 at Article 1.1.
[479] *Green Energy and Green Economy Act*, 2009, SO 2009, c12, Sch B II 7 (1), online: www.ontario.ca/laws/statute/s09012.
[480] *Ibid*.

Body was whether the feed-in tariff constituted a subsidy pursuant to Article 1 of the *SCM Agreement*, which defines subsidies within the context of requiring a "financial contribution by a government or by any public body" that includes "any form of income support or price support" and where a "benefit is conferred".[481] Accordingly, the Panel explored whether the FIT Program was discriminatory in regards to its local content requirements and, consequently, in contravention of the *SCM Agreement*, *TRIMs* and the *GATT* 1994.[482]

The *Canada Renewable Energy/FIT* case was initiated by Japan's complaint against Canada, which was later supported by the United States and the European Union in September 2010. The WTO conveyed a Panel to adjudicate the complaint in June 2011, and the European Union made a similar request in August 2011, resulting in two panels hearing the disputes.[483] Canada maintained that the FIT Program should be exempt from *SCM Agreement* requirements on the basis of its intended purpose as a government procurement program to facilitate affordable renewable energy usage in Ontario.[484] Both panels found Canada in contravention of the *GATT* and *TRIMs* on grounds that the FIT Program's local content requirements were discriminatory. However, they were inconclusive on the issue of subsidy. As discussed below, the Appellate Body later found that the local content requirements infringed the MFN status of the *GATT*, but entirely omitted a decision as to whether the FIT Program, in general, constituted a subsidy under the *SCM Agreement*. The finding of fact that the local content requirements contained in the FIT scheme constituted a subsidy contrary to the *SCM Agreement* posed little legal controversy.

Canada appealed the decision in February 2013. On May 6, 2013, the Appellate Body held

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[481] *SCM Agreement*, *supra* note 368, at Article 1.
[482] *Canada Feed-in Tariff Program* (Panel Report), *supra* note 369 at paras 3.2, 3.4.
[483] *Canada – Renewable Energy/FIT Cases, supra* note 369; Note also that the European Union also requested consultation resulting in a second Panel in 2012. Third Party status was also filed by Australia, Brazil, China, Chinese Taipei, El Salvador, Honduras, India, Japan, Korea, Mexico, Norway, Saudi Arabia, Turkey, and the United States.
[484] *Ibid*, *Canada – Renewable Energy/FIT Cases.*

that Ontario's FIT Program was inconsistent with two international treaties to which Canada was a signatory (the *TRIMs Agreement* and Article III of the *GATT*).[485] The *Canada-Renewable Energy/FIT* cases are the only decisions to date that have been rendered at the Appellate level.[486]

The Appellate Body considered two primary issues. First, it questioned whether the local content requirements of the FIT scheme constituted a subsidy. Second, it considered whether the FIT program conferred a "benefit" to electricity producers within the meaning of the various WTO Agreements. In *Canada – Measures Affecting the Export of Civilian Aircraft*, the WTO Panel found that a benefit is conferred by a country "when it confers an advantage on the recipient relative to applicable commercial benchmarks, i.e., when it is provided on terms that are more advantageous than those that would be available to the recipient on the market."[487] This definition brings into question renewable energy FIT programs that guarantee premium prices for renewable energy. While the Appellate Body in the *Canada Renewable Energy/FIT* case upheld the decision to prohibit local content requirements, it reversed the finding that FITs conferred a "benefit" to electricity producers.[488] Despite this finding, the Appellate Body did not explicitly state that FITs were a legal subsidy. In fact, the WTO decision does not give any future guidance for the future of government-supported renewable energy projects.

That the more contentious issue of subsides was left undecided by the Appellate Body has

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[485]WTO, *Appellate Body Issues Reports on Renewable Energy Dispute*, (2013), Online: www.wto.org/English/news_e/news13_e/412_426abr_e.htm>, two reports were issued on the same day, namely, Appellate Body Reports, *Canada – Certain Measures Affecting the Renewable Energy Generation Sector, Canada – Measures Relating to the Feed-in Tariff Program*, (2013) WTO Doc WT/DS412/AB.R, WT/DS426/AB/R (May 6, 2013) adopted May 23, 2013).

[486]*Canada – Certain Measures Affecting the Renewable Energy Sector* (WT/DS412/AB/R), online: www.wto.org/english/tratop_e/dispu_e/cases_e/ds412_e.htm. *China – Measures Concerning World Power Equipment* (2010) WTO DOC WT/DS419/1, DS/419 online: www.wto.org/english/tratop_e/dispu_e/cases_e/ds419_e.htm, online: www.wto.org/english/tratop_e/dispu_e/cases_e/ds419_e.htm; *Canada – Measure Relating to Feed-in Tariff Program* (WT/DS426/AB/R), (Appellate Body Report) online: www.wto.org/english/tratop_e/dispu_e/cases_e/ds412_e.htm.

[487] WTO, *Canada – Measures Affecting the Export of Civilian Aircraft*, (1999) WTO DOC ¶ 9.120, WT/DS70/R (Panel Report).

[488] *SCM Agreement*, *supra* note 368 at Article 14.

led to criticism among trade and environment scholars. Authors Aaron Cosbey and Petros Mavroidis argue that the *Canada Renewable Energy/FIT* WTO decision has created a very murky outcome: "[t]he reader of the reports is left with the impression that the WTO adjudicating bodies felt that it was necessary to engage in legal acrobatics in order to avoid finding that a scheme aimed at promoting a public good – the underlying feed-in tariff for renewable energy – was in fact a subsidy."[489] Cosbey and Mavroidis express criticism that the WTO judges were possibly guilty of inventing the law, rather than administering the treaties. This criticism seems to only be partly accurate since the first issue of the MFN status was clearly decided within the context of the *GATT* and *TRIM*s. In this regard, Cosbey and Mavroidis' concern as to whether the "WTO courts have behaved as agents called to apply a law decided by their principals, or whether they re-invented themselves as principals and decided what the law should be" does not seem to be applicable to the non-determination of the FIT scheme as a subsidy. Cosbey and Mavroidis also argue that "the WTO *SCM Agreement* must be redrafted to account for the rationale of subsidies".[490] They note that the current problems of ambiguous subsidies need to be fixed and call for the "WTO Membership to stand up and respond to the call of duty."[491] Cosbey and Mavroidis are correct in that the WTO courts have not clarified whether FIT would remain an actionable subsidy or if the *SCM Agreement* should consider the two classes of subsidies within the context of the environment.[492]

The problem with the WTO's failure to render a decision on whether the FIT Program is a subsidy may not have as far reaching implications on industrialized nations like Canada that have an oversupply of energy.[493] However, where developing nations, like those in sub-Saharan Africa, have

[489] Cosbey & Mavroidis (2014), *supra* note 454 at 12.
[490] *Ibid*.
[491] *Ibid*.
[492] *Ibid*.
[493] *Ibid*.

chosen a green energy path to development, unclear international laws may impact on the ability to commit financiers to a project. The balance of this paper will be dedicated to exploring the potential impact on the *Canada Renewable Energy/FIT* decision on the developing world. The fact that green energy subsidies will likely meet the requirement of a subsidy within the meaning of the WTO (since they are specific and may have adverse effects), may call for a specific legal principle separate from traditional subsidies. An examination of the three requirements to an actionable subsidy actually highlights the very reason why flexibilities may need to be carved out from environmental subsidies to facilitate a green path to regional development. These flexibilities will clearly demark the non-actionability of subsidies aimed at correcting environmental distortions typically considered discriminatory under the *GATT*. The reasoning in the *Canada Renewable Energy/FIT* decision lays the foundation to assess whether green energy programs may be at risk of being attacked through a WTO challenge.

There is some support for the incorporation of the *GATT* XX provisions in the *SCM Agreement*.[494] While it is highly possible that the *SCM Agreement* can acknowledge the *GATT* exceptions, it is counterintuitive that the main international treaty on subsidies should leave the subject matter of renewable energy to be governed by another agreement.

A. Creating the Local Regulatory Infrastructure for Green Energy Initiatives

Usually, the regulatory framework for energy is radically transformed in a developing country before a green energy project can be introduced. For example, in Ghana, this process began in 2011

[494] Luca Rubini, "Ain't Wastin' Time No More: Subsidies for Renewable Energy, the SCM Agreement, Policy Space, and Law Reform", (2012) 15 *J Int'l Eco L* 525; Aaron Cosbey, *Renewable Energy Subsidies and the WTO: The Wrong Law and the Wrong Venue, Subsidy Watch (Global Subsidies Initiative*, Int'l Inst. For Sustainable Dev, Geneva, Switz) June 2011; Robert Howse, "Climate Mitigation Subsidies and the WTO Legal Framework: A Policy Analysis" (2010) *International Institute for Sustainable Development*; Mark Wu and James Salzman, "Next Generation of Trade and Environment Conflicts: The Rise of Green Industrial Policy" (2013) 108 *Nw. UL Rev.* 401

with the enactment of Ghana's *Renewable Energy Act* (2011).[495] The Bill itself, and the implementation of a feed-in-tariff system, were largely modeled on the hydro system in Ontario Canada. This was a part of a wider policy that the World Bank and the IMF maintained would make Ghana more attractive to foreign investors. Recall that, in 2009, Ontario enacted the *Green Energy and Green Economy Act* which created the regulatory framework for the FIT Program.[496] The Ontario Power Authority (OPA) was designated as the agency that would set tariffs and assign energy contracts.[497] The FIT scheme arrangement whereby governments traditionally pay a fixed price—potentially a premium cost in order to "support" the usage of renewable energy—has been classified as a "price support" and arguably a subsidy. The Appellate Body clearly sanctions subsidies that arise from domestic content requirements, and, while there are issues to be raised about how that decision will impact developing nations (for example in relation to the domestic content requirements), such analysis will not be entertained herein.[498] Instead, this section of the paper will explore the narrow issue of subsidies as they relate specifically to FITs.

Under the Ghana FIT program, energy generated through renewable energy sources like solar photovoltaic (PV) electricity are guaranteed a price per KWh for electricity delivered to a local grid. These terms are usually outlined in a Power Purchase Agreement. Contracts of this nature are often

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[495] *Ghana Renewable Energy Act, supra* note 379.
[496] *Green Energy and Green Economy Act*, *supra* note 479.
[497] *Ibid.*
[498] There are a number of Request for Consultations that address the issue of domestic content requirements, see: *Canada Renewable Energy/FIT* (Appellate Body Report) *supra* note 369; Request for Consultations, *United States – Countervailing and Anti-Dumping Measures on Certain Products from China (US – Countervailing and Anti-Dumping Measures)*, WTO DOC (2013) WT/DS449/1, G/L/1001, G/SCM/D92/1,G/ADP/D95/1, panel composed 4 March 2013; Request for Consultations, European Union and Certain Member States – Certain Measures Affecting the Renewable Energy Generation Sector (EU – Renewable Energy), WTO (2012) DOC WT/DS452/1, G/L/1008, G/SCM/D95/1,G/TRIMS/D/34, online: www.wto.org/english/tratop_e/dispu_e/cases_e/ds452_e.htm; Request for Consultations, *India – Certain Measures Relating to Solar Cells and Solar Modules (India – Solar Cells and Modules)*, (2013) WTO DOC WT/DS456/1, G/L/1023, G/TRIMS/D35, G/SCM/D96/1; *India – Certain Measures Relating to Solar Cells and Solar Modules (India – Solar Cells and Modules)*, (2016) DS/456 Panel Report (under appeal), online: www.wto.org/english/tratop_e/dispu_e/cases_e/ds456_e.htm.

entered into by the Electricity Commission of Ghana and independent power producers.[499] Ghana currently has a number of mechanisms that could be challenged as financial supports or a subsidy under the *SCM Agreement*. This includes subsidies, favorable tax incentives and policies, pricing mechanisms such as the FIT Programs, and other rewards and local content requirements that may be introduced by local governments.

The financial support is not concentrated in one industry or sector, but can be found in reduced value added taxes, research and development incentives, and incentives to develop local projects. The *Ghana Renewable Energy Act, 2011*[500] for example, promotes the development of renewable energy technologies[501] and funds research and project construction in the renewable energy sector.[502] The *Act* designates the Public Utilities Regulatory Commission as the overseer and issuer of rates and "charges for grid connection" along with rates for "electricity from renewable energy sources."[503] The *Energy Commission Act, 1997* gives authority to the Energy Commission to "regulate and manage the utilization of energy resources in Ghana and co-ordinate policies in relation to them." [504] This includes issuing energy licenses and formulating national policies for the development and utilization of energy resources including renewable energy, solar, wind and biomass.[505] The Ghana Public Utilities Regulatory commission ("PURC") is an independent body responsible for "charges for the supply, transportation and distribution of natural gas services."[506] PURC operated under the *Public Utilities Regulatory Act*, 1997 (Act 538) and sets the tariff rates for energy pursuant to section

[499] Electricity Company of Ghana, online: www.ecgonline.info/index.php/about-the-power-sector-in-ghana.html.
[500] *Ghana Renewable Energy Act, supra note 379*; See also the *Energy Commission Act, supra* note *12.*
[501] *Ibid.*
[502] *Energy Commission Act, 1997* (Act 541), online: www.energycom.gov.gh/files/ACT.pdf.
[503] *Ghana Renewable Energy Act*, *supra* note 379 at section 5.
[504] *Energy Commission Act, 1997, supra* note 379.
[505] Ghana Energy Commission, Mandate and Functions, online: www.energycom.gov.gh/index.php/mandate-and-functions.
[506] Ghana Public Utilities Commission, online: www.purc.com.gh/

16 of the *Act*.[507] GRIDCo, which was established under the *Energy Commission Act, 1997*, is a private limited liability company that is responsible for the equitable dispatch and transmission of electricity generated by wholesale suppliers to the Grid.[508] These new regulatory bodies were enacted to facilitate relative energy to the Ghanaian public.

Whether the *Canada Renewable Energy/FIT* case will inhibit the implementation of a FIT scheme in a developing nation like Ghana, is still to be tested. In assessing whether the feed-in tariff program would constitute a subsidy in accordance with the WTO *Canada Renewable Energy*/*FIT* decision, three criteria must be met. The three-part test under the *SCM Agreement* is summarized as follows:

1. Does the subsidy produce a "financial contribution by a government or any public body"[509]
2. Is the subsidy specific to a particular industry[510]
3. Does the subsidy have an adverse effect…[511]

If the tripartite test above is answered affirmatively, then the subsidy is actionable and could invoke a challenge by a Member State within the WTO. Currently, there is no specific mechanism to protect green energy programs within international law. If the FIT Program were to be challenged, the complainant would have to first establish that the newly created PURC, the entity that fixes the tariff, is a government entity under Article a.1(a)(1) of the *SCM Agreement*. A government entity is defined as a "public body" which "exercises authority vested in it by a government".[512] The WTO Appellate Body has defined a public body as:

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[507] *Public Utilities Regulatory Act*, 1997 (Act 538), online: www.purc.com.gh/purc/purc/Legislation/PURCAct538.
[508] GRIDCo, online: www.gridcogh.com/en/about-us/overview.php
[509] *SCM Agreement*, *supra* note 368 at Art. 1.1(a)(1).
[510] *Ibid* Art. 2.1(b).
[511] *SCM Agreement*, *supra* note 368 at Art. 3.1(b); See also the local content requirements: Jan-Christoph Kuntze and Tom Moerenhout, "Local Content Requirements and the Renewable Energy Industry: A Good Match?" International Center for Trade and Sustainable Development, available at: www.ictsd.org/downloads/2013/06/local-content-requirments-and-the-renewable-energy-industry-a-good-match.pdf
[512] *SCM Agreement*, *supra* note 368 at Article 1.1(a)(1).

> "…an entity that possesses, exercises or is vested with governmental authority. Yet, just as no two governments are exactly alike, the precise contours and characteristics of a public body are bound to differ from entity to entity, State to State, and case to case."[513]

Thus, for the *SCM Agreement* to apply, a public body must be the subject of the complaint. Green subsidies not procured by government agencies would not be subject to attack. However, pursuant to Article 1.1(a)(1)(iv) of the *SCM Agreement*, an entity may still be deemed a subsidizer if it promotes renewable energy products and was directed by a government to do so.[514]

B. The Application of the *Canada Renewable Energy/FIT* case to Green Energy Projects in Sub-Saharan Africa

Many countries in sub-Saharan Africa are beginning to implement energy solutions. These solutions include low-carbon policies that may subsidize, through FITs, the cost of renewable energy alternatives. Among the ECOWAS region, Ghana has the second largest number of inhabitants, exceeded only by Nigeria. While Nigeria's energy system and needs would produce a unique case study, their system is based on a more complex interaction between federal regulations and state and traditional entities. Ghana implemented the regulatory framework, similar to that of Ontario, Canada, to facilitate renewable energy investments and projects. For the transition to renewable energy to occur, the regulatory framework must lay a suitable foundation—this has already been achieved in Ghana. Note that, prior to the implementation of Ontario's FIT Program, the province adopted new renewable energy laws that facilitated green energy projects. Thus, aside from any infringing local content requirement, FITs must be preceded by a regulatory framework that establishes an alternative renewable energy supply-mix as an alternative to fossil fuels.

I. Does the FIT Program Confer a Financial Contribution: Relevant Market Considerations?

[513] *United States – Definitive Anti-dumping and Countervailing Duties on Certain Products from China* (2011) WTO DOC (Appellate Body Report) EY/FD379/SB/R at para 317.
[514] *SCM Agreement, supra* note 368 at Article 1.1(a)(1)(iv).

The first requirement to challenge a green energy subsidy is that the initiative must produce a financial contribution. In assessing whether there is a *financial contribution* by a government or public body which *benefits* the recipient within the meaning of Article 1.1(a)(1) of the *SCM Agreement*, the following four criteria must be met:

> " (i) a government practice involves a direct transfer of funds (e.g. grants, loans, and equity infusion), potential direct transfers of funds or liabilities (e.g. loan guarantees);
>
> (ii) government revenue that is otherwise due is foregone or not collected (e.g. fiscal incentives such as tax credits);
>
> (iii) a government provides goods or services other than general infrastructure, or purchases goods;
>
> (iv) a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above which would normally be vested in the government and the practice, in no real sense, differs from practices normally followed by governments".[515]

Financial Contribution refers to not only the direct transfer of funds, but also an income or price support, as in the case with a FIT. The *Canada Renewable Energy/FIT* case clarifies that energy products, and specifically renewable energy supply, fall within the definition of goods under the *SCM Agreement*. The purchase of the energy by a government for redistribution to the public in a FIT system would usually constitute a financial contribution, especially if it is purchased below market value and for a fixed price. Thus, while the Panel concluded that the FIT Program was designed "with a view of commercial resale", it still falls outside of Article III:8(a).[516]

The test for financial contribution requires a market analysis and evidence that those favourable terms were not available in the "relevant market". The Panel decision was upheld by the Appellate Body which created a distinction between government intervention that creates markets

[515] *SCM Agreement*, *supra* note 368 Article 1.1(a)(1) online: www.wto.org/english/docs_e/legal_e/24-scm.pdf; See also: *Canada-Renewable Energy/FIT* (Appellate Body Report), *supra* note 369 at paras 2.86-2.93 and 5.116-5.139.
[516] *Canada-Renewable Energy/FIT* (Panel Report) *supra* note 369 at para 7.152.

and one that intervenes in pre-existing markets.[517]

Most renewable energy projects are creating a market rather than competing in an existing market and, therefore, may avoid the finding of an adverse effect for the initial project. However, where the market has been already created, future projects run the risk of contravening Article 1.1 of the *SCM Agreement*.

The issue of pre-existing markets was addressed in response to the European Union and Japan argument that, as the wind and solar photovoltaic electricity market would not have existed without the FIT Program, the Canadian government conferred a benefit energy suppliers. However, the Appellate Body found that the FIT did not constitute a benefit, as no comparable market existed to confer an advantage. A benefit could not be conferred to a new producer where there was no prejudice to an existing producer. One Panelist dissented in favour of the "but-for" test, claiming that the standard should be that the renewable energy market would not have existed without the FIT scheme. The majority found that the relevant market must be wind and solar PV electricity specifically, rather than the entire electricity market.[518] Furthermore, the fact that the FIT Program created the market is not sufficient to find a subsidy.

Other cases like the *Canada Aircraft* case that consider how the term "benefits" should be applied to the local conditions would also likely stand for the proposition that implementing a FIT in developing region like Ghana would not confer a "benefit" to beneficiaries like Independent Power Producers under such programs. The complainant's industry must suffer serious prejudice.[519] A benefits analysis would clearly demonstrate that no "advantage on the recipient relative to applicable

[517] *Canada-Renewable Energy/FIT* (Appellate Body Report), *supra* note 369 at para 5.188.
[518] *Ibid* para 5.178.
[519] Panel Report, *Canada – Measures Affecting the Export of Civilian Aircraft ¶ 9.120, WT/DS70/R (Apr 14, 1999)* ["*Canada – Aircraft*"].

commercial benchmarks" would be conferred on the independent energy producer.[520] This finding is also based on the fact that the region is plagued with energy insecurity issues and, as such, the FIT Program could not provide "terms that are more advantageous than those that would be available to the recipient on the market."[521]

The *Canada Renewable Energy/FIT* decision is important to environmental strategies, as it would permit the setting of national targets as promoted at the 2015 United Nations Climate Change Conference (Paris COP 21), and would allow governments to create markets to meet these objectives.[522] In addition, new markets can be defined to attach to certain environmental targets. This could include, for instance, a market aimed at reducing CO^2 emissions for fossil fuel reliance based on certain targets. Currently, if renewable energy subsidies like those potentially arising from FIT schemes are challenged at the WTO, a panel would have to decide on public policy grounds if the project is of benefit to the local environment. This analysis would require an assessment of the "relevant markets" which, in the developing world, is usually an undeveloped renewable energy market. The panel with expertise in international issues may not have the specific knowledge to address particularities within local environments including which benefits are justified within a particular country. For example, will a local content requirement, or the need for subsidy, in a developing nation like Canada differ from a local content requirement in a country undergoing development and battling high rates of unemployment, like Ghana? The Appellate Body also identified a policy reason to support renewable energy programs and justify their inclusion as non-actionable subsidies: "fossil fuel resources are exhaustible and thus fossil energy needs to be replaced progressively if electricity supply is to be guaranteed in the long term."[523] Despite numerous findings

[520] *SCM Agreement*, *supra* note 368 at Article 14.
[521] Panel Report, *Canada – Measures Affecting the Export of Civilian Aircraft*, ¶ 9.120, WT/DS70/R (Apr 14, 1999).
[522] United Nations Conference on Climate Change, COP21, online: www.cop21paris.org/about/cop21
[523] *Canada – Renewable Energy / FIT* (Appellate Body Report), *supra* note 369 at para 5.186.

that green energy subsidies arising from FIT Programs should not be actionable, the WTO Appellate Body did not explicitly state that Article 8 of the *SCM Agreement* should be reconsidered for reinstatement.

There is definitely a need for concrete laws on what constitutes non-actionable subsidies rather than reliance on unclear adjudicated outcomes. Despite this reality, the *Canada Renewable Energy/FIT* case only makes exception for a new market. While an infancy industry will be protected, but this may not be the case for an already established industry. The distinction "seems to have opened the door wide to infant industry protection" while rendering arguably disadvantaging existing industries.[524] The Appellate Body clearly distinguished between a new market created by renewable energy sources and existing energy products procured by the government; it concludes that "where a government creates a market, it cannot be said that the government intervention distorts the market, as there would not be a market if the government had not created it."[525] Essentially the Appellate Body concluded that the relevant market would be the one that wind and solar market created on the supply-side by the government. Consequently, without the creation of this market by the government, it would not have existed.[526] While the issue of discrimination pursuant to Article 1 of the *GATT* has not been challenged within the context of the *Canada Renewable Energy/FIT* decision, the Appellate Body clearly created a distinction between government initiatives aimed at new industries as compared to existing ones. This distinction may create grounds for a WTO challenge where an existing industry is not afforded the same kind of concession as a new one, especially in cases where both industries have initiatives aimed at correcting market or environmental distortions. There is no bar on government policies that seem to protect the environment through the

[524] Cosbey & Mavroidis, *supra* note 454 at 26.
[525] *Canada-Renewable Energy/FIT* (Appellate Body Report), *supra* note 369 at para 5.118.
[526] *Ibid* at para 5.178.

purchase of renewable energy technologies. However, if products are being used in such projects, the suppliers of those products must be treated equally irrespective of whether they are local producers or foreign manufacturers. Thus, green energy projects in the developing world may be able to rely on the exemption as outline in the *Canada RE FIT* case of "government interventions" that actually "create markets that would otherwise not exist and, on the other hand, other types of government interventions in support of certain players in markets that already exist or to correct distortions therein."[527] There is also concern that the decision is vague and opens the door to dangerous reasoning beyond the clean energy sector but may impact on other government initiatives.[528]

While the argument could be made that the FIT Program for green energy projects is in direct competition with traditional electricity, it would be sold as an alternative to traditional electricity, making it very difficult to establish distortion of an existing market. Despite this reality, the threat of a WTO challenge still looms for investors in renewable energy projects. This impending threat may pose a deterrent to nations lacking the financial means to withstand a WTO challenge. Developing nations may shy away from environmental policies vulnerable to WTO challenges. There is evidence to suggest that a nation's legal capacity, which is connected to wealth and industrialization, determines its ability to commence and withstand a WTO challenge.[529] WTO statistical data reveals an under-representation of developing nations in the WTO Dispute Settlement

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[527] *Canada – Renewable Energy / Canada – FIT* (Appellate Body Report), para 5.188.
[528] L Rubini, "The Good, the Bad, and the Ugly" (2014) 48:5 *Journal of World Trade* 895 at 914.
[529] Chad P Bown, "Participation in WTO Dispute Dispute Settlement: Complainants, Interested Parties, and Free Riders" (2005) 19:2 *World Bank Economic Review* 287; Henrik Horn, Henrik, Hakan Nordstrom & Petros C Mavoirids 'Is the Use of the WTO Dispute Settlement System Biased? CEPR Discussion Paper 2340 (London: Centre for Economic Policy Research, 1999); Marc L Busch, Eric Reinhardt & Gregory Shaffer "Does Legal Capacity Matter? A Survey of WTO Members' Minnesota Legal Studies Research Paper No 09-31, (2009) 4 *World Trade Review*, online: file:///C:/Users/llewis/Downloads/SSRN-id1444385.pdf; M Kim, *Costly procedures: Divergent effects of legalization in the GATT/WTO dispute settlement procedures* (2008) 52:3 *International Studies Quarterly* 657; James Smith 'Inequality in International Trade? Developing Countries and Institutional Change in WTO Dispute Settlement' (2004) 11:3 *Review of International Political Economy* 542.

System. Specifically, two main theories have attempted to explain the presence of wealthier nations and absence of poorer nations from the Dispute Settlement System. The first theory highlights that larger, richer economies have more complex trade relations and necessarily "gravitate" to the WTO to settle disputes. The second explanation is that richer nations will retaliate against poorer ones advancing a complaint, thereby reducing the number of cases brought to the WTO by poorer nations. This second approach assumes that there is some level of discrimination arising from disparate legal capacities of larger economies litigating against smaller ones.[530] These theories may help to predict how developing nations may react to WTO challenges regarding environmental policy initiatives like FIT schemes.

The ambiguity of the *SCM Agreement* and the WTO Appellate Body's reluctance to classify FIT as subsidies may not be in line with international climate change goals. In this regard, the *SCM Agreement* needs to be aligned with global climate change abatement goals. Specifically, Article 8 of the *SCM Agreement* could be reinstated in order to create certainty for renewable energy investors. The current standard is set by the Appellate Body's decision in *Canada Renewable Energy/FIT* case, which offers mere policy considerations but fails to entrench the intent of non-actionable renewable energy subsidies into law. A Power Purchase Agreement that contemplates fixed purchase price of energy per kWh higher than conventional prices may be deemed a subsidy. In the case with Ghana, there are very few photovoltaic solar plants and where these plants exist, they are usually under the FIT Program. As such, even if the FIT Program in developing nations is classified as a subsidy, the impact could be limited to local production so as to not offend other Member's market (assuming that the Member does not have markets in that jurisdiction).[531]

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[530] *Ibid*.
[531] Luca Rubini, "*Ain't Wastin' Time No More*: Subsidies for Renewable Energy, the SCM Agreement, Policy Space, and Law Reform" (2012) 15:2 *Journal of International Law* 525.

Further, the prohibition against government support in the *SCM Agreement* is counterintuitive to the goal of climate change abatement. Renewable energy alternatives are far more costly to implement than traditional high CO^2 emitting sources.[532] Consequently, government support is always needed to encourage alternative choices and to provide incentives for developers to invest in costly renewable energy projects. Thus, government support is an essential part of implementing these measures and has been argued to be the primary reason why environmental programs are initiated.[533] The type of government support that is needed is not merely financial, but also legislative. There must be regulatory framework to facilitate renewable energy production, providing tax incentives and guaranteeing the rates that energy will be purchased back at.

2. Is the FIT Program Specific?

The second requirement for an actionable subsidy is that it limits access to "specific" groups, enterprises or industries, pursuant to Article 2 of the *SCM Agreement*.[534] In the case of a FIT program, the subsidy would always be specific to a renewable energy sector. Consequently, the second part of the test will usually be met, absent a more concrete definition of "specific".[535] This requirement can be interpreted, not as solely referring to a specific industrial activity, but rather to whether the policy is neutral and non-discriminatory. The issue of neutrality cannot be averted where a government commits to a Power Purchase Agreement with a guaranteed term and fixed tariffs. This raises questions about how the *SCM Agreement* addresses not only climate change issues, but also policies aimed at development. The Appellate Body's analysis of the "specific" criterion

[532] David Popp, Ivan Hascic, and Neelakshi Medhi, "Technology and the Diffusion of Renewable Energy" (2011) 33 *Energy Eco* 648.
[533] *Ibid* at 649.
[534] *SCM Agreement*, *supra* note 368 at Article 2.
[535] *Ibid* at Article 2.1(a), 2.2 and 2.3.

highlights the need for a clear concrete law establishing a non-actionable subsidy category for green energy projects. The purpose of the non-actionable subsidy exception is to allow specific subsidies to exist without the threat of countervailing measures. Hence, the requirement that an actionable subsidy be specific is counter-intuitive to climate change abatement strategies, as green subsidies are by their very nature specific to addressing environmental issues.

The "specific" requirement gives rise to numerous paradoxes as it relates to non-actionable studies and the environment. The social utility of green energy programs was also highlighted in the Appellate Body decision: "governments might provide monetary incentives to a few enterprises (*specific* contributions) in order for the society at large to enjoy clean air; they do not have to provide monetary incentives to the whole society (non-specific) to achieve this goal."[536]

The Appellate Body appears to have created policy regarding non-actionable subsidies that should be dealt with by means of amending the *SCM Agreement*. In the *Canada Renewable Energy/FIT* decision the Appellate body highlighted the need to create new environmental markets:

> Governments intervene by reducing reliance on fossil energy resources and promoting the generation of electricity from renewable energy resources to ensure the sustainability of electricity markets in the long term. Fossil energy resources are exhaustible, and thus fossil energy needs to be replaced progressively if electricity supply is to be guaranteed in the long term. Government intervention in favour of the substitution of fossil energy with renewable energy today is meant to ensure the proper functioning or the existence of an electricity market with a constant and reliable supply of electricity in the long term.[537]

The specific nature of environmental subsidies requires a clear distinction between those that distort, like green energy subsidies, and those that do not. In this regard, a test needs to be developed which will enable adjudicators to separate the treatment of these subsidies. It would not be inconsistent with the *SCM Agreement* to call for a reinstatement of Article 8 of the *SCM Agreement* as the legal provision in support of environmental subsidies. Beyond reviving Article 8, there is the possibility

[536] *Canada Renewable Energy/FIT* (Appellate Body Report) *supra* note 368.
[537] *Ibid* at para 5.186.

that flexibilities could be created in existing treatise to accommodate environmental subsidies. Relaxing the *GATT* to contemplate green energy subsidies has been argued as more pragmatic than reviving Article 8 of the *SCM Agreement,* which may contravene the Polluter Pays Principle.[538] This would require that subsidies be renegotiated with a new rationale where the negotiators "distinguish wheat from chaff," recognizing that "subsidies can distort, as they can address distortions."[539]

The initial classification of subsidies as distorting or correcting seems to be in line with the original provisions in Article 8 of the *SCM Agreement*. Essentially, non-actionable subsidies are those subsidies that correct a pre-existing market distortion. Therefore, a subsidy that is non-distorting and also correcting, such as those intended by the FIT Programs in the developing world, are the exact initiative that should be protected under the non-actionable class of the *SCM Agreement*. The rationale of Article 8 of *SCM Agreement* was for the exact purpose of "allowing specific subsidies to stay in place without the risk of facing countermeasures."[540] The problem with the absence of flexibilities in the *SCM Agreement* is that there is no consideration for government policy initiatives aiming to promote renewable energy alternatives. While Article 25 of the *SCM Agreement* requires Member States to file annual notification of subsidies, and to disclose the policy objectives for the subsidies, no provision or classification for non-actionable subsidies are provided.[541] Government policies aimed at climate change abatement require the implementation of "specific" national green energy measures, which may run afoul of the *SCM Agreement*.

3. Does the FIT Program Have an Adverse Effect?

The final part of the test for determining whether action can be taken against a country for

[538] Sykes (2003), *supra* 442 at 28.
[539] Cosbey & Mavroidis, *supra* note 454 at 43.
[540] *Ibid* at 36.
[541] *SCM Agreement, supra* note 368 at Article 25.2(iii).

supporting a FIT Program is whether the subsidy has a negative effect. Thus, a subsidy may not be actionable if, although a financial contribution and specific effect exists, it is not found to have a negative effect.[542] An "adverse effect" is defined in Article 5 of the *SCM Agreement*; both Articles 5 and 6 of the *SCM Agreement* recognize that a subsidy may have adverse effects if it causes injury to the domestic industry of another Member, or displaces or impeded imports, or significantly undercuts prices of a like product of a Member.[543]

In the *Canada Renewable Energy Case/FIT* case, the Panel and Appellate Body assessed whether the FIT Program constituted a subsidy under the *SCM Agreement*. The Appellate Body confirmed that governments may intervene in markets to encourage use of renewable energy alternatives "if, on the one hand, higher prices for renewable electricity have certain positive externalities, such as guaranteeing long-term supply and addressing environmental concerns".[544] Similarly, it was recognized that government intervention is warranted where cheap energy products create a negative externality such as adverse "impact on human health and the environment", resulting from fossil fuel energy emissions and nuclear waste disposal.[545] Cosbey and Mavroidis argue that "payment to firms that create public goods is simply payment of the full benefits conferred by the firm's actions – an internalization of external environmental costs."[546] This assessment requires redefining the "appropriate market against which to benchmark" the government intervention and clarifying to whom the benefit accrues.[547] For example, is it solely the company that is granted a contract based on guaranteed FIT rates that is benefiting, or is the beneficiary the entire society that gains from reduced pollution? Cosbey and Mavroidis further question whether the

[542] Bigdeli (2009), *supra* note 409.
[543] *SCM Agreement*, *supra* note 368 at Articles 5(a), 5(c) 6.3(a), and 6.3(c).
[544] *Canada Renewable Energy/FIT* (Appellate Body Report) *supra* note 369 at para 5.189.
[545] *Ibid* at para 5.189.
[546] Cosbey & Mavroidis, *supra* note 454 at 36.
[547] *Ibid* at 37.

actual recipient of a benefit is the company that creates an externality by polluting or the company that is internalizing the cost of pollution by receiving a subsidy?[548] The issue of adverse effects cannot be adequately assessed without an analysis of the whole cost of production, including the cost borne for the externalities.

Similarly, the application of the adverse effect principle to environmental subsidies may also produce peculiar results where environmental costs are not considered. If Article 8 of the *SCM Agreement* were still effective, an adverse effect may not be found in situations where the subsidy was aimed at creating the public good of environmental protection or climate change abatement. The issue of adverse effect is quite muddled when one includes the cost of a negative externality like high carbon fossil fuels as compared to low CO^2 emitting renewable energy sources.

C. The Reinstatement of Non-Actionable Subsidies in the SCM Agreement

Under the WTO, a subsidy must contain a financial contribution, confer a specific benefit and have an adverse effect to be considered "actionable." The increase in green energy Request for Consultations have led some scholars to argue for the need to create applicable trade rules or, at the very least, modify existing ones.[549] Andrew Green, in as early as 2006, advocated for the replacement of the non-actionable subsidy removed from the *SCM Agreement* with a more precise category that covered environmental subsidies.[550] These subsidies would be directly related to environmental protection and would still be subject to the exception treatment in the *GATT* XX.[551] Some scholars argue that the *SCM Agreement* should contain provisions to address various aspects of subsidies that are aimed at fostering a "shift toward cleaner production alternatives" and also "environmental

[548] *Ibid*.
[549] Andrew Green, "Trade Rules and Climate Change Subsidies" (2006) 5 *World Trade Rev* 377.
[550] *Ibid*.
[551] *Ibid* at 408-410.

services".[552] The specific subsidies employed by FIT Programs, whether they are for the payment of renewable energy or the use of local content requirements, would be protected under this recommendation.

It is very likely that the FIT Programs in the ECOWAS region, and specifically countries like Ghana, would survive a WTO challenge by invoking the *GATT* chapeau clause. Firstly, absent local content requirements, the program does not arbitrarily discriminate against Member States. Secondly, the program focuses on domestic energy and as such does not compete with an international energy market (in applying the "relevant market" test). Consequently, FIT Programs that focus on genuine environmental goals would satisfy the exception as set out in Article XX(g) of the *GATT*, if the Member's intent is proven purely environmental. The intent must be justifiable beyond the legitimacy of the policy. Countries like China and India, for example, that have advanced solar panel industries may not pass the "specific" threshold if it is found that the environmental policies are directly connected to the promotion of industrial policies. As such, the environmental intent contained in Article XX(g) should not be disguised or altered by economic and industrial goals. This requirement may pose some difficulty for developing nations, especially in sub-Saharan Africa, in demonstrating that renewable energy goals are not necessarily tied to the development of an ancillary local industry. The analysis of whether flexibilities in international trade agreements could be applied to FIT programs that promote regional development among least-developed and developing nations is beyond the scope of this paper, but is an issue well worth exploring.

There has also been some support for creating an independent agreement to govern renewable energy. This agreement would set permissible subsidies in the renewable energy sector and could

[552] Franciso Aguayo Ayala & Kevin P Gallagher, (2005) "Preserving Policy Space for Sustainable Development" (2005) *International Institute of Sustainable Development* at 2.

distinguish between regional development needs through a tri-tier box system.[553] The system advocated by Virginia Hildreth would take into consideration the uniqueness of developing nations and the financial challenges that they face in meeting climate change abatement goals. Hildreth proposes that developing nations could fit into a different tier than, for example, a developed nation, "because of both the incredibly high need for low-cost energy and their limited existing energy infrastructure."[554] Other scholars have also argued that effective pollution control should be maintained through tight international laws that create an economic disincentive to pollute.[555]

Clearly, for the WTO to seriously consider environmental subsidies, two classifications need to emerge: the first recognizing subsidies that distort, and the second acknowledging environmental subsidies that correct distortions. The WTO should set guidelines in agreements to address the real problem, subsidies that do not address market failures, but create trade distortions. The failure to distinguish between distorting and non-distorting subsidies may impede the effective implementation of other WTO treaty provisions aimed at addressing global public concerns like climate change. Moreover, a distorting effect may differ when factors such as economic development are accounted for.

Prior to the elimination of Article 8 in 1999, the *GATT Council Meeting* of 1999 contemplated the operability of the *SCM Agreement*. In that document, the *GATT* referenced Article 8 of the *SCM Agreement* and the category of "non-actionable" subsidies as relating to "research and development, structural adjustment assistance, and environmental protection and regional aid."[556] Therefore, at that time, the non-actionable subsidy category appeared to be acceptable—it may not have been

[553] Virginia R Hildreth, "Renewable Energy Subsidies and the GATT" (2014) 14:2 *Chicago Journal of International Law* 702.
[554] *Ibid* at 727.
[555] Frederic L Kirgis Jr, "Effective Pollution in Industrial Countries: International Economic Disincentives, Policy Response, and the GATT" (1972) 70:5 *Michigan Law Review* 859.
[556] GATT Council Meeting, *supra* note 443 at 16.

thought that this provision would one day be eliminated. While it is unclear whether the framers of Article 8 of the *SCM Agreement* contemplated its future removal, it is indisputable that there still exists a major international treaty (the *GATT*) with provisions in Article XX(b) for environmental flexibilities. While the *GATT* does not prohibit green energy initiatives, the risk of having these practices labeled a subsidy under the *SCM Agreement* remains. What is needed is a clear provision within the *SCM Agreement* that will explicitly permit green energy projects to meet environmental goals and regional development objectives.

The WTO *Canada Renewable Energy/FIT* decision supports the premise that nations are encouraged to undertake "new" programs to create "new markets" aimed at protecting the environment. This is in line with severed international treaties that recognize the goal of environmental protection. Specifically, Article XX(b) of the *GATT* contains an exception where it is "necessary to protect human, animal or plant life or health".[557] Additionally, Article 8 of the *SCM Agreement* confirmed a "non-actionable" subsidies provision similar with a goal of environmental protection as contained in the *GATT*.[558] With the elimination of Article 8 from the *SCM Agreement*, environmental public policy exceptions need to rely on flexibilities contained in Agreements like Article XX(b)[559] including a chapeau clause that protects legitimate environmental objectives within the context of trade.[560] The chapeau clause must be used in a manner that does "not result in arbitrary or unjustifiable trade discrimination or serve as a disguised restriction on trade."[561] The Appellate Body's definition of the environment includes "exhaustible natural resources"[562] and "living

[557] *Ibid* at 14.
[558] *Ibid* at 16.
[559] *Ibid.*
[560] *GATT*, *supra* note 368 Article XX.
[561] Sanford E Gaines, "Considering WTO Law in Design of Climate Change Regimes Beyond Kyoto" IOP Conf Series: (2009) 8(1) *Earth and Env't Sci* 1.
[562] *United States – Standards for Reformulation and Conventional Gasoline* (1996) WTO Doc WT/DS2/AB/R (Appellate Body Report) at 11, 12.

resources".[563] The chapeau clause permits environmental measures while prohibiting any trade abuses that affect environmental policies. Specifically, the chapeau clause cautions that unilateral trade measures "may not be used where necessary to protect human health or to promote conservation of natural resources, provided that the measures do not result in arbitrary or unjustifiable trade discrimination or serve as a disguised restriction on trade."[564]

In the *United States – Standards for Reformulated and Conventional Gasoline* ("*United States – Gasoline*"), the Appellate Body concluded that the chapeau clause must be applied in a manner treating all trade partners equally.[565] With respect to the environment, the Appellate Body held that "clean air" amounts to an "exhaustible natural resource".[566] The application standard as set out in *United States – Gasoline* was applied in the *United States – Import Prohibition of Certain Shrimp and Shrimp Products*.[567] In that case it was found that, regardless of the good intentions of the US ban on shrimp obtained with technology harmful to sea turtles, the mechanism was not equitably applied to all Member States. In reaching their conclusion, the Appellate Body assessed whether the measure was being "abused so as to frustrate or defeat the substantive rights of the appellees under the *GATT 1994*."[568] Despite the environmental concerns associated with the shrimp ban, the United States had applied the provision in an arbitrary and discriminatory manner, failing to treat all trading partners the same—an environmental objective cannot save a regulation where the requirements are not equitably applied to trade Members. Regardless, the Appellate Body recognized the legitimacy

[563] *Ibid* at ¶127.
[564] Sanford E Gaines, "Considering WTO Law in Design of Climate Change Regimes Beyond Kyoto" IOP Conf Series: (2009) 8(1) *Earth and Env't Sci* 1.
[565] *United States – Standards for Reformulation and Conventional Gasoline* (1996) WTO Doc WT/DS2/AB/R (Appellate Body Report).
[566] *Ibid* at 11 and 12.
[567] *United States – Import Prohibition of Certain Shrimp and Shrimp Products* (1998) WTO Doc WT/DS58/AB/R, DS/58 (Appellate Body Report) online: www.wto.org/english/tratop_e/dispu_e/cases_e/ds58_e.htm ["*United States – Shrimp/Turtle"*].
[568] *Ibid*, at ¶39.

of the environmental objective pursuant to Article XX(g) of the *GATT*.[569] Furthermore, the *United States Shrimp/Turtle* case clarifies the concept of environmental goods in international law by recognizing "exhaustible natural resources" as including "living resources."[570] The Appellate Body emphasized that "Article XX(g) was *not* limited to conservation of "mineral" or "non-living" natural resources."[571] The *United States Shrimp/Turtle* case clarifies that "[w]e do not believe that "exhaustible" natural resources and "renewable" natural resources are mutually exclusive."[572]

The WTO Appellate Body decision in *United States – Gasoline*, and the *United States – Shrimp* cases reveals that a well-meaning environmental program may not be upheld if it is found to be discriminatory. An application of this principle to the *SCM Agreement* could prompt the conclusion that green energy subsidies still need to avoid application "in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade."[573] In the *Brazil-Retreaded Tyres* case, the Appellate Body concluded that a measure should be "necessary" and minimally restrictive to be saved under the *GATT* Article XX provision.[574] The *Brazil – Measures Affecting Imports of Retreaded Tyres* Appellate Body considered whether an "import ban" on tyres can be upheld under Article XX of the *GATT*.[575] An import ban is arguably far more restrictive than a subsidy, yet the Appellate Body concluded that certain "environmental problems may be tackled only with a comprehensive policy comprising a multiplicity of interacting measures".[576] Even a cost benefit analysis must be cautious because the Appellate Body notes the passage of time as a requirement to

[569] *Ibid* at ¶184.
[570] *Ibid* at ¶127.
[571] *Ibid*.
[572] *Ibid* at ¶128.
[573] *GATT*, *supra* note 368 at Article XX.
[574] *Brazil – Measures Affecting Imports of Retreated Tyres* WT/DS332/AB/R adopted 17 December 2007 at para 150.
[575] *Ibid.*
[576] *Ibid* at para 151.

assess the effectiveness of some measures.[577] In this regard, the Appellate Body concluded that "measures adopted in order to attenuate global warming and climate change" fall into the category of initiatives that "can only be evaluated with the benefit of time."[578]

The problem with utilizing the chapeau clause is that, if the government initiative does not meet the lesser restrictive and necessary requirement as per *United States Shrimp* and *United States Gasoline*, the measure may be held in violation of the *GATT*. Even where a measure is deemed to be in furtherance of a legitimate environmental goal, the Appellate Body ruled in the *Canada Renewable Energy/FIT case* that such measures cannot amount to a subsidy where there was no pre-existing industry. This decision recognizes infancy industries and may legitimize a one- time subsidy. This would mean that the same company utilizing a FIT Program may not be granted a Power Purchase Agreement guaranteeing a feed-in tariff on the second project. Further, if a Power Purchase Agreement were obtained in this case, the project may not pass the adverse effect component, as it would no longer be a subsidy for the creation of a new market.

The nature of feed-in tariffs is such that they are often arranged by a government enterprise that also regulates the industry. These enterprises set the energy purchase price which, in the case of solar, may not be driven by market principles and is typically subsidized. In the case with the Ontario FIT system, it was alleged that these policies were discriminatory and distorted trade. Under Article XVII of the *GATT*, government enterprises must be non-discriminatory in their practices.[579] The paradox exists because, while the MFN rationale guides fair trade between nations, it does not overtly sanction or condone non-distorting subsidies like those aimed at meeting national climate change abatement goals. The reluctance to entertain the issue of non-actionable subsidies in the *Canada*

[577] *Canada Renewable Energy/FIT* (Appellate Body Report) *supra* note 369 at para 5.187.
[578] *Ibid* at para 151.
[579] *GATT*, *supra* note 368 at Article XVII.

Renewable energy/FIT case may be linked to the fear that if this section were reinstated, it could bring abuses. Some scholars have contemplated the negative outcome of reinstating Article 8 of the *SCM Agreement* and have concluded that the provision could be built into existing trade regimes without "inviting misuse of the exception."[580]

The notion that WTO treaties may be modified to include environmental public policy considerations is not new to green energy projects. The pharmaceutical industry also dealt with the issue of affordable medicines after it was found that *TRIPS* had an adverse effect on access to life-saving medicines in impoverished nations.[581] In the past, the WTO has made exceptions to international laws in order to promote public policy objectives such as affordable health care.[582] As per Article 27 of the *TRIPS* Agreement, a WTO Member State cannot refuse to grant a patent, and international patents are recognized "in all fields of technology."[583] As the majority of WTO members were required to support *TRIPS* in order to ratify the legislation, multinationals were forced to incorporate some exceptions to Article 27(2) that would recognize countries' right to provide necessary health care for their citizens. This exception is found in Article 31 of *TRIPS* and is known as the compulsory licensing exception.[584]

Under the *TRIPS* Agreement, nations may restrict exclusive rights and the rights to grant pharmaceutical patents. This achievement on the part of multinational corporations was only obtained by virtue of the concession that there must be "*mutual advantage of producers and users*" of the technology as contained in Article 7 of the *TRIPS*.[585] Article 8 of the *TRIPS* Agreement

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[580] Cosby & Mavroidis, *supra* note 454 at 45.
[581] WTO. *Implementation of Paragraph 6 of the Doha Declaration on the TRIPS Agreement and Public Health, Decision of 30 August 2003,* online: www.who.int/medicines/areas/policy/WT_L_540_e.pdf WT/L/540, 2 September 2003; *TRIPS*, *supra* note 368 Articles 30 and 31.
[582] *TRIPS*, *supra* note 368 Articles 30 and 31.
[583] *Ibid* at Article 27.
[584] *Ibid* at Article 31.
[585] *Ibid* at Article 7.

attempts to balance the prospect of an abuse of power by patent holders against the ability to promote the free trade in technology which may affect the ability to provide of the health care needs of citizens in developing and least-developed countries. This concern was addressed by granting developing nations the ability to produce their own medications, or import these drugs from another nation with the ability to produce them, in special circumstances under Article 30 and 31. Arguably, if exceptions of this nature can be granted to deal with the global health care crises, then flexibilities may also be implemented to combat climate change.

The reinstatement of non-actionable subsidies in the *SCM Agreement* prompts consideration as to how flexibilities addressing critical societal problems should be incorporated in WTO treaties. Just as *TRIPS* flexibilities recognize the importance of patented medicines in the lives of indigent global citizens, the *SCM Agreement* should recognize the importance of "non-actionable" subsidies related to green energy projects. The global environmental policy goal of addressing climate change can be said to be a goal that recognizes environmental subsidies aimed at offsetting the costs and risks of renewable energy projects. The issue of what constitutes a subsidy is not settled; whether initiatives like the FIT program are actually subsidies is still in dispute when contrasted with externalities caused by tradition energy sources like coal, which are arguably subsidized because the producer does not pay the full cost of the externality.[586]

IV. CONCLUSION

This paper explored whether the decision in the *Canada Renewable Energy/FIT* case impacted Ghana's ability (as a developing nation) to enhance and support renewable energy projects under the *SCM Agreement*s. Currently, renewable energy policies that reward investments by

[586] Stiglitz, *supra* note 463 at 2.

subsidizing the higher cost of green technologies, are at conflict with international laws like *TRIMs*, the *SCM Agreement* and the *GATT*. The current state of renewable energy policy is guided largely by Article XX of the *GATT*. Based on current WTO decisions on the issue of environmental subsidies, it is likely that green energy subsidies would be upheld pursuant to Article XX(b) of the *GATT*. They are supported by several WTO Appellate Body decisions as well as the flexibilities contained in the *Paris Agreement*. However, this prediction is not based on any international agreement that addresses the issue of subsidies, since non-actionable subsidies are omitted from the *SCM Agreement*. In this regard, the WTO needs to entertain a specific agreement to address the growing number of disputes on renewable energy and the uniqueness of objectives related to green energy. In order to meet the national goals of lowering CO^2 emissions, the reinstatement of flexibilities like *SCM Agreement* Article 8 may need to be reconsidered.[587] COP 21 and the ensuing *Paris Agreement* references the ability to meet environmental and climate change abatement goals by utilizing government incentives and supports along with other forms of subsidies. This expressed approval is a signal to Member-States that the *SCM Agreement* needs to be re-negotiated to consider a re-instatement of non-actionable subsidies. WTO law needs to take into consideration the policy goal of climate change abatement and green subsidies as a tool to meet this objective.

This study found that the international law on non-actionable subsidies is muddled. On one hand, the WTO Appellate Body recognizes non-actionable subsidies within the green energy sector, but does not go as far as approving or sanctioning them. The lack of clarity creates uncertainty for countries and foreign investors in environmental projects, especially in the developing world, where such projects would not exist but for the infusion of foreign capital. The WTO Appellate Body in

[587]*SCM Agreement*, *supra* note 368 at Article 8: Identification of Non-Actionable Subsidies), online: www.wto.org/english/doc_e/legal_e/24-scm_01_e.htm>. See also Michael Froman (2014) Letter to Congress (Notification of Administration entering WTO negotiations on environmental goods). Online: www.ustr.gov/sites/default/files/03212014-Letter-to-Congress.pdf.

the *Canada Renewable Energy/FIT* case laid the foundation for dialogue on the modernization of the WTO *SCM Agreement*. However, this forum has no ability to legislate consensus. Instead, a Ministerial Conference may need to be held, and a consensus obtained from the WTO Subsidies Committee, to consider the reinstatement of Article 8 for environmental subsidies and regional development objectives.

Developed and least-developed countries can carve a green path to development. While this goal will reduce the global effects of climate change, it is a costly endeavour. FIT Programs in the developing world attempt to create some level of financial certainty for investors who have expended 10s of millions on costly green energy projects. Without some assurance that these projects will not be a target of WTO challenges, foreign investors will be reluctant to invest in developing nations. The end result is that these countries will be forced to adopt the cheaper, carbon intensive method of burning fossil fuels to achieve regional development. This outcome in contrary to the regional development and environmental goals in Articles XX(b) of the *GATT*.

The WTO *Canada Renewable Energy/FIT* case has resulted in the WTO deciding the future of non-actionable environmental subsidies, rather than it being addressed by the *SCM Agreement*. The notion that green energy subsidies should be incorporated in an international agreement that deals with the issue is not novel, but evokes reluctance on the part of some WTO Members. The reality is that, even without a concrete agreement governing international trade within the energy sector, government subsidies in the energy sector will continue to influence foreign investments, especially in the developing world. The paradox is that, while fossil fuel subsidies (that is the failure to account for environmental externalities in the cost of the fuel) evade WTO scrutiny, renewable energy subsidies are under attack.

The Canada *Renewable Energy/FIT* case recognizes that environmental subsidies, like those

contained in FIT schemes, may be necessary to meet national climate change abatement goals. Despite this recognition, there are no international agreements that expressly address the issue of renewable energy and green technologies. The current international trade environment leaves the application of FIT Programs to the WTO Dispute Settlement Body to interpret the legitimacy of these programs on a case-by-case basis. The current process is most disadvantageous to developing nations which rely on foreign investments to develop infancy industries like renewable energy. Without clear policy on which measures may be actionable as subsidies, foreign investors may shy away from costly projects like solar photovoltaic plants, and the presence of a FIT that is mired in uncertainty may not allay precarious investment concerns. The WTO Members need to debate the serious issue of environmental subsidies and set clear guidelines as to how they are to be incorporated and addressed by the primary Agreement that deals with the issue of subsidies. It is paradoxical that the *SCM Agreement* does not address the issue of environmental subsidies, especially at a time when the WTO was called upon to essentially overstep its function by crafting policies on the matter. The *Canada Renewable Energy/FIT* decisions are ambiguous on the issue of the legitimacy of FIT subsidies because there are no existing rules within the *SCM Agreement* to guide decisions on non-actionable subsidies. This approach does not lend certainty when the Dispute Settlement Body is bestowed with the dual task of setting and applying policy. However, it is unclear whether these subsidy provisions, as espoused in the *Canada Renewable Energy/FIT* decision, will make their way into multilateral trade negotiations and agreements. The issue is not whether non-actionable subsidies should exist, but rather the need to clarify whether national climate change abatement targets will be subject to complaints by other Members. The precarious climate created by the absence of green energy issues from the WTO Agreements puts the legitimacy of the *SCM Agreement* into question when it abdicates that which it was enacted to govern.

CHAPTER FIVE:

Evergreening Through Trade Secrets as an Impediment to Green Technology Transfer to the Developing World

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L E S L Y N L E W I S *

ABSTRACT

Intellectual property law was constructed to facilitate innovation and development by granting a limited monopoly in exchange for the public's right to use an invention after the period of exclusivity expires. The trade-off of granting intellectual property protections in reward for the investment in an invention is intended to be a temporary benefit. Trade secrets have been thought of as the weakest form of intellectual property, because non-disclosure is the only form of protection. In other words, infringement of a trade secret occurs upon the unauthorized disclosure of the secret. However, absent reverse engineering and/or legitimate disclosure, protection over trade secrets may arguably extend the exclusivity rights in perpetuity. The debate on "evergreening" has focused largely on extending the life cycle of pharmaceutical patents to the omission of other forms of intellectual property, like trade secrets. The concept has also been widely ignored in relation to climate change abatement technologies. In this regard, considerations around evergreening and trade secrets have been substantially neglected. The loophole in international intellectual property treaties, like *Trade Related Aspects of Intellectual Property Rights* ("*TRIPS"*), may lead to inequalities between industrial nations and developing ones, especially for products like photovoltaic solar panels that rely heavily on trade-secret protection. In addition, this non-disclosure may also impact on green technology transfer and may impede climate change abatement strategies in the developing world. This paper will explore the practice of evergreening as it relates to the prospect that trade secret protection may extend beyond the 20-year limit, as prescribed in *TRIPS*, and the implications of this practice for developing countries that seek to meet climate change commitments as outlined in the 2016 *Paris Climate Change Agreement* (the "*Paris Agreement*"). Arguably, the absence of a fixed statutory period for trade secrets may enable patent owners to participate in creative ways to "evergreen" their products or processes, with the result of extending the life-cycle. The practice of evergreening through trade secrets may have a negative impact on the ability of developing nations to meet their

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national climate change objectives. Specifically, international treaties like *TRIPS, the General Agreement on Tariffs and Trade, 1994* ("*GATT"*), the United Nations Framework Convention on Climate Change (the "UNFCCC"), and the *Paris Agreement*, have attempted to incorporate climate change flexibilities that assist developing countries in meeting their climate change goals. The efficacy of technology transfer provisions in international law will be examined within the context of how the lack of a fixed term for trade secrets impacts on actual green technology transfer. It will canvass whether trade secret protection of off-patent green technologies acts as an inadvertent barrier to technology transfer within the developing world.

I. INTRODUCTION

Climate change is a global phenomenon that creates new legal and practical challenges. One such issue is the costliness of climate abatement technologies and the problems that intellectual property protection poses in exacerbating inequities between industrialized and developing nations. It has been argued that these intellectual property systems often prefer the interests of industrialized nations over developing ones.[588] Specifically, developing nations have been asked to adopt stricter environmental standards than were present during industrial growth of western nations, such as the United Kingdom, the United States and Japan. Some scholars have referenced this environmental "burden" as a form of environmental imperialism that aims to further impoverish nations where the inhabitants are predominantly people of colour.[589] The imposition of strict environmental standards have been said to be a means of imperialistic control over these countries' development path.[590] One instrument of control that has been used, and has arguably increased the cost of development, is intellectual property protection. While a number of studies have focussed on the role that patents play in development, the concentration on trade secrets has been sparing. The question of whether trade secrets should be given a fixed term of protection like other forms of intellectual property still remains unanswered. Essentially, while other forms of intellectual property such as patents enjoy a 20-year

[588] Cameron Hutchinson, "Does TRIPS Facilitate or Impede Climate Change Technology Transfer into Developing Countries" (2006) 3 U Ottawa L & Tech J 517.
[589] Paul Driessen, *Eco-Imperialsim: Green Power, Black Death* (Bellevue, WA: Free Press, 2004).
[590] *Ibid*.

exclusivity period, trade secrets are not subject to any such fixed terms. Instead, a trade secret is lost through disclosure, reverse engineering, appropriation (usually from a breach of a commercial or employment contract, or misappropriation). Absent these elements a trade secret can remain protected intellectual property in perpetuity. This paper will explore trade secrets within the context of "evergreening" and query whether the lack of fixed-term periods for trade secrets is justifiable in light of global climate change mitigation and adaptation goals.

This paper is divided into three parts. The first portion of the paper addresses the absence of a fixed statutory period for trade secrets both in the international law and under Canadian and American common law. The second portion of the paper addresses the impact of the lack of a fixed statutory period for trade secrets on commercial practices and argues that the practice of "evergreening" is enabled by the lack of a fixed term. The final section of this paper addresses the impact of the practice of evergreening through trade secrets on the developing world's ability to choose a sustainable path of development.

Arguably, the potential to maintain a trade secret for an indefinite period may have a negative impact on the transfer of green technologies like solar panels to the developing world. Furthermore, the absence of a fixed statutory period in trade secrets may have a chilling effect on national climate change abatement strategies, especially in emerging economies. In this regard, this paper queries whether trade secrets of green technologies can be interpreted as "evergreening" through product life-extension strategies. It recognizes the importance of intellectual property rights and explores whether the current state of the law on trade secrets (i.e. the lack of fixed terms) is justifiable within the context of *TRIPS*.

The paper draws upon the example of photovoltaic (PV) solar panel technology and examines the practice of enhancements used by industries after a patent has already been granted. It queries

whether the practice of technology owners legally modifying their products through trade secret enhancements, which extend beyond the 20-year limitation period, is a form of evergreening negatively impacting green technology transfer to the developing world. If trade secrets are maintained beyond the standard 20-year period, this may have a negative impact on innovation and development, especially in developing regions.

There are three main ways that a trade secret can be lost: disclosure (direct or inadvertent), reverse engineering, or misappropriation. In the latter case, the court has ruled that misappropriation is prohibited and the violator is forever enjoined from benefitting from the misappropriated information. The rights to a trade secret may be statutorily based or arise from a contractual right to keep the particular secret. However, cases involving employee disclosure, or breaches of contract, may see to the general prohibition of using trade secrets for a fixed utility period, unlike those secrets based on a statutory right of secrecy. Therefore, if there is no disclosure, reverse engineering or misappropriation (by breach of contract), then a trade secret has the potential of remaining a secret in perpetuity. Cases where injunctions have been ordered to remedy misappropriation that is achieved through some aspect of criminality (as distinguished from mere breach of contract) are especially instructive in highlighting the possibility for a trade secret to last for an indefinite period of time. Consequently, this paper is primarily concerned with the inability to legislate a 20-year fixed statutory term for a trade secret and the courts treatment of trade secret cases involving criminality (where a permanent injunction is granted). In this regard, the claim of perpetuity does not relate to situations involving a mere civil breach of contract, voluntary or involuntary disclosure, or other breach of contract situations. Therefore, absent a breach of contract, should trade secrets be subject to fixed statutory periods similar to other intellectual property rights? Additionally, does the absence of a fixed statutory period for trade secrets impact the ability of developing nations to meet their

global climate change obligations under international agreements, like the *Paris Agreement*? In this regard, the utility of trade secrets are inherently recognized, however, it will be argued in this paper that the current system of not having statutory fixed terms for trade secrets is arguably unjustifiable, especially in light of universal intellectual property regimes like *TRIPS* and global climate change commitments like the *Paris Agreement*.

II. Literature Review of Trade Secrets and Evergreening

Balancing intellectual property rights and issues of public interest gives rise to complex legal, financial, and regulatory arrangements, often involving local and international agreements.[591] Similarly, while much debate has been raised over the impact of environmental standards and intellectual property rights (like patents) on the developing world, very little scholarly debate has surfaced around the impact of practices that extend a technology's intellectual property life cycle. When one explores the commitments concerning technology transfer and its importance to the developing world, made in international treaties like *TRIPS*, *GATT,* and the *Kyoto Protocol,* questions arise about whether there are impediments to achieving these goals within international intellectual property rights treaties.[592] Specifically, the practice of evergreening and its impact on environmental protection has not received wide scholarly attention. When one considers the balance that is often struck between the disclosure of a patent in exchange for a fixed period of exclusive rights, it

[591] Adam B Jaffe et al, "Energy-efficient Technologies and Climate Change Policies: Issues and Evidence" (1999) 19 *Resources for the Future*, *Climate Issue Brief* 3, online: <rff.org/files/sharepoint/WorkImages/Download/RFF-CCIB-19.pdf>.

[592] See *Agreement on Trade-Related Aspects of Intellectual Property Rights*, 15 April 1994, Annex 1C of the Marrakesh Agreement Establishing the World Trade Organization, 1869 UNTS 299, arts 27.2, 66.2, online: <wto.org/english/docs_e/legal_e/27-trips_01_e.htm> [*TRIPS*]; *Kyoto Protocol*, *supra* note 240; *General Agreement on Tariffs and Trade*, 30 October 1947, 58 UNTS 187 (first entered into force on 1 January 1948) [*GATT*].

confounds why more scholarly debate is not focused on the social impact of practices that extend these rights, especially in the context of public goods and climate change abatement.

Patents, copyrights, trademarks and trade secrets are the four main areas of intellectual property.[593] The domain of trade secrets is unique, as it is the only area that does not have fixed statutory terms. In addition, the case law on trade secrets does not stipulate a minimum or maximum amount of time that a trade secret may last, that is, if the owner continues to maintain its secrecy. Cases where injunctions have been ordered to remedy misappropriation are especially instructive in highlighting the possibility for a trade secret to last for an indefinite period of time.

A. The Statutory Treatment of Trade Secrets in International Law

Prior to the United States advocating for international intellectual property laws that mirror their jurisdictional rights, there was "no mention of trade secrets in any multilateral or bilateral agreements."[594] In fact, any attempt to regulate trade secrets would negate the very essence of the practice which relies on keeping information confidential as the only means of protection. With the Uruguay Round of negotiations *TRIPS* enshrined traded secrets in Article 39, with a specific focus on commercial practices under Article 39.2. Article 39 of *TRIPS* attempts to balance intellectual property rights and prevent against unfair competition. Article 39.2 of *TRIPS* recognizes a trade secret within the realm of "honest commercial practices", so long as the information:

> (a) is secret…
> (b) has commercial value because it is secret; and
> (c) has been subject to reasonable steps under the circumstances, by the person lawfully in control of the information, to keep it secret.[595]

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[593] Robert A Choate & William H Francis, *Cases and Materials on Patent Law; Also Including Trade Secrets, Copyrights, Trademarks,* 2nd ed (St. Paul, Minn: West Publishing Company, 1981) at 5.
[594] Sharon K Sandeen, "The Limits of Trade Secret Law: Article 39 of the TRIPS Agreement and the Uniform Trade Secret Act on which it is Based" in R C Dreyfuss & K J Strandburg, eds, *The Law and Theory of Trade Secrecy: A Handbook of Contemporary Research* (Cheltenham, UK: Edward Elgar Publishing, 2011) 537 at 539.
[595] *TRIPS*, *supra* note 592, art 39.2.

Consequently, information that has already been disclosed ("prior art") is not subject to any form of intellectual property protection under trade secrets or patents.

Scholars like Sharon Sandeen have argued that the enshrinement of Article 39(2) in *TRIPS* is "modeled after the definition of "trade secret" that is contained in the Uniform Trade Secrets Act (UTSA)".[596] Sandeen argues that U.S. industrial leaders "advocated for an international system for the protection of international property rights ("IPRs") that was based upon the laws of the United States."[597]

The traditional grant of a limited monopoly for intellectual property does not apply to trade secrets. In fact, the law aids and abets the holder of a trade secret to keep it secret for as long as possible and disclosure nullifies its protection. In other words, an obligation to utilize trade secret protection requires non-disclosure and secrecy, and laws in various jurisdictions reference the rights that a holder of a secret have under the law.

In international law, a requirement of a trade secret under Article 39(c) of *TRIPS* is that it must be shown that the owner of the secret took "reasonable steps under the circumstances, by the person lawfully in control of the information, to keep it secret."[598] Moreover, unlike all other forms of intellectual property including trademarks, copyrights and patents, no one common law jurisdiction or American jurisprudence sets limits to how long the holder of a trade secret has before that knowledge must be placed in the public domain. The ability to hold a trade secret in perpetuity has not been statutorily or judicially prohibited. The argument may exist that trade secrets are then counterintuitive to the public policy principle adopted in patents that requires eventual disclosure to

[596] Sandeen, *supra* note 594 at 538.
[597] *Ibid* at 539.
[598] *TRIPS*, *supra* note 592, art 39(c).

foster innovation. However, in the US, the courts have ruled that limitless trade secret protection and fixed term patent protection are not incompatible.[599]

Some scholars have identified that patent terms could correspond with research and development expenditures, thus giving short terms to enhancements.[600] In "The Role of Patent Protection in (Clean/Green) Technology Transfer", Bronwyn Hall and Christian Helmer highlight the problem of enhancements, which are often protected as trade-secrets:

> A large range of different technologies can achieve emission reductions, and for a significant share of these technologies, the underlying technology is mature and in the public domain. Most technological progress is expected to come from incremental improvements of existing off-patent technologies. While such incremental innovation may be patentable, it leaves ample scope for competing technologies and therefore limits the role specific patents may play for technological progress in this area.[601]

This issue of limiting or fixing terms has not been substantially explored within the context of international agreements on technology transfer, and more specifically, the impact on the evergreening of intellectual property that affects global environmental abatement initiatives.

1. *Evergreening in International IP Law and its Impact on Global Climate Change Goals*

Evergreening is technically, but not expressly, prohibited under several World Trade Organization ("WTO") treaties. The general understanding is that industrialized nations should not erect any impediments to economic growth for developing nations. This affirmation includes an obligation to assist through transferring technologies to these growing regions. The role of international treaties like *TRIPS*, *GATT,* the *Kyoto Protocol*, and the *Paris Agreement*, in facilitating

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[599] *Kewanee Oil Co v Bicron Corp*, 478 F (2d) 1074 (6th Cir 1973) [*Kewanee Oil*], rev'd 416 US 470 (1974); *Aronson v Quick Point Pencil Co*, 440 US 257 (1979), aff'g 416 US 470 (1974).

[600] Carlos M Correa, "Managing the Provision of Knowledge: The Design of Intellectual Property Laws" in Inge Kaul, ed, *Providing Global Public Goods: Managing Globalization* (Oxford: Oxford University Press, 2003).

[601] Bronwyn H Hall & Christian Helmers, "The Role of Patent Protection in (Clean/Green) Technology Transfer" (2009) 26:4 Santa Clara Comp & High Tech LJ 487 at 493; see also Daniel K N Johnson & Kristina M Lybecker, "Innovating for an Uncertain Market: A Literature Review of the Constraints on Environmental Innovation" (2009) Colorado College Working Paper No 2009-06.

fair trade practices that encourage economic growth of all WTO Members, cannot be understated. A number of international agreements contemplate the necessity of developed nations to assist developing nations in meeting their environmental goals. Specifically, Article 4.5 of the Kyoto Protocol highlights the need for developed countries to "take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to environmentally sound technologies and know-how to other parties, particularly developing country parties to enable them to implement the provisions of the Convention."[602] Articles 10(c) and 12 of the Protocol encourage technology transfer by focussing on creating an "enabling environment"[603] that assists developing nations in their goal of sustainable development while "achieving compliance with their quantified emission limitation and reduction commitments."[604] Even with the support of the UNFCCC, programs are sometimes implemented with disparate outcomes. For example, the well-intended Clean Development Mechanisms ("CDM"s) under the Protocol allow polluters in developed countries to claim certified emissions reduction credits from green investments in developing countries, resulting in only a few developing nations being beneficiaries of this initiative (Brazil, India, China and Mexico). To demonstrate this, of the 7,828 CDM projects in 2015, only 2.51% were in Africa.[605] The *Paris Agreemen*t attempts to balance mitigation and adaptation measures with the local development needs by its commitment to reduce "vulnerability to climate change",[606] particularly the conditions experienced by developing nations who are facing "the adverse effects of climate change."[607] Commitments in the *Paris Agreement* also recognize "a country-driven, gender-responsive,

[602] *Kyoto Protocol*, *supra* note 240, art 10(c).
[603] *Ibid,* arts 10(c)–12.
[604] *Ibid*, arts 4, 12, 17.
[605] *Clean Development Mechanism*, UNFCCC, Executive Board Annual Report (2014), online: <unfccc.int/resource/docs/publications/unfccc_cdm-eb_annual_report2014.pdf> at 7, 17.
[606] *Adoption of the Paris Agreement*, Dec 1/CP.21, UNFCCCOR, Sess 21, UN Doc FCCC/CP/2015/10/Add.1 (2016), art 7.1.
[607] *Ibid*, art 7.2.

participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems"[608] that include "traditional knowledge, knowledge of indigenous peoples and local knowledge systems" in the decision making process.[609]

The main body that regulates trade and intellectual property is the WTO which was created in 1995 after eight years of negotiations, beginning in September of 1986 in Punta del Este, Uruguay, and ending in Marrakesh, Morocco on April 15, 1994. On January 1, 1995 the *TRIPS* Agreement came into effect with the aim of harmonizing global intellectual property protection. *TRIPS* is administered through the WTO *TRIPS* Council which holds annual Members' meetings. In 2001 the WTO Doha Ministerial Conference created the Working Group on Trade and Transfer of Technology ("WGTTT").[610] Since its creation, the Working Group meets on average 4 times per year and submits annual reports to the General Council on the success of technology transfer under Article 66.2 of *TRIPS*.[611] UNFCCC was created in 1994 and the Kyoto Protocol enshrined in 2005.[612] Article 4.1(c) of the Convention underscores the importance of environmentally sound technology transfer and Article 4.5 references the diffusion of environmentally sound technologies and the goals of climate change mitigation. Specifically, Article 4.5 encourages developed countries to "take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to environmentally sound technologies and know-how to other parties, particularly developing country parties to enable them to implement the provisions of the Convention."[613] The UNFCCC report identified a number

[608] *Ibid,* art 7.5.
[609] *Ibid*.
[610] *Doha Ministerial Declaration*, WTO Doc WT/MIN(01)/DEC/1 (2001), 4th Sess, online: <wto.org/english/thewto_e/minist_e/min01_e/mindecl_e.pdf> at para 37.
[611] WTO, Doha Ministerial Conference, *Implementation-Related Issues and Concerns* (14 November 2001), WTO Doc WT/MIN(01)/17, 4th Sess, s 11.1, online: <wto.org/english/thewto_e/minist_e/min01_e/mindecl_implementation_e.pdf>.
[612] *Kyoto Protocol, supra* note 240, art 3.2.
[613] *Ibid*, art 4.5.

of barriers to the transfer of green technology to the developing world, including institutional, political, technological, economic and informational.[614]

The role of the private sector in facilitating technology transfer is also captured in Article 10(c) of the Kyoto Protocol which promotes removing any legal, administrative and regulatory barriers to "create an environment conducive to private and public sector technology transfer."[615] Despite the perceived failure of Kyoto, the Protocol was a signal from the international community that the issue of increasing carbon dioxide emissions would be compounded with the growth of developing economies. Three years after adoption, a conference was held in Bali, Indonesia, with the aim of creating a climate change treaty.[616]

While the Kyoto Protocol creates a mechanism for technology transfer, there are no affirmative, proscriptive measures that a developing country could rely on in order to access environmentally sound technology.

2. *TRIPS and Technology Transfer*

In 2003 the WGTTT reaffirmed the positive obligation of developed nations to assist in technology transfer by incorporating the requirement under Article 66.2 to submit detailed annual reports.[617] This reporting requirement, while creating positive obligations under Article 66.2, the mechanisms to facilitate and monitor its successful implementation have not been put into effect. Unlike *TRIPS* and the minimum standards for intellectual property, the technology transfer provision sets no fixed level that WTO Members must implement or engage in order to comply with Article

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[614] UNFCCC, *Technical Paper on Terms of Transfer of Technology and Know-How,* supra *note 241*.
[615] *Kyoto Protocol*, *supra* note 240, art 10(c).
[616] *Report of the Conference of the Parties on its thirteenth session, held in Bali from 3 to 15 December 2007*, UNFCCCOR, 2008, UN Doc FCC/CP/2007/6/Add.1.
[617] It should be noted that this "requirement" was not enforced; many countries failed to submit reports. See e.g. Commission on Intellectual Property Rights, "Integrating Intellectual Property Rights and Development Policy" (September 2002) at 25–27, online: <iprcommission.org/papers/pdfs/final_report/CIPRfullfinal.pdf>.

66.2. The "public good" associated with climate change abatement increases the obligation for technology transfer. The problem arises because Article 66.2 is obligatory and would require mechanisms to support and monitor its effective implementation. Another problem with international treaties relating to technology transfer is that these agreements, while they address minimum standards, they fail to set enforceable practice directions for patent abuses like evergreening that may hinder technological progress and advancement.

Economic development and the commitment to transfer technology must consider green technologies as a tool to abate climate change while simultaneously assisting with the development of a nation. *TRIPS* also attempts to balance the inequality that would result from least developed countries requirement to adhere to patents where their economies were technologically delayed. The concessionary Article 66.2 attempted to create a legal obligation for developed countries to assist in the technological development of LDC through technology transfer. Article 66.2 reads as follows:

> Developed country members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least developed country members in order to enable them to create a sound and viable technological base.[618]

Recognizing the disadvantage that costly patents may render to developing and least-developed countries, *TRIPS* attempts to address this inequality by creating a legal obligation for developed countries to engage in technology transfer with least-developed countries. Accordingly, Article 66.2 recognizes that developed countries need to provide incentives for technology transfer to developing nations.[619] Technically, Member States can also label certain practices including evergreening as anti-competitive under Article 40 of *TRIPS* as a means to "prevent and control" such activities that may have an "adverse effect on competition in the relevant market."[620] Article 40.2 has been

[618] *Ibid.*
[619] *TRIPS*, *supra* note 592, art 66.2.
[620] *Ibid*.

criticized for being too general and not explicitly addressing how to minimize such abuses. Correa addresses shortcomings within Article 40 by highlighting the fact that "[i]nstead, while expressly allowing Members to adopt measures to control or prevent such practices, it takes pains to establish limits to national action in this field."[621] Thus, the issue of whether term extensions should even apply to clean technologies in the area of patents is still unsettled. The issue is even more complex when one considers that trade secrets have no fixed IP term and as such, there is limited discussion about trade secrets that extend beyond 20 years. Even without this clarification, however, developing nations still call for the temporary removal of licenses on environmentally-sound technologies to abate the effects of climate change.[622] Other measures proposed by developing countries include patent pooling, royalty-free compulsory licensing of green technology, and the revoking of patent rights on existing green patents.[623] It should be noted that even if developing nations succeed in labelling such practices as anti-competitive, there is still no mechanism for imposing penalties on Member States engaging in such practices.

The issue of technology transfer is addressed under Article XX of the *GATT*, as well as Articles 7, 8, 40 and 66.2 of *TRIPS*. The WTO's Dispute Settlement Body ("DSB") has heard five cases pertaining to the General Exceptions provision under Article XX of the *GATT*, one case under Article 7 and a companion case under Article 8 of *TRIPS*, while no cases have been brought forth under Articles 40 or 66.2 of *TRIPS*.[624] While Article 66.2 of *TRIPS* is most directly related to the issue of

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[621] Carlos M Correa, "Can TRIPS Agreement Foster Technology Transfer to Developing Countries?" in Keith E Maskus & Jerome H Reichman, eds, *International Public Goods and Transfer of Technology: Under A Globalized Intellectual Property Regime* (New York: Cambridge University Press, 2005) at 237.
[622] Jason R Weiner, "Sharing Potential and the Potential for Sharing: Open Source Licensing as a Legal and Economic Modality for the Dissemination of Renewable Energy Technology" (2006) 18:2 Geo Intl Envtl L Rev 277.
[623] *Report of the Ad Hoc Working Group on Long-term Cooperation Action under the Convention on its eighth session, held in Copenhagen from 7 to 15 December 2009*, UNFCCCOR, 2010, UN Doc FCCC/AWGLCA/2009/17, online: <unfccc.int/sites/default/files/resource/docs/2009/awglca8/eng/17.pdf>.
[624] See "Dispute Settlement Rules: Understanding on Rules and Procedures Governing the Settlement of Disputes" (1994), Marrakesh Agreement Establishing the World Trade Organization, Annex 2, 1869 UNTS 401, online: <wto.org/english/tratop_e/dispu_e/dispu_agreements_index_e.htm?id=A26>.

technology transfer, the absence of request for consultations hinders any meaningful assessment of how this provision could be implemented in international law. The issue of whether a generic manufacturer can stockpile a product prior to the expiry of a patent was considered by the DSB in DS114. The decision may be instructive in assessing the scope of *TRIPS* exceptions under Article 30 as they relate to various aspects of evergreening. The DSU case of *Canada – Patent Protection of Pharmaceutical Products* (DS114) ("*Canada Pharmaceutical Case*")[625] addressed the prospect of generic manufacturers stockpiling products six months prior to patent expiry.

The *Canada Pharmaceutical Case* differs from the subject matter herein, because it related to the challenge of Article 28 (during the life of a patent), which is not relevant to the issue of evergreening (which deals with the extension of the product's exclusivity period). In addition, Canada is an industrialized nation and its invocation of the Article 30 exception would be on entirely different grounds than that of a developing nation. The challenge in the *Canada Pharmaceutical Case* pertained to section 55.2(2) of the Canadian *Patent Act*, specifically, the regulatory review process that allowed generic manufacturers to stockpile products in contravention of Article 28 of *TRIPS* which conferred exclusive rights on patent holders. While Canada agreed that the stockpiling provision violated Article 28.1 of *TRIPS*, it argued that the measure could be justified under the Article 30 exception. The Panel found that the measure could not be justified because there were no limits on the quantity of product produced for stockpiling and as such constituted a "substantial curtailment of the exclusionary rights" granted by Article 28.1.[626]

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[625] *Canada – Patent Protection of Pharmaceutical Products (Complaint by the European Communities)* (2000), WTO Doc WT/DS114/R (17 March, 2000), online: <docs.wto.org/dol2fe/Pages/FE_Search/FE_S_S009-DP.aspx?language=E&CatalogueIdList=29169&CurrentCatalogueIdIndex=0&FullTextHash=&HasEnglishRecord=True&HasFrenchRecord=True&HasSpanishRecord=True>.

[626] *Ibid* at s 7.36.

While this case addresses the issue of how an exception to the non-discrimination provision in *TRIPS* arose, it is not entirely analogous to the issue of trade secrets addressed herein, which is primarily concerned with the intellectual property protection conferred without a fixed period regarding when those exclusive rights will expire. In the *Canadian Pharmaceutical Case*, the issue pertained to the infringement of rights, via stockpiling, during the period of exclusivity (prior to patent expiry). While the fact that there is no fixed expiry term for trade secrets makes the application of this case difficult within a general context, the Panel's decision that the European Union failed to demonstrate that the Canadian regulatory review provision was discriminatory under Article 27.1, is somewhat supportive of the principle that Member States may enact laws that promote the development of their local economies once they are non-discriminatory pursuant to Article 30. In this regard, the *Canada Pharmaceutical Case* decision supports the principle of Article 8 once the measure or exception meets the minimum tripartite requirements of 1) being limited, 2) it does not "unreasonably conflict with the normal exploitation of the patent", and 3) it does not "unreasonably prejudice the legitimate interests of the patent owner".[627] These requirements also take into consideration the "legitimate interests" of third parties. Article 7 (promotion of technological innovation and transfer) and Article 8 (promotion of public health and unreasonable restraint on trade) were not invoked by Canada, which is an industrialized nation, but could potentially be relied upon in future disputes involving developing nations within the context of the Article 30 exception.

The issue of technology transfer is also directly linked to the promotion of social and economic welfare as contained in Article 7 of *TRIPS.* This provision recognizes that the promotion of intellectual rights "should contribute to the promotion of technological innovation and to the transfer and dissemination of technology."[628] Article 8 of *TRIPS* also upholds each Member State's right to

[627] *TRIPS*, *supra* note 592, art 30.
[628] *Ibid*, art 7.

protect the public's interests and this would arguably include alleged intellectual property abuses such as evergreening. Article 8 recognizes the right of Member States to "adopt measures necessary to protect and promote the public interest in sectors of vital importance to their socio-economic and technological development". In addition, Members are encouraged to adopt measures that are "consistent" with *TRIPS* and to "prevent the abuse of intellectual property rights by right holders or the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology".[629] Thus, practices such as evergreening may be viewed by some Member States as not being in the public interest and consequently inconsistent "with the provisions" of *TRIPS.* Article 8 could therefore be used to challenge practices such as evergreening that could negatively impact on green technology transfer. A total of two related cases (DS408 and DS409) have been brought before the WTO Dispute Settlement Body under Articles 7 and 8 of *TRIPS*. In DS408 "European Union and a Member State – Seizure of Generic Drugs in Transit", India initiated a request for consultation with the European Union and the Netherlands, alleging that the two countries were repeatedly seizing their generic drugs that were on route to third party countries through ports and airports in the Netherlands. On May 28, 2010 Brazil, Canada and Ecuador requested to join the consultations and were followed on May 31, 2010 by China, Japan and Turkey.[630] The consultations have not been concluded to date and no determination has been reached. It is unclear whether aspects of Article 7 referencing the "mutual advantage of producers and users of technological knowledge" will be advanced, or if the consultations will focus more on Article 8 and the right of members to "adopt measures necessary to protect public health."[631]

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[629] *Ibid*, art 8.
[630] *European Union and a Member State – Seizure of Generic Drugs in Transit (Complaint by India)* (2010), WTO Doc WT/DS408/1–8, online: <wto.org/english/tratop_e/dispu_e/cases_e/ds408_e.htm>; *European Union and a Member State — Seizure of Generic Drugs in Transit (Complaint by Brazil)* (2010), WTO Doc WT/DS409/1–8, online: <wto.org/english/tratop_e/dispu_e/cases_e/ds409_e.htm>.
[631] *TRIPS*, *supra* note 592, arts 7–8.

3. *The GATT and Technology Transfer*

The *GATT* contains perhaps one of the strongest provisions for implementing trade exceptions relating to environmental protection. Article XX of the *GATT* contains a chapeau provision that could potentially facilitate the transfer of environmentally sound technology to the developing world. A total of five Requests of Consultations were considered under Article XX of the *GATT* by the WTO Dispute Settlement Body.[632] These five cases largely addressed food issues related to livestock and shrimp importation. Moreover, these cases did not consider patents or more specifically, trade secrets. Despite the lack of direct connection to the subject matter of trade secrets, these cases may be instructive in understanding how exceptions that pertain to the environment and technological advancement may be addressed by the WTO.

On October 8, 1996, a request for consultation was initiated by India, Malaysia, Pakistan and China against the United States regarding the US' ban on the importation of shrimp products from these countries. The complainants alleged that the shrimp ban was inconsistent with Article XI:1 of the *GATT*. It was also alleged that the chapeau of Article XX of the *GATT* could not be used to justify this inconsistency. The panel found that the shrimp ban was inconsistent with Article XI:1 of the *GATT* and could not be justified under Article XX of the *GATT*. The Appellate Body reversed the panel's decision and essentially concluded that the shrimp ban was within the scope of measures permitted by the chapeau of Article XX of the *GATT*, but that the US measures did not meet the requirements of the chapeau of Article XX. The Appellate Body found that in spite of this failure, the US qualified for provisional justifications under Article XX(g) of the *GATT*. Consequently, Article XX(g) of the *GATT* may be used to justify conservation measures, even where those practices conflict with a Member's obligations under the *GATT*. This decision raises concerns about whether

[632] *GATT*, *supra* note 592, art XX.

Article XX(g) could be used to support climate change abatement strategies that may be initially deemed inconsistent with international trade obligations.

B. Common Law Treatment of Trade Secrets (Canada and the U.S.)

It has long been established in Anglo-American jurisprudence that the main quality of a trade secret is the confidence that one party holds about the particular secret that enhances trade or provides a competitive advantage.[633] As such, the proprietary nature is not contained in the main feature of this intellectual property *per se*, but is instead the non-disclosure of the trade secret.[634] Therefore, the protection of a trade secret traditionally only lasts as long as the trade remains a secret.[635] The problem of secrecy is inherently connected to the uncertainty that exists regarding how long trade secret protection lasts. While all forms of intellectual property other than trade secrets provide for fixed statutory term limits, trade secrets have no such provision and have been determined largely by case law involving injunctions. In cases where the trade secret remains secret, an injunction may protect the duration of the secret, which may persist in perpetuity.[636] Most countries indirectly provide protection for trade secrets in their federal or state/provincial laws by combining a number of areas of law including tort law (trespass)[637] and contract law (theories of breach of confidence[638]

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[633] *E I Du Pont de Nemours Power Co v Massland*, 244 US 100 (1917) [*Massland*].
[634] *Ibid* at 102 (where Holmes J commented, in obiter, that the fact that something may be property is separate from whether it may be protected as in the case with a "valuable secret" or where facts are obtained "through a special confidence".
[635] *US Restatement of Torts* §757 (1939).
[636] E J Khan, *The Big Drink: The Story of Coca-Cola* (New York: Random House, 1960).
[637] The Supreme Court of Canada has ruled that negligence claims must be derived from independent and actionable wrongs, separate from contractual relationships; see *J Nunes Diamonds Ltd v Dominion Electric Protection Co*, [1972] SCR 769 at 777–778, 26 DLR (3d) 699 at 727–728.
[638] Canadian and American case law has generally followed the decision in *Coco v A N Clark (Engineers) Ltd,* [1968] FSR 415 at 415, [1969] RPC 41 (Ch) [*Coco* cited to FSR]. For a general overview of the principle of breach of confidence in *Coco*, see page 425, whereat it was concluded that courts "…must be ready to make those implications upon which the sane and fair conduct of business is likely to depend"); see also P North, "Breach of Confidence: Is There a New Tort?" (1972) 12 J Soc'y Pub Teachers L 149.

that are founded in equity,[639] unfair competition,[640] which has been classified also as a tort of conversion,[641] and unjust enrichment),[642] criminal law,[643] and the most robustly litigated area of employee/employer law and fiduciary obligations emanating there from.[644] In this regard, the accidental loss of a trade secret (absent misappropriation or breach of contract) will not be protected.[645] Similarly, trade secrets that are lost by reverse engineering are also not protected.[646]

The lack of uniformity in trade secret law has led to disaccorded judicial outcomes,[647] not only in commonwealth nations,[648] but also under American jurisprudence. The main jurisprudence in trade

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[639] Woodhouse J found that claims, in equity, of breach of confidence can be pursued independently from contract and tort claims; see *Consolidated Ltd v European Strength Food Co Pty Ltd*, [1978] 2 NZLR 515 (CA) at 520; see also *Consolidated Textiles Ltd v Central Dynamics Ltd* (1974), 18 CPR (2d) 1 at 11–13, [1974] 2 FC 814 at 827–829 (TD).

[640] This cause of action is usually attached to nondisclosure agreements (NDA), non-compete agreements (NCA), non-solicitation or non-circumvention agreements, or breach of licensing agreements; see *Atlantic Business Interiors Ltd v Hipson et al*, 2005 NSCA 16 at para 38, 230 NSR (2d). See e.g. South African cases on unfair competition: *Prok Africa (Pty) Ltd. v NTH (Pty) Ltd*, [1980] 3 SALR 687 at 697.

[641] *MacDonald v Vapor Canada Ltd*, [1977] 2 SCR 134, 22 CPR (2d) 1, 66 DLR (3d) 1 at 13.

[642] There is a general principle at common law, articulated by Lord Denning in *Seager v Copydex Ltd,* [1967] 1 WLR 923 (CA) at 931, that "…he who received information in confidence shall not take unfair advantage of it." See e.g. the predecessor cases of Canada and the US: *Fibrosa Spolka Akcyjna v Fairbairn Lawson Combe Barbour Ltd*, [1943] AC 32 HL at 61; *Deglman v Guaranty Trust Co of Canada*, [1954] 3 DLR 785 at 788, [1954] SCR 725.

[643] F Kaufman, "Industrial Espionage and the Criminal Law: in *Studies in Criminal Law Procedure* (Toronto: Canada Law Book Ltd, 1972) 101.

[644] Jennifer Brant & Sebastian Lohse, "Trade Secrets: Tools for Innovation and Collaboration" (2014), International Chamber of Commerce, Innovation and Intellectual Property Series, at 7; see also M A Lemley, "The Surprising Virtues of Treating Trade Secrets as IP Rights" (2008) 61 Stan L Rev 311; Griffin M Barnett, "Combatting Trade Secret Theft By Foreign State-Owned Entities: An International Law Approach" (2015) 5:2 J Intl and Comparative L 46; World Intellectual Property Organization, "What is a Trade Secret?", online: <wipo.int/sme/en/ip_business/trade_secrets/trade_secrets.htm> [WIPO, *Trade Secret?*]; for fiduciary-employee relations, see P Y Atkinson and R A Spence, "Fiduciary Duties Owed by Departing Employees – The Emerging 'Unfairness Principle'" (1984) 8:4 Can Bus LJ 501; *Faccenda Chicken Ltd v Fowler*, [1986] 3 WLR 288*,* [1986] 1 All ER 617 at 731 (for the principle that all information of a confidential nature can bind employees in post-employment covenants); see *Gates Rubber Company v Bando Chemical Industries Ltd et al*, 9 F (3d) 823 at 848 (10th Cir 1993), for the principle that a breach of confidentiality in trade secret cases provides an additional element over copyrights which "qualitatively distinguishes such trade secret causes of action from claims for copyright infringement that are based solely on copying."

[645] Uniform Law Conference of Canada, *Uniform Trade Secret Act* (1989), online: <ulcc.ca/en/home/537-josetta-1-en-gb/uniform-actsa/trade-secrets-act/730-uniform-trade-secrets-act-1989> [*Uniform Trade Secret Act*].

[646] *Ibid*, s 6.2.

[647] See *Greenberg v Croydon Plastics Co*, 378 F Supp 806 (ED Pa 1974) at 812, where it was admitted that the "concept of a trade secret is extraordinarily difficult to define." Note that prior to 1989 in Canada, there was no precise definition of a trade secret, and Canadian courts largely relied upon the now repealed section 7(e) of the *Trade Marks Act* by applying a standard which prohibited conduct "contrary to honest industrial or commercial usage in Canada." See *Trade-Mark Act*, RSC 1985, c T–13, s 7(e), which was repealed in 2014. For an analogous statute which is similar to the current treatment of trade secrets in Canada, see *Uniform Trade Secrets Act* § 1, 14 ULA 537, 541 (1985).

[648] HG Fox, *The Canadian Law of Trade Marks and Unfair Competition*, 3rd ed (Toronto: Carswell, 1972); S Ricketson "Confidential Information – A New Proprietary Interest? Part I" (1977) 11 Melbourne UL Rev 223; W R Cornish

secret law has been concentrated in the area of breach of confidentiality arising from employment obligations.[649] In the United States, the divergent theories and legal outcomes on trade secret litigation that arose from the application of the *US Restatement of Torts* §757.[650] The *US Restatement of Torts* §757 (1939) defines trade secrets in the following way:

> A trade secret may consist of any formula, pattern, device or compilation of information which is used in one's business and which gives him an opportunity to obtain an advantage over competitors who do not know or use it.[651]

The judicial definitions of trade secrets and its legal applications have led to immense disagreement in the area of trade secret law and has been said to raise "more questions than it answers."[652] It has also been found that the operational definition is also unclear and consists "of little more than an enumeration of the factors which courts utilize in deciding what kinds of information are protectable trade secrets."[653] The uncertainty that arose from a common-law interpretation of the *US Restatement of Torts* eventually led to a codification of federal and state level common-law trade secret decisions into the *Uniform Trade Secrets Act*.[654] The reality of trade secret law around the globe is no different than in Canada where there is also no singular statutory protection for undisclosed commercial information.[655]

"Protection of Confidential Information in English Law" (1975) 6 Intl Rev Industrial Property and Copyright L 43; David Vaver "Civil Liabilities for Taking or Using Trade Secrets in Canada" (1981) 5 Can Bus LJ 253.

[649] The common law has, on public policy ground, frowned upon contracts that restrict employee mobility; see *Nordenfelt v Maxim Nordenfelt Guns and Ammunition Co Ltd* (1984), [1894] AC 535 (HL).

[650] *US Restatement of Torts*, *supra* note 635; see also a number of secondary sources: R M Milgrim, *Trade Secrets* (New York: Matthew Bender, 1978); Aaron N Wise, *Trade Secrets & Know-How Throughout the World* (New York: Clark Boardman, 1974); R Callmann, *The Law of Unfair Competition, Trademarks and Monopolies*, 3rd ed (Illinois: Callaghan, 1969).

[651] *Ibid*, *US Restatement of Tort*s at §757. Note: Comment B of the Restatement of Torts admits to the difficulty that arises in defining a trade secret and adds that an "exact definition of a trade secret is not possible."

[652] Robert A Spanner, *Who Owns Innovation*, 1st ed (Illinois: Dow Jones-Irwin, 1984) at 7.

[653] *Ibid*.

[654] *Uniform Trade Secret Act, supra* note 645; Richard F Dole Jr, "Permanent Injunctive Relief for Trade Secret Misappropriation Without an Express Limit upon Its Duration: The Uniform Trade Secret Act Reconsidered" (2011) 17 BUJ Sci & Tech L 173.

[655] Alberta Law Reform Institute, "Trade Secrets Report No 46" (1986), online: <alri.ualberta.ca/docs/fr046.pdf>; John T Ramsay and François Grenier, *Trade Secrets Throughout the World, Canada* (Toronto: Thomson/West, 2005); James D Kokonis, "Confidential Information" in Gordon F Henderson et al, eds, Copyright and Confidential Information Law of Canada (Scarborough: Carswell, 1994) 325 at 327.

4. *Unlimited Term Protection for Trade Secrets*

Unlike other forms of intellectual property like patents, trademarks, and copyrights that have fixed terms prescribed by statutory limits, trade secret protection can be unlimited.[656] While patents protect information is filed in a patent, the only protection for trade secrets is non-disclosure. Thus, the protection exists until the rights holder voluntarily discloses that information. Similarly, while patents grant an exclusive right for a limited period, trade secrets contain no requirement to eventually make an invention or know-how public. The Supreme Court in *Kewanee Oil Co* recognized that there may be overlaps in patent and trade secret protection, with trade secret enjoying an extended protection which does not require eventual public disclosure. [657] Thus, it is not inconceivable for many firms to forego patenting enhancements achieved after the expiry of a patent, and instead, choosing choose to retain protection of these enhancements as trade secrets in perpetuity. Thus, while trade secrets may have infinite protection under the law (especially for undisclosed information), the protection is more closely tied with the length of time that a trade secret has utility,[658] which has been estimated by one scholar as "a mere three years."[659] While this argument appears to contradict the within thesis which maintains that absent a fixed statutory period for trade secrets, the holder of this IP has a perpetual right to operate (absent a legitimate disclosure), it does not consider the issue of enhancements. For example, as will be argued below, PV solar panels and other environmental products are often improved through enhancements based on the original IP. Therefore, the estimated utility of a trade secret that has been subject to an enhancement can extend well beyond three years as putatively projected by certain scholars.

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[656] Lemley (2008), *supra* note 644; Karl F Jorda, "The Rights of the First Inventor—Trade Secret User as Against Those of the Second Inventor Patentee (Part II)" (1979), 61 J Pat Trademark Off Soc'y 593.
[657] *Kewanee Oil*, *supra* note 599.
[658] *Nelson Burns & Co Ltd et al v Gratham Industries Ltd et al* (1983), 150 DLR (3d) 692 (H Ct J), aff'd (1986), 55 OR (2d) 426 (CA), leave to appeal to SCC refused (1986), 56 OR (2d) 604.
[659] P W Leuzzi, Process Inventions: Trade Secrets or Patents Protection (1984) 66 J Pat Trademark Off Soc'y 159 at 168.

Contrary to the above argument that the utility of a trade secret is three years, case law in the area of trade secrets has granted permanent injunctions, which suggests that the duration or a trade secret can be infinite, or else there would be no need to permanently enjoin the infringer.[660] In *Allen-Qualley Co v Shellmar* ("*Shellmar*"),[661] the plaintiff Allen-Qualley was negotiating a license from Shellmar for a candy-wrapping machine. Shellmar obtained confidential information and used it to conduct a patent search that revealed much of the secret candy-making machine. Shellmar purchased the patent and the issue was whether it breached the oral agreement to hold the confidential information in trust until the licensing contract was duly executed. A perpetual injunction was issued against Shellmar, which prohibited the use of the candy-machine; a reassignment of the patent, to Allen-Qualley, was also ordered. The issue of perpetual injunctions raised in *Shellmar* goes beyond protecting trade secrets (which remains secret), to contemplating the length of punishment an infringer ought to face. In the companion case of *Shellmar Products Co v Allen-Qualley Co*,[662] several third parties were granted patents on the candy-machine which divulged the secret that was in dispute in the initial *Shellmar* case. Shellmar sought to set aside the earlier injunction on the basis that the trade secret was disclosed in patents that were filed subsequent to the order. The court found that Shellmar's breach of confidence prohibits it from benefiting from the use of the candy-machine and that by its conduct it "…had taken itself outside the pale of the general public to which the disclosure of that patent was made."[663] The logic of the court rests on the fact that should a trade secret be misused, the abuser should never benefit from the breach once it has gone public. This prevents the deliberate breach that would thereafter result in public knowledge, and the abuser subsequently claiming the

[660] The term "perpetual" injunction has been used in the case law to suggest a permanent or ongoing injunction with no fixed duration; see *Shellmar Products Co v Allen-Qualley Co* 87 F (2d) 104 (7th Cir 1936); see also *Shellmar Products Co v Allen-Qualley Co* 301 US 695 (1937).
[661] *Allen-Qualley Co v Shellmar Prods Co*, 31 F (2d) 293 (ND Ill 1929), aff'd 36 F (2d) 623 (7th Cir 1929).
[662] *Ibid* (cited to 36 F (2d) 623 (7th Cir 1929)).
[663] *Ibid* at 107.

right to use the public information that he pillaged. The breach of confidence forever enjoins the abuser from using the information that was gained in confidence. Thus, *Shellmar* stands for the proposition that an infringer who has received knowledge and has acted to breach confidence shall not benefit from his/her actions. However, where the information has not been disclosed through unscrupulous means, then an injunction should only be granted up until the time where that information legitimately becomes public.[664]

There are essentially two lines of reasoning in trade secret injunction cases: that of *Shellmar*, which champions the protection of undisclosed trade secrets in perpetuity, but only against violators; and that *of Conmar Products Corp v Universal Slide Fastener Co* ("*Conmar*"), which recognizes, where trade secrets have already been legitimately disclosed, with only limited protection. In *Conmar* trade secrets were disclosed through a zipper patent that was later deemed invalid. Judge Learned Hand found that since the secret had already been disclosed through the issuance of a patent, Universal Slide Fastener could not rely on trade secret doctrine. It was clearly stipulated that the intellectual property is not the confidential information, but is instead the trade secret. As such, if no secret exists because of legitimate disclosure, then there is no legal protection extended to the confidential relationship.[665] The line of cases that follow *Conmar* focus on freedom of employment where the trade secret had already been divulged.[666] Thus, *Comar* does not undermine the reasoning in *Shellmar* which continues to protect trade secrets that have not been divulged or that have been disclosed through breach of confidence. The perpetual protection of trade secrets offered under *Shellmar* gives rise to the potential that companies may use this form of intellectual property to evergreen their products.

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[664] *Conmar Products Corp v Universal Slide Fastener Co*, 172 F (2d) 150, 156 (2d Cir 1949).
[665] *Ibid.*
[666] *Ibid*; see also *Winston Research Corp v Minnesota Mining & Manufacturing Co*, 350 F (2d) 134 (9th Cir 1965).

Another seminal American case considered a particular factual situation, which traditionally gives rise to questions of evergreening, wherein – after the expiry of a patent – a patent-holder improves on the product through an enhancement kept as a trade secret.[667] In *Franke v Wiltscheck*, the defendant argued that the enhancement should not be subject to protection, as it was based on an expired patent. The court made a clear distinction between cases involving enhancements protected as trade secrets, and those based on expired patents:

> Plaintiffs do not assert, indeed cannot assert, a property right in their development such as would entitle them to exclusive enjoyment against world. There is not a patent, but a trade secret. The essence of their action is not infringement, but breach of faith. It matters not that defendants could have gained their knowledge from a study of the expired patent and the plaintiffs' publicly marketed product. The fact is that they did not. Instead they gained it from plaintiffs via their confidential relationship, and in so doing incurred a duty not to use it to plaintiffs' detriment. This duty they have breached.[668]

The notion that enhancements of a patent can be protected via trade secrets, as advanced in *Franke*, coupled with case law and statutory principles that fail to limit the duration of a trade secret, is the current basis for a doctrine of evergreening in trade secrets. However, the court in *Franke* found that if the defendant had gained knowledge of the trade secret through an expired patent, then the plaintiffs could not assert "a property right in their development such as would entitle them to exclusive enjoyment against the world."[669] This statement clearly supports the proposition that legitimate disclosure, reverse engineering or ingenuity can lead to the loss of trade secret protection, however, a breach of a "confidential relationship" will enjoin the infringer from benefitting from the illicit disclosure.

The issue of how long an infringer will be prohibited from putting to use a trade secret will likely be clarified in the recent case involving a Chinese company (Sinovel) and an American company

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[667] *Franke et al v Wiltschek*, 209 F (2d) 493 (2d Cir 1953), 99 USPQ (BNA) 431 [*Franke*]. For a more comprehensive discussion of this case, see Charles T Graves, "Trade Secrets as Property: Theory and Consequences" (2007) 15 Ga J IPL 39.
[668] *Franke*, *ibid* at 495–496.
[669] *Ibid* at para 8.

(American Superconductor). The *Sinovel* case addresses the issue of economic espionage and international misappropriation of trade secrets. An engineer of American Superconductor was convicted of stealing source codes for wind turbine software and selling it to *Sinovel* (a state-owned company in China). Sinovel was a loyal customer of American Superconductor and it is alleged that they began to find fault with the product and eventually stopped paying for its use. At the time of the breach it is alleged that Sinovel owed American Superconductor 100 million in already delivered services and future contracts totaling $700 million.[670] At the time Sinovel had provided 70% of American Superconductors annual revenues, and its stock plunged 80% in six months.[671] After discovering that Sinovel had found a way to use its technology without a license, American Superconductor commenced three lawsuits (two against the company and its two executives in federal court and the other against the former employee Dejan Karabasevic) in an attempt to prevent Sinovel from using the pirated software. The case is set to be heard on December 5, 2016. The ruling of this case will likely expand the law on the duration of an injunction for trade secret breaches involving impropriety. On July 6, 2018 US District Judge James Paterson convicted Sinovel of stealing trade secrets and ordered it to pay 1.5 million dollars in fines.[672] Sinovel was also sentenced to one year probation and payment of the $ 57.5 million settlement with AMSC.[673]

Cases prior to *Sinovel* largely dealt with the length of an injunction within the context of the employment sector. The area of law grew to encompass concerns relating to balancing an employer's

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[670] United States Department of Justice, News Release, "Sinovel Corporation and Three Individuals Charged in Wisconsin with Theft of AMSC Trade Secret" (27 June 2013), online: <justice.gov/opa/pr/sinovel-corporation-and-three-individuals-charged-wisconsin-theft-amsc-trade-secrets>.
[671] Jonathan Weisman, "U.S. to Share Cautionary Tale of Trade Secret Theft with Chinese Official", *The New York Times* (14 February 2012), online: <nytimes.com/2012/02/15/world/asia/chinese-official-to-hear-trade-theft-tale.html>.
[672] Todd Richmond, "Federal Judge Fines Chinese Wind Turbine Maker $1.5 Million" *AP News* (6 July 2018), online: <apnews.com/578e4452fffc4ac2b0744b1b56c925ef>; Christie Smythe, "Sinovel Must Pay $59 Million as Punishment in Trade Secret Case" *Bloomberg* (6 July 2018), online: <bloomberg.com/news/articles/2018-07-06/sinovel-must-pay-59-million-as-punishment-in-trade-secrets-case>.
[673] *Ibid*.

right to maintain proprietary secrets, while simultaneously not limiting an employee's freedom of mobility and right to earn a living.[674] For example, courts have relaxed the disclosure rule in cases where it is necessary for an employee to reveal a trade secret in order to perform their job.[675] It is this burden upon employees that has led the courts to question how long a trade secret should enjoy protection under the law. The notion that trade secrets could be divided into two classes, a property class and a non-property class, has been advanced.[676] According to Bruce Bugler, this distinction could arguably be implemented as follows:

> All jurisdictions agree that as long as the employer holds an item secret, the law grants protection for an unlimited amount of time. However, holding an employee to an obligation to a past employer for an unlimited amount of time can reduce his employment mobility. Accordingly, the current unlimited protection should only apply where a "property quality" trade secret is found to exist.[677]

It is further argued that where the trade secret is shown to have "non-property qualities" it should not be extended unlimited protection.[678] In the *Sinovel c*ase an employee plead guilty of fraud and economic espionage for misappropriating his employer's confidential information and revealing it to the detriment of his former employer. This case could be distinguished from cases that attempt to balance the freedom of employment (that is an employee's obligation to retain the secret against his/her right to be employed) from cases involving impropriety of this nature. This analysis has largely been dedicated to the courts' balancing of the rights of the employee with the employer's rights,[679] in cases unlike Sinovel where there is no impropriety.

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[674] *Conmar, supra* note 664; *Winston, supra* note 666.
[675] *PepsiCo Inc v Redmond*, 54 F (3d) 1262 (7th Cir 1995) at 1269–1271.
[676] Bruce A Kugler, "Limiting Trade Secret Protection" (1988) 22:3 Val U L Rev 725.
[677] *Ibid*.
[678] *Ibid*; *A B Consolidated Ltd v Europe Strength Food Co Pty Ltd,* [1978] 2 NZLR 515 (CA), wherein a perpetual injunction was granted; this decision was upheld on appeal.
[679] Michael Barclay, "Trade Secrets: How Long Should an Injunction Last? (1978) 26 UCLA L Rev 203, wherein it was stated that trade secret protections can be infinite.

Teva, one of the world's largest generic manufacturers of pharmaceutical products, filed a Complaint against Apotex Inc and Apotex Corp ("Apotex"). Canadian generic manufacturer under the *Defend Trade Secrets Act* ("*DTSA*").[680] The Complaint alleges that a former Teva employee (Barinder Sandhu) provided confidential trade secret information to her boyfriend (Jeremy Desai, CEO of Apotex), with whom she resided in Pennsylvania at the time of the complaint.[681] Sandhu allegedly synchronised confidential Teva information with a cloud account and uploaded 900 Teva files, as well as saved files on at least 10 USB drives. In addition to claims under the *DTSA*, Teva also alleged that Apotex violated the *Computer Fraud and Abuse Act* ("*CFAA*")[682] and committed various tort and contract violations. In August of 2017, Apotex brought a motion to dismiss the Complaint on the following grounds:

> The specific acts of alleged misappropriation occurred prior to the enactment of the *DTSA* and as such the Act does not apply;
> Teva failed to provide sufficient facts to identify the specific trade secret that was infringed and the complaint is therefore not tenable under the *Pennsylvania Uniform Trade Secret Act* ("*PUTSA*");
> Teva failed to state a specific loss under the *CFFA*;
> The *PUTSA* is not applicable as it would pre-empt the common law conversion claims and such claims should fall under the uniform system;
> The state contract and tort claims made under the *PUSTA* do not allege sufficient facts to disclose a cause of action and should be barred at law.[683]

On January 30, 2018 Justice Savaged delivered a decision on a motion for dismissal which was partially granted.[684] While the Judge agreed that Teva's former employee may have transmitted confidential information gained from her employment, it failed to plea that Sandhu's did not have

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[680] *Defend Trade Secrets Act* of 2016, Pub L No 114–153.
[681] *Teva Pharmaceuticals USA Inc v Barinder Sandhu, Jeremy Desai, Apotex Inc and Apotex Corp*, No 2:2017-3031 (ED Pa 2017).
[682] *Computer Fraud and Abuse Act,* 18 USC § 1030.
[683] *Teva*, *supra* note 681.
[684] *Teva Pharmaceuticals USA Inc v Barinder Sandhu, Jeremy Desai, Apotex Inc and Apotex Corp*, No 17-3031 in the United States District Court For The Eastern District of Pennsylvania, "Memorandum Opinion" (30 January, 2018), per Savage J.

the authorization to access the computer for this purpose, as outlined in the *Computer Fraud and Abuse Act*. The balance of the Complaint is still pending and will be instructive on the issue of injunctive relief for former employees under the new *DTSA* and state law.

The above-mentioned employment cases do not consider the impact of the unlimited trade secret protection on development and technology transfer because they do not address issues beyond employment that permit a trade secret to be protected even beyond the 20-years afforded to other IP. In addition, the extraterritorial considerations as revealed by the *Sinovel* case need to be further explored by the literature. Other suggestions of refining trade secret protection advocate for a trade secret registry, but this solution also does not resolve issues around how to limit the duration of trade secrets and potential abuses. The concerns arising over extending monopoly periods beyond the term granted for the intellectual property have traditionally given rise to the doctrine of "evergreening". This principle has been primarily focused on the practice as it relates to patents, but it has been parsimonious in the area of trade secrets.

5. Trade Secret & Evergreening in the Caselaw

The principle of "evergreening" has not been widely canvassed in the literature or case law on trade secrets. The scholarly focus on evergreening is largely concentrated in the pharmaceutical sector and closely tied to North American cases.[685] Evergreening traditionally refers to the practice

[685] The Canadian process is regulated by the *Patented Medicines (Notice of Compliance) Regulations*, SOR/93-133 [*NOC Regulations*], while the US process is filed through the *Drug Price Competition and Patent Term Restoration Act of 1984*, Pub L No 98-417, 98 Stat 1585 [*Hatch-Waxman Act*], *an amendment to the Federal Food, Drug, and Cosmetic Act* § 505(j); 21 USC § 355(j), which allows a generic product to be approved on bioequivalency to an expired brand's product via an abbreviated new drug application ("ANDA"); see *Bristol-Myers Squibb Canada Co v Apotex Inc* [2009] FC 137 [*Bristol-Myers*]; *Whirlpool Corp. v Camco Inc.* [2000] 2 SCR 1067 [*Whirlpool*]; *Apotex Inc v Sanofi-Synthelabo Canada Inc,* 2008 SCC 61, [2008] 3 SCR 265, (also referred to as PLAVIX) [*Sanofi-Synthelabo*]; *Apotex Inc v Pfizer Canada Inc et al*, 2009 FCA 8 [*Pfizer*]; *Windsurfing International Inc v Tabur Marine Ltd*, [1985] RPC 59 (UK); see also *Windsurfing International Inc v Tabur Marine Ltd*, [1985] RPC 59 (UK); *Pozzoli SPA v BOSO SA*, [2007] FSR 37, [2007] ENCA Civ 588; *Angiotech Pharmaceuticals Inc v Conor Medsystems Inc*, [2008] UKHL 49; *KSR International Co v Teleflex Inc*, 550 US 398 (2007); *Beloit Canada Ltd v Valmet OY* (1986), 8 CPR (3d) 289 (FCA); *Saint-Gobain Pam SA v Fusion Provia Ltd*, [2005] EWCA Civ 177; *Graham v John Deere*, 383 US 1 (1966); *Re O'Farrell* 853 F (2d) 894, 7 USPQ (2d) 1673.

in which patent owners use legal and regulatory means to extend their intellectual property monopoly privileges over a product or a process. While the concept of evergreening has been popularized within the pharmaceutical context, the example is not entirely analogous to the green technology sector, primarily because evergreening often commences early in the inventive stage with pharma products (for example data that is kept secret in the market clearance stage). Unlike pharmaceutical products, green technology products like solar panels do not require market clearance from a pharmacological perspective, as such, improvements and confidential information exists largely in the form of product enhancements after the patent has expired, rendering the old technology inefficient and non-competitive from a market and profit perspective. Generally, evergreening practices can fit into two categories, those that extend the life of tangible products and processes, and those that deal with intangibles such as information and know-how. From the perspective of tangible assets, evergreening often adopts industry practice that extends the life-cycle of a product, while intangible forms include practices like trade secrets. Patents grant a temporary monopoly to an inventor as a balance between rewarding the efforts of innovation and fostering disclosure of new inventions. This disclosure is expected to facilitate and encourage further innovation and be of benefit to society's progress at large. In most jurisdictions the limited monopoly is granted for 20-years, thereafter, the patent expires and the monopoly period ends. It is just prior to the expiry of the patent that evergreening practices are initiated. The product that is evergreened continues to be sold at brand-name prices as it remains protected under law. This strategy has a direct effect of extending the legal period of the brand patent and therefore delaying the entry of cheaper off-patent substitutes. The problem arises when patent holders attempt to extend the 20-year monopoly period, especially on items that are critical to societal development like green technologies used in climate change abatement or patents on life-saving drugs.

The literature on evergreening within the pharmaceutical context is rich and provides an extensive background to the practice. The concept of "evergreening" in Canadian case law is essentially the prohibition against double-patenting, as was explained by Mr. Justice Hughes in *Bristol-Myers Squibb Canada Co v Apotex Inc*:

> Double patenting, put simply, involves the concept that a person cannot get a second patent for the same thing for which they already have received a patent. A patent is a monopoly for a limited period of time and that period should not be extended by the expedient of getting a subsequent patent for the same thing.[686]

The principle against monopoly extension is clearly elucidated in the prohibition against "evergreening."[687] There are also a number of obvious life cycle management strategies adopted in this practice, many of which have been popularized by the pharmaceutical sector, including the slight modification of drug compositions,[688] as well as brand migration.[689] Other less obvious practices include pricing pressures,[690] the refusal to grant licenses associated with products,[691] the combining of existing drugs,[692] and outright litigation.[693] While the general rule against evergreening is that the same product cannot be patented twice, there is no prohibition against utilizing a trade secret to protect improvements or enhancements that would otherwise not be patentable. This omission may pose serious concerns for the implementation of green technology transfer to (or within) the

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[686] *Bristol-Myers*, *ibid* at 173–174.
[687] See generally *Whirlpool, supra* note 685 at para 63; *Sanofi-Synthelabo, supra* note 685; *Pfizer, supra* note 685.
[688] Slightly modifying the composition of a product by way of utilizing its derivatives, such as polymorphs or enantiomers, is one example of such a practice.
[689] This practice attempts to phase out an existing drug prior to the expiry of the patent and to redirect the consumer to the replacement product. For example Prilosec consumers were migrated to Nexium. AstraZeneca and Prilosec which was succeeded by Nexium. AstraZeneca spent over $300 million in advertising to promote Nexium and to move consumers away from Prilosec to Nexium.
[690] This is often achieved by creating patent thickets, the use of multiple licenses and patents to obtain a single product.
[691] Korean Trade Promotion Agency, "Case Study 4: The Republic of Korea and the Montreal Protocol" in Veena Jha & Ulrich Hoffmann, eds, *Achieving Objectives of Multilateral Environmental Agreements: A Package of Trade Measures and Positive Measures,* UN Doc UNCTAD/ITCD/TED/6, online: <unctad.org/en/docs/itcdted6_en.pdf>.
[692] This process sees to the combination of two or more drugs or patented compounds. For example, Caduet is a combination of Lipitor (Atorvastatin) and Norvasc (Amlodipine), once used to treat liver dysfunction.
[693] The commencement of litigation in jurisdictions like Canada grants a 30-month stay of a generic manufacturer's production, thereby extending the monopoly period by 2.5 years.

developing world. Such concerns include the inability of developing countries to utilize green technologies that are protected by trade secrets even after patents have expired.

III. Trade Secrets as an Impediment to Green Technology Transfer to the Developing World under International Agreements

Evergreening through trade secrets is not directly contemplated in *TRIPS*, the *GATT* or the Kyoto Protocol, and consequently there is no prohibition against withholding information in perpetuity. Article 44 of the *TRIPS* Agreement does recognize that judicial authorities will grant infringement remedies, however, the duration of these rulings are specifically omitted from *TRIPS*. Injunctive relief under *TRIPS* is addressed in Article 44 which sets out that:

> 1. The judicial authorities shall have the authority to order a party to desist from an infringement, *inter alia* to prevent the entry into the channels of commerce in their jurisdiction of imported goods that involve the infringement of an intellectual property right, immediately after customs clearance of such goods…
>
> 2. ...the remedies under this Part shall apply or, where these remedies are inconsistent with a Member's law, declaratory judgments and adequate compensation shall be available.[694]

Thus, while Article 44 recognizes the rights of WTO Members to access injunctive relief in national courts, it does not set time limits on the duration of that relief. The fact that these treaties do not contain a time limit on trade secrets and there is essentially no mechanism to determine how long a trade secret has been in practice, brings into question the efficacy of Articles 7 and 8 of *TRIPS* which attempts to balance intellectual property abuses so that technology could be mutually advantageous to "producers and users",[695] and also Article XX(b) and XX(g) of the *GATT* which recognizes exceptions that facilitate the development of Member States on human development and environmental grounds. If these provisions cannot be operationalized, then they cannot represent a

[694] *TRIPS*, *supra* note 592, art 44.
[695] *Ibid*, arts 7–8.

viable challenge to the prospect that green products may be evergreened through utilizing trade secrets.

Evergreening may have a negative social impact on developing nations that are heavily reliant upon technology transfer to address climate change abatement needs. The impact on developing countries is most felt when evergreening practices result in barriers to the entry of technologies that will help in assisting these markets down a green development path. This barrier may have a global impact on climate change abatement strategies. The dilemma arising from the evergreening through trade secrets is particularly evident in the solar panel industry which has many off-patent alternatives that have been enhanced and are protected by trade secret know-how. In this regard, eliminating impediments to obtaining a license to utilize the enhanced technology must be addressed. Article 39 of *TRIPS* permits a Member to protect a trade secret except in situations "where necessary to protect the public, or unless steps are taken to ensure that the data are protected against unfair commercial use."[696] For example, pharmaceutical products disclose a step-by-step process of reproducing the medicine. Therefore, green technologies like those in the renewable energy sector are often off-patent and improvements are in the form of trade secrets. The speed at which technology increases in the solar industry would render the filing of new patents useless and as such the more pragmatic option of containing enhancements in the form of trade secrets is adopted. In addition, the technical know-how that is required to assemble some green technologies like solar panels may not be within the public domain. These processes are often protected by trade-secrets. The issue of whether there should be a time limit on those secrets in a similar manner as patents, raises concerns about fair commercial practices. Some scholars have argued that this non-disclosure curtails innovation and

[696] *TRIPS*, *supra* note 592, art 39.

technological diffusion.[697] Since many environmental technology patents are enhancements on existing technology and know-how, the reduced research and development investment may not justify a new patent for a 20-year term. Thus, while the off-patent product can be copied, in the case with solar PV panels, enhancements often render the old product economically inefficient to utilize. The competition from other producers that can generate the energy at a cheaper cost by using superior panels will push any user of an off-patent panel out of the market. In addition, purchasing solar panels or operating a photovoltaic solar plant does not require the disclosure of trade secrets to the purchaser/operator because panels are often manufactured abroad and shipped to the receiving country. As such, the enhancement on this technology can be protected by a trade secret in perpetuity.

A problem arises in the area of transferring green technology as designed by international treaties because companies need to be financially compensated for licensing those technologies. When fossil fuels represent a cheaper alternative to green technologies, developing countries require an incentive to choose the costlier, environmentally friendly choice. Patents on the renewable energy sector are less important to the rights holder as are trade secrets. This is because many technologies in the renewable energy sector, and specifically photovoltaic solar panels, are off-patent and have expired. The value of these technologies is often found in the improvements,[698] which require a license to access. Another problem with viewing relaxed patent requirements as a solution to green technology transfer is that many developing countries do not have the finances or the manufacturing capacity to take advantage of the technology. With

[697] John H Barton & Keith E Maskus, "Economic Perspectives on a Multilateral Agreement on Open Access to Basic Science and Technology", in Simon J Evenett & Bernard M Hoekman, eds, *Economic Development & Multilateral Trade Cooperation* (Washington, DC: World Bank and Palgrave MacMillian, 2006); Michael Heller, *The Gridlock Economy: How Too Much Ownership Wrecks Market, Stops Innovation, and Cost Lives* (New York: Basic Books, 2008); D S Levine "Secrecy & Unaccountability: Trade Secrets in Our Public Infrastructure" (2006) 59 Fla L Rev 135.

[698] Michael Hasper, "Green Technology in Developing Countries: Creating Accessibility Through a Global Exchange Forum" (2009) 7:1 Duke L & Tech Rev; John H Barton, "Patenting and Access to Clean Energy Technologies in Developing Countries", *WIPO Mag*azine, February 2008, online: <wipo.int/wipo_magazine/en/2008/01/article_0003.html>

reference to the solar energy industry, the construction of photovoltaic solar plants requires capital infusion of tens of millions of dollars, and collaboration with foreign companies and financiers.

In light of the public good argument, questions are raised about whether there should be reasonable limits to such protection.[699] The outcome is that the technological know-how as contained in trade secrets are intangible and controlled by the bearer of that particular secret. Even if that trade secret were disclosed, it would be of no assistance to a country that did not have the financial means to acquire, produce or assemble products like solar panels. In Levine and Bolderin's "Against Intellectual Monopoly", they argue that Article 7 of *TRIPS* states that patents and limited monopolies are an ineffective method of promoting innovation.[700] Trade secrets can also limit the freedom to use green patents that are in the public domain,[701] because of the ability to maintain intellectual property protection over enhancements and know-how that are a necessary precondition to properly utilizing these products. Thus, the theoretical models that tout strong intellectual property laws like trade secrets as a perquisite to foreign direct investment infusion are simply inapplicable to many developing countries. The inapplicability arises because many developing nations do not have the requisite local capacity to mimic the technology without knowledge transfer assistance. Essentially, the scenario that arose from the US-Chinese case law on misappropriation may not be present in sub-Saharan Africa, and specifically in relation to renewable energy projects. Hence, the extension of trade secrets in perpetuity serves merely to increase the costs of production for southern nations that may already be discouraged from utilizing costly green technologies.

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[699] R Bone, "A New Look at Trade Secret Law: Doctrine in Search of Justification" (1998) 86:2 Cal L Rev 241; Elizabeth A Rowe, "Striking a Balance, When Should Trade-Secret Law Shield Disclosures to Government?" (2011) 96 Iowa L Rev 791.

[700] Michele Boldrin & David K Levine, *Against Intellectual Monopoly*, 1st ed (New York: Cambridge University Press, 2008); see also Claude Henry & Joseph E Stiglitz, "Intellectual Property, Dissemination of Innovation and Sustainable Development" (2010) 1:3 Global Policy 237.

[701] Paul J Heald, "Mowing the Playing Field: Addressing Information Distortion and Asymmetry in the TRIPS Game" (2002) Vanderbilt University Law School Law & Economic Working Paper No 02-21; Surinder K Verma, "Protection of Trade Secrets Under the TRIPS Agreement, and Developing Countries" (1998) 1:5 J World Intellectual Property 723.

A number of provisions in the *Paris Agreement* address the hardship that developing nations may experience in meeting their commitments, and consequently have built in financial and technological mechanisms into the Agreement to address this concern. The xix main provisions in the *Paris Agreement* directly address hardship concerns faced by developing nations: a mechanism to contribute to the mitigation of greenhouse gas emissions and support sustainable development" (Article 6), a finance mechanism (Article 9), a technology transfer mechanism (Article 10), a capacity building mechanism (Article 11), an education and knowledge transfer provision (Article 12), and an enhanced transparency provision (Article 13). The new requirement in the *Paris Agreement* that developing countries report the "financial, technology transfer and capacity-building support needed and received under Article 9, 10, and 11" of the *Agreement*, could also bring to light the impact that trade secrets have on green technology transfer. This non-obligatory requirement creates a platform for developing countries to open the discussion on areas of intellectual property (such as no fixed terms for trade secrets) that are negatively impacting on technology transfer.

A. Evergreening through Patent Thickets and Licensing Refusals

Arguably, the absence of a fixed statutory period for trade secrets could encourage perpetual secrets if a product is improved through an enhancement and a license may be required to obtain that improved knowledge. It is clear that aside from intellectual property constraints, obtaining various licenses and finances to build renewable energy plants will require foreign capital. The cost of patenting a simple product may be prohibitive when one considers the filing fees in local and multiple jurisdictions along with the prospect of litigation. Practices such as "patent thickets" are arguably used to compel inventors to apply for multiple licenses in order to obtain a single invention, with the outcome of thwarting development.[702] In 1993 the Korean government alleged that companies that

[702] Carl Shapiro, "Navigating the patent thicket: Cross licenses, patent pools, and standard setting" in *Innovation Policy*

held green patents refused to grant a license for use of the technology. The withholding of licenses has been identified by the IPCC as occurring in "cases where the private firms and even public institutions of industrialized countries refused to license such green technologies like HFC-134a, fuel cell and IGCC (Integrated Gasification Combined Cycle)".[703] The IPCC found the following:

> Firms may choose to withhold technological information from particular countries for competitive reasons, a strategy that is facilitated by globalized IPRs. The spectre of anticompetitive deployment of patents and patent pools in order to discourage local firms from learning technologies through imitation and reverse engineering surely looms large in the context of weak competition enforcement in most developing economies.[704]

In the Korean case, the country and economy were inundated with non-ozone depleting technologies dumped in the country by a foreign company that filed 40 patents. This practice occurred at the time when Korea, which was refused a license on HFC technology, decided to develop its own local capacity in the area. The filing of multiple patents on the technology was interpreted as an attempt to stifle Korean growth in the technology by increasing the cost of development. The effect of such broad property rights on development has been found to stagnate innovation because of the costly nature of obtaining a licence from the patent holder.[705]

The lack of a fixed statutory period for trade secrets may also have impacted on patent thickets, or withholding license or enhancements via trade secrets, which has been commonly associated with the refusal to license technology. India also raised concerns about evergreening and the application of the Montreal Protocol. Indian firms claimed that they were because they were deemed to be a

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and the Economy, Vol 1 (Cambridge, MA: MIT Press, 2001) 119.

[703] Intergovernmental Panel on Climate Change, IPCC Working Group III*, Summary for Policy Makers: Methodological and Technological Issues in Technology Transfer* in *Technology Transfer* (2000) at s 3.5.2, online: <ipcc.ch/ipccreports/sres/tectran/index.php?idp=47>.

[704] Keith E Maskus, Kamal Saggi & Thitima Puttitanun, "Patent Rights and International Technology Transfer through Direct Investment and Licensing" in Keith E Maskus & Jerome H Reichman, eds, *International Public Goods and the Transfer of Technology under a Globalized Intellectual Property Regime* (Cambridge University Press, 2005) 265.

[705] Carlos A Primo Braga, Carsten Fink & Claudia Paz Sepulveda, "Intellectual Property Rights and Economic Development" in Keith E Maskus, ed, *The WTO, Intellectual Property Rights and the Knowledge Economy* (Cheltenham, UK: Edward Elgar, 2004) 245; See also Hutchinson, *supra* note 588, n 42.

"potential competitor", companies possession substitutes to ozone depleting technologies refused to license the product to Indian companies.[706] India further alleged that these technologies were necessary to meet environmental targets under the Kyoto Protocol, and that the refusal to grant a license is a demonstration of corporate monopoly over the industry. The fact that a small group of technology companies hold these patents leads to the conclusion that these companies may be "operating as a cartel to control production."[707]

Technology transfer in the energy sector is largely connected with the effective licensing of the technology. In light of concerns that expired patents could still not be utilized in the renewable energy sector due to the inability to secure licenses for technology, a joint United Nation Energy Programme, European Patent Office and International Centre for Trade and Sustainable Development's study was commissioned to examine licensing practices in the clean energy sector. The global licensing survey concluded that intellectual property protection in the host country was an important factor in entering a license agreement. The respondents also cited other local infrastructural factors as also affecting the decision to enter into a licensing agreement.[708]

Evergreening has also taken the form of patenting many small steps in an invention, or separately patenting compounds and technological processes that make it difficult for small inventions to file a patent without paying licensing fees. This practice increases the cost of filing a patent to include fees payable to the owners that already have a patent on the process or product. For example, multiple

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[706] Jayashree Watal, "Case Study 3: India – The Issue of Technology Transfer in the Context of the Montreal Protocol" in Veena Jha & Ulrich Hoffman, eds, *Achieving Objectives of Multilateral Environmental Agreements: A Package of Trade Measures and Positive Measures* (United Nations Conference on Trade and Development UNCTAD/ITCD/TED/6) 45–55, at 49; Jayashree Watal, *Intellectual Property Rights in the WTO and Developing Countries* (The Hague: Kluwer Law International, 2001).

[707] *Ibid*.

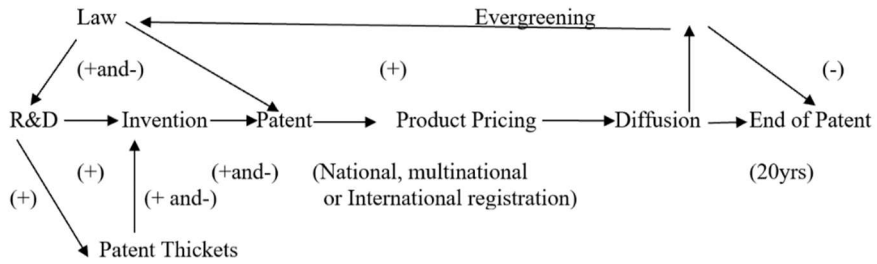
[708] United Nations Environment Program (UNEP), European Patent Office (EPO) & International Centre for Trade and Sustainable Development (ICTSD), *Patents and clean energy: bridging the gap between evidence and policy: Final Report* (2010), online at: <ictsd.org/sites/default/files/research/Patents%20and%20clean%20energy%20bridging%20the%20gap%20between%20evidence%20and%20policy_0.pdf> [UNEP et al, *Patents*].

patents can be obtained as a form of a "picket fence", which involves obtaining a series of patents around a single product or drug that makes it difficult to produce the product without paying royalties for the various patents. The result is that the need to obtain multiple patents may block the innovator from using the patent.

The practice of "picket fencing" also occurs when firms take out patents that may not be used immediately, but can guarantee a strategic edge in the future by forcing the user to obtain multiple licenses, thereby increasing the cost of production. The practice of "patent thickets" is said to thwart innovation by creating multiple patents within a patent, thereby increasing the cost of copying the invention by requiring that numerous patent rights are acquired to reproduce one invention. This means that a person wishing to utilize the patent may have to pay multiple licensing fees for the various patents required to reproduce the product.

These practices increase the cost of invention which may pose a hindrance to cost sensitive developing nations. Figure 1 captures from different perspectives the practice of evergreening, which forces users to obtain licenses:

Figure 1: Corporate Evergreening Patent Strategy



A strategy aimed at protecting tangible assets like patents may utilize the life extension approach which would extend the patent beyond the stipulated expiry period. In addition, protecting intangible assets like "know-how" is most often achieved through trade secrets. Many trade secrets are revealed under confidentiality or licensing agreements. Disclosure in this manner does not extinguish the

rights to the trade secret. The problem arises with the withholding of a license containing a trade secret, or an outright refusal to grant such licenses. These evergreening practices have been referred to as patent thickets or patent fencing and these activities apply equally to patents as well as trade secrets.

The World Intellectual Property Organization ("WIPO") has summarized the costliness of patent thickets affecting intellectual property rights as follows:

> …patent thickets – may forego research activity… whereby patent rights are distributed over a fragmented base of IP holders, and those who wish to introduce products using such technologies face the high cost of negotiating with multiple parties. If each technology is essential, a negotiation failure with any of the IP holders is equivalent to a failure with all. New products are blocked, all IP holders lose an opportunity to commercialize and society misses out on new technology. Even in the case where an enterprising entrepreneur could strike a deal with each separate IP right holder, he or she is likely to overpay if the number of IP holders that could claim infringement is sufficiently large.[709]

Thus, patent thickets represent an indirect form of evergreening by making innovation financially impractical because of the requirement to obtain multiple licenses from multiple rights holders.[710] In addition, some scholars have claimed that weak patent laws that permit "multiple and overlapping" patents also contribute to the patent thicket problem. Maskus and Okediji argue the following:

> [P]atent thickets substantially heighten transaction costs associated with licensing and extract additional rents from would-be licensees in the event that one patent owner chooses to hold out. Further, fragmentation of patent ownership increases the costs of the patent system from public users. Another problem is that patent documents may not require sufficient disclosure to be useful as sources of cutting-edge technical information for less sophisticated users, including firms in DCs and LDCs.[711]

Thus, according to Maskus and Okediji the requirement that a user obtain multiple licenses may act as an impediment to innovation. Moreover, if one patent holder refuses to grant a license this

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[709] WIPO, *Trade Secret*?, *supra* note 644.
[710] UK Intellectual Property Office (UKIPO), "Patent Thickets: An Overview" *(*2011), online: <ipo.gov.uk/informatic-thickets.pdf>.
[711] ICTSD, Keith E Maskus & Ruth L Okediji, *Intellectual Property Rights and International Technology Transfer to Address Climate Change: Risks, Opportunities and Policy Options* (2010), Issue Paper No 32 at 16.

could prevent use of the patent. In this regard, the financial burdens imposed by patent thickets represent a form of evergreening.

The advantage of the patent thickets to the patent holder does not end with the expiry of the patent. In fact, this practice may be extended through trade secrets. Many PV panels are constructed and assembled through trade secrets and there is no guarantee that technical know-how will be transferred to the public once the patent has expired. Technical know-how is an essential ingredient in transferring green technology. The costs associated with such transfers are expected to be borne by the recipient of the technology. Trade secret coverage can broadly apply to a number of business practices and strategies, including technical, financial, or even strategic information that are proprietary and are of a secretive nature, including formulae, processes,[712] pattern, compilation, program, device, method, technique, or process.[713] It is well accepted that trade secret law has also been extended to protect "know-how" which is defined as follows:

> [K]now-how is defined as a body of unpatented technology useful in making a product to be sold commercially. It includes a complete body of manufacturing information needed by an industrial organization to satisfy design, develop, fabricate or produce goods.[714]

The issue of development and the transfer of technology in green energy projects is largely concerned with the "know how" aspect of trade secrets, and as such, the analysis herein will largely focus on trade secret "know how".

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[712] See *C&F Packing Co v IBP Inc et al*, 224 F (3d) 1296 (Fed Cir 2000), wherein C&F sued IBP and Pizza Hut for misappropriation of trade secrets under the Illinois Trade Secrets Act. It was alleged that a process for enhanced packaging and freezing of precooked meats and pizza toppings was misappropriated from C&F. The court found a misappropriation of trade secrets.

[713] See also D W Quinto & S H Singer, *Trade Secret: Law and Practice,* 2nd ed (Oxford University Press, 2012), wherein it is described that trade secrets have been extended to include formulae, contracts, consumer lists, know-how, contractual terms, software and even business plans.

[714] L M Rosenbluth, The Trade Secret Quagmire in Pennsylvania: A Mandate for Statutory Clarification" (1981) 86 Duken L Rev 137 at 150; see also D L Worthing, "Know-How Misuse: A Potential Weapon for Licensees" (1971) 53 J Pat Off Soc'y 177.

Trade secrets can be used to protect information that enhances expired patents.[715] While contracts involving technology transfer usually require a license for patents, the trade secret aspect may be protected by having the company import its employees to the domestic project destination. In that vein, the company can maintain its trade secrets by transporting their employees to work on foreign projects, rather than reveal the proprietary information or "know-how." In energy projects, patent licenses alone may not be sufficient to commence the project and the "know-how" which is protected by trade secrets may be of more value since, in many cases, the patents on solar panels have expired and are readily accessible in the public domain.[716]

The fact that many climate change technologies are subject to multiple patents and processes makes the cost of accessing them quite prohibitive.[717] Unlike other forms of patenting products such as those in the pharmaceutical sector, it has been argued that no singular technology "will be necessary or sufficient on its own to solve climate change."[718] It is indisputable that once a patent expires(usually after the 20-year exclusivity period), the utility of the patent must be opened to the public for social benefit. However, where the patent is improved on by an enhancement through trade secrets, this may indirectly extend the life of the patent in perpetuity. Consequently, trade secrets represent a more onerous form of intellectual property than patents as the latter has time limits on the monopoly period. The consequences of an intellectual property mechanism that has no time limits can have a severe impact on technology transfer which will directly affect how the developing world addresses costly issues like climate change abatement.

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[715] K F Jorda (2007), "Trade Secrets and Trade-Secret Licensing" in Anatole Krattiger et al, eds, *Intellectual Property Management in Health and Agricultural Innovation: A Handbook of Best Practices, (*Oxford, UK: MIHR), online: <ipHandbook.org>.

[716] Melvin F Jager, *Trade Secrets Law* (St. Paul, Minnesota: Thomson/West, 2002).

[717] Matthew Littleton, "The TRIPS Agreement and Transfer of Climate-Change-Related Technologies to Developing Countries" (2008) DESA Working Paper No 71, online: <un.org/esa/desa/papers/2008/wp71_2008.pdf>.

[718] Sidney A Rosenzweig, "Inside Views: PFF on Cooling the World By Misappropriating Patent Rights", *Intellectual Property Watch* (1 April 2009), online: <ip-watch.org/weblog/2009/04/01/cooling-the-world-by-misappropriating-patent-rights/>.

The concerns raised by developing and least-developed Member States in the *TRIPS* Council meetings on technology transfer and climate change abatement highlight the need to set tangible targets for technology transfer especially in the area of green technology. In addition, cases like the Korean and Indian licensing cases demonstrate the power of trade secrets and impact that withholding licenses can have on development. It further highlights the fact that there are a number of commercial strategies that can be adopted beyond patents that can extend the life cycle of product and processes. The tolerance for these strategies may wane given the impact that these practices may have on the ability of nations to meet climate change objectives. New mechanisms need to be developed that will address some of the problems posed by the application of trade secrets and patent thickets to green technology transfer. With the lag in technology being a reality in many developing countries, the developing world's ability to technologically catch-up and compete in the world of inventions and innovations is severely hindered. Arguably, the practice of evergreening exacerbates already existing problems by further thwarting innovation, with the most profound effect being on the developing world. This is because the patent rules are so technical, that large companies may hide behind the technical complexities of energy production and products. Innovation then becomes directly associated with the level of technological advancement and the ability of companies in the developing world to imitate existing inventions. Where such inventions are only accessible through costly patents or licensing fees, this poses a financial burden for developing countries that can only be remedied through some aspect of foreign investments. Without external investments, innovation remains curtailed and reduced to "technical evergreening".

B. The Impact of Evergreening on Green Technology Transfer to Developing Countries

This practice of evergreening concentrates patents and compounds in the hands of fewer owner corporations and brings to light concerns arising from the "anti-commons". A theoretical framework

for assessing the impact of overuse, or underuse, was initially contemplated in 1968, when Garrett Hardin adopted a metaphor of overuse and the overexploitation of common pastures by cattle leading to a "tragedy of the commons".[719] Hardin postulated that unfettered use of the commons would eventually lead to overuse and ruins:

> Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.[720]

Some thirty years later, Michael Heller and Rebecca Eisenberg modified the "tragedy of the commons" theory by focusing on the opposite consequence that could arise from too many people being given the "rights to exclude others".[721] Heller and Eisenberg explain the distinction between the tragedy that arises from "commons" and "anti-commons":

> Anticommons property can best be understood as the mirror image of commons property. A resource is prone to overuse in a tragedy of the commons when too many owners each have a privilege to use a given resource and no one has a right to exclude another.[722]

By contrast, a resource is prone to underuse in a:

> [t]ragedy of the anticommons: when multiple owners each have a right to exclude others from a scarce resource and no one has an effective privilege to use. […] Once an anticommons emerges, collecting rights into usable private property is often brutal and slow.[723]

The anti-commons is the reverse situation where a small number of users have the rights to exclude others from resources. This results in a situation of underuse. In the intellectual property context, this is similar to a patent thicket, in that multiple exclusive rights can be used to impose very high taxes on a person who wishes to use a product. This tends to discourage use of products. The theoretical principle underlying evergreening recognizes that when the exclusivity period is extended beyond the 20-year patent protection period, society's ability to benefit from the invention is

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[719] Garrett Hardin, "The Tragedy of the Commons" (1968) 162 Science 1243.
[720] *Ibid.*
[721] Michael A Heller and Rebecca S Eisenberg, "Can Patents Deter Innovation? The Anticommons in Biomedical Research" (1998) 280 Science 698.
[722] *Ibid.*
[723] *Ibid.*

diminished. This results in knowledge and innovative capacities being concentrated in the hands of fewer inventors. This extension of monopoly period for intellectual property may actually thwart innovation by blocking entry into the common market. The impact of these evergreening practices on the market is well known and documented in the patent sector as it relates to the pharmaceutical industry. However, these same practices are also adopted in other intellectual property sectors like trade secrets and other industries including renewable energy products.

Rebecca Eisenberg also highlights the problem of evergreening as it relates to "new uses", especially within the pharmaceutical sector. She argues that inventing products or identifying new compounds is easy, but the difficulty lies in the efficacy of the product.[724] The process of ascertaining the safety of the product may involve "secrets" that may not be divulged even after the product hits the market. She argues that trade secrets have an unfair advantage in almost circumventing the regulatory process. Eisenberg highlights the impact of trade secrets in the pharmaceutical sector and notes that:

> Trade secrecy mitigates this risk by allowing firms to suppress data from clinical trials, withholding its value not only from competitors but also from consumers who might otherwise demand less of the product. But trade secrecy greatly compromises the social value of the information as a resource for improving public health and for promoting further R&D. It also exposes drug companies and regulators to charges of bad faith and incompetence, compromising the signaling function of regulatory approval as a maker of safety and efficacy.[725]

The compromised social value raised by Eisenberg is not confined solely to the pharmaceutical sector, but would encompass other public goods such as the environment. In addition, the exercise of trade secrets have been found to sometimes have a very detrimental impact on society and the public good.[726] Eisenberg's recognition of trade secrets and the harm that may emerge from the

[724] Rebecca S Eisenberg "The Problem of New Uses" (2005) 5 Yale J Health Pol'y L & Ethics 717.
[725] *Ibid* at 720.
[726] *Ibid* at 736. See the argument relating to revealing trade secret data on clinical studies to patients. It has been argued that drug companies only reveal what they want to about the clinic trials.

suppression of data from clinical trials raises an important question about the impact of this form of intellectual property on technological innovation and development.

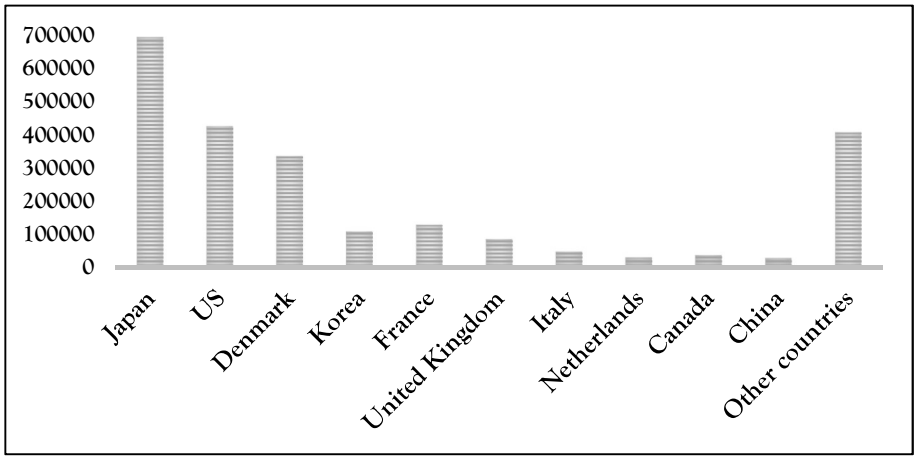
The impact of expired patents and trade secrets on competition was addressed by W N Price II, in the article "Expired Patents, Trade Secrets, and Stymied Competition".[727] Price acknowledges that patents and trade secrets are often used in a complementary manner whereby the latter is adopted as an enhancement for the patent or where the patentee claims "a broad group of inventions, but keep secret the precise member of that group she has determined will work best and me most commercially successful."[728] While the best mode requirement is referenced in the paper, Price acknowledges that it can be circumvented by updating the patent after filing (and perhaps not filing) the update as an enhancement but maintaining it as a trade secret. Price notes that the best mode requirement "has many limitations" primarily because a "licensee or assignee" do not need to be disclosed.[729] The ability to update a patent after filing via a trade secret and to keep that enhancement a secret is at the heart of the debate on evergreening and trade secrets. The practice of evergreening a patent goes beyond mere extension of the patent life through new product filings, but also includes more covert practices such as patent thickets and license refusals.

Evergreening has traditionally been viewed from the perspective of pharmaceutical companies extending the life of a drug through various practices. Little attention has been paid to other areas like climate change and also other forms of intellectual property beyond patents like trade secrets. The issue of evergreening is particularly relevant to the application of international treaties that contemplate the ability of developing countries to grow their economies by transferring technologies to these areas. If this objective is thwarted by a technicality that permits enhancements on green

[727] W Nicholson Price II, "Expired Patents, Trade Secrets, and Stymied Competition" (2017) 92:4 NDLR 1611, online: <scholarship.law.nd.edu/cgi/viewcontent.cgi?article=4713&context=ndlr>.
[728] *Ibid* at 9.
[729] *Ibid*.

technologies to be protected beyond the tradition 20-year period, this may have grave effects on the ability of developing nations to meet their climate change abatement goals. The global problem of climate change is being addressed by setting universal abatement targets. The 2014 Intergovernmental Panel on Climate Change ("IPCC") report set the goal of keeping climate change within a 2% of pre-industrial levels.[730] Achieving this goal will require a migration away from high polluting fossil fuels to clean solutions like solar energy. The technological solutions that would assist developing countries in making clean choices are largely concentrated in the hands of companies and governments within industrialized nations. The International Centre for Trade and Sustainable Development reported a total of 2, 310, 472 clean patents by 2007.[731] Figure 2 highlights this global disparity in worldwide clean energy patents.[732]

Figure 2: Top 10 Clean Patent-Holding Countries Compared to Others[733]

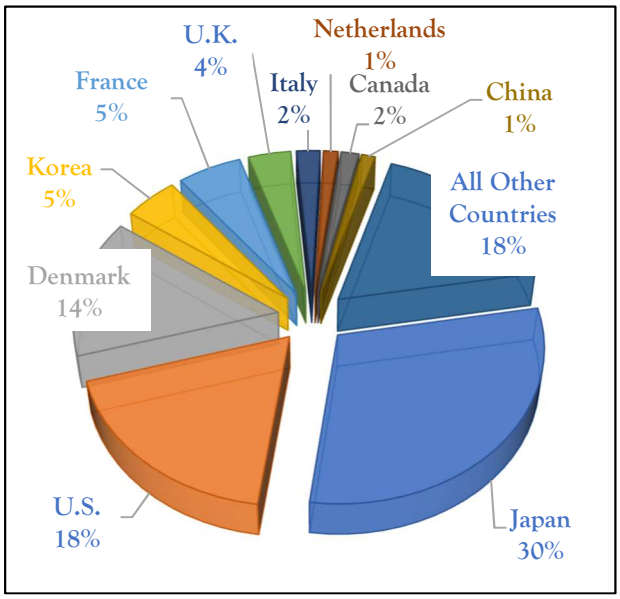


The disparity of proprietary interests over green patents is starkly contrasted in the following figure – *Figure 3* – which highlights that, of the 2,310,472 clean patents, 1,905,154 (or 82%) were

[730] Intergovernmental Panel on Climate Change, IPCC Working Group III, *Climate Change 2014: Mitigation of Climate Change* (New York: Cambridge University Press, 2014), online: <ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_full.pdf>.
[731] UNEP *et al*, *Patents, supra* note 708 (the categories of clean patents that were reported are in the area of solar PV, solar thermal, geothermal, hydro-marine, biofuels, carbon capture, IGCC, selected CETs, and fossil and nuclear energy).
[732] *Ibid.*
[733] *Ibid.*

concentrated in the hands of ten countries, while the rest of the world owned 405,318 (or 17.5%) of those patents. The following figure captures the disproportionate concentration of patents across the globe.[734]

Figure 3: Clean Patents by Countries



The problem of climate change abatement and technology transfer is complicated by the fact that the patents and intellectual property that facilitates green energy alternatives are primarily concentrated in the hands of industrialized nations. Consequently, developing nations that wish to utilize green technologies may encounter financial obstacles associated with purchasing the licenses and patents.

Patent statistics clearly demonstrate the dominance of certain developed countries in holding patents on specific technologies. According to the WIPO World Patent Report, the number of patents filed on environmental technologies have increased over the past 30 years.[735] The number of patents

[734] *Ibid.*
[735] WIPO, *World Intellectual Property Report: The Changing Face of Innovation* (2011), online: <wipo.int/edocs/pubdocs/en/intproperty/944/wipo_pub_944_2011.pdf> at 120.

filed on clean technology is predicted to increase in the future.[736] With specific reference to solar technology, it is anticipated that this form of renewable energy will increase by 35 per cent by 2020.[737] Figure 4 captures this increase in green patents.

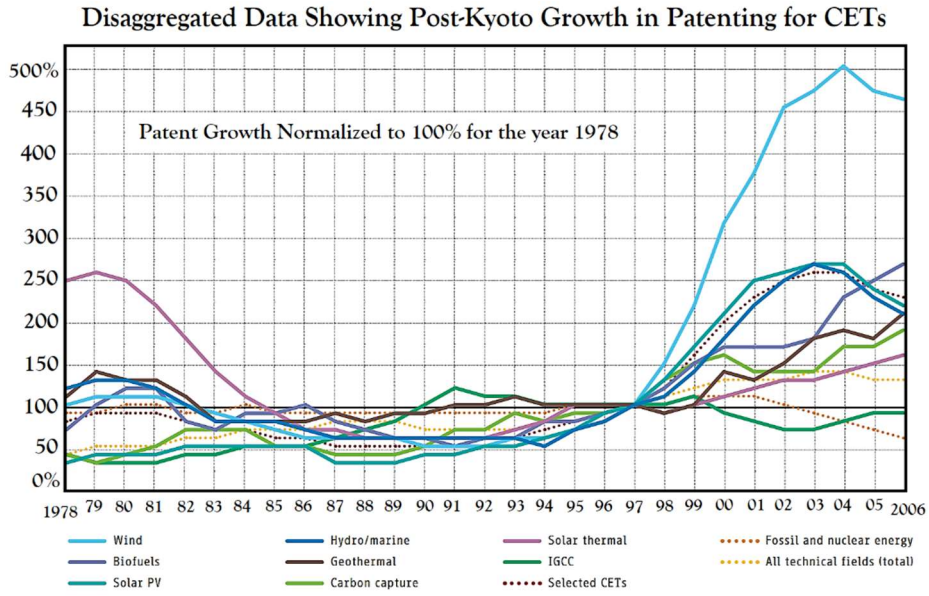


Figure 4[738] also shows the drastic increase in patents among OECD nations over the past 28 years. A collaborative study encompassing various green technologies including solar PV, wind, geothermal, fossil and nuclear identified 2310472 patents worldwide.[739] Of these worldwide patents, 2,071 are related to solar PV technologies from industrial nations like Japan, United States, Denmark, United Kingdom and France.[740] The aforementioned countries own 96% of these patents.[741] The proliferation of green energy technologies and for a perpetual monopoly through trade secrets over them, may have tremendous cost effects on the developing world.

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[736] Todd R Miller et al, "Patent Trends in the Cleantech Industry" (2008) 20:7 IP & Tech LJ.
[737] Peter Lorenz et al, "The Economics of Solar Power" (2008) *The McKinsey Quarterly*, online: <sites.middlebury.edu/ec465/files/2011/02/Economics-of-solar-power.pdf>.
[738] UNEP *et al*, *Patents*, *supra* note 708 at 77.
[739] *Ibid* at 77.
[740] See generally UNEP et al, *Patents, supra* note 708.
[741] *Ibid.*

C. TRADE SECRETS IN PERPETUITY ON ENHANCEMENTS AND KNOW-HOW

The connection between access to this knowledge and economic development cannot be understated and has been identified as one of the most important aspects of economic growth.[742] Endogenous growth models acknowledge that companies continue to monopolize information that are in the public domain by keeping secret critical information that could further innovation of the expired product or process that is no longer protected by a patent.[743] Scholars like Mark Lemley see the competitive advantage that is gained from trade secrets as an incentive for firms to invest in developing trade secrets over other forms of intellectual property.[744] In this regard, trade secrets may displace patents as a desired form of intellectual property, especially in the early stages of development[745] or inventions that occur after the expiry of the patent.[746] Cost factors may also influence the gravitation towards trade secrets over patents.[747] The role that trade secrets play in the international diffusion of technology would differ depending on the development stage of the recipient country and also the nature of the technology that is subject to the trade secret. It has been postulated that firms' foreign direct investments may be tied to the strength of trade secret protection in a country.[748] It has been argued that firms may be more likely "to invest or trade in a country that protects trade secrets, particularly where that investment requires the business to reveal or develop trade secrets."[749] However, this analysis may only hold true in cases where the recipient country has

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[742] Paul Romer, "The Origins of Endogenous Growth" (1994) 8:1 *J Econ Perspectives* 3 at 18.
[743] *Ibid*.
[744] Lemley (2008), *supra* note 644.
[745] Ipl Png, "Law and Innovation: Evidence from State Trade Secrets Laws" (2017) 99:1 Rev Econ and Statistics 167.
[746] David D Friedman, William M Landes & Richard A Posner, "Some Economics of Trade Secret Law" (1991) 5:1 J Econ Perspectives 61, online: <aeaweb.org/articles?id=10.1257/jep.5.1.61> [Friedman et al].
[747] A Arundel, "The Relative Effectiveness of Patents and Secrecy for Appropriation" (2001) 30 Research Policy 611; W Cohen, R Nelson & J Walsh, "Protecting their Intellectual Assets: Appropriability Conditions and Why US Manufacturing Firms Patent (Or Not)" (2000) NBER Working Paper No W7552, online: <nber.org/papers/w7552.pdf>.
[748] W G Park & D Lippoldt, "Technology Transfer and the Economic Implications of the Strengthening of Intellectual Property Rights in Developing Countries" (2008) OECD Trade Policy Working Paper No 62, online: <sourceoecd.org/10.1787/244764462745>.
[749] D Lippoldt & M F Schultz, "Uncovering Trade Secrets – An Empirical Assessment of Economic Implications of

the local capacity to mimic the technology and convert the misappropriated technology into a commercial opportunity. This scenario has taken place in a number of disputes between US and Chinese companies, but this reality may not unfold where the foreign company retains the secret by transplanting its own employees to the overseas development which is often the case in green energy projects in sub-Saharan Africa.

In the area of solar panels and other green energy products, the patents are often expired, and the knowledge associated with enhancing these products is protected by trade secrets. This protection limits the new creation of second generation products,[750] and most importantly, inhibits the ability to transfer knowledge in ways that would encourage growth and development in underdeveloped regions. The issue becomes whether the social value of primary inventions and the infinite protection of these undisclosed enhancements through trade secrets, has more social value than secondary inventions.[751]

Evergreening adopts multiple forms of life-extension strategies. Within the green technology sector, evergreening is practiced by maintaining technological knowledge via trade secrets, thereby creating an "anti-commons" effect. This non-disclosure is said to curtail innovation and technological diffusion.[752] The result is that the cheaper product (in this case solar panels) becomes inferior and falls into disuse because of the higher costs associated with using an inefficient product. Access to the superior product can only be gained through acquiring a license to use the enhancement. The fact that this enhancement is often protected through trade secrets means that developing countries may

Protection for Undisclosed Data" (2014) OECD Trade Policy Paper No 167 at 9.

[750] Brett M Frischmann & Mark A Lemley, "Spillovers" (2007) 107:1 Colum L Rev 257; Suzanne Scotchmer, "Standing on the Shoulders of Giants: Cumulative Research and the Patent Law" (1991) 5:1 J Econ Perspectives 29 at 32, online: <aeaweb.org/articles?id=10.1257/jep.5.1.29> [Scotchmer].

[751] Scotchmer, *ibid* (wherein she argues that the social value of secondary inventions is greater than its primary counterpart; this practice of extending the term of an intellectual property has been adopted in the high tech industry which sees a trade secret as a stronger form of protection because of the non-disclosure and the ability to keep the technology secret in perpetuity); see Friedman et al*, supra* note 746 at 62–64.

[752] Barton & Maskus *supra* note 697*;* see generally Heller*, supra* note 697.

never have access to the know-how contained in the technology. Moreover, the cost of acquiring licenses may render this aspect of technology transfer unattainable on the African continent if all means of financing are not contemplated from the outset. The reality is that despite the concentration of technology in the hands of the procurer of the trade secret, the inability to finance renewable energy projects is probably a more profound barrier on the African continent than any form of intellectual property protection.

IV. CONCLUSION

The implications of trade secrets on international law, as related to climate change, is intrinsically tied to a legislative and judicial climate that recognizes the rights of trade secret holders to maintain their intellectual property in perpetuity or at least beyond the traditional 20-year period. This paper has explored both the statutory expiry periods of trade secrets along with its treatment under Canadian and U.S. common law. It found that absent reverse engineering, disclosure by a patent holder or through either criminal or civil misappropriation, trade secrets have the potential of having perpetual intellectual property protection. This practice is contrary to the principle of granting limited fixed term monopoly rights in exchange for disclosure. The absence of a statutory fixed term for trade secrets enables the practice of evergreening as a legitimate business practice. The impact on developing nations is that the ability to utilize green technology to aid development may be hindered by practices like undisclosed product enhancements, patent thickets or licensing withholding practices that are based on trade secrets. If this is not the direct goal of trade secret law, then further scholarly work needs to be devoted to understanding the current state of trade secret law and its impact on the social, economic and legal implications affecting a nation's ability to meet its environmental and climate change abatement objectives. It is clear that the developing world, and in particular sub-Saharan African countries, are engaging in development projects in the green energy

sector that could lead to economic growth in green industries through knowledge transfers and technology diffusion. This calls for a greater analysis of the role of trade secrets, in fostering or impeding economic growth in green energy and other environmental/climate change abatement projects and strategies. A debate needs to occur regarding how confidential commercial information is going to be balanced against global climate change abatement objectives, and primarily whether a fixed monopoly period needs to be created for trade secrets, especially those containing public utility features of climate change abatement.

The issue of trade secrets and climate change must balance the dual societal need of encouraging innovations through limited intellectual property protections with the public good of accessing needed technologies designed to solve environmental problems. The practice of evergreening is contradictory to the international agreements ratified by WTO Members in that the practice results in the circumvention of the technology transfer obligations as outlined in agreements like *TRIPS*. While *TRIPS* does set minimum intellectual property standards for nations to uphold, it does not enforce the non-compliance of directives, such as those of technology transfer. Article 39.2 of *TRIPS* recognizes the rights to intellectual property protection in the form of trade secrets but sets no limits or conditions on the duration of that protection and exceptions or flexibilities that may be adopted in addressing global issues such as climate change abatement.

While evergreening is arguably anti-competitive, the study of this practice has not extended far beyond the pharmaceutical sector. The debate that emerged around evergreening often addressed equitable issues such as the impact of this practice on the affordability of life-saving medicines in the developing world. The subject of evergreening rarely considers issues of global concern like the environment. In addition, throughout the practice of evergreening, the scholarly focus dedicated to the practice of evergreening has not adequately considered other intellectual property areas like trade

secrets, especially within the framework of climate change. Specifically, consideration of the practice of not having fixed intellectual property terms for trade secrets have been minimally considered within scholarly debate. Instead, the focus on trade secret infringement or loss of protection primarily addresses issues of reverse engineering, employee disclosure and voluntary disclosure through patents. The concept that trade secrets can extend even beyond a 20-year period that is prescribed for other forms of intellectual property has received very little scholarly attention. This omission has led to the consequence of having an intellectual property category (trade secret) that fails to limit the exclusivity period, thereby neglecting the public social benefit of inventions or innovation. This shortcoming may render technological transfer-provisions in an international treaty, like *TRIPS,* completely inoperable, and may also impact the ability of developing nations to utilize green technology in their developmental paths.

While technology transfer as well as the economic, technical and industrial barriers to the technology transfer has been raised in international trade discussions on numerous occasions, the discussion has often focussed on the impediments that *TRIPS* poses from a patent perspective. Consequently, solutions and discussions have centred on the compulsory licensing of green technologies.[753] Little focus has been given to potentially anti-competitive practices like evergreening as it relates to trade secrets. Virtually absent from the debate are discussions of practices like trade secrets on the dissemination of green technology to the developing world.

In technologically intensive industries like those of renewable energy, evergreening can also impact on development. For example, the solar panel industry requires extensive know-how and financial outlay. If such paths to development are impeded by anti-competitive practices then developing countries may choose a cheaper, less complicated and less green development path, like

[753] Robert Fair, "Does Climate Change Justify Compulsory Licensing of Green Technology?" (2009) 6:1 Intl L & Management Rev 21.

intensive burning of inexpensive fossil fuels for energy. The applicability of evergreening to environmentally sound technologies has been an area of neglect in the scholarly debate of the subject. The fact that many environmental products like solar panels use enhancements that are maintained through trade secrets also renders these improvements an area of intellectual property worth studying. An even greater omission is that very little connection has been identified in the literature between the practice of evergreening and its impact on climate change abatement strategies like green technology transfer. International treaties, including *TRIPS,* the UNFCCC Conventions, and the *Paris Agreement,* all contain technology transfer provisions, yet if industry practices, such as evergreening, block the operationalization of these provisions, then such treaties become essentially toothless in their capacity to encourage commitments related to technology transfer and climate change abatement.

CHAPTER SIX

Kofi Asante, Leslyn Lewis, and Jon Sarpong "A Study of the Economic and Technical Analysis of Large scale Photovoltaic Plants in Ghana: A Model to Increase Foreign Direct Investments" 3:7 (2014) *International Journal of Engineering Research & Technology* (IJERT) 1415.

Abstract

To date, the primary energy issue facing developing economies is one of energy deficiency. Given continental Africa's geographic location and optimal access to the equator, terrestrial photovoltaics ("PVs") are the ultimate solution to Africa's quest of achieving an environmentally comparatively benign source of electrical energy.

The resulting energy deficiency highlights a scenario that is caused, in part, by a lack of investment in large scale commercialized renewable energy plants which is primarily due to the unwillingness of financiers to provide early stage resources in the developing world. This paper describes an optimal investment planning model for large-scale PV generation in an existing power grid. The objective of the model is to arrive at decisions that yield the most profitable outcomes for foreign direct investment ("FDI") opportunities, while taking into consideration the technical constraints as well as environmental impacts pertaining to Ghana.

Keywords—photovoltaics; levelised cost; foreign direct investment; system capacity factor ;

1.0 INTRODUCTION

To date the primary energy issue facing developing economies is energy deficiency. Terrestrial PVs are the ultimate solution to mankind's quest of achieving an environmentally comparatively benign source of electrical energy. PV technology has been under-utilized as a source of energy generation due to the perceived high cost relative to other sources such as fossil fuels in these emerging economies.[754] Recent advances in solar technology has led to increased efficiency, decreased cost of PV modules, and ultimately a significant decrease in the cost of solar generated electricity.[755] Some authors predict large scale PV generated technology will achieve grid

[754] K Asante, K M Cross, and W Varhue, Heteroepitaxial Reflector for the Fabrication of Si Thin Film Photovoltaic Devices" 3 (2013) *AIP Advan*ces 3, online: https://aip.scitation.org/doi/10.1063/1.4827500, last visited March 20, 2014.
[755] S B Darling, F You, T Veselka, A Velosa, "Assumptions and the Levelized cost of energy for Photovoltaics Energy" 4 (2011) *Environ Sci* 3133.

parity when appropriate carbon taxes are considered.[756]

PV projects are generally recognized as embodying more elements of sustainable development than a conventional energy projects and sources. Among the noted benefits of PV projects are the reduction in greenhouse gas emissions from $CO_2$and NOx and an overall reduction in toxic gas particles (SO_2).[757] In addition, PV plants can be placed in esthetically desirable places such as near natural parks, since these plants result in a reduction in electricity gridlines. However, these projects are not completely without environmental harm and as such FDIs need to consider Environmental Impact Assessments even for PV projects. Proper project design requires a complete contemplation of the potential environmental harms, which in the case with PV projects may include: noise pollution during construction, depletion of natural resources where the plant is situated, air pollution, and waste management arising from the disposal of batteries.[758]

The economic feasibility of an energy generation project is usually evaluated by a number of measures such as ROI (Return on Investment), IRR (Internal Rate of Return) and LCOE (Levelised Cost of Electricity).[759] LCOE is dominantly used in estimating the cost of producing electricity by a power producer. It is calculated by accounting for all of a system's expected lifetime costs (including construction, financing, fuel, maintenance, taxes, insurance and incentives), which are then divided by the system's lifetime expected power output (kWh). The LCOE can be expressed in units that are directly comparable to the rate paid for electricity from the local utility (e.g., cents /kWh), a simple way to assess the cost effectiveness of a PV system is to compare its LCOE to the

M Bazilian, I Onyeji, M Liebreich, I MacGill, J Chase, J Shah, D Gielen, D Arent, D Landfear, S Zhengrong "Re-considering the Economics of Photovoltaic Power" 54 (2013) *Renewable Energy* 329; T S Schmidt, R Born, M Schneider, "Assessing the costs of photovoltaic and wind power in six developing countries" 2 (2012) *Nature Climate and Change* 548.

[757] T Tsoutsos, F Niki and G Vassilis "Environmental impacts from the solar energy technologies" 33:3 (2005) *Energy Policy* 289; B Norton, P Eames, and N Lo, "Full-energy-chain Analysis of Greenhouse Gas Emissions for Solar Thermal Electric Power Generation Systems" 15 (1998) *Renewable Energy* 131.

[758] V Fthenakis "End-of-life Management and Recycling of PV Modules" 28 (2000) *Energy Policy* 1051.

[759] Bazilian *et al*, *supra* note 756.

rate charged by the local utility.[760] Several authors have estimated the PV LCOE's for different countries.[761] Schmidt *et al*[762] obtained LCOE's ranging from $0.20- $0.35/kWh for six developing countries – Brazil, Egypt, India, Kenya, Nicaragua and Thailand. Focusing only on Africa, it has been reported that estimated PV LCOEs range from $0.20- $0.51/kWh.[763] On the other hand the PV LCOE for Canada ranges from $0.10 -$0.15/kWh,[764] while that of the USA varies widely from $0.07-0.18/kWh for utility scale under various incentives.[765]

Although several studies have been dedicated to economic and technical analysis in African countries, it remains challenging to project the study from one country to the other. Reasons include: the differences between regional markets, the complexity of the balance systems, transmission tariffs and labor rates. Secondly the LCOE varies based on geographic (including solar insolation), financing terms, as well as the grid connection capacity of the existing system. Finally, the environmental aspect of large scale PV on developing nations and in particular Ghana has not been thoroughly studied. In the past two decades, Ghana's Foreign Direct Investment (FDI) has fluctuated initially dropping substantially from 1994 to 2004 by forty (40%), and later demonstrating a sharp increase between 2004 to 2012 of two thousand two hundred and sixty-five percent (2,265 %) (from 233,000,000 in 1994, reduced to 139,270,000 in 2004, and 3,294,520,000 in 2012).[766] Despite this increase, there is still a level of consternation among multinational enterprises in investing in various

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[760] S B Darling, F You, T Veselka, A Velosa, "Assumptions and the Levelized cost of energy for Photovoltaics Energy" 4 (2011) *Environ Sci* 3133; K Branker, M J Pathak, J M Pearce, "A Review of Solar Photovoltaic Levelized Cost of Electricity" 15 (2011) *Renewable & Sustainable Energy Reviews* 4470; P Joskow "Comparing the costs of intermittent and dispatchable electricity generating technologies" 100:238 (2011) *American Economic Review: Papers and Proceedings*.

[761] *Ibid*, Branker *et al*.

[762] T S Schmidt, R Born & M Schneider "Assessing the Costs of Photovoltaic and Wind Power in Six Developing Countries" 2 (2012) *Nature Climate and Change* 548.

[763] Bazilian *et al*, *supra* note 756.

[764] K Branker, *supra* note 760.

[765] P Joskow "Comparing the costs of intermittent and dispatchable electricity generating technologies" 100:238 (2011) *American Economic Review: Papers and Proceedings*.

[766] World Bank. ―Foreign Direct Investment, net flows‖ at: http://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD last visited March 24, 2014.

sub-Saharan African countries, and particularly in high capital ventures such as PV plants. A number of scholars have explored the role of FDIs in contributing to development in Sub-Saharan Africa[767] however, few studies have focused on Ghana, and there is a clear absence in the literature on scholarly work dedicated to FDI and PV projects. This paper focusses on using a suitable mathematical model to calculate the LCOE and in the process demonstrate to investors the viability of investment in Ghana, while examining the technical and environmental constraints. This model provides a framework and tools to help investors make good decisions in the complex LCOE calculations, thereby enhancing economic development through increased foreign direct investments (FDIs).

2.0 ECONOMIC CONSIDERATION FOR PV PROJECTS IN GHANA

Ghana lies near the equator, this prime location leads to the country having optimal access to solar resource. It is also considered as a country with relatively stable economic growth and a suitable climate for industrial investment. However, there is a growing need for access to electricity. Subsequently, the emerging economy faces energy crisis because the electricity generation lags behind demand. The demand for energy has doubled within the past decade as displayed in Fig. 1. In addition to this, system losses have increased correspondingly. The annual growth rate for electricity demand in the country has exceeded 10% in the last three years. For instance, between the first quarter of 2011, and the same period this year, the system peak demand has grown by 101 MW (from 1609 MW to 1710 MW). Indeed, peak demand has now risen to 1,726 MW, supply

[767] D W Loree, and E Guisinger "Policy and Non-Policy Determinants of US Equity Foreign Direct Investment." *Journal of International Business Studies* 1995, pp 281-299; T Addison, and H Almas, "The New Global Determinants of FDI flows to developing countries: The importance of ICT and democratization‖. No. 2003/45. WIDER Papers//World Institute for Development Economics (UNUWIDER), 2003.

capacity, however, has not kept pace with this growth in demand thereby putting the power system under great stress in 2012.[768]

Transmission losses are also a major source of concern. As depicted in Fig. 1, the transmission network reported losses of about 2.8 % and that has steadily increased to about 4.7 % in 2013. To put the losses into perspective, in 2010, the transmission network transported about 10,232.1GWh of electricity with 3.7% losses. A loss of 3.7 % represents 378GWh.[769] This amount of significant transmission losses in the system impacts the incentive for foreign investment.

The Government of Ghana in a bid to encourage alternative sources of energy passed the renewable *Energy Act* 2011 [Act 832]. This act established Ghana's first comprehensive guaranteed pricing structure for renewable energy production applicable to large-scale PV generation. This policy is also referred to as a feed in tariff (FIT). In Ghana, the current FIT rate of $0.20 /kWh is much higher than the rate of conventional sources.[770]

Some factors particularly favorable to FDI's include (i) political stability (ii) availability of solar resource, and substantial Government support. With all three indicators fairly met, it is a paradox that large scale PV generation has not yet began in Ghana with the exception of the Governments 2MW VRA test plant in the Northern region. The rest of the paper attempts to unravel this paradox by examining factors that are pivotal to attracting investors.

2.1A Model for Investment in PV in Ghana

Corporations involved with FDI are not only concerned with the LCOE, but also yielding a

[768]Ghana Grid Company Ltd. Annual Report 2011, online: http://www.gridcogh.com/media/photos/forms/annual/2011%20GRIDCo%20Annual%20Report.pdf, last visited March 24, 2014.

[769] Public Utility and Regulatory Commission (2013), online: www.purc.com.gh/purc/sites/default/files/2013_Tariff_Prop osal_GRIDCo.pdf last visited March 24, 2014.

[770] *Ibid*; Energy Statistical Bulletin 2000-2011, Energy Commission, Ghana Publication April 2012.

return

on investment Our LCOE was derived by analyzing the cost of generating electricity from PV, accounting for geographic location (including solar insolation), balance of system, inflation and discount rate.

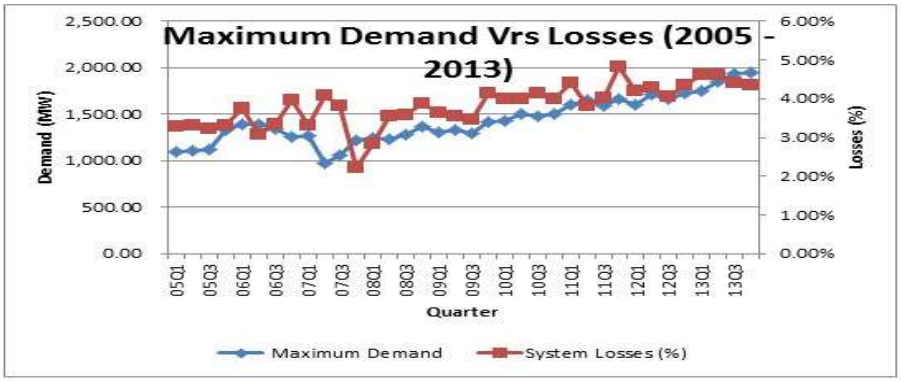

Figure 5: Plot of energy demand and Loss between 2011 and 2013 (Source private communication with Gridco).

2.1.1Mathematical Model

The model proposed by Darling *et al*[771] is adopted with our additional constraints. Mathematically, the LCOE is represented as;

$$LCOE = \frac{PCI - \sum_{n=1}^{N} \frac{DEP+INT}{(1+DR)^n} TR + \sum_{n=1}^{N} \frac{LP}{(1+DR)^n} + \eta}{\sum_{n=1}^{N} \frac{Initial\ \ kWh \times (1-SDR)^n}{(1+DR)^n}} \qquad (1)$$

with $\eta = \sum_{n=1}^{N} \frac{AO}{(1+DR)^n}(1-TR) - \frac{RV}{(1+DR)^n}$

where *PCI* is the project cost minus any investment tax credit or grant, *DEP* is depreciation, *INT* is interest paid, *LP* is loan payment, and *TR* is the tax rate where *AO* is the annual operations cost, *DR* is the discount rate, *RV* is the residual value, *SDR* is the system degradation rate, and *N* is the

[771] Darling *et al*, *supra* note 760.

number of years the system is in operation. This work assumes a 10 MW grid connected PV system is to be developed at each of the ten regional capitals. The locations are Accra, Koforidua, Takoradi (Sekondi Takoradi), Kumasi, Tamale, Wa, Ho and Sunyani. Because Ghana lies close to the equator, a single tracking axis system will provide optimum results. The rest of the assumptions are displayed in table 1.

Table 2: PV Cost Assumptions

		PV COST ASSUMPTIONS	
I	**Capacity Project**	MW	10
	Average Insolation in year	(> 2500 sunshine hours)	5.4
	Output per year per MW Installed Capacity	MWH	1971
	Increase in Output with Tilt	15%	2267
	System Efficiency to Grid		87.50%
	Degradation Factor for Panels		0.75%
	Project Cost per MW		
II	(including tilt)	$ mil / MW	1.75
	Total Direct Project Cost	$ mil	17.5
	Corporate, Consulting & Op Expense-Construct Period	2 years	3.00
	Contingency as % of Project Cost		0.88
	Total Direct Project Cost	$ mil	21.38
	Working Capital	2 years	**1.09**
	Total Capital Required	$ mil	**22.47**
	Financing		
	Debt	90.00%	20.22
	Equity	10.00%	2.25
	Interest of Bank Borrowings		6.00%
	Loan Repayment		
	Grace Period for Principle & Interest	Years	1
	(No Accrued Interest Capitalization during construction)	2 years	
	Repayment from COD	Years	14
	Project Life	Years	25

2.2 Major LCOE Inputs

Our model for FDI indicates that the total upfront cost of a solar PV power plant can be split into several major components.[772] These costs are dependent on a variety of parameters, as discussed below.

2.2.1 Plant cost

There are a variety of ways to talk about plant cost. The first step is to determine the type of technology suitable for ones needs. The conventional flat PV modules are preferred in developing countries as opposed to the new technology Concentrated Photovoltaics because of the reliable history flat PV's have generated. In general, there are 3 types of flat panel PV modules on the market: monocrystalline, polycrystalline, and thin film panels. Polycrystalline has been found to be more suited for temperatures above 25°C.[773] PV module costs represent 40-60% of total PV system costs, and installation costs account for the remaining costs.[774] Hence the PV module cost displayed in table 1 is reasonable.[775] The equipment cost reflects the cost of modules, inverters and balance of system (BOS). The BOS refers to all the components that make up the grid-tied PV system except the PV panels and the inverter, it includes the wiring, protection devices, enclosures, disconnects, installation equipment and power metering devices.

2.2.2 Annual Cost

In the LCOE calculation the present value of the annual system operating and maintenance costs is added to the total life cycle cost. These costs include inverter maintenance, panel cleaning,

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[772] W Muneer, K Bhattacharya, and C A Ca˜nizares "Large-Scale Solar PV Investment Models, Tools, and Analysis: The Ontario Case" 26:4 (2011) *IEEE Trans. Power Syst*. 2547.
[773] D C Jordan Methods for analysis of outdoor performance data. *NREL PV Module Reliability Workshop*, Golden CO, USA. http://www.nrel.gov/pv/pvmrw.html 2011.
[774] Muneer *et al*, *supra* note 772.
[775] Avior Energy Technical Reports, available online at www.aviorenergy.com (2013).

site monitoring, insurance, land leases, financial reporting, general overhead and field repairs, among other items.

2.2.3 System Residual Value

The present value of the end of life asset value is deducted from the total life cycle cost in the LCOE calculation. Silicon solar panels carry performance warranties for 25 years and have a useful life that is significantly longer. Therefore, if a project is financed for a 10- or 15-year term the project residual value can be significant.[776]

2.2.4 System Energy Production

The value of the electricity produced over the total life cycle of the system is calculated by determining the annual production over the life of the production which is then discounted based on a derived discount rate.

3.0 PROJECT CONSTRAINTS

The project constrains considered included: (i)The solar insolation (geographic location) and ambient conditions which defines the most attractive design. (ii) The capacity factor is an index of the efficiency of the plant's output (iii) High capital cost (iv) Technical constraints.

3.1 Solar Insolation

In other to determine the location of a PV plant, it is of prime importance to have an idea of the local weather and specifically the average annual daily solar radiation ($kWh/m^2/day$), as it is a

[776] SunPower Corporation. ―Levelized Cost of Electricity - The Drivers of The Levelized Cost of electricity for Utility-Scale Photovoltaics‖, 2008 pp. 1-27.

good indicator of the long-term performance and economics of solar energy systems at that location.[777]

To this effect data of the seasonal variation in horizontal solar radiation were obtained from NASA online database[778] and Avior Energy Inc. Technical reports.[779] A plot of the solar irradiance for each of the capital cities is displayed in Fig. 6. These provide a rough indication of the solar resource available in the area in units of kWh/m^2/day of insolation. It means that on a sunny day with the sun high in the sky, the insolation at the earth's surface is roughly 1kW/m^2 (1-sun). Therefore if, the average insolation is 5.4 kWh/m^2 it is equivalent to 1 kW/m^{2}for 5.4 hours of full sun.

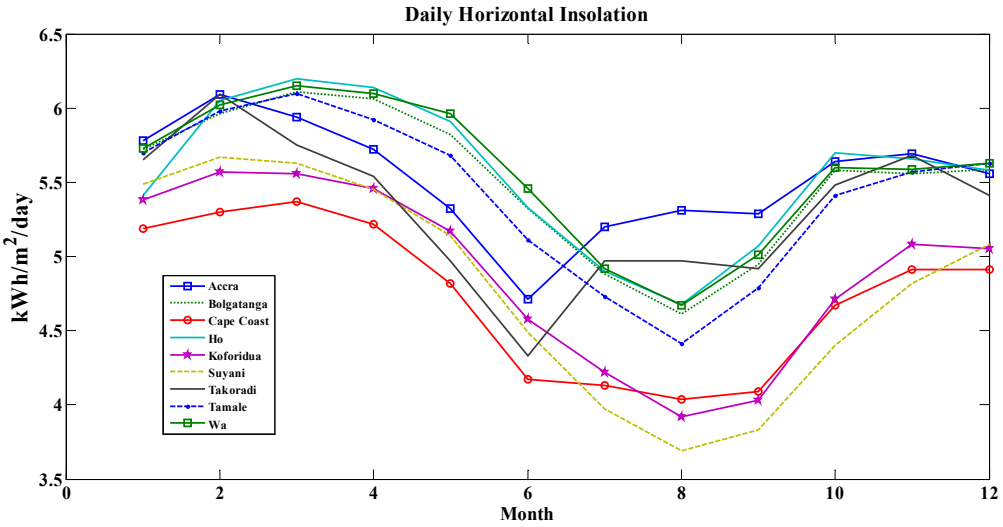

Figure 6: Average solar activity for Accra, Ghana.[780]

[777] NASA Surface meteorology and Solar Energy (SSE) Dataset NASA Earth Science Enterprise Program in collaboration with CANMET Technology Centre, release 6.0, 2008, online: www.eosweb.larc.nasa.gov/sse/RETScreen/ last visited March 25, 2014.
[778] *Ibid*.
[779] Avior Energy Technical Reports, available online at www.aviorenergy.com (2013).
[780] *Ibid*; NASA (SSE) Dataset, *supra* note 777.

It can be seen from Fig. 5, that the average insolation of Ghana lies between 3.5 -6.4 kWh/m^2. The average solar insolation for the different cities (Fig. 5) displays a seasonal variation consistent with the rainfall pattern in Ghana. Generally, the rainy season which occurs from the 5th – 8th month has more cloud cover and hence a lower insolation levels for all the cities. Clear days especially in 2nd- 4th the dry season with little overcast occurring in the 2 months have higher insolation levels. Comparing the insolation at Wa with that of Cape Coast, we observed that the profile of Wa is about 15% higher than that of Cape Coast (Fig. 5). Hence in the average, a Wa location will give a PV output of 15% more output than an identical PV system situated in Cape Coast.

3.2 System Capacity Factor

The capacity factor which is a key driver of a solar project's economics is dependent on the solar irradiation. With the majority of the expense of a PV power plant being fixed, capital cost LCOE is strongly correlated to the power plant's utilization (capacity factor). In this work we extend the concept developed by Wajid *et al* (2011)[781] to evaluate the capacity. The capacity factor of a solar PV module is a function of the solar irradiance of the geographic location, and the performance of the PV panel among other factors. Mathematically the capacity factor is evaluated as follow

$$CF_i^{PV} = \frac{\sum_m (Po_{i,m}^{PV} \eta_{d,m})}{P_r^{PV} \sum_m \eta_m} \qquad (2)$$

where$\eta_{,d,m}$the energy produced is based on the number of daylight hours, $Po_{i,m}^{PV}$ is the PV output and P_r^{PV} is the rating of the PV module.

Using the above equation the capacity factor for the different regional capitals is calculated and displayed in Fig.7. It is worth mentioning that we were conservative in our calculations and we assumed the worst

[781] M Wajid, K Bhattacharya & C A Canizares, "Large-Scale Solar PV Investment Models, Tools, And Analysis: The Ontario Case" IEEE, sponsored by IEEE Power and Energy Society, May 27, 2011, online: https://ieeexplore.ieee.org/abstract/document/5778963, last visited March 24, 2014.

case scenario for each case displayed in Fig. 7.

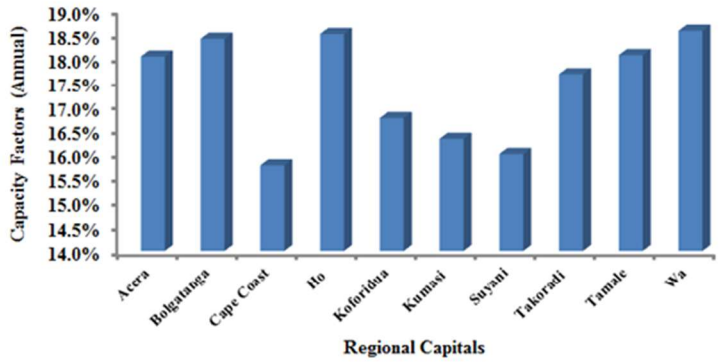

Figure 7: Solar capacity factors for the capitals in Ghana's ten regions.

The LCOE can be simplified to

$$LCOE\left(\frac{\$}{kwh}\right) = \frac{[Annual\ Fixed\ cost\ + Variable\ cost)(\frac{\$}{kW})}{24 * 365 * CF} \quad (3)$$

To illustrate the impact of the CF, the LCOE is evaluated assuming the same conditions and panels except for a change in CF due to solar irradiance. The result is displayed in Fig 8.

The Wa site provides the most economically attractive returns, while Cape Coast provides the least returns. For the sake of brevity, all other factors were considered equal for all the regions with the exception of the CF.

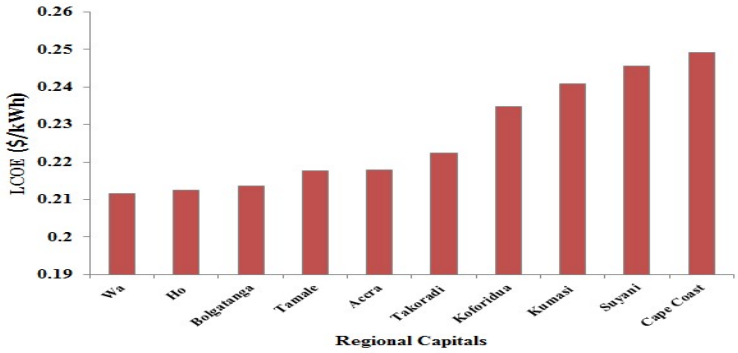

Figure 8: LCOE for the different regional capitals. The LCOE increases with decreasing CF.

3.3 Capital Cost

There are various ways to optimize the capital cost. However, because PV modules cost about 65% of the total capital cost hence an accurate forecast of the performance of the panels is crucial to project investors.[782] Hence for our analysis, the focus is on ways we can minimize PV panel cost.

First, capital cost can be reduced by minimizing the cost of the PV modules. PV modules are made up of interconnected PV cells and encapsulated to form modules. The PV module is protected further by covering the surface with tempered glass. The cost of shipping modules by sea is about \$0.05–\$0.06/W[783] adding 5%–10% to module costs. As module costs decrease, shipping costs for some types of module manufacturing could become a more significant factor and may lead to disaggregated manufacturing models, with separate cell manufacturing and module assembly facilities, for example. Many PV components—including polysilicon, wafers, and cells—can be shipped cheaply due to their low weight and volume and high value. In fact, cells can often be shipped by air to module manufacturing facilities. The glass cover of c-Si modules adds the most to shipping costs, because glass is dense and tends to fill a shipping container based on weight rather than volume. Lower- efficiency modules have more glass per watt— and thus cost more to ship— per unit of power. The key to reducing these charges is to ship the cells separately into the country, fabricate the glass locally and assembly the unit locally.

Second, temperature plays an important role, PV modules are rated (power, voltage, and current) at a standard test condition (STC) temperature of 25°C (77°F). The effect of temperature

[782] W Short, D Packey & T Holt "A Manual for the Economic Evaluation of Energy Efficiency and Renewable Energy Technologies", *Report NREL/TP* 1995 *pp 462-5173*.
[783] P Joskow, "Comparing the costs of intermittent and dispatchable electricity generating technologies" 100:238 (2011) *American Economic Review: Papers and Proceedings*; A Goodrich, M Woodhouse, T James, "Installed Solar PV System Prices" *ARPA-E Solar* ADEPT/EERE SEGIS-AC Workshop (Proceedings) 2011.

on the PV module cannot be overstated, since crystalline silicon PV modules respond to the widely varying environmental conditions addressed above. From a performance perspective (needed to calculate the output of the PV system), the electrical output is directly proportional to the irradiance and has an inverse relationship with the module operating temperature. However, as the module temperature increases above the 25°C level, the module power output will drop about 0.5 percent per degree C increase in temperature.[784] Hence meteorological records must be accessed to predict the temperature variation of the location.

Finally, the PV modules cost about 65% of the total capital cost hence an accurate forecast of the performance of the panels is crucial to project investors. To be able to forecast accurately, the panel efficiency and an accurate quantification of power decline over time, also known as degradation rate is essential to all stakeholders. Financially, degradation of a PV module or system is equally important, because a higher degradation rate translates directly into less power produced and, therefore, reduces future cash flows.[785] Furthermore, inaccuracies in determined degradation rates lead directly to increased financial risk.[786] PV systems are often financed based on an assumed of 0.5 to 1.0% per year degradation rate although 1% per year is used based on warranties.[787]

3.4 Interest Rates

Large scale PV projects require a considerable size of investment. Such finance can be provided by commercial bank loans or equipment finance from a global PV companies. For large

[784] P Gilman, N Blair, & C Cameron, *Solar Energy Costs: The Solar Advisor Model, in Solar Cells and their Applications* (2nd Ed) in **eds** L Fraas and L. Partain (John Wiley & Sons, Inc, Hoboken: NJ, USAm 2010) pp 472-493
[785] Short & Packey, *supra* note 782.
[786] *Ibid*.
[787] D C Jordan & S R Kurtz, "Photovoltaic Degradation Rates—an Analytical Review" 21 (2013) *Progress in Photovoltaics: Research and Applications* 12.

scale utility projects involving PPA, the LCOE can be considered as revenue per unit of electricity generated that is required to recover costs, meet targets, cover debts and account for incentive payment. This required revenue can be considered as the LCOE .[788]

Interest rate plays a substantial part which is the foremost in seeking finance for any project. In our calculation to verify the impact of interest rate on the LCOE, the following assumptions were made: (i) the life time of the solar farm was tied to the length of the PPA which is 20 years.[789] The discount rate in was assumed to be constant at 6% .[790] Fig. 9 shows how sensitive the LCOE is to interest rates. For each loan interest, at a debt fraction of 90% was assumed.

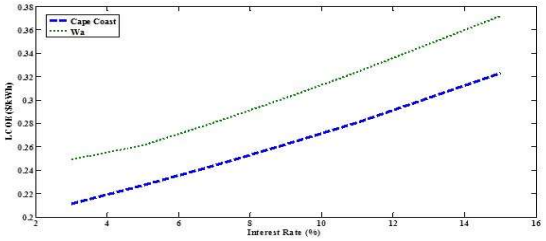

Figure 9: Interest Rate as a function of LCOE

The results are displayed in Fig 9 clearly shows that LCOE increases as interest rate increases and that LCOE is heavily dependent on interest rate. Secondly Fig. 9 illustrates that the LCOE for different CF varies with interest, by comparing the LCOE in $/kWh for identical PV systems installed in Cape Coast with identical systems installed in Wa as a function of the interest rate. To highlight the impact of interest component on LCOE, the models assumed that all other cost remain the same. Clearly the LCOE for the low CF (Cape Coast) is much higher than that of the relatively

[788] P Gilman, N Blair, & C Cameron, "Solar Energy Costs: The Solar Advisor Model, in Solar Cells and their Applications" in L Fraas and L Partain eds., *Solar Cell and Their Application* 2nd ed (John Wiley & Sons, Inc, Hoboken, NJ, USA: 2010) 472.
[789] Public Utility and Regulatory Commission (2013), online: www.purc.com.gh/purc/sites/default/files/2013_Tariff_Proposal_GRIDCo.pdf.
[790] Darling et al, *supra* note 755; K Zweibel, E James, & F Vasilis, "A Solar Grand Plan", (2008) *Scientific American* 64, online: http://www.science.smith.edu/~jcardell/Readings/uGrid/Solar_Plan_08.pdf, last visted March 10, 2014.

higher CF (Wa).

3.5 Bankability

Bankability refers to whether the projects using the solar products are likely to be offered non-recourse debt financing by banks. Banks and independent rating agencies use formal and informal ways to assess the credit risk of a project. Projects have to meet minimum criteria in order to bankable through commercial debt; at least a BB or Ba grade is required to attract commercial debt.[791] Lower credit rating implies higher interest rates. Moody's Investors Service provides international financial research on bonds issued by commercial and government entities and, with Standard & Poor's and Fitch Group, is considered one of the Big Three credit rating agencies.

Unfortunately, Moody's has lowered Ghana's B1 sovereign rating from stable to negative, the agency announced December 5, 2013.[792] This implies that financing from a commercial bank for a solar project in Ghana will inquire higher interest rate, to obtain lower interest rates, equipment finance from large scale PV manufactures should be negotiated.[793] The bankability of a project is not only predicated on the pragmatics of systems capacity factors and technical constraints, but also on the viability of obtaining a bankable PPA. This includes negotiating payment currencies and frequencies, bank guarantees and comfort letters, price escalators and a term duration sufficient enough to recoup the capital investment and earn a profit from the project. Consequently, PV projects require not just a solid financial plan and technical expertise, but also a legal team that is familiar with PPA clauses and negotiations. A small omission as not negotiating a price escalator

[791] H Cleijne, and W Ruijgrok, "Modelling Risks of Renewable Energy Investments Work Package 2" - Report witin the 5th Framework Programme of the European Commission supported by DG Research (Netherlands, July 2004), online: https://green-x.at/downloads/WP2%20-%20Modelling%20risks%20of%20renewable%20energy%20investments%20(Green-X).pdf.

[792] Ghanawebn(2013) http://www.ghanaweb.com/GhanaHomePage/business/artikel.php?ID=294353

[793] Avior Energy Technical Reports, available online at www.aviorenergy.com (2013).

that is greater than the rate of inflation could render the PPA un-bankable, and unable to attract FDIs.

3.6 Technical Constraints

These constraints deal with the actual construction and output of the PV farm. More often than not, a solar PV project can be made more economical by combining excellent components of various types of technologies and brands, for example, the PV panels are bought from a manufacturer other than the one supplying the inverter, checking the performance of the various types of technology can be extremely daunting. To maximize the output, there is a need for a universal algorithm that monitors performance of the entire site and can also detect a drop in performance of a specific unit of the site.[794] Other constraints include the degradation of the optical performance of the PV panels due to the accumulation of dirt on the PV panels especially in the dry season. Cleaning panels represents a considerable expense in manpower and water, usually a scarce resource in the dry season. Currently there is no record of any efficient automatic panel cleaning device. Developing of such a device will minimize the use of water and potentially decrease the expense of manpower. Furthermore, degradation also contributes to module mismatch over time which adversely impacts power plant performance.

3.7 Transmission Constraints

Illiceto *et al* reported that within the period of 1996- 1998 the 161 KV lines underwent an average of 2.1 outages per 100 Km per year due to lightening and transient faults.[795] Although

[794] Black and Veatch Corporation Renewable Energy Transmission Initiative Phase 2B: Draft Report. Sacramento, CA: RETI Stakeholder Steering Committee, 2010.
[795] F Iliceto, F M Gatta, S Lauria, and G Dokyi ―Three-Phase and Single-Phase Electrification in Developing Countries Using the Insulated Shield Wires of HV Lines Energized at MV", *CIRED* paper N° 5/p10, Session, (Nice, France: 1999).

GRIDco reports that the occurrence of power outages on the power lines is significantly lower, there are no existing records available to us to suggest otherwise. Besides there are no clear guidelines in the *Renewable Energy Act* as to who is responsible to pay for the power of renewable energy without storage in the case of such an outage. Furthermore, there is no grid code for renewable energy. This lack of uniformity will be an impediment to integrating renewable energy on the grid.

Currently in Ghana there is an on-going project to replace all the 161kV lines with 330kV as the country's primary transmission backbone will be 330 kV, which will provide significant reinforcement and increased power transfer capability from generators to load centres. Although this is a step in the right direction, conventional power systems have addressed the uncertainty of load demand by controlling supply. With renewable energy sources, however, uncertainty and intermittency on the supply side must also be managed. The *smart grid*—an evolution of electricity networks toward greater reliance on communications, computation, and control—promises a solution.

4.0 DISCUSSIONS

As mentioned earlier, grid parity is considered pivotal for the cost effectiveness of solar PV, and entails reducing the cost of solar PV electricity to be competitive with conventional grid-supplied electricity. For parity, the total cost to consumers of PV electricity is compared to retail grid electricity prices. Although the LCOE is not the same as retail electrical prices, it is used as a proxy for the total price to be paid by consumers, adding in as many of the realistic costs as possible. The LCOE methodology is then used to back calculate what the required system and finance costs need to be to attain grid parity.

In Ghana, electricity prices range from $0.09/kWh $0.22/kWh in major cities for residential

and commercial load[796] so using that as a proxy for grid parity, with the addition of incentives like carbon credit and government tax credits, the LCOE for solar in Ghana is attractive.

Any the positive aspects of PV far outweigh any negative potential, however, the potential destruction of farms, and forest land for PV's should be considered carefully.

5.0 CONCLUSIONS

A number of measures from the developing point of view was discussed that can reduce the LCOE. By the methodology adopted, site, CF and capital cost can reduce the LCOE, and make the project viable.

Ghana's' solar resource is vast, accessible, and can be synchronous with energy demand. While the resource differs from one region to the other, with proper planning a suitable site can be accessed. The main factor limiting utilization of the Ghana's solar resource at a large scale today is its cost and bankability of the PPA. Secondly if the residents of the country pay less than the tariff as it used to be in the case (electricity bill was \$0.05/kWh), while solar tariffs were \$0.24/kWh,[797] it drives FDI's away because the process appears to be unsustainable. However, with the recent increase in tariffs (domestic users are currently at ranging from \$0.09/kWh whilst heavy industrial users like the mines are at \$ 0.22/kWh) makes the program sustainable (albeit the FIT is now \$0.20/kWh).

The poor credit rating of the Government of Ghana (although ECG is the off taker) negatively

[796] Public Utility and Regulatory Commission (2013) www.purc.com.gh/purc/sites/default/files/2013_Tariff_Proposal_GRIDCo.pdf

[797] Avior Energy Technical Reports, available online at www.aviorenergy.com (2013).

impacts lending interest rates from commercial banks for developing solar PV's in Ghana, it is therefore suggested that project developers should seek equipment finance from venture and manufacturing companies to reduce interest rates. Finally, for brevity the cost of land was assumed to be the same for all regional capitals, which is not the case and that should be factored in any working model. The final conclusion is that the frame work and technology that currently exist is sufficient and cost effective to attract FDI, when the right modalities are considered.

CHAPTER SEVEN

CREATING A GREEN ENERGY INFRASTRUCTURE IN SUB-SAHARAN AFRICA:

CLIMATE FINANCE AS AN INNOVATIVE SOLUTION TO THE UNDER-REPRESENTATION OF SUB-SAHARAN AFRICA IN GREEN ENERGY PROJECTS.

ABSTRACT

A number of Conference of Parties ("COP") to the United Nations Framework on Climate Change ("the UNFCCC") have addressed the issue of climate change and its effect on the developing world. Energy insecurity must be addressed as a precondition to sustainable development, along with the regional factors that pose legal and institutional barriers to implementing of green energy projects in sub-Saharan Africa. Many sub-Saharan African nations have enacted renewable energy laws and regulations to increase investor confidence in green energy projects. Despite current regulatory enhancements, investors are still reluctant to invest in the region due to financing and political risks. Climate financing could potentially address investor concerns, however, initiatives like the Green Climate Fund ("GC Fund") and the African Climate Change Fund need to be implemented in a manner that promotes confidence among investors in these high capital projects. Arguably, for climate financing to achieve its full potential in sub-Saharan Africa it must be implemented in an innovative fashion that contemplates the infrastructure, environment and social governance for investments as well as fulfilling the dual goal of development and balancing national commitments under the *Paris Climate Change Agreement* (COP 21).

1.0 INTRODUCTION

Climate change is an urgent global challenge that requires unprecedented legal and policy innovation to reduce global CO_2 emission levels. The United Nations Office for Disaster Risk Reduction estimates that approximately an annual loss in global GDP production of US$ 4 trillion per year (or 5%) is attributed to climate change.[798] Energy security issues are at the forefront of many national policies, however, developing nations must simultaneously contend with issues relating to poverty and the lack of energy. There is still 1.1 billion people world-wide without access to electricity, and in sub-Saharan Africa only 65 percent of the population lacks access to electricity which is the highest among all regions.[799]

Financial impediments have been identified as a primary barrier to developing renewable energy choices in Africa. In 2013 the Organization for Economic Co-operation and Development ("OECD") along with the Climate Policy Initiative conducted a study on climate finance and identified the lack of climate financing as one of the primary barriers to implementing green projects in the developing world. They estimated that developed countries had mobilized US $62 billion towards climate finance.[800] Despite this large financial commitment, regions like sub-Saharan Africa have not shared in the benefits from these climate funds. Some developing nations have argued that there was limited transparency in the OECD report and that the actual figure is closer to US $2.2 billion,[801] thus, explaining the limited impact on certain regions.

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[798] United Nations Office for Disaster Risk Reduction, *From Shared Risk to Shared Value – The business Case for Disaster Risk Reduction. Global Assessment Report for Disaster Risk Reduction* (Geneva, 2013).
[799] World Bank, *World Development Indicators: Featuring the Sustainable Development Goals* (Washington: World Bank Group, 2016), online: www.openknowledge.worldbank.org/bitstream/handle/10986/23969/9781464806834.pdf, 14 accessed 3 June, 2017.
[800] OECD "Climate Finance in 2013-2014 and the USD 100 Billion Goal", a report by the Organization for Economic Co-operation and Development (OECD) in Collaboration with Climate Policy Initiative (2015), online: www.oecd.org/environment/cc/OECD-CPI-Climate-Finance-Report.pdf, 7 accessed July 4, 2017.
[801] Paris Climate Talks: Indian Officials Accuse OECD of Exaggerating Climate Aid, www.theguardian.com/environment/2015/dec/02/paris-climate-talks-indian-officials-accuse-rich-countries-of-exaggerating-climate-aid.

According to the African Development Bank the lack of climate financing in sub-Saharan Africa is largely attributable to infrastructural problems. The Akinwumi Adesina, President of the African Development Bank notes that "If we don't fix Africa's infrastructure financing gap – which we put at some US $60 – 70 billion a year – we will continue to take two percentage points off Africa's annual growth rates…"[802] In 2014, a total of US$ 391 billion was invested in climate finance initiatives, yet, despite bearing a disproportionate impact of climate change, sub-Saharan Africa only yielded US$ 12 billion(3%) of the total global climate change investments.[803] With specific reference to renewable energy investments, in 2014 these initiatives far surpassed all other categories of mitigation finance combined, accounting for 81% or US$ 292 billion.[804] A negligible amount was allocated towards sub-Saharan Africa projects.

1.1 Research Question

This paper will begin by exploring possible regional barriers to the implementation of green energy projects in sub-Saharan Africa. It will examine the lack of interest in renewable energy projects in sub-Saharan Africa and question whether local policies, institutions and organizational structure may act as barriers to investors. In this regard, can international Agreements like the 2015 *Paris Agreement*[805] address some of the financial barriers to sustainable development by creating a financial environment that is conducive to green energy projects and climate finance for sub-Saharan Africa? Specifically, this paper highlights the role of climate finance in addressing climate change mitigation and adaptation goals from both a host nation perspective, and also an

[802] Africa Development Bank Group, "ACCF Grants USD 1.35 Million to Enhance Climate Finance Readiness in Cape Verde, Kenya and Swaziland", (October 23, 2016) online: www.afdb.org/en/news-and-events/article/the-future-of-africa-lies-inside-africa-15606/.
[803] *Ibid*.
[804] Barbara Bucher *et al*, *The Global Landscape of Climate Finance 2015, Climate Policy Initiative (CPI) Report* (San Francisco, CPI, 2015), online: www.climatepolicyinitiative.org/wp-content/uploads/2015/11/Global-Landscape-of-Climate-Finance-2015.pdf , 9.
[805] UNFCCC, *Paris Climate Agreement*, online: www.unfccc.int/paris_agreement/items/9485.php, accessed July 1, 2017.

international law approach. The study will highlight climate financing instruments and provisions in international Agreements and explore whether they have been effectively operationalized in relation to sub-Saharan Africa. The scope of analysis will focus on renewable energy projects, such as solar photovoltaic plants ("PV"), and the barriers of private financing for these high investment initiatives.

According to the International Energy Agency, Africa's greenhouse gas contribution is 8% of the total global emission, and 21% of the carbon from forest biomass.[806] With deforestation accounting for about 12 to 17 % of total greenhouse gas emissions,[807] and 81.2% of the sub-Saharan African population reliant on biomass as the source of energy,[808] the potential for renewable energy projects cannot be overlooked. In this regard, the importance of including sub-Saharan Africa in mitigation efforts is tied to the fact that a large number of the continent's population are reliant on fossil fuels and forests play a role in regulating greenhouse gases. As such, the mitigation strategy of preserving forests and finding alternative energy sources for the growing sub-Saharan population must be equally considered in global climate change abatement measures. Moreover, despite sub-Saharan Africa's current low contribution to GHG emissions, emission projections for the next two decades are expected to increase by 50% within the region.[809] This great increase may negate gains made in other parts of the world. The International Energy Agency expects that the developing world will account for 93% of the growth in energy needs from 2010 to 2035.[810] The statistics point to the need to steer Africa down a sustainable

[806]IEA (International Energy Agency), "*2009 Energy Balance for Africa*", online www.iea.org/stats/balancetable.asp?COUNTRY_CODE=11.
[807] G Van der Werf, D Morton, R DeFries, J Olivier, P Kasibhatia, R Jackson, G Collatz, J Randerson, "CO2 Emissions from Forest Loss" (2009) 2 *Nature Geoscience* 737.
[808] K Stecher, A Brosowski, and D Thran, (2013) *Biomass Potential in Africa*, A Publication of IRENA and DBFZ.
[809] IEA (International Energy Agency), 2010. World Energy Outlook 2010. Paris, France: International Energy Agency, online: http://www.worldenergyoutlook.org/media/weo2010.pdf.
[810] *Ibid.*

development path that will require investments in the renewable energy infrastructure. These investments must find innovative ways balance the needs of investors to create financially viable projects, while addressing the continent's energy infrastructure needs.

Climate finance instruments can adopt the form of a concessional loan, grants, letters of credit, or bank guarantees. The UNFCCC does not have a specific definition of climate finance,[811] however, it has combined a number of aggregate factors which frames the goal of climate finance as "reducing emissions and enhancing sinks of greenhouse gases and aims at reducing vulnerability of, and maintaining the increasing resilience of, human and ecological systems to negative climate change impacts."[812] The financial mechanism was initially articulated in relation to technology transfer under Article 11 of the UNFCCC as providing "financial resources on a grant of concessional loan basis, including for the transfer of technology".[813] Climate financing encompasses, loans, grants, equity investments, venture capital, infrastructural funds, institutional investors and government guarantees. The UNFCCC Standing Committee on Finance Report explains climate finance as followings:

> "Climate finance data are aggregated in two ways in the 2014 BA: (i) Global climate finance which includes public and private financial resources devoted to addressing climate change globally, and (ii) Flows from developed to developing countries aimed at addressing climate change, which includes climate finance reported to the UNFCCC."[814]

The Report further concluded that both the National Communications and Biennial Reports need to present a more "comprehensive picture of climate finance", and that "information on both finance provided by developed countries and finance received by developing countries is

[811] UNFCCC Standing Committee on Finance: 2014 Biennial Assessment and Overview of Climate Finance Flows Report, online: www.unfccc.int/files/cooperation_and_support/financial_mechanism/standing_committee/application/pdf/2014_biennial_assessment_and_overview_of_climate_finance_flows_report_web.pdf, 5.
[812] *Ibid*.
[813] UNFCCC 1992. United Nations Framework Convention on Climate Change. United Nations Framework Convention on Climate Change, Bonn, Germany.
[814] UNFCCC Standing Committee on Finance, 2014, *supra* note 811 at 34.

needed".[815] The UNFCCC Report describes global climate finance as including the following:

> "all financial flows whose expected effect is to reduce net GHG emissions and/or to enhance resilience to the impacts of climate variability and the projected climate change. This covers private and public funds, domestic and international climate finance flows, and expenditures for mitigation and adaptation to current climate variability as well as future climate change. It covers the full value of the financial flow rather than the share associated with the climate change benefit, e.g. the entire investment in a wind turbine rather than the portion attributed to the emission reductions (IPCC 2014)."[816]

The Report estimates that the climate finance flows to the developing world range from 40 to 175 billion USD per year, or which 35 to 50 billion are from public institutions and 5 to 125 billion are from private finance.[817] While the summary of climate finance includes private funds, these funds are not "systematically tracked" resulting in only limited information existing about the level of contribution.[818] The shortcomings in tracking private financing may contribute to an added obstacle when assessing how the *Paris Agreement* will address some of the financial obstacles that previously limited sub-Saharan Africa's inclusion in private climate finance projects.

2.0 THE IMPORTANCE OF CLEAN ENERGY PROJECTS TO SUSTAINABLE DEVELOPMENT IN SUB-SAHARAN AFRICA

Africa's development challenges have longed been linked to the lack of accessible energy. Access to affordable renewable energy is also directly tied to a country's access to the finances. The lack of finances curtails the development of industries fueled by renewal energy, as well as a nation's transition to a sustainable renewable alternatives. Müller *et al* have found that countries with higher gross domestic products per capital are more readily adapted to renewable energy technologies. [819] Thus, the wealthier the nation, the more likely that it will have the resources to

[815] *Ibid*, 6.
[816] *Ibid*, 15.
[817] *Ibid*, 6.
[818] *Ibid*, 16.
[819] S Müller, A Brown and S Ölz, *Renewable Energy*. *Policy Considerations for Deploying Renewables* (Information Paper: OECD/IEA, 2011).

fund renewable energy projects. In addition, the "full belly thesis" espoused by Damilola Olawuyi in *The Human Rights Based Approach to Carbon Finance*, maintains that citizens would only become concerned with issues like choosing renewable alternative over high polluting fossil fuels after their basic necessities have been met.[820] Olawuyi also raises concern related to carbon finance and the ability to safeguard against funding projects that violate human rights.[821]

The World Bank's prepared the *World Development Indicators: Featuring the Sustainable Development Goals* which identified "universal access to affordable, reliable, and modern energy services [as] critical to sustainable development."[822] In relation to energy and sustainable development, the Report concluded the following:

> "Energy, especially electricity, is crucial to improving the standard of living for people in low-and middle income countries. It is key to providing reliable and efficient lighting, heating, cooking, and mechanical power; to delivering clean water, sanitation, and healthcare; and to operating well functioning transport and telecommunications services. Modern energy services are central to the economic development of a country and to the welfare of its citizens. Without such services, businesses stagnate, and the potential of people to live healthy, productive lives is diminished."[823]

Poverty eradication, especially in Africa, cannot seriously be addressed without a discussion of energy security.

2.1 Barriers to Clean Energy Projects in Sub-Saharan Africa

The lack of regulatory energy framework was once recognized as a primary obstacle to attracting foreign investments in the renewable sector.[824] However, many sub-Saharan African nations have implemented renewable energy legislation and regulatory frameworks that promote

[820] Damilola Olawuyi, *The Human Rights Based Approach to Carbon Finance* (Cambridge: Cambridge University Press, 2016).
[821] *Ibid*.
[822] *World Development Indicators* (2016)*, supra* note 799 at 14.
[823] *Ibid*, 14.
[824] World Bank, *A Brighter Future? Energy in Africa's Development* (World Bank, 1996).

practices like feed-in tariffs that take into consideration investor risks. Thus, the new regulatory framework did not cure fundamental problems, including namely, the lack of finance to fund renewable energy projects, and also the absence of poor institutional policy frameworks to facilitate alternative energy markets. Essentially, a change in regulatory frameworks alone is insufficient to address the range of obstacles including "economic, policy, structural and social challenges"[825], that could impede the implementation of renewable energy technologies. In this regard, an enabling infrastructure that includes policy organizations aimed at facilitating the economic, technical, financial and social needs of the community's transition to renewable energy must complement regulatory changes in order to have a societal impact.

The International Support for Domestic Action ("ISDA") Project featured case studies on the barriers to transition to low carbon economies in five developing countries. The study recognized the need for private and public sector investment in encouraging low-carbon choices.[826] The ISDA study explored some of the reasons why private financiers shy away from investing in green projects. They note that a "frequent mentioned reason is that the risk of return ratio of climate often does not compete with that of conventional projects."[827] One of the recommendations for international support mechanisms is to "facilitate access to finance to support private investors in the transition to low carbon investment".[828] In 2010, the *Cancun Agreement* (COP 16) recognized the need to set specific targets for climate finance by stating that "developed

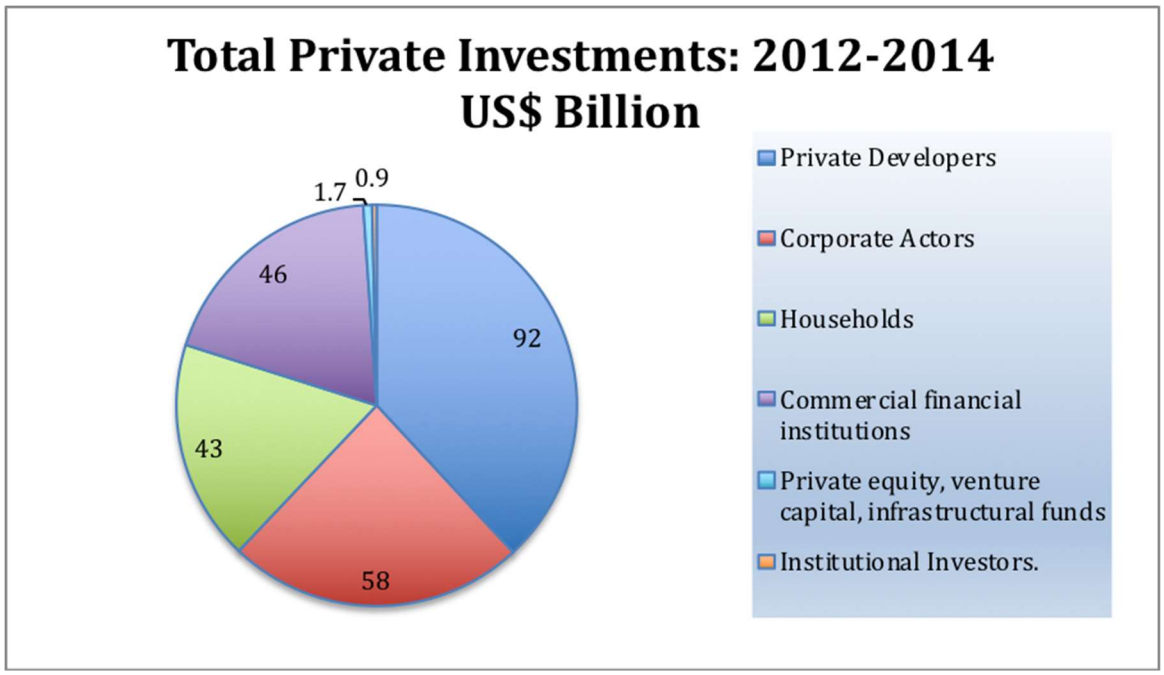
[825] S Hostettler, "Energy Challenges in the Global South", In: S Hostettler, A Gadgil, and E. Hazboun (eds). *Sustainable Access to Energy in the Global South: Essential Technologies and Implementation Approaches,* 3-9 (London: Springer International Publishing, 2015); Lada V Kochtcheeva, Renewable Energy: Global Challenges (May, 27, 2016), online: http://www.e-ir.info/2016/05/27/renewable-energy-global-challenges/.
[826] International Support for Domestic Action ("ISDA"), online: www.iddri.com/Publications/Publications-scientifiques-et-autres/isda_financial-support_september-2009-report.pdf, 3.
[827] *Ibid*, 7.
[828] Karsten Neuhoff *et al*, "Structuring International Financial Support to Support Domestic Climate Change Mitigation in Developing Countries" (Climate Strategies, 2009), online: www.iddri.com/Publications/Publications-scientifiques-et-autres/isda_financial-support_september-2009-report.pdf, 3.

country Parties commit, in the context of meaningful mitigation actions and transparency on implementation, to a goal of mobilizing jointly US$ 100 billion per year by 2020 to address the needs of developing countries."[829] The *Cancun* COP outlined a variety of sources of financing ranging from public and private, bilateral and multilateral financing to developing country Parties.[830] A new commitment of 30 billion US$ was also undertaken to finance Fast-start Finance that supports mitigation and adaptation efforts in developing countries. The 30 billion US$ commitment for Fast-start Financing was reiterated in the Bali COP 18.[831]

The issue of Africa's underrepresentation within the climate finance sphere is compounded when the issue of private finance of renewable energy projects are considered. Global climate finance increased in 2014 and was largely attributed to "a steady increase in public finance and record private investments in renewable energy technologies."[832] Climate finance flows totaled US$ 391 billion in 2014 with 148 billion generated from public finance and 243 billion from private funds.[833] With respect to the sources of funding developed from private investors, project developers comprised US $92 billion of the total $243 billion in funds raised by this sector.

[829] COP 16, Cancun Decision 1/CP.16, www.unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf, para 98.
[830] *Ibid*.
[831] Bali (COP 18) Decision 1/CP.18, United Nations, "Bali Action Plan 2007, Report of the Conference of the Parties on Its Thirteenth Session held in Bali from 3 to 15 December 2007, Agreed outcome pursuant to the Bali Action Plan, online: http://unfccc.int/resource/docs/2012/cop18/eng/08a01.pdf, accessed 18 August, 2017.
[832] Global Landscape of Climate Finance, *supra* note 804 at 1.
[833] *Ibid*.

Figure 10: Global Mitigation Financing 2014, totaled US 391 billion.[834]



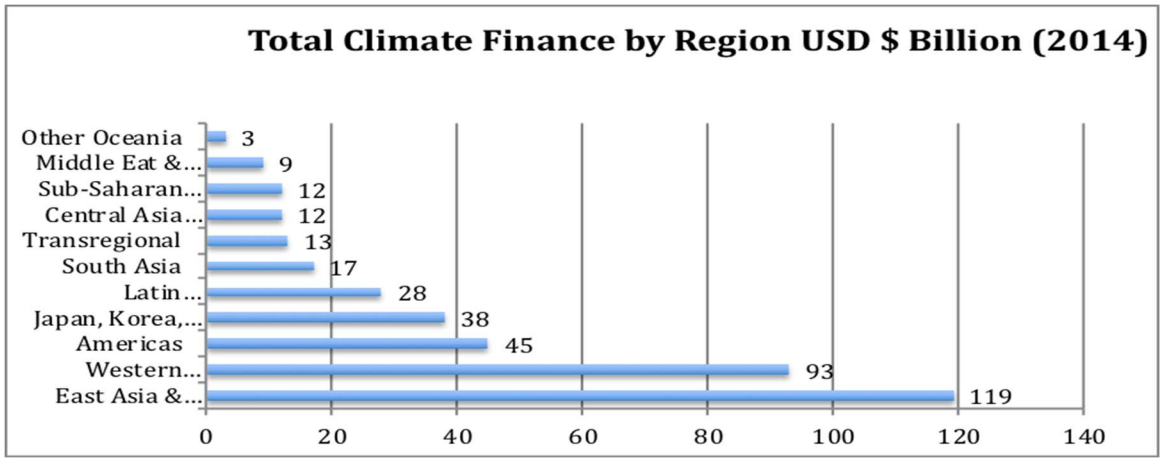
Of the 391 billion in climate financing, 93% was focused on mitigation initiatives and 81% of the total amount (US$ 361 billion) was directed towards renewable energy activities.[835] In 2015 the renewable energy landscape would be funded 80% by private sector funds (US$ 242 billion) versus 20% public finance (representing US$49 billion).[836] The 2016 World Bank Group annual report acknowledges that $720 million will be allocated to the Scaling Up Renewable Energy in Low Income Countries Program ("SREP").[837]

Another barrier to financing green energy projects in sub-Saharan Africa is that many countries in the region may not have the institutional structures that would lend confidence to

[834] Climate Policy Initiative, "Global Landscape of Climate Finance" *supra* note 804 at 5.
[835] *Ibid*, 9.
[836] *Ibid,* 6.
[837] World Bank Group, Annual Report 2016, online: https://www.climateinvestmentfunds.org/sites/default/files/images/feature/cif_report_web.pdf, 7 accessed August 16, 201.

raising the private capital required to fund high cost projects. Private funds appear to be predominantly spent in the region where those funds were initially raised, and "92% of private investments were raised and spent within the same country, highlighting the importance of domestic frameworks for attracting investments."[838] This outcome is primarily due to the fact that private developers will often invest in projects and regions where their risks are low or mitigated by governmental policies, guarantees and political risk factors. The propensity of private investors investing in regions where the finance is being raised has led to disproportionate investments outcomes, with sub-Saharan Africa being per capital the least desirable area of private climate finance flows. Of the total USD$ 391 billion investments in 2014, sub-Saharan Africa only yielded USD$ 12 billion(3%) of the total global climate change investments with Asian and the Pacific receiving the largest finance flows of USD $119 billion (31%), and China receiving USD$ 84 billion (22%).[839]

Figure 11:[840] *Climate Finance by Region USD$ Billion (2014)*



[838] *Ibid*, 10.
[839] *Ibid*.
[840] The date in this chart was taken from: "Global Landscape of Climate Finance", *supra* note 804 at 10. See http://climatepolicyinitiative.org/wp-content/uploads/2015/11/Global-Landscape-of-Climate-Finance-2015.pdf, 2 accessed May 24, 2017.

The regional disparities revealed by the statistical evidence of climate finance flows cannot be understated, and raises questions about how to improve the regional investment framework and provide confidence to private investors considering projects within the sub-Saharan African region.

3.0 OVERCOMING BARRIERS TO FINANCING GREEN ENERGY PROJECTS IN SUB-SAHARAN AFRICA: THE GREEN CLIMATE FUND AND THE AFRICAN CLIMATE CHANGE FUND

The seminal role of financial institutions in shaping economic policy was advanced by John Gurley and E Shaw in their article "Financial Aspects of Economic Development".[841] A modern and innovative approach to climate finance should consider the role of local financial policies in facilitating climate change and how initiatives like the Green Climate Fund ("GC Fund") can offset these regional problems. Barriers can be removed through private Sector Facility which allows private financiers to access finance through the GC Fund.

3.1 The Green Climate Fund and the African Climate Change Fund

The establishment of the GC Fund ("the Fund") and the United Nations Framework Convention on Climate Change ("UNFCCC") adoption of the *Paris Agreement* in December 2015 at the COP21 creates a framework for the mobilization of global climate finance initiatives including the continent of Africa. Climate finance attempts to address the challenges that arise from meeting the population growth needs while keeping carbon emissions within a globally acceptable level. Therefore, the goal must consider both the objective of meeting and expanding the current needs while also providing a mechanism to include the 1.2 billion people around the globe that lack access to energy.[842]

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[841] *Ibid*.
[842] World Bank, World Development Indicators 2016 (Washington: World Bank Group, 2016), 14.

The effectiveness of the GC Fund's programming are measured by "country-driven programming", the viability of the "investment framework, which lays out the criteria against which proposals will be considered", and the "results management framework, which sets out the metrics by which the results and impact will be monitored and assessed."[843] High value areas of the Funds investments in reduced emissions were also identified as including: energy generation and access, transportation, building (cities, industries and appliances), forest and land use.

Country ownership of projects is a fundamental cornerstone of the Fund. Each country was required to establish a National Designated Authority (NDA) which will facilitate projects and interactions with the Fund. The Funds are directly administered through accredited entities including government ministries, local development banks, and other organizations that meet the Funds standards. The non-objection procedure ensures national ownership over the development and initiative and prevents private interest from hijacking projects. This ensures that no goals that are parallel or contrary to the national initiatives are funded through the project.

Shortly after the GC Fund was created, it became obvious that sub-Saharan Africa was not optimizing climate financing in ways like regions such as China and India. This reality gave rise to an initiative to create an ACC Fund that would respond to the direct and special needs of countries on the African continent. This push was borne out of not only addressing mitigation factors, but a recognition that the poorest countries will suffer a disproportionate impact from climate change and may also be ill-equipped to adapt to the change.

An interesting aspect of the GC Fund is that it provides both loan and grants for public and private sector climate initiatives which were extensively canvassed in both the 8th and 9th Board

[843] Green Climate Fund, 2015. Analysis of the Expected Role and Impact of the Green Climate Fund. 9th Board Meeting, GCF/B.09/06, 24-26 March 2015, online: http://carbonmarketwatch.org/wp-content/uploads/2015/04/Report-on-9th-Meeting-of-the-Green-Climate-Fund_final.pdf, 5.

meeting of the Fund. The 8th Board Meeting of the Green Climate Fund laid out the foundations for grants and concessional loans terms.[844] The terms for both grants and concessional loans, factored in issues relating to the *Subsidies and Countervailing Measures Agreement* on and the prohibition against distortive subsidies.[845] Accordingly, both grants and loans will have a service fee of 0.5 percent and a commitment fee of 0.7 percent.[846] Grants can contain a repayment period, in which case these grants would be highly concessional with grace periods of up to 10 years. For grants without a repayment contingency, such instruments would have no reimbursement provision. Loans are also divided into two categories: highly concessional (with up to 40 year repayment and 10 years grace period) and moderately concessional (with up to 25 year repayment and 5 year grace period). Interest rates are based on a number of country factors including credit risk, while concessionality is largely tied to whether it is public initiative (more concessional) or private sector (less concessional) project. While the grant portion may be advanced with or without a repayment contingency to rebuff allegations of a prohibited subsidy, the repayment contingency is primarily only applicable to the private sector.

Funding through grants or loans of up to US$50 million can also utilize the simplified no-objection procedure. This process does not require the approval of the Investment Committee Board on the recommendation from the Secretariat and the technical advisory report from the Technical Advisory Panel, but instead may obtain a decision directly from the Executive Director of the Secretariat. There are also flexibilities or concessionalities that can be applied in the manner

[844] Green Climate Fund, 2014. Revised Programme of Work on Readiness and Preparatory Support. 8th Board Meeting, GCF/B.08/11, October 2014, online: www.gcfund.org/fileadmin/00_customer/documents/MOB201410-8th/GCF_B.08_10Revised_Program_Work_Readiness_fin_20141007.pdf ["Green Climate Fund"].
[845] Consideration of this Agreement was necessary to ensure that grants were not deemed to be actionable or prohibited subsidies under international law. See: *Agreement on Subsidies and Countervailing Measures*, Apr 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1867 UNTS 14 online: https://www.wto.org/english/docs_e/legal_e/24-scm.pdf ("*SCM Agreement*").
[846] Green Climate Fund (2014), *supra* note 844.

by which the loans are dispensed, with again the public sector receiving more concessions that the private sector loans.[847] One such concessionality is found in the "Other Financial Instruments" commitment that recognizes the need to provide guarantees and equity to finance higher risk climate change projects. The Board also approved an allocation that equally distributes funding based on 50% mitigation and 50% adaptation initiatives, with 50% of these funds being allocated for LDC, Small Island Developing States (SIDS) and other sub-Saharan African nations.[848] The ninth Board meeting of the Green Climate Fund queried the initial mobilization process that would be in place for establishing investment portfolios. Seven strategic programming approaches were identified, these include: emissions reduction potential, adaptation costs and needs, poverty alleviation and vulnerability, co-benefits, cost efficiency programming priorities including other climate related funds, and the potential for private sector investments.[849]

The ACC Fund was established April 2014 to act as a bilateral trust fund with a mandate to facilitate global climate finance to regional member countries. The ACC Fund supported its first two projects: the first, allocated USD $ 420,000 towards the appropriate and accurate measurements of "up-to-date information on climate change vulnerabilities, greenhouse gas emissions and opportunities for climate change adaptation and mitigation."[850] The second grant was given to Mali in the amount of US $ 404,000 to develop strategic programs for climate resilience strategies.[851] The ACC Fund operates under the Africa Development Bank and has

[847] *Ibid*, 47.
[848] *Ibid*.
[849] *Ibid*, 4.
[850] Africa Development Bank Group, "First Two Projects of Africa Climate Change Fund Approved to Support Climate Finance Readiness in Africa", (August 27, 2015) online: http://www.afdb.org/en/news-and-events/article/first-two-projects-of-africa-climate-change-fund-approved-to-support-climate-finance-readiness-in-africa-14604/; Zahra Hirji, "Controversial Climate Fund Scrambles to Fund its First Projects: A look at the first eight projects that the Green Climate Fund will finance to help the world's poorest cope with global warming" Inside Climate News (Nov 11, 2015) online: www.insideclimatenews.org/news/10112015/green-climate-fund.
[851] *Ibid,* "First Two Projects of Africa Climate Change Fund…".

financed projects in Mali, Cape Verde, Swaziland, Tanzania (Zanzibar), and Kenya primarily for climate finance readiness.[852] In May 2016 the bank also granted a US$ 0.8 million capacity and mobilization grant in Côte d'Ivoire.[853] Two of three of the first projects were in Africa, and collectively received $363 million to rebuild Peruvian wetlands, providing off-grid solar in East Africa and enhancing the extreme weather warning system in Malawi. By 2013 there were at least 15 climate funds that were active in Africa.[854] Under the new model, the GC Fund will fund approximately 40% of the Green Facility for Africa (formerly known as the Africa Green Fund), and this new model will be managed by the African Development Bank.[855]

Currently, the Green Climate Fund projects in sub-Saharan Africa that have received funding are largely small-scale as medium/large scale projects and are generally not funded by grants on the continent of Africa. Of the 492 projects, only 9 were large-scale projects, and all were funded by loans, while 483 were small scale and funded by a combination of financial instruments (grants 467, loans 8, private equity 1, unknown 7).[856] The reality of funding only equity funded small-scale projects, and only 9 loan funded large-scale projects, reveals the reluctance on the part of investors to undertake both large-scale projects along with those involving equity and loan components on the continent.

3.2 The *Paris Agreement* & Green Energy Projects in Sub-Saharan Africa

The *Paris Agreement* was adopted on December 12, 2015 by the Conference of Parties to

[852] Africa Development Bank Group, "The Future of Africa Lies Inside Africa", (April 16, 2016) online: http://www.afdb.org/en/news-and-events/article/accf-grants-usd-1-35-million-to-enhance-climate-finance-readiness-in-cape-verde-kenya-and-swaziland-14867/
[853] Africa Development Bank Group, "ACCF Grants US $0.8 Million To Enhance Climate Finance Readiness In Côte d' Ivoire and to Make Two Transboundary Projects Climate-Resilient", (June 22, 2016) online: http://www.afdb.org/en/news-and-events/article/accf-grants-us-0-8-million-to-enhance-climate-finance-readiness-in-cote-divoire-and-to-make-two-transboundary-projects-climate-resilient-15870/
[854] Timothy Afful-Koomson "The Green Climate Fund in Africa: What Should Be Different?" (2015) 7:4 *Climate and Development* 367 at 368.
[855] *Ibid* at 368.
[856] *Ibid* at 371.

the UNFCCC. Despite the existence of numerous international agreements that referenced the importance of finances in assisting developing and least-developed countries,[857] the *Paris Agreement* did not address the mechanisms that would assist least-developed and developing nations to meet climate change obligations.[858] In December 2015, the Paris Climate Change Conference (COP21) was held and it was the culmination of numerous attempts to craft an international climate regime agreement that initially began in Bali (2007), continued in Copenhagen (2009) and was attempted again in Durban (2011). The commitment to negotiate the *Paris Agreement* essentially emerged out of the 17th Conference of Parties in Durban 2011. In preparation for the Paris Conference, all national participants were invited to initially submit Intended Nationally Determined Contributions ("INDC") prior to attending the Conference and to firm up these intentions in Nationally Determined Contributions ("NDC"). The *Paris Agreement* sets the goal of "[h]olding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 ºC above pre-industrial levels…".[859] NDC is a movement away from pre-determined standards as set out in treaties like the *Kyoto Protocol*, to an approach that permits Members to set "voluntary" targets as adopted in the "Lima Call to Action" which recognized "common but differentiated responsibilities".[860] The *Paris Agreement* is the first international climate change Agreement that permits Members to submit their own voluntary pledges to climate change mitigation, which were

[857] *Montreal Protocol on Substance that Deplete the Ozone Layer*, 16 September 1987, 1522 UNTS 3, 26 ILM 1541 (entered into force 1 January 1989); UNFCCC, *supra* note 241; *Kyoto Protocol*, *supra* note 240; *Copenhagen Accord*, United Nations Climate Change Conference 2009 in Copenhagen; Convention on Biological Diversity, 5 June 1992, 1760 U.N.T.S. 143 (entered into force 21 March 1994; United Nations, "Agenda 21: Earth Summit – The United Nations Programme of Action from Rio" (June 1992); *TRIPS: 1994: Agreement on Trade-related Aspects of Intellectual Property Rights*, Appendix 1C of the *Agreement Establishing the World Trade Organization* (Marrakesh, Morocco, Apri15), online: http://www.wto.org/english/docs_e/legal_e/27-trips_01_e.htm.
[858] *Paris Agreement*, *supra* note 805.
[859] *Ibid*, Article 2(a).
[860] Lima Call for Action (Decision -1-CP.20), online: https://unfccc.int/files/meetings/lima_dec_2014/application/pdf/auv_cop20_lima_call_for_climate_action.pdf.

used to carve out the first international agreement on climate change.

Despite the existence of numerous international Agreements that referenced the importance of finances in assisting developing and least-developed countries,[861] financial mechanism provisions were finally incorporated in the *Paris Agreement.*[862] These financial requirements currently in the *Paris Agreement* already existed in Articles 4.3 and 4.4 of the UNFCCC, the *Paris Agreement* however added a new layer of mandatory reporting attached to the voluntary pledges.

The financial mechanism in the *Paris Agreement* is one of the most important elements of the Agreement. National climate change strategies are decided by the COP21 in the *Paris Agreement* and the Nationally Appropriate Mitigation Actions (NAMAs) for the Climate Fund. Contributions to the GC Fund are voluntary. It was anticipated that the Green Climate Fund ("GC Fund") would replace the *Kyoto Protocol's* Adaptation Fund, the Global Environmental Facility ("GEF") and the World Bank's Climate Investment Fund. The Ad Hoc Working Group on long-term Cooperation Action (AWG-LCA) outlines how the GCF would be implemented. It was decided by the AWG-LCA that the GCF would be "accountable to and functions under the guidance of the Conference of Parties",[863] which is similar to the GEF which is also accountable to the COP.

The Financial Mechanism as outline in Article 14 of the *Paris Agreement* can only be operationalized within the context of climate change projects in sub-Saharan Africa if they respond to the concerns of investors, including economic risk, the bankability of the project needs, political

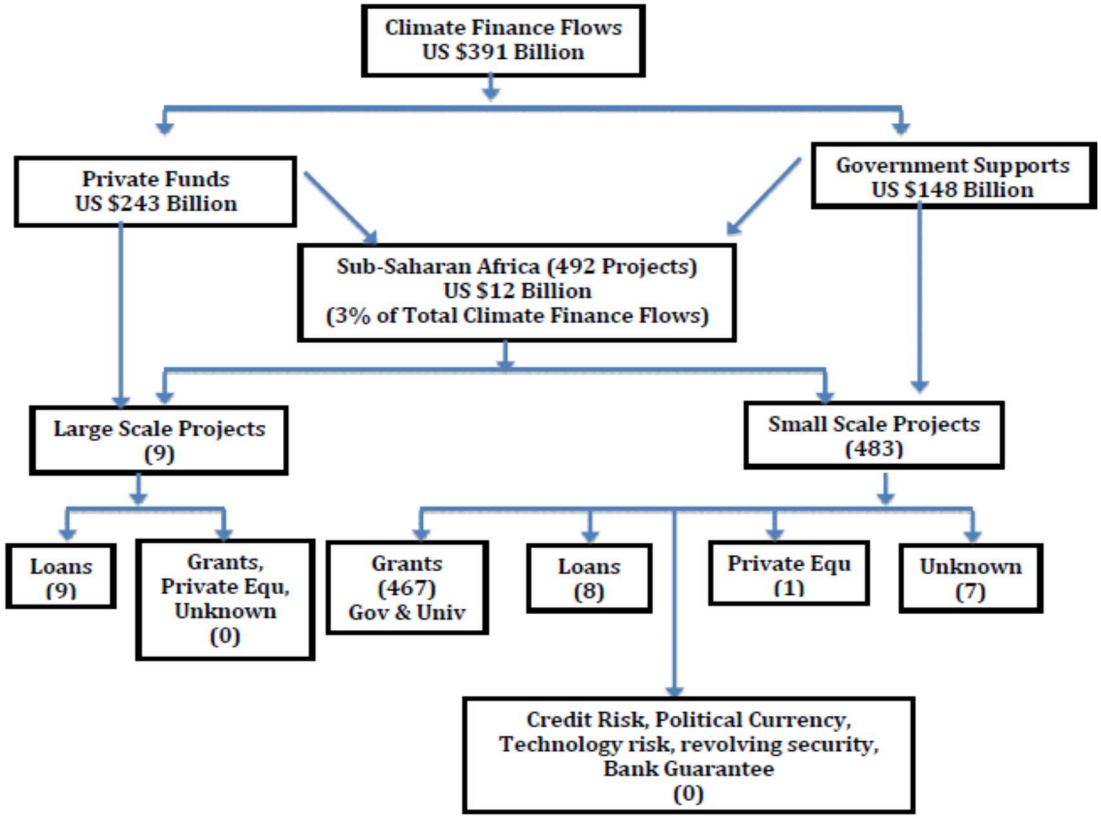
[861]*Montreal Protocol*, *supra* note *857*; UNFCCC, *supra* note 241; *Kyoto Protocol, supra* note 240; *Bali Action Plan*, *supra* note 233; *Copenhagen Accord*, *supra* note 857; Agenda 21, *supra* note 857; *TRIPS, supra* note 857.
[862]*Paris Agreement*, *supra* note 805.
[863] UNFCCC (2010) "Outcome of the Work f the Ad Hoc Working Group on Long-term Cooperative Action Under the Convention" Advance unedited version, Draft decisions -/CP.16.Available, online: www.unfccc.int/file/meetings/cop_16/application/pdf/cop16_lca.pdf, para 102 accessed July 22, 2017.

and regional risk factors. In the case with solar projects that are based on feed-in tariffs, the issue of bankability relates to the ability of the particular government to meet its financial commitment from the commercial operation period, and at the minimum to cover the risks covering the 6 year old break-even period. Factors such as a country's credit rating affect its perceived bankability, and if the ability of the government to pay is in question, this concern impacts the developer's ability to obtain equity and debt financing.

Another method that can be adopted in climate financing is public credit guarantees. These instruments could be raised to offset the risk that the government will default on its payments under the contract. Credit guarantees simultaneously address the financial risk and also the political instability risk by insuring that payments would be made in the event of a default. The default could arise due to political instability, change in regulation, or the inability of the government to meet its debt obligations. In this regard, the government shares the risk of default with the insurer or guarantor, thereby encouraging financiers to undertake these projects by guaranteeing the initial prospect investment. There is an argument that while mitigation measures like renewable energy projects could be funded by loans, grants should be seriously considered especially among least-developed countries.

The chart below shows the difference in private and public sector climate finance initiatives.

Figure 12: *Climate Finance, Public versus Private Funding*[864]



Investments and credit guarantees could also have the effect of creating confidence in a regulatory scheme, which may have the effect of creating stability even if there is a change in government. This could bring consistency and continuity within the new regulatory framework.

Another method of operationalizing Article 14 of the *Paris Agreement* would be to encourage lending institutions to provide funding to governments similar to that provided for private ventures. Many financing entities distrust government bureaucrats in the developing world who have, in the past, been accused of misappropriating funds. In this regard, financing in the form of grants can be channeled through universities that would be accountable to the funder, and

[864] Statistics adopted from: Afful-Koomson, *supra* note 854 at 371.

manage the funds in collaboration with government.

The *Paris Agreement* recognizes that the past efforts of climate change abatement financing have not been particularly robust. In this regard, the Agreement stipulates that "mobilization of climate finance should represent a progression beyond previous efforts."[865] The Agreement also recognizes that generating these funds, including public funds, should focus on "supporting country-driven strategies, and taking into account the need and priorities of developing country Parties."[866] The *Agreement* also encourages "scaled-up financial resources" aimed at "achieving a balance between adoption and mitigation" that take into account individual country needs and "the priorities and needs of developing country Parties".[867] In meeting the financial needs "[d]eveloped country Parties shall biennially communicate indicative quantitative and qualitative information" related to how they have met these financial goals of "supporting country-driven strategies".[868] The reporting requirement is both quantitative and qualitative requiring developed countries not only to provide statistical data on the quantum of investments, but the qualitative outcomes from those investments. One shortcoming of the Agreement is that while developed countries are required to voluntarily report financial information, no concrete financial goals were set in the Agreement.

The underrepresentation of sub-Saharan Africa in climate finance flows to the region has been addressed in the *Paris Agreement*. For the first time, developing countries are required to report the "financial, technology transfer and capacity-building support needed and received under Article 9, 10, and 11" of the Agreement.[869] While this provision is non-obligatory, it provides

[865] *Paris Agreement*, *supra* note 805 Article 9.3.
[866] *Ibid*, Article 9.3.
[867] *Ibid*, Article 9.4.
[868] *Ibid*, Article 9.5.
[869] *Ibid*, Article 13.10.

somewhat of an incentive to developing nations that have been neglected from climate finance to express their needs. It also reveals tacit biases in the system by presenting a clearer picture as to which nations are being supported in their climate change mitigation and adaptation efforts.

Given the impact of fossil fuel usage and the need for energy infrastructures in the developing world, it is not a surprise that the *Paris Agreement* would contain provisions to encourage public-private partnerships to address climate change through financing. A financial mechanism was created. The mechanism for reporting is entrenched in Article 14. The goal of Article 14 is to "stocktake" the financial reporting information for assessment of "long-term" goals. It also requires the *Paris Agreement* to "periodically take stock of the implementation of th[e] Agreement to assess the collective progress towards achieving the purpose of th[e] Agreement and its long-term goals (referred to as the "global stocktake)".[870] In addressing the financial shortcomings that led to many countries not taking advantage of programs like the Clean Development Mechanisms, the *Paris Agreement* succeeded in setting increased finance adaptation as a primary priority. This means that efforts to adopt new technologies and to steer countries towards choosing green energy over fossil fuels, will receive as much priority as mitigation efforts. Arguably, the lack of climate financing is one of the primary reasons for the under-participation of sub-African countries in green energy projects

4.0 CONCLUSION

Many sub-Saharan African nations have already implemented regulatory changes within the energy sector that should have increased investor confidence. Specifically, there still appears to be greater reluctance to invest in green energy projects within the region. The *Paris Agreement*

[870] *Ibid*, Article 14.1.

did not resolve issues of long-term climate finance but laid the foundation for nations to pledge how they will contribute to solving the problem of climate change. Financial support for mitigation will have to adapt to address regional factors that block investor interests. An innovative approach to climate change abatement policies on the sub-Saharan African continent will have to incorporate regional financial solutions, rather than merely project specific outcomes.

International commitments towards climate change mitigation including those found in the *Paris Agreement* cannot be achieved without considering new policies that address regional needs including the reluctance of private investors to undertake projects in sub-Saharan Africa. While many sub-Saharan African countries have the political will to set strong environmental policies, they often lacked the financial ability to implement these initiatives. Consequently, regulatory changes like renewable energy legislation and feed-in-tariffs system that encourage foreign investments, often remain stagnant as investors are unable to look beyond the financial risk of the project. It highlighted the flexibilities that are contained in the *Paris Agreement* that facilitate the operationalization of climate finance on the sub-Saharan continent. The *Paris Agreemen*t shows great initiatives and motivation on the part of nations to voluntarily move towards a solution to climate change. The operationalization of the *Agreement* is worthy of entertaining, especially as it relates to the global south which are disproportionately affected by climate change. Arguably, the lack of climate financing is one of the primary reasons for the under-participation of sub-Saharan African countries in climate finance projects. In this regard, this paper addressed some of the climate change financial risks that are germane to the sub-Saharan African region and propose possible solutions for mitigating these investor concerns that explore the connection between public policy, finance and private investments.

CHAPTER EIGHT

Leslyn Lewis, "Innovative Policies for Overcoming Barriers to Financing Green Energy Projects in Sub-Saharan Africa" in Neil Craik, Cameron Jefferies, Sara Seck, and Timothy Stevens (eds), *Global Environmental Change and Innovation in International Law* (Toronto: Cambridge University Press, 2018)

Abstract

International organizations including the United Nations and the World Bank agree that sub-Saharan Africa's ('SSA') development is inextricably tied to the growth of the energy sector within the region. Moreover, industrialization of the region needs to occur within a framework of innovative, flexible and effective policy institutions and processes. As such, sustainable development in SSA must incorporate innovative policies that respond to local energy needs while also addressing regional financial challenges and global environmental goals as set by the Paris Agreement on Climate Change ('Paris Agreement').

In this regard, one of the goals of the United Nations Agenda 2030 is to 'ensure access to affordable, reliable, sustainable and modern energy for all'.[871]Access to electricity is a key indicator of a nation's progress on the development path,[872] and correlates with economic growth. At the same time, new methods of electrification using fossil fuel generation is making a significant contribution to global greenhouse gas emissions. According to the International Energy Agency ('IEA'), energy generation and usage contributes to more than 60% of greenhouse gas emissions.[873] Measured in global terms, African states make a very limited contribution to

[871]United Nations, *The Millennium Development*, Sustainable Development Goal 7, online at: www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E; World Bank, *World Development Indicators: Featuring the Sustainable Development Goals* (Washington: World Bank Group, 2016), online at: www.openknowledge.worldbank.org/bitstream/handle/10986/23969/9781464806834.pdf.

[872] Taryn Dinkelman, 'The Effects of Rural Electrification on Employment: New Evidence of South Africa' (2011) 101:7 *American Economic Review*3078-3108.

[873] International Energy Agency (IEA), *World Energy Outlook 2013: Executive Summary*, 1, online at: https://www.iea.org/Textbase/npsum/WEO2013SUM.pdf.

greenhouse gas emissions in large part because of their comparatively small energy consumption. While the region comprises 13% of the world's population, it only uses 4% of the world's energy.[874] The IEA has estimated that approximately 80% of the population of SSA (some 700 million people) do not have access to clean cooking sources[875] and that most of the energy is consumed within the residential sector, with high volumes of biomass (80%) used for cooking.[876] According to the World Health Organization ('WHO'), the emissions from cooking are a major risk factor among women and children in SSA for respiratory and pulmonary diseases.[877]There are compelling arguments for expanding access to electricity to address this. The IEA estimates that almost half of the world's 1.2 billion people who lack access to electricity reside in SSA.[878]This is because of a serious absence of adequate electricity infrastructure,[879] which is a product of insufficient investment.[880]

Economic development in SSA, and in Ghana specifically, is directly tied to energy availability within the region. Without adequate and reliable energy supply it is difficult for countries in SSA to achieve sustained and inclusive economic growth and to attract foreign investment. Improved access to energy, particularly electricity, is an essential ingredient not only for increasing economic growth and gross domestic product (GDP)[881] but also for promoting

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[874] IEA, *Africa Energy Outlook: A Focus on Energy Prospects in Sub-Saharan Africa* (2014), 13, online at: https://www.icafrica.org/fileadmin/documents/Knowledge/Energy/AfricaEnergyOutlook-IEA.pdf.
[875] IEA, *Measuring Progress Towards Energy for All – Power to the People?* (Paris: OECD/IEA: 2012), online: http://www.worldenergyoutlook.org/media/weowebsite/energydevelopment/2012updates/Measuringprogresstowardsenergyforall_WEO2012.pdf, 533.
[876] IEA, *supra* note 874, 34.
[877] World Health Organization (WHO), *Fuel for Life: Household Energy and Health* (2006), 7-12, online at: http://www.who.int/indoorair/publications/fuelforlife.pdf?ua=1.
[878] IEA, *supra* note 874, 31-32.
[879] José A Gómez-Ibáñez, *Regulating Infrastructure: Monopoly, Contracts, and Discretion* (Cambridge: Harvard University Press, 2003).
[880] Glen Robbins and David Perkins, 'Mining FDI and Infrastructure Development on Africa's East Coast: Examining the Recent Experience of Tanzania and Mozambique' (2012) 24:2 *Journal of International Development* 220-236.
[881] Michael A Toman and Barbora Jemelkova, 'Energy and Economic Development: An Assessment of the State of Knowledge' 24:4 (2003) *Energy Journal* 93-112; Yemane Wolde-Rufael,'Electricity Consumption and Economic Growth: A Time Series Experience for 17 African Countries' (2006) 34 *Energy Policy* 1106-1114.

human development more generally.[882] There is a very significant and growing demand for electricity in SSA, and as the region's population grows, demand may double within the next 15 years.[883] Satisfying this demand is a major challenge for governments, especially because they are now operating in a carbon constrained context. This means that commitments to increasing affordable access to secure electricity supply in SSA must be achieved within nationally determined contributions ('NDCs') consistent with the Paris Agreement's objectives to keeping global temperature rises well below 2ºC. Innovative industrial modernisation policies must therefore be tied to NDCs that are entrenched in regulatory policies which in turn set clear goals in alignment with the Paris Agreement. There are a number of studies that have explored developments in the finance sector that can enhance funding for renewable energy projects in SSA.[884] This chapter seeks to build on these in assessing how an effective and sustainable energy policy can be implemented in the region.

I Development Agency Interventions in Energy Modernisation in SSA

The World Bank has recognized that'*[n]o country in the world has succeeded* in shaking loose *from subsistence economy without* access to the services that *modern energy* provides.'[885] In 1993

[882] United Nations, Agenda 2030 Sustainable Development Goals (Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all) online: http://www.un.org/sustainabledevelopment/energy/.

[883] International Renewable Energy Agency (IRENA), *Africa Power Sector: Planning and Prospects for Renewable Energy* (2015), online at: http://www.irena.org/DocumentDownloads/Publications/IRENA_Africa_Power_Sector_synthesis_2015.pdf, 13.

[884] Innovation Energie Développement, *Final Report, Support Study for DFID - Low Carbon Mini Grids: Identifying the Gaps and Building the Evidence Based on Low Carbon Mini-grids*, online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/278021/IED-green-min-grids-support-study1.pdf; International Finance Corporation, *From Gap to Opportunity: Business Models for Scaling Up Energy Access*(2012), online at: http://www.ifc.org/wps/wcm/connect/ca9c22004b5d0f098d82cfbbd578891b/EnergyAccessReport.pdf?MOD=AJPERES; Haruna Gujba, *et al*., 'Financing Low Carbon Energy Access in Africa' (2012) 47 *Energy Policy* 71-78; Chijioke Oji, Ogundiran Soumonni and Kalu Ojah, 'Financing Renewable Energy Projects for Sustainable Economic Development in Africa' (2016) 93 *Energy Procedia* 113-119.

[885] WorldBank,A*BrighterFuture?EnergyinAfrica'sDevelopment*(WorldBank,1996),cited in Chien-Chiang Lee & Yi-Bin Chiu, "Modeling OECD Energy Demand: An International Panel Smooth Transition Error- Correction Model" (2013) 25 Intl Rev Economics & Finance 372 (emphasis added).

the World Bank formulated an 'Electric Power Lending Policy' with the mandate of creating reform of power sectors. The Policy set the requirement for the Bank to lend money to those developing countries that implemented the following four policy changes:[886]

v. Transparent regulatory processes;
vi. Commercialized and corporatized power enterprises;
vii. Allowance for the importation of power services; and,
viii. Encouragement of private investment in the power sector.

In general terms, the main barriers to the modernization of the African power sector can be summarized as being of a regulatory, technical and financial nature. The UN Economic Commission for Africa has argued in response to these that Africa needs to create 'institutions, rules, financing mechanisms, and regulations needed to make the market work in support of energy for sustainable development'.[887] Over more than a decade, the UN has been active in energy policy development in Africa. In 2004, African delegates met in Rome to develop a framework for the creation of UN-Energy branch for Africa with a mandate to create a 'collaborative framework with the objective to promote more efficient, coherent and coordinated actions of UN and non-UN organizations working in Africa on the issues of energy development'.[888] The UN also investigated the causal relationship between electricity consumption and economic growth in 17 African countries.[889]

More recently, the UN has linked energy issues to broader questions of effective industrial policy.[890] African governments have been encouraged to establish Industrial Policy Organizations

[886] United Nations Economic Commission for Africa, 'Power Sector in Africa: Policy Guidelines for the Sustainability of the Sector' in UN-Energy/Africa, *Energy for Sustainable Development: Policy Options for Africa*, 53, online at: https://www.iaea.org/OurWork/ST/NE/Pess/assets/un-energy_africa_pub.pdf (the four points were extracted from this report).
[887] United Nations Economic Commission for Africa, *Dynamic Industrial Policy in Africa: Economic Report on Africa* (2014)*, online at:* https://www.uneca.org/sites/default/files/PublicationFiles/final_era2014_march25_en.pdf.
[888] United Nations Economic Commission for Africa, *supra* note 886, 1.
[889] *Ibid*.
[890] United Nations Economic Commission for Africa, Dynamic Industrial Policy, *supra* note 887.

(IPOs)to create 'incentive structures for firms to expand production and investment in vital and high growth potential industries'.[891] These industrial policies should be innovative and responsive not only to local factors and needs, but also include global climate change goals and international financier concerns. A particular challenge that has been identified is 'weak institutional structures and poor policy design' which are 'at the root of Africa's industrial policy problem throughout its post-independence history'.[892] Africa is now in a unique position to pursue a more inclusive and environmentally sustainable path to energy modernisation. While not a blank canvas, there are certainly major opportunities to avoid mistakes made elsewhere in the world where carbon intensive modes of energy production and use have become entrenched:

> Climate change could hobble Africa's economic growth momentum as the continent attempts to switch to industrialization and economic transformation. But it could also provide an opportunity: Africa has vast renewable energy resources of hydropower, geothermal, biomass, wind and solar. And as Africa is not locked in any technology preferences, *it can follow a green and clean industrializing energy pathway and leapfrog old carbon-intensive models.*[893]

Recognizing that policies aimed at industrialization will require a great amount of capital infusion, the UN also emphasizes the importance of generating external financing for these projects. It notes that the 'success of industrial policy projects depends heavily on African countries securing public and private finance in priority areas, especially infrastructure, education and technology.[894]

The twin goals of economic development and increasing access to sustainable energy in SSA will require large financial investment from private investors, given the limitations and barriers that exist for public and local government funding sources. Many African countries will need to go beyond reform to their legal and regulatory infrastructure in order to attract foreign

[891] *Ibid*, xi.
[892] *Ibid*, xiii-xiv (emphasis added).
[893] *Ibid*, xvi (emphasis added).
[894] *Ibid*, xvi.

investors as Independent Power Producers (IPPs). The UN poses the question of how countries like Ghana can 'build innovative, effective and flexible industrial policy institutions, processes and mechanisms to enhance industrialization and structural transformation in Africa'?[895] It is clear that there are many possible responses to this question, with many different policies available to solve Africa's energy problem. One of these is feed-in tariffs (FiTs), which are payments to users for renewable energy that they produce. FiTs are an important policy tool to assist in meeting development and energy security needs, although taken alone they are insufficient to assist countries like Ghana in moving from the Power Purchase Agreement ('PPA') stage to the financial close stage for solar photovoltaic ('PV') plants.

This chapter focuses on two case studies to illustrate how FiTs can be utilized along with other innovative industrial policies to address investor reluctance. While FiTs are not the only policy tool available, the chapter highlights how two particular FiTs may be best used to avoid certain pitfalls and overcome local barriers with financing and technology. The study draws lessons from Ghana and Uganda, which have both implemented a FiT system to address barriers to investing in renewable energy projects. However, while Uganda has had several successes, Ghana still struggles to attract foreign investors for its renewable energy projects. This raises questions about some of the strategies and policies that Ghana can employ to attract financiers for these high-risk projects. The aim of this study is thus also to collect a series of best practices that will improve the private investment climate for renewable energy projects among SSA countries through implementing innovative industrial policies.[896]

II The Problem of Financing High Capital Renewable Energy Plants in SSA

A Independent Power Producers (IPP) and Private Finance in SSA Renewable Energy

[895] *Ibid*, xiii.
[896] On the topic of best practices in the SSA context see Anton Eberhard and Katharine Nawaal Gratwick, 'IPPs in Sub-Saharan Africa: Determinants of Success' (2011) 39 *Energy Policy* 5541-5549.

Projects

Addressing the vast energy needs of SSA will inevitably require private investors to bridge the financing gap left by public financing. A common approach to private investing has been through IPPs, which are non-public entities that own and operate facilities to generate electricity. These are financed primarily through private funds and are privately developed, owned and operated, often through a special purpose vehicle (SPV) that enters into Power Purchase Agreements (PPA). The parties to the PPA are usually the government buyer (often called the off-taker) and the private investor/developer. The solar IPP projects in SSA often have a mix of financing, ranging from one corporation funding the entire project to various debt and equity finance structures. Risk assessment is crucial in renewable energy projects and the creditworthiness of the off-taker is of paramount importance.

The vast majority of IPP projects in SSA Africa are concentrated in Kenya, Nigeria, South Africa, Tanzania and Uganda.[897] The emergence of IPPs has not resolved the barriers that financiers encounter in developing renewable energy projects in sub-Saharan Africa. Firstly, local financing is not an option in the majority of cases. For example, Nigeria is one of the few countries in SSA that has the infrastructural banking system to finance these kinds of large investments, but it often only finances such large-scale projects for up to 5 years (whereas solar PPAs are usually for 15 to 20 years). Few sub-Saharan African countries have sufficient sovereign wealth funds to finance large-scale, long-term projects. As such, renewable energy projects based on 20 year PPAs often have to find equity on the international market. With the low credit rating of many SSA countries, raising the debt and equity needed to finance a project can be challenging.

Some scholars have attributed the absence of renewable energy projects in SSA to a failure

[897] Anton Eberhard, et al., *Independent Power Projects in Sub-Saharan Africa: Lessons from Five Key Countries*(World Bank Publications, 2016).

of management.[898] Ikejemba *et al*. conclude that despite the implementation of many small and medium-size PV projects in SSA, 'most of them have been left to deteriorate with no maintenance, no cleaning, no repairs and more importantly no sustainable management method that encompasses them all'.[899] Moreover, many projects have faced many challenges in getting off the ground. For example, one of Ghana's largest renewable energy projects by Blue Energy received a substantial amount of attention, but never materialized.[900] While Blue Energy received a PPA in 2011, the project never reached financial close, much less commercial operation.[901] Issues of sustainable management and lack of financing are often attributed to the reluctance of investors to undertake PV projects because of these kinds of risk factors.

Foreign investors have shied away from high capital renewable energy projects in SSA due to numerous perceived barriers to investment. Attracting investors to renewable energy projects in the developing world requires effort in reducing perceived risks, including those of a regulatory and political nature.[902] The UNDP 'De-risking Renewable Energy Investments' identified several barriers to investment that result in higher financing costs for these projects in the developing world. There are a number of impediments such as political instability and inadequate regulatory

[898] Eugene C. X. Ikejemba, et al., 'The Empirical Reality & Sustainable Management Failures of Renewable Energy Projects in Sub-Saharan Africa (Part 1 of 2)' (2017) 102 *Renewable Energy* 234-240.
[899] *Ibid*, 235.
[900] Solar Power Portal, "Blue Energy Announces its First International Solar Project in Ghana", online: https://www.solarpowerportal.co.uk/news/blue_energy_announces_its_first_international_solar_project_in_ghana; Andrew Bounds, "Blue Energy to Build Solar Site in Ghana" December 3, 2012 *Financial Times*.
[901]Blue Energy Website, online at: http://www.blue-energyco.com/africas-largest-solar-pv-power-plant.
[902] United Nations Development Programme, *De-risking Renewable Energy Investments. A Framework to Support Policymakers in Selecting Public Instruments to Promote Renewable Energy Investment in Developing Countries*, online at: http://www.undp.org/content/undp/en/home/librarypage/environment-energy/low_emission_climateresilientdevelopment/derisking-renewable-energy-investment.html; Nadejda Komendantova, Anthony Patt and Keith Williges, 'Solar Power Investment in North Africa: Reducing Perceived Risks' (2011) 15:9 *Renew, Sustain, Energy Reviews*4829-4835; Nadejda Komendantova, et al., 'Perception of Risks in Renewable Energy Projects: The Case of Concentrated Solar Power in North Africa' (2012) 40 *Energy Policy* 102-108; Thomas Schinko and Nadejda Komendantova, 'De-risking Investments into Concentrated Solar Power in North Africa: Impacts on the Cost of Electricity Generation' (2016) 92 *Renewable Energy* 262-272.

frameworks that impact on the ultimate barrier of financing renewable energy projects in SSA.[903] These barriers increase the risks associated with the high capital-intensive costs, resulting in the initial risk often outweighing the financial gains.[904] A recent approach to mitigating risks bifurcates the burden, so that 'private international investors are exposed only to the general political risks while international development banks cover mainly the regulatory risk'.[905]

The capital-intensive nature of renewable energy projects increases the financial risks and consequently limits the number of financing tools available. In addition, national factors including country-specific political and economic barriers[906] must also be considered in project financial risks assessment, especially with respect to solar projects.[907] Many investors insist that a risk-mitigating solution would be to have the host country guarantee the off-takers' payments, should a default arise. These sovereign guarantees generally arise when the off-taker has a poor credit rating, or the risk of default on payments is high. These guarantees are recognized as government debts, and consequently, recording them on the books may affect a nation's balance sheet.[908] For this reason, governments are reluctant to indebt the nation in pursuance of one project owned by a foreign corporation. Therefore, innovative solutions are needed to satisfy investor concerns.

The overwhelming majority of renewable energy projects in Ghana have never passed the approval stage, primarily because of local barriers to finance. These investment risks to financiers include the following:

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[903] Elmar Steurer, David Manatsgruber and Esther Prudence Jouégo, 'Risk Clustering as a Finance Concept for Rural Electrification in sub-Saharan Africa to Attract International Private Investors'(2016) 93*Energy Procedia* 183-190.
[904] Deutsche Bank Climate Change Advisors, "Get FiT Plus" De-Risking Clean Energy Business Models in a Developing Country Context" (April 2011), online: https://www.db.com/cr/en/docs/GET_FiT_Plus.pdf.
[905]Steurer, Manatsgruber and Jouégo, *supra* note 903, 183.
[906]Merce Labordena, et al., 'Impact of Political Economic Barriers for Concentrating Solar Power in Sub-Saharan Africa' (2017) 102 *Energy Policy* 52-72.
[907] Michael Peters, et al., 'Shedding Light on Solar Technology – A Techno-economic Assessment and Its Policy Implications' (2011) 39 *Energy Policy* 6422-6439.
[908]Mauro Mecagni, et al., *Issuing International Sovereign Bonds: Opportunities and Challenges for Sub-Saharan Africa* (Washington DC: International Monetary Fund, 2014).

1. Commercial risks (engineering, procurement and construction (EPC), as well as development, operation risks);

2. Political risks (changes in government, dishonouring of contracts, regulatory changes);[909]

3. Technological barriers, including low grid capacity;[910]

4. High Sovereign Credit Risk (foreign exchange rate risk and inflation; or off-taker defaulting on payment, currency risk).

Investors are concerned with offsetting the above risks before a project can be deemed viable. Thus, innovative industrial policies and institutions as envisaged by development agencies are essential for mitigating these risks. Currently, Ghana struggles to generate sufficient power for residential and commercial purposes,[911] but is also unable to accrue additional debt by sovereign guarantees for projects owned by an IPP. The chapter now turns to examine Ghana's circumstances in more detail as a case study of the role of innovation in energy policy development in SSA.

III The Ghanaian Case Study: Attracting Investments for IPP through Innovative Industrial Policy

In the early 1990s, the World Bank required the developing countries which sought loans from it to undergo significant power sector reforms, which entailed changing the legal and

[909] International Finance Corporation, *supra* note 884. Large scale bonds in USD were issued in Kenya and Zambia in 2014 to mitigate political risk: see Tomoko Matsukawa and Odo Habeck, *Review of Risk Mitigation Instruments for Infrastructure Financing and Recent Trends and Developments* (Washington DC: The World Bank and PPIAF, 2007), andsee Trends and Policy Options #4, online: https://openknowledge.worldbank.org/bitstream/handle/10986/6778/405300Risk0mit101OFFICIAL0USE0ONLY1.pdf?sequence=1&isAllowed=y.

[910] Akanksha Chaurey and Tara Chandra Kandpal, 'Assessment and Evaluation of PV Based Decentralized Rural Electrification: An Overview' (2011) 14:8 *Renewable and Sustainable Energy Reviews* 2266-2278.

[911] Energy Commission of Ghana, *National Energy Statistics 2005 – 2014*, online at: www.energycom.gov.gh/files/Energy%20Statistics_2015.pdf.

regulatory frameworks to improve transparency.[912] In compliance with the World Bank's demand that developing countries adopt a transparent power sector model, in 2011 Ghana implemented a renewable energy framework that incorporated the FiT scheme under the *Ghana Renewable Energy Act* (2011) and the Renewable Energy Purchase Obligation ('RPO').[913] This model is based on the government off-taker entering into a PPA with the developer. In this case, the electricity price and the revenue risks are shifted to the government off-taker. Other than the currency risk (which can also be addressed in the PPA), the only other financial risk relates to the inability of the off-taker to make payments on the electricity purchased. In such cases, the government off-taker will almost always reject sovereign guarantees in favour of a revolving bank guarantee security payment that would be replenished monthly. In this regard, rather than indebting the entire nation, the national government can provide a limited guarantee in the form of a payment security to the developer to offset the risk of defaulting under the obligations under the PPA. Ghana does not currently have higher tariff rates for peak periods, so setting the default payment (bank guarantee) will be easier than projecting an increase in energy prices.

A number of green energy projects have been approved in Ghana, with an energy license being issued by its governing body. Despite this approval, the projects have had difficulty acquiring construction financing. Since 2013, Ghana has issued 65 licenses to produce and supply for solar projects, but only one company has successfully commercialized and connected a 20 MW solar photovoltaic plant to the grid.[914] Despite the fact that Ghana has complied with international

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[912] World Bank, *The World Bank's Role in the Electric Power Sector: Policies for Effective Institutional, Regulatory, and Financial Reform* (1993), online at: http://documents.worldbank.org/curated/en/477961468782140142/The-World-Banks-role-in-the-electric-power-sector-policies-for-effective-institutional-regulatory-and-financial-reform.

[913] *Renewable Energy Act, 2011*, Act 832 of the Parliament of the Republic of Ghana, Dec 31, 2011 ['*Ghana Renewable Energy Act*'] online at: http://energycom.gov.gh/files/RENEWABLE%20ENERGY%20ACT%202011%20(ACT%20832).pdf. The *Renewable Energy Act* should be read in conjunction with the *Energy Commission Act, 1997* (Act 541), online at: www.energycom.gov.gh/files/ACT.pdf.

[914] Electricity Company of Ghana, *Provisional Wholesale Supply and Generation Licence Holders*, online at:

demands to upgrade its power sector's regulatory infrastructure, it still has not attracted an influx of foreign investments in the renewable energy sector. This raises questions about whether there are regional peculiarities that act as barriers to investments which can explain why some regions have experienced an influx of investment while SSA has not.

A The BXC Project

Ghana has had one successful connection of an IPP to the grid. In 2013, Beijing Xiaocheng Company(BXC) was granted a 'Provisional Wholesale Supply and Generation License' by Ghana's Energy Commission.[915] The 20 MW plant took approximately 8 months to complete and was financed exclusively by Chinese firms.[916] This endeavour is unique because BXC self-financed the US$30 million required to bring the project to the commercial operation phase. The 20 MW plant, which is scalable up to 40 MW, is connected to the ECG sub-station in Winneba. The plant is located in Gomoa Onyzandze in the Central Region (about 20 miles from the capital of Accra), and is currently Ghana's largest solar PV plant with operational grid connectivity.

The reasons that led BXC to self-financing are multifaceted. Firstly, this company had the capacity to provide many aspects of the transaction, including Operation and Maintenance (which was easier as a sister company supplied the solar panels), as well as the Engineering and Procurement. To finance the 20 MW project, BXC tapped into the Sovereign Wealth Fund (China African Development Fund) established by the China Development Bank.[917] The plant cost

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http://www.energycom.gov.gh/files/Provisional%20Wholesale%20Supply%20and%20Generation%20Licence%20Holders.pdf.

[915] *Ibid*.

[916] Guest Contributor, 'Ghana's Largest Solar PV Project Just Connected to the Grid', Clean Technica, April 17, 2016 online at: www.cleantechnica.com/2016/04/17/ghanas-largest-solar-pv-project-just-connected-to-the-grid/.

[917] Sovereign Wealth Fund Institute, *China-Africa Development Fund*, online at: www.swfinstitute.org/swfs/china-africa-development-fund.

US$30 million to build and began when BXC Ghana, a subsidiary of BXC Beijing China, entered into a PPA with the ECG that guaranteed tariff rates for the fixed contract period. The parent company solely funded the project without any infusion of government finance.[918] It is clear the BXC solution is not an option that will be available for all developers, and thus alternative solutions like the GET FiT program successfully adopted in Uganda must be considered as a means to address the impediments that discourage investors in Ghana.

B Model Jurisdictions for Renewable Energy Investment in SSA: Ghana and Uganda Compared

Ghana has a regulatory framework which encourages renewable energy projects and innovative approaches that can be taken to address barriers to investments. But Uganda is perhaps the best example of a SSA nation that has succeeded in attracting private investment in renewable energy. South Africa has the largest number of IPPs in SSA and of the 67 IPPs outside of South Africa, Ugandan projects comprise almost one-third (19 projects).[919] A notable example is the Ugandan 'GET FiT' program, which is a joint project between the Electricity Regulatory Agency of Uganda and KfW (the German government's development bank). The program's primary goal is to 'leverage private investment into renewable energy generation projects in Uganda'.[920] The program is supported by the governments of Norway, Germany, and the United Kingdom.

Within the past three years, Uganda has provided evidence that a SSA country can implement an innovative policy framework that facilitates the expeditious development of new generation capacity. Not only has Uganda implemented the GET FiT program, but it has done so

[918] D Ola, 'BXC Connects 20MW Solar Plant to Ghana's National Grid', PV-Tech, 15 April 2016, online at: www.pv-tech.org/news/new-solar-farm-launches-20mw-into-ghanas-national-grid.
[919] Anton Eberhard, 'Powering Africa: Facing the Financing and Reform Challenges', Research Papers (Dec 2015), 7, online at: http://www.afd.fr/webdav/site/afd/shared/PUBLICATIONS/RECHERCHE/Scientifiques/Papiers%20de%20recherche/21-papiers-recherche.pdf.
[920] GET FiT Uganda, *Annual Report 2016*, 13, online at: https://www.getfit-uganda.org/downloads/.

while overcoming many similar challenges as those faced by Ghana. Uganda has also successfully combined development within the energy sector with sustainable environmental practices in the renewable and alternative energy sectors. By 2012, the time when Ghana was beginning to implement its *Renewable Energy Act*, Uganda had 11 IPP projects. It is projected that between '2015 and 2018 … up to 20 small-scale (1-20 MW) projects will be added to this portfolio through the government's cooperation with the German Development Bank on the GET FiT Uganda program'.[921]

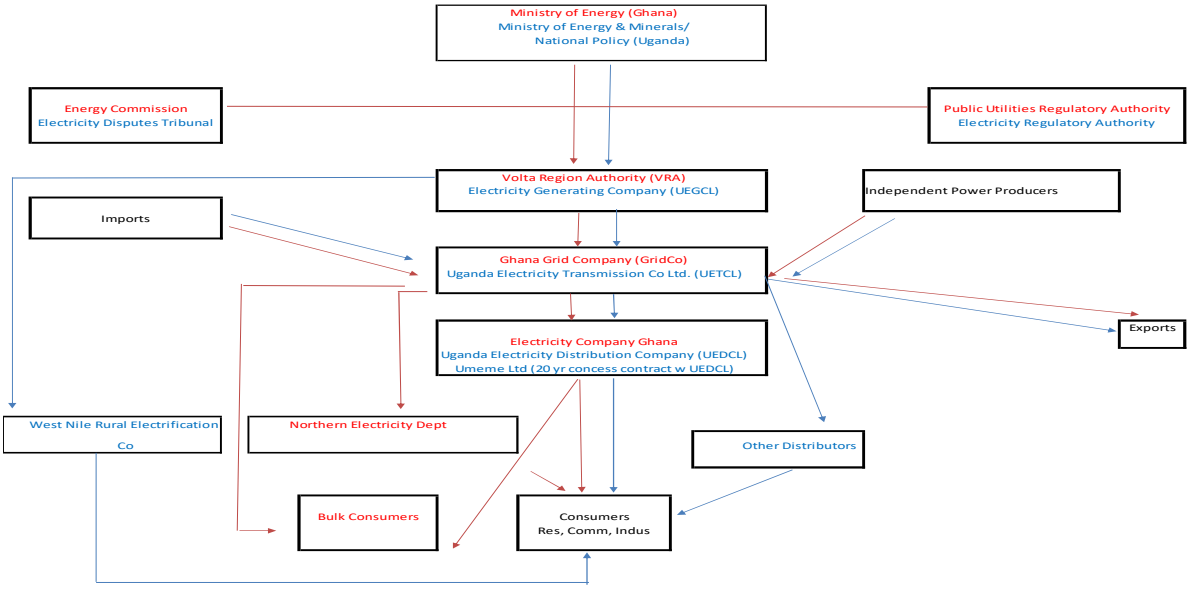
The GET FiT initiative is in its infancy stage in Uganda (the GET FiT policy having been launched in 2013) but has nonetheless experienced considerable success. By 2016, Uganda had installed 86 MW of new power plant capacity.[922] In 2016, 8 plants reached financial close under the GET FiT program for a total of 11 out of 17 projects.[923] By December 2016, Uganda marked the connection of its first solar plant to the Grid under the program (the 10 MW Soroti plant). On the back of these developments, Bloomberg's 'Climatescope 2016' has ranked Uganda second on the continent of Africa for its clean energy investment and progressive climate change policies.[924] Impressively, Uganda is ranked seventh out of 55 developing countries worldwide in renewable energy investment.[925]

Uganda makes a good comparative case study with Ghana because the electricity markets of the two countries are virtually identical. While there are minor variations between the two in the way electricity is distributed to rural areas, the number of distributors, and the distinction between bulk versus regular consumers, the dispatch and regulation of electricity closely mirrors

[921] Eberhard, *et al*, *supra* note 897, xlvii.
[922] GET FiT Uganda, *supra* note 920, 5.
[923] *Ibid*, 9.
[924] *Ibid*,7.
[925] *Ibid*.

each other. Figure 13 highlights the similarities in the two countries' respective electricity distribution systems.

Figure 13: Comparative organizational structure of Ghanaian and Ugandan Electricity Sectors[926]



The Electricity Company of Ghana Ltd, the Northern Electricity Distribution Company Ltd and one private distribution company are responsible for the distribution of electricity across the country. Electricity connection sites are located at Akosombo, Kpong, Aboadze and Tema and electricity is distributed to the various load centres across the country.[927] Like Uganda, electricity in Ghana is fed through a central grid. In Ghana's case, the Ghana Grid Company Ltd (GRIDCo) acts as an Independent Systems Operator and manages the transmission networks across the country, while the Public Utility and Regulatory Authority ('PURC') sets the tariff rates (the guaranteed tariff rate is designed to act as an assurance to IPPs that the price of energy will not fall

[926] This diagram was constructed using data obtained from the Ghana Grid Company and the Ugandan Regulatory Authority:see Ghana Grid Company, online at: http://www-pub.iaea.org/MTCD/Publications/PDF/CNPP2013_CD/countryprofiles/Ghana/Ghana.htm. See also Joseph Mawejje, Ezra Munyambonera and Lawrence Bategeka, *Uganda's Electricity Sector Reforms and Institutional Restructuring* (Economic Policy Research Centre, 2012), online at: http://ageconsearch.umn.edu/bitstream/150239/2/series89.pdf.
[927] GRIDCo, *National Grid*, online at: http://www.gridcogh.com/en/national-grid.php.

below the rate for a fixed period of usually 10 to 15 years). Both Uganda and Ghana have a Limited Liability Electricity Distribution Company that distributes electricity to consumers.

In Ghana, IPPs play a significant role in supplementing the energy produced by the state-owned power generation utilities (the Volta River Authority and Bui Power Authority). GRIDCo, the Electricity Company of Ghana (ECG), and the Northern Electricity Distribution Company (NEDCo) are responsible for feeding government-produced energy and the energy produced by IPPs into the same grid. The FiT scheme is intended to provide some certainty to IPPs that the high upfront financial outlays associated with renewable energy projects can be recouped with a profit over the contract period.

The World Bank has implemented the Scaling Up Renewable Energy Program ('SREP') through its climate investment funds sector, an $839 million funding program aimed at encouraging renewable energy usage in the developing world.[928] The SREP Program in Ghana is designed to address local problems around the inadequate grid capacity. The solar PV solution promoted by the SREP program resolves some immediate energy problems, but does not go as far as rectifying Ghana's low capacity grid problem, which is a major reason why financiers shy away from investing.[929] Instead, the SREP program supports rooftop and battery operated standalone systems that do not need to be fed into the grid. The SREP Ghana program identifies the main barriers to investment in renewable energy resources as 'limited experience and track record of utility-scale solar development, high perceived risk by private developers of a largely untested new FiT regime, and limited access to affordable financing'.[930] However, the Ghanaian problem goes

[928] Climate Investment Funds, *SREP: Scaling Up Renewable Energy Program*, online at: www-cif.climateinvestmentfunds.org/fund/scaling-renewable-energy-program.
[929] Climate Investment Funds, *SREP Investment Plan for Ghana*, vii, online at: www-cif.climateinvestmentfunds.org/sites/default/files/SREP_13_4_SREP_Investment_Plan_for_Ghana.pdf.
[930] *Ibid*, 33.

beyond affordable financing, because even if the project were to reach financial close, the grid capacity issues may make it impossible for the new power station to feed its energy into the outdated grid. This adds another dimension to the reluctance of foreign investors to support renewable energy projects in Ghana.

IV Building Innovative Industrial Policy Institutions in the Ghanaian Renewable Energy Sector

A The GET FiT Solution

There are a number of innovative policies that support global renewable energy projects.[931] The goal of the GET FiT Program has been identified as 'to support renewable energy policies that reduce or mitigate investment risks, and consequently attract significant private capital to drive markets for commercially-available technologies'.[932] Private capital is attracted by the GET FiT Program's partnership with project developers, investors and financiers to address a number of barriers including political, local currency, off-taker, market and insurance risks.[933]

The adoption of the GET FiT model in Ghana will require the implementation of innovative industrial policies. These policies would need to contemplate how the financial concerns of IPPs and financiers will be managed. In addition, the policy must go beyond just the ability to attract debt and equity financing for the project but also consume other national risk factors, including the following:

1. Return on investment: whether the tariff offers sufficient returns, especially in long term projects that do not contain a price escalator;[934]

[931] DB Climate Change Advisors, *Global Climate Change Policy Tracker: An Investor's Assessment* (2009), online at: http://climate.columbia.edu/files/2016/04/2009_DBCCA_Policy_Tracker_Exec_Summary-4.pdf.
[932] DB Climate Change Advisors, *GET FiT Program: Global Energy Transfer Feed-in Tariffs for Developing Countries* (2010), 6, online at: www.institutional.deutscheam.com/content/_media/GET_FIT_-_042610_FINAL.pdf.
[933] *Ibid*, 7.
[934] One of the Development Partners can provide additional support to supplement the tariff subsidy. These include the AfDB, the World Bank Group (WBG), the European Union (EU), the United Nations Development Program (UNDP), the AgenceFrançaise de Développement (AFD), the KreditanstaltfürWiederaufbau (KfW), the Millennium Challenge Corporation (MCC) and the State Secretariat for Economic A airs (SECO): Climate Investment Funds,

2. Whether there is an enabling regulatory environment (renewable energy legislation and feed-in tariff scheme);

3. Political risk: the political stability of the country.

4. Insurance issues

    a. Corruption index: How corrupt is the country? Will insurance cover political risk?
    b. Early termination fears: concerns that the project will abort prior to term as stipulated in the PPA (usually 15 to 20 years);
    c. Credit rating issues of the off-taker: will insurance guarantee payments by government off-taker in situations of political instability?

5. Currency Index: how volatile is the country's currency? Are hedging instruments required?

6. Technical issues / no grid capacity: even if the project meets financial close and enters the commercial operation phase, the energy produced from the plant may never get fed into the grid due to the inability of the grid to handle the load.

The GET FiT Program offers direct incentives, risk mitigation strategies involving international organizations and local institutions, and technical assistance addressing non-financial barriers.[935]

SREP Investment Plan for Ghana' (Meeting of the SREP Sub-Committee (2015), 26, online at: www-cif.climateinvestmentfunds.org/sites/default/files/SREP_13_4_SREP_Investment_Plan_for_Ghana.pdf.

[935] DB Climate Change Advisors, *supra* note 931; DB Climate Change Advisors GET FiT, *supra* note 932.

Figure 14:[936] *Challenges that Innovative Industrial Policies Need to Address.*

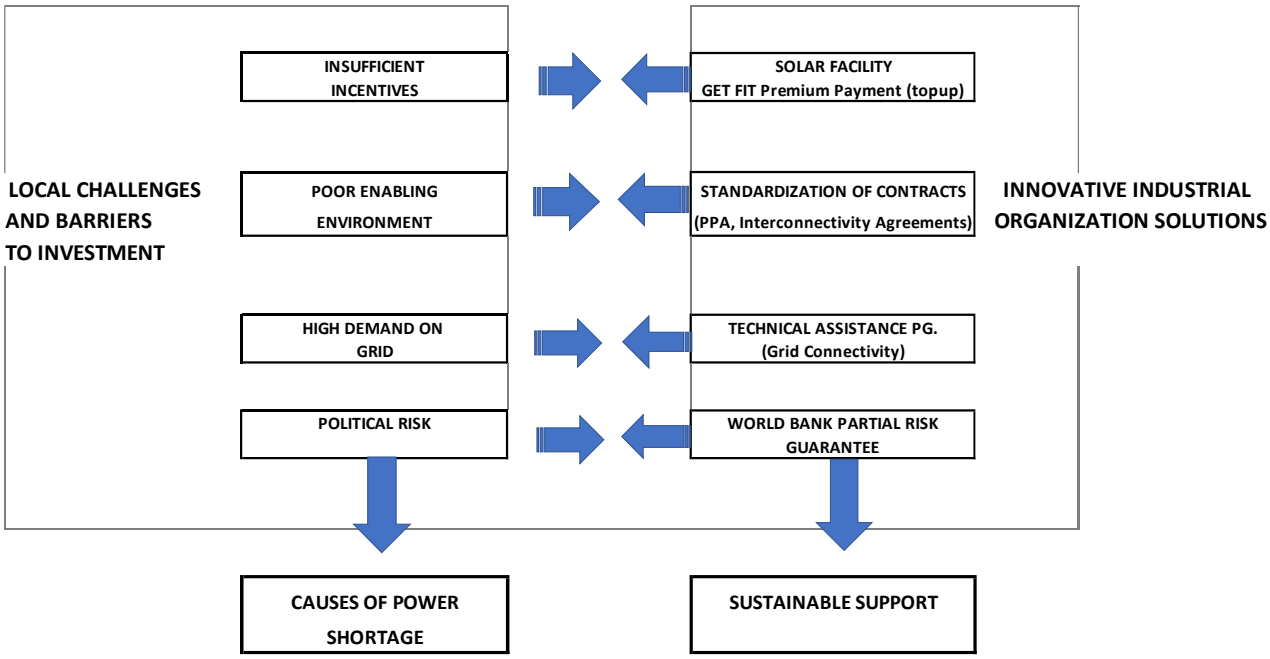


Figure 14 captures the main institutional challenges that SSA nations face in implementing renewable energy alternatives. Many of these risks can be mitigated by the implementation of an innovative IPO such as the GET FiT Program.

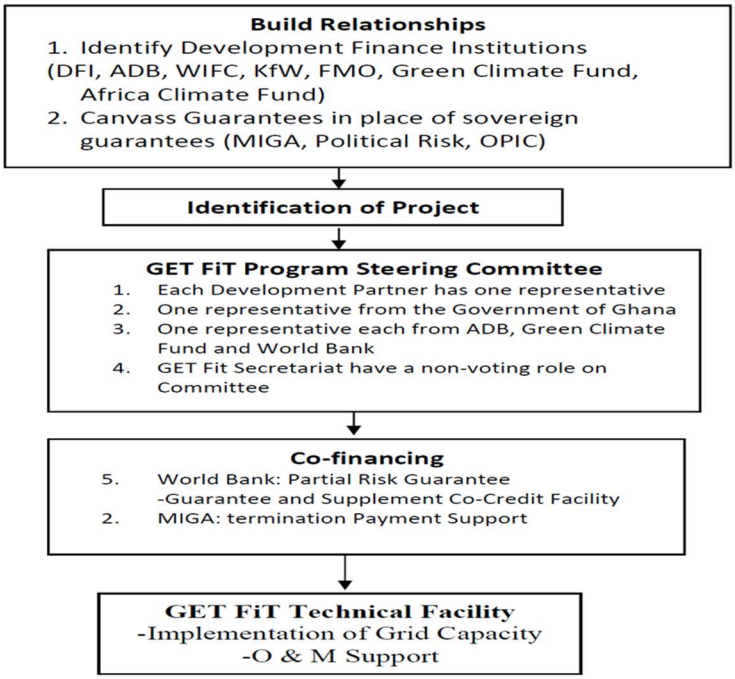
B Building Financial Relations for an Innovative Industrial Policy

The first step to implementing an innovative industrial policy that can manage the GET FiT initiative is to build relationships with potential partners. For example, if a GET FiT Program were to be initiated in Ghana, it could begin as a joint initiative between the Government of Ghana (Ministry of Energy), PURC and the ECG and international green climate funds (Green Climate Fund and/or African Climate Fund and African Development Bank).

[936] This diagram adopted features from GET FiT Uganda, *Annual Report 2014*, 8, online at: https://www.getfit-uganda.org/downloads/.

Figure 15 illustrates the successful industrial policy relationships that need to be forged between Development Financial Institutions (DFI) that can assist in securing initial project funds (the African Development Bank, the World Bank (International Finance Corporation), KfW and FMO). Ghana may also be able to apply for early funding from KfW or the African Development Bank to assist with transition services in the early stages of implementing projects. KfW and the African Development Bank can also play a role in providing a tariff subsidy to the ECG under the GET FiT program.

Figure 15: *Industrial Policy GET FiT Organization*



The GET FiT program also has the capacity to assist local governments in providing guarantees. In most cases an international sponsor would provide the guarantee for the GET FiT payment, which releases national governments of the obligation to enter into sovereign guarantees that act as national debts. Political risks can also be addressed through insurance offered by MIGA or other

private sector providers.

The African Development Bank could possibly act as the overseer of GET FIT Programs that obtain funding from the Green Climate Fund or the African Climate Fund. Similarly, the success of the Ghanaian renewable energy sector lies in its strategic partnerships. Once relationships have been established, innovative IPOs should ascertain any co-finance and credit investment approval requirements that the DFI will set for the project. For example, can a partial risk guarantee from the World Bank supplement government letters of credit?[937] This arrangement ensures that tariff payments from the state-owned utility will be covered by the partial risk guarantee. The MIGA guarantee may also include a termination payment support. These provisions remove the need for sovereign guarantees which act to encumber the financial obligations of the state. Countries like Uganda received approval on March 2014 from the World Bank IDA Partial Risk Guarantee ('PRG') facility for small-scale renewable energy projects in Uganda.[938] The US$160 million PRG facility is also used to mitigate investor risk by providing 'short term liquidity support' for PPA obligations, along with '[t]ermination compensation events of government/utility default under the PPA/ IA' and '[c]ommercial debt guarantee'.[939] In addition, the GET FiT Technical Facility provides training and development assistance to facilitate project implementation, as well as with respect to operation and maintenance.

[937] The Multilateral Investment Guarantee Agency, which is a part of the World Bank Group, has a coverage policy called 'Non-Honoring of Financial Obligations' ('NHSFO'), which 'protects the lender against losses resulting from a government's failure to make a payment when due under an unconditional financial payment obligation or guarantee' given in favor of a project that otherwise meets all of MIGA's eligibility requirements: MIGA Brief, *MIGA's Non-Honoring of Sovereign Financial Obligations Product*, online at: http://treasury.worldbank.org/bdm/pdf/MIGA_NHSFO_brief.pdf. Note that this product does not require a claimant to first go through arbitration or obtain a court order to receive a payout under the policy. Unlike arbitration award default (AAD) coverage that converts regulatory and commercial actions into 'political acts' irrespective of intent and provides coverage for these contractual breaches.
[938] GET FiT Uganda, *Annual Report 2015*, 15, online at: https://www.getfit-uganda.org/downloads/.
[939] *Ibid*.

C Creating Incentives to Invest: the Ugandaian GET FiT Model and its Application to Ghana

The Ghanaian GET FiT Program could begin by identifying key areas that would benefit from small-scale renewable generating projects (up to 20 MW). The GET FiT Program would be able to create an IPO that would govern the implementation of the Programs with three main objectives:[940]

1. GET FiT Premium Payment Mechanism (a results-based top-up);
2. Guarantee Facility (secures against off-taker and political risk);
3. Private Financing Mechanism (offers debt and equity concessional loans at competitive rates).

Each of the above instruments can work together and would be closely monitored by the GET FiT Program Steering Committee, which would include a representative from each development partner.[941] The Steering Committee may also have one representative from the Ghanaian government, with the African Development Bank or the Green Climate Fund, the World Bank and the GET FiT Secretariat having non-voting roles on the Steering Committee.[942]

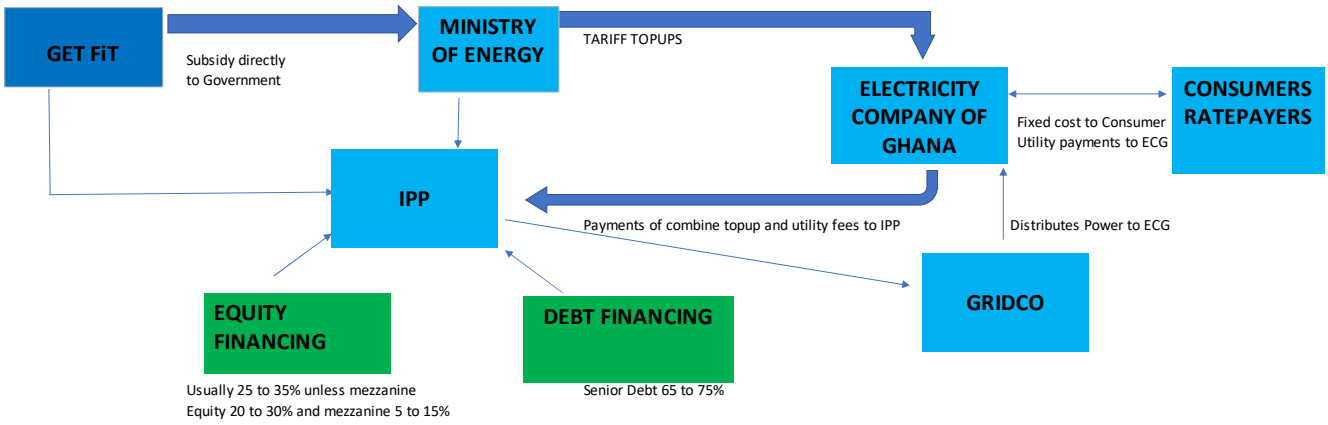
Ensuring that the PPA is bankable is also very important and thus the innovative industrial policy must work with the Government of Ghana (through the Ministry of Energy) to ensure that all contracts can account for currency pitfalls in the tariff rate as set by PURC and administered by the ECG. The tariff rate must be hedged against currency risk, especially beyond the construction stage when payments are due. The PPA could contain a price escalator to account for currency and interest rate risk by fixing the tariff rate in a stable foreign currency. If the tariff is not expressed in a stable foreign currency, then a provision must be included for the rate to be

[940] Note that there are similarities between the objectives as adopted by GET FiT Uganda. However, national peculiarities are not conducive to a cookie cutter approach.
[941] GET FiT Program Uganda, *GET FiT Information Letter*, online at: www.getfit-uganda.org/downloads/.
[942] *Ibid*.

fully adjustable, taking into account the foreign exchange rate risk. In addition, the fear that consumers will not be able to afford increased utility costs is addressed by guaranteeing that the off-taker pays the market rate to the IPP and that additional costs to the consumer are offset by this arrangement. The GET FiT payment portions are usually made in US dollars, thereby minimizing the currency risk.

The GET FiT Program would thus create an enabling environment that provides direct financial support and risk mitigating strategies to address barriers to investments. Once those concerns are mitigated, the IPP can enter into debt and equity financing with financiers. In the case of Ghana, the GET FiT Program could channel the funds to the Ministry of Energy, which would then divert them directly to the ECG (the party to the PPA).The payments under the PPA would be guaranteed by the GET FiT Program. In addition, the ECG could collect regular utility premiums and combine them with GET FiT guarantees to make direct payments to the IPP.

Figure 16: Providing Incentives to Invest: Tariff Top-Ups



As indicated in Figure 16, an innovative industrial policy approach would begin by addressing the overall issue of insufficient incentives by implementing a program like the GET FiT, which involves built-in top-up payments on the fixed tariffs offered by PURC.

Ghana has already completed the process of standardizing its legal documentation in the energy sector (PPA, Implementation Agreement, and Direct Agreements). This helps streamline the PPA process, and creates uniformity and consistency and assures developers and banks that contracts will not be hindered by lengthy negotiations and amendments, thereby reducing transaction costs for all parties. Having a bankable PPA (and/or IA) is a crucial part of an IPP's assessment of the project viability.

Ghana is currently ranked 29th by the Bloomberg New Energy Finance's Climatescope Report.[943]One of the primary impediments to the development of renewable energy projects in Ghana, and in sub-Saharan nations in general, is the request for governments to provide sovereign guarantees to investors. There are various possible solutions to this challenge. For example, Ghana could use 'front-loaded results-based premium payment designed to top-up' its feed-in tariffs which could be paid out in an accelerated payment over the first five years of operation.[944] Figure 16 highlights the process that could be adopted to facilitate front-loaded top-ups. The practice may instill confidence in investors by utilizing a top-up payment for the actual delivery of energy to the grid over the period of the PPA (which is usually 20 years).

The front-loaded mechanism has been used in other SSA countries like Uganda and has been described as a process of 'discounting the total support over the 20 years and disbursing these funds through the first five years of operation'.[945] The goal behind this innovative financing practice is to 'enable commercial lending to projects, by providing additional cash flow to project owners during critical (early) debt repayment periods'.[946] In the Ugandan case, the top-up amount for solar was set at USc/kWh 11 for a 20 year period with a 50% GET FiT premium offered on

[943] Climatescope 2016, online at: http://global-climatescope.org/en/compare/#?compare=gh&with=ug.
[944] See *Get Fit Uganda,2015*, *supra* note 938. This practice was implemented in Uganda.
[945] *Ibid*, 13.
[946] *Ibid*.

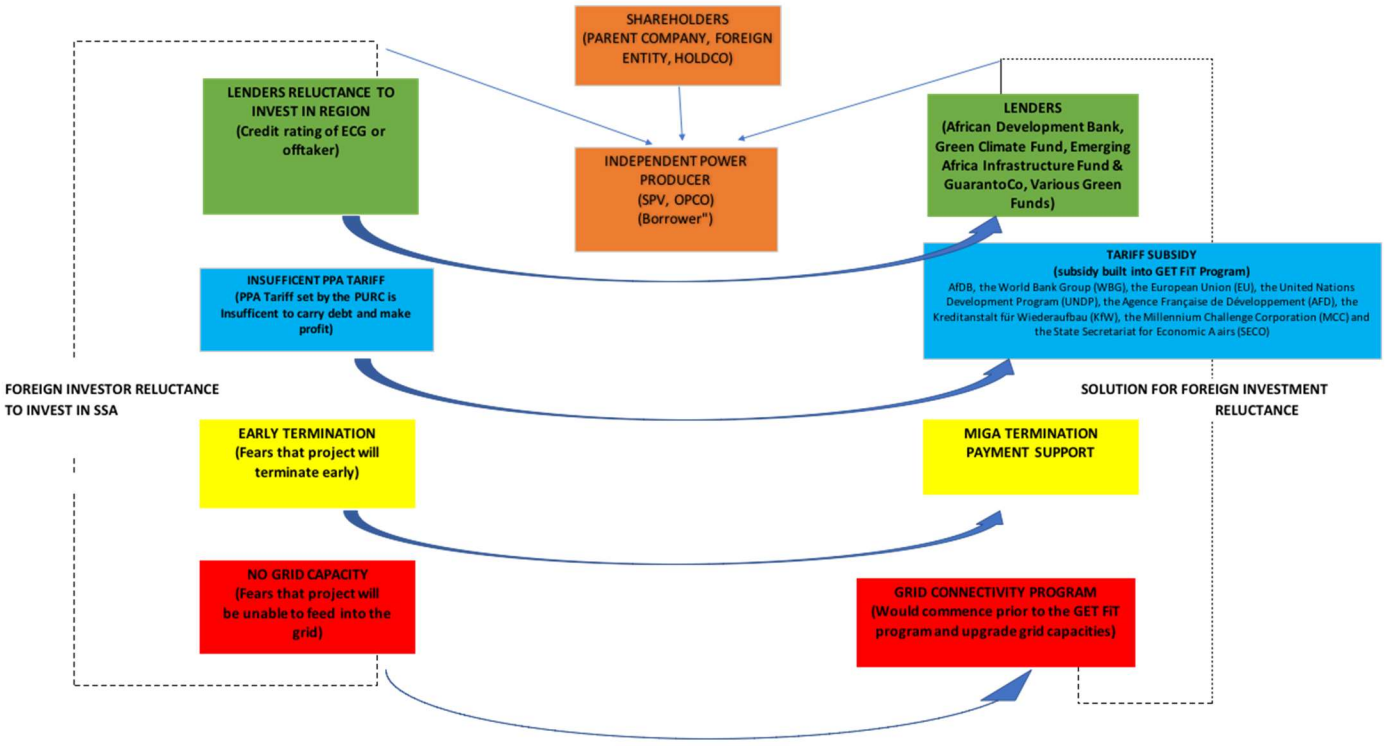
commercial operation date (COD) disbursed over the first five years of operation.[947] This policy and practice is attractive to investors, especially in the solar sector, which requires high financial outlays to reach the commercial operation stage. The goal of the premium upfront payment is to provide additional cash flow to the projects in the early critical stages of high debt repayment and cash outlay.[948]The local Electricity Regulatory Authority's contribution to the Facility is set at the tariff rate (which is set at US$0.11), while the GET FiT provides the top-up portion.[949]

After sufficient incentives to invest in the region have been established, the IPO should attempt to develop equity and debt partnerships. For example, in the Ugandan case, the equity portion was a combination of straight equity and a mezzanine debt facility offered by the Green Africa Power facility (with a commitment of £98 million from the UK government and £121 million from the government of Norway).[950] This arrangement allows debt financiers not only to invest in the project, but also to retain a small portion of the equity in the company (the Special Purpose Vehicle (SPV). In addition, local banks are often not equipped to advance financing based on a 15 or 20-year contract. Funds such as the Emerging African Infrastructural Fund lend money to the private sector at highly concessional rates and rarely consider long-term contracts beyond 10 years (which is usually not the case with conventional banks).[951] In addition, the GuarantCo fund addresses local currency debt issues by providing 'credit enhancement of local currency' to 'private, municipal and parastatal infrastructure sectors in lower income countries'.[952] GuarantCo also provides partial risk guarantee coverage and default risk guarantee for construction failures

[947] *Ibid*, 13.
[948] *Ibid*.
[949] *Ibid*,14.
[950]Green Africa Power, *Executive Summary* (2016), online at: www.greenafricapower.com/docs/GAP_executive_summary_2016.pdf.
[951] GET FiT Uganda, *1st GET FiT Stakeholder Meeting: Kampala, 9 April 2013*, 3, online at:https://www.getfit-uganda.org/downloads/.
[952] *Ibid*.

and revenue shortage.[953] In addition to the overall organizational barriers, financiers are concerned with direct financial impediments. The six barriers listed previously can be managed by implementing policies that directly address these investor concerns. Figure 17 below highlights some solutions for these investor concerns.

Figure 17: *Industrial Policy Solutions to Investor Concerns*[954]



As Figure 17 illustrates, even if all of the financial fears are addressed, an innovative policy organization must consider technical assistance issues which could impede the final implementation of a project. Even if Ghana is able to obtain financing for renewable energy projects, the problem of having sufficient capacity on the grid to accommodate the energy generated from the project also arises. Grid capacity issues can be addressed through innovative industrial policies that are aimed at grid optimization and modernization. In the Ghanaian case,

[953] *Ibid.*
[954] For similar concerns raised in Uganda, see GET FiT Uganda, *supra* note 951.

the Africa Development Bank, through the Green Climate Fund, can mitigate the risk by financing a high proportion of the overall capital needed for the project. Due to issues with interconnectivity in Ghana, innovative IPOs should include an Interconnectivity Support Assistance Program which will assist with transmission and distribution of the energy to and via the grid.[955] A key component of the innovative IPOs would thus need to ensure that the energy that is produced actually reaches the grid, and that the grid has capacity for the produced energy. In this regard, interconnectivity support is crucial and may need to begin early on, and be included as a part of financing projections.

Conclusion

This chapter has argued that resolving financing challenges to facilitate the development of renewable energy projects in SSA will require the implementation of innovative industrial policies. These policies need to bring together governments, developers, investors, global institutions like the World Bank and local entities such as the African Development Bank in a concerted effort to finance renewable energy projects in SSA. The chapter demonstrated that that despite the implementation of a FiT program and a regulatory framework that complies with World Bank recommendations, large-scale foreign investment in renewable energy projects have still not materialized among many SSA nations such as Ghana. In relation to climate change and energy insecurity in Africa, the chapter revealed that innovative IPOs can address some of the financial barriers to investors financing renewable energy projects in the region. The Ghanaian example demonstrates that creating a regulatory structure that incorporates the FiT is insufficient to allay the financial concerns of foreign investors. The SSA energy solution is intrinsically tied to the ability to obtain innovative private financing for energy projects. SSA state goals of development

[955] Clean Energy Pipeline, *Clean Energy Africa Financial Guide* (2015), online at: www.cleanenergypipeline.com.

cannot be satisfied without a viable energy infrastructure that will fuel industry and growth. Fortunately, SSA countries like Ghana can look to regional successes like Uganda for inspiration in implementing innovative IPOs that address the urgent energy and development needs, while simultaneously adhering to global environmental targets set under the *Paris Agreement*.

CHAPTER NINE

Conclusion

CONCLUSION

The collection of papers herein explored the connection between international law and local legal and regulatory harmonization efforts within developing countries like those in the sub-Saharan region. The chapters in this portfolio share a common theme that addresses whether WTO agreements impede the development of government climate change abatement policies because of the requirement that these programs meet a minimum standard of compliance with international law? This question was addressed by exploring a number of issues including whether climate change policies can be viewed as a "public good". Three other concerns arise as a corollary to the public good issue: whether the most-favour nation provision in the *GATT* that may render FIT as "subsidies"; whether local policies that can increase FDI; and, if sub-Saharan Africa requires its own unique climate finance strategies and innovative policy solutions. This study explored why countries like Ghana that adhered to processes of implementing enabling legislative and regulatory structures in sectors such as energy, were still not receiving a proportional share of foreign investments. It queried why, despite the implementation of various international laws, modification of the regulatory infrastructure and the approval of renewable energy projects, Ghana still was unable to attract FDI to finance these projects without a sovereign guarantee. While issues of development have persisted for a longer period with IPR, the energy sector is just beginning to implement the enabling environment to facilitate foreign investors.

A number of international trade agreements were predicated on the notion that increased harmonized standards would create a local environment that is conducive to attracting foreign investment and increasing trade. Beginning with *TRIPS*, many developing countries optimistically implemented global IP laws and standards, that would increase investor confidence and translate

into development initiatives within in the region. International trade agreements like *TRIPS* soon incorporated flexibilities that would assist developing nations in modernizing their local IP laws. The paper *The Applicability of TRIPS Flexibilities to the Developing World for Climate Change Mitigation as a Public Good in Green Technology Projects* concluded that flexibilities in *TRIPS* could be used for climate change abatement initiatives. Specifically, chapter 3 explored whether the applicability of flexibilities like national urgency (Article 31) in *TRIPS* could potentially be invoked for the purposes of obtaining access to green energy technologies.

The importance as energy as a precondition to development has been acknowledged by many international organizations including the WTO, the World Bank and the United Nations. Similarly, the commitment to encourage developing nations down a sustainable path with less reliance on fossil fuels is echoed across the globe. Unfortunately, sub-Saharan Africa has witnessed one too many failed international policies promising the fruits of modernization. Beginning with the failed optimism that joining the WTO brought and signing of *TRIPS* as a panacea for affordable medicines in the region, disappointments also emerged in the energy sector. Unfortunately, energy and development policies in many sub-Saharan African countries did not cure local impediments to attracting FDI.

The gap between how a policy is conceived and implemented is often related to intervening local factors. In the case with several sub-Saharan nations, implementing an entirely new national regulatory framework for the purpose of attracting investments was insufficient, and this shortcoming raises questions about the inflexibility of the imposed international policy framework. The affordable medicines example informs us of an instance where an international treaty, namely *TRIPS* (Article 31), represented a local barrier to accessing the very resource that the treaty protected. In the case with *TRIPS*, many developing nations were unable to afford

medicine to treat their citizens due to the global harmonization of patent laws. Flexibilities needed to be imposed in order to counteract this unintended negative outcome. In a similar manner, chapter 3 explored whether climate change can be regarded as a "public good" in the same manner as affordable medicines? This raises questions about whether exceptions and flexibilities should be included in international treaties to account for global climate change commitments. This chapter found that patents have increased the cost of green technology, which has a negative effect on developing countries. The impact of patents on green energy projects is most profound in the area of technology transfer. Specifically, this research found that not only can patents affect technology transfer that may be necessary to meet environmental targets, but that international treaties may also pose obstacles. For example, Article 31 of *TRIPS* permits for an exception to patent terms on the basis of "national urgency", however, it is unclear whether the provision can be applied in the case of climate change. In any event, most of the solar panels in question are off-patent, so one may argue that harmonized global patent laws do not have a negative impact on the green energy industry. This research has found that even though products may be off-patent, the enhancements made to them may be protected by a trade secret (which runs as long as the secret remains undisclosed). This reality raises issues about corporate abuses that may arise from the practice of "evergreening".

The FIT scheme is another example of where policies derived from international organizations and treaties may have unintended consequences. The FIT scheme is an international policy recommendation that has been implemented in several sub-Saharan African countries to attract renewable energy project investments but concern arises on the issue of climate change as a subsidies may affect the desired policy outcome. The paper *The WTO Canada Renewable Energy Feed-In Tariff Case and its Application to Green Energy Projects in the Developing*

World: The Abdication of the Subsidies and Countervailing Measures Agreement within Green Energy Conflicts highlighted the role of FIT Programs as a commonly used policy tool to encourage renewable energy usage in the developing world. Chapter 4 explored the impact of international agreements like the *SCM Agreement* on FIT initiatives on sub-Saharan Africa. Countries like Ghana implemented significant regulatory changes to the energy sector, however, these enhancements were still insufficient because of potential conflicts between international law and local policies like FIT. The *Canada Renewable Energy/FIT* case raises questions about whether local policies aimed at addressing climate change will be attacked as subsidies under the *SCM Agreement*. The *Canada Renewable Energy/FIT* case did not unequivocally address whether FIT schemes that guarantee payments to foreign developers to encourage investments and mitigate risks, will be considered a subsidy under the *SCM Agreement*. This highlights concerns relating to the compatibility of some international agreements with local sustainable development policies. The *Canada Renewable Energy* case also calls on the WTO to reconsider the viability of a non-actionable subsidy category for renewable energy projects that may be challenged FIT as an incentive to local energy producers under the most favoured nation provision of the *GATT*. The *Canada Renewable Energy* case leaves a number of unanswered questions in the area of subsidies and climate change. Specifically, the ambiguity of the decision of whether feed-in tariffs are subsidies creates uncertainty for nations like Ghana that have recently changed the regulatory framework as well as those that have implemented incentive energy programs like FIT. Finally, this chapter concluded that if FIT programs are deemed to be subsidies, then considerations should be extended to granting an exception under the *SCM*.

This study also found that international agreements can facilitate or impede local climate change strategies. Chapter 4 reviewed the local policy instrument of FIT to encourage renewable

energy investments and projects in sub-Saharan Africa. In *The WTO Canada Renewable Energy Feed-In Tariff Case and its Application to Green Energy Projects in the Developing World: The Abdication of Subsidies and Countervailing measures Agreement within Green Energy Conflicts* it was found that treaties like the *SCM Agreement* may have a direct impact on local climate change policies. The removal of the non-actionable subsidies provision from the *Agreement* means that policies like FITs (which is the most commonly used renewable energy policy world-wide) could be attacked as creating trade barriers under the MFN clause of the *GATT*. While the WTO Dispute Settlement Body addressed the issues of FIT and subsidies, there was no clear determination of whether FITs should be classified as a subsidy under international law. The *Canada Renewable Energy* case highlights the connection between international treaties like the *GATT*, and how local policies will be interpretation by the WTO Dispute Settlement Body. The decision also creates uncertainties for development policies like technology transfer and local content requirements that directly promotion the growth of local industries for development purposes. Serious consideration needs to be given to whether the *SCM Agreement* should create a non-actionable provision for climate change abatement strategies. Again the issue of unintended consequences gives rise to questions regarding whether regional development needs may require that "flexibilities" be read into international treaties like *TRIPS,* the *GATT* and the *SCM Agreement*. This research revealed a paradox of developing nations implementing enabling regulatory frameworks to attract foreign investments, while international organizations maintain unclear treaty provisions that may create uncertainty for foreign investors.

Chapter 5 considered whether there are existing corporate practices that may impede the transfer of green technology to the developing world. In *Evergreening Through Trade Secrets as an Impediment to Green Technology Transfer to the Developing World* the impact of life-extension

strategies like evergreening was explored within the context of climate change abatement technology. The practice of evergreening through extending the life of a patent through an enhancement protected by a trade secret may impact on the transfer of green technology to the developing world. In this regard, it was found that the protection of off-patent technologies through trade secrets that have no fixed expiry periods, may inadvertently act as a barrier to green technology transfer in the developing world. Similarly, global patent protection as contained in *TRIPS* has an unintended consequence of permitting products to be evergreened. This practice was popularized in the pharmaceutical sector to extend the lifecycle of popular medicines. The concern within the energy sector is that treaties like *TRIPS* may lead to inequalities for developing nations, especially for products like photovoltaic solar panels that rely heavily on trade-secret protection. Climate change National Determined Contributions (NDC) under the *Paris Agreement* may have technology transfer provisions, especially for renewable energy products. The issue of evergreening may limit access to products that should be in the market but protected indefinitely under a trade secret. Chapter 5 found that trade secret protection of off-patent green technologies may act as an inadvertent barrier to technology transfer within the developing world, and may facilitate corporate abuses such as "evergreening". This chapter gives rise to similar concerns surrounding whether flexibilities need to be read into Article 39(2) of *TRIPS* relating to setting a term limit (perhaps 20 years as with patents) on how long a trade secret that deals with environmental abatement can be protected.

The paper *A Study of the Economic and Technical Analysis of Large Scale Photovoltaic Plants in Ghana: A Model to Increase Foreign Direct Investments* demonstrated that implementing sustainable energy regulations within the region is insufficient to attract foreign investors. The paper addressed a model that foreign investors may use to assess the cost of producing the

electricity (Levelised Cost of Electricity "LCOE") versus the rate that is offered under the PPA and also charged to the consumer. This study is important because there were no clear *indicia* of LCOE within sub-Saharan Africa. In addition, very few studies focuses on the LCOE in Ghana from the perspective of attracting foreign investments. The study is also important because it identified a number of factors, like bankability of the PPA, that can reduce the LCOE. Instead practical environmental and cost factors including region factors like political risk, bankability of the PPA and sovereign guarantees were identified as complementary to regulatory reform. Chapter 6 revealed that in order to attract foreign investors, risk mitigation initiatives must complement not only regulatory reform but also local finance facilitating factors.

This research also found that a financial policy infrastructure needs to be created within developing nations. Chapter 7 identified regionally specific financial risks for sub-Saharan Africa and examined possible solutions. In *Creating a Green Energy Infrastructure in Sub-Saharan Africa: Climate Finance as an Innovative Solution to the Under-Representation of Sub-Saharan Africa in Green Energy Projects*, various climate finance instruments aimed at addressing the problem of sustainable development in Africa were advanced. This research found that international agreements and the harmonization of local laws and regulatory processes is insufficient to facilitate sustainable development, especially within the renewable energy sector in sub-Saharan Africa. Issues of long-term climate finance were not resolved with the *Paris Agreement*, although it does lend support to mitigation through its financial mechanisms. This does not reduce the need for regional financial solutions to be implemented on a country-by-country basis, rather than merely project specific outcomes. The specific regional considerations are essential for the success of international commitments as found in the *Paris Agreement*. The financial risk of the project continues to overshadow strong local policies like FIT, this is also

compounded by uncertainty in the international legal regime on whether such ventures will eventually be considered as subsidies. This chapter highlights the need for climate finance in mitigating investor risks and instilling confidence.

Despite the World Bank's recognition in 1993 that Africa's power sector required technical and financial infusion,[956] and that the energy problem in Africa was related to "the lack of institutional infrastructures",[957] it was not until 21 years later that, the United Nations realized that industrial development in Africa necessitates the implementation of "effective Industrial Policy Organizations (IPOs)".[958] Chapter 8 builds on the early theme that developing nations need to project beyond the international harmonization of laws to include changes in local policy organizations. In *Innovative Policies for Overcoming Barriers to Financing Green Energy Projects in Sub-Saharan Africa* the paper addressed regional financial impediments that act as barriers to attracting foreign investors in renewable energy projects. The paper revealed that local obstacles to climate financing can be mitigated by implementing policies that increase investor confidence. The Ghanaian case study revealed that despite regulatory energy reform, the country still was unable to attract foreign investors in the renewable energy sector. Of the numerous solar PPAs issued, only one reached financial close and that project was privately financed by a Chinese conglomerate. On the other hand, success stories like Uganda exists in sub-Saharan Africa and it was found that the reluctance of private investors could be mitigated by implementing innovative industrial policy solutions like the GetFiT initiative.

Regional and financial impediments were also identified as barriers to the implementation alternative renewable energy choices in sub-Saharan. In this regard, the lack of FDI on the sub-

[956] United Nations Economic Commission on Africa, *supra* note 886.
[957] *Ibid*.
[958] *Ibid* at xvi.

Saharan continent is connected to factors beyond the implementation of an enabling regulatory framework as recommended by international organizations like the World Bank. This chapter reviewed the mitigation of local obstacles that affect private climate financing within the sub-Saharan African region. Equally important are the local conditions that explain the reluctance of private investors to undertake projects in sub-Saharan Africa. For example, there are risks beyond those identified by the World bank that are specific to the sub-Saharan Africa. Consequently, solutions for attracting FDI to the region must address these regionally specific risks. This analysis requires the connection between public policy, finance and private investments. For example, what good is a feed-in tariff program if the existing grids are too old to support any newly generated electricity. Surely, a policy would be needed to provide financing to upgrade the grid capacity or provide some alternative to the existing grid. These are some of the policy solutions that require specific local consideration and implementation and cannot be achieved by an overarching policy paper from organizations like the UN or the World Bank. The World Bank's implementation of the Scaling Up Renewable Energy Program (SREP) Program in Ghana was an attempt to address some of the local problems and also learn from past mistakes. However, while the program identified a number of financing problems in Ghana, it fell short of resolving Ghana's low capacity grid problem. Simply put, investors are not interested in building a power station that cannot be fed into the grid because of capacity problems. As a temporary solution, the SREP program uses rooftop and battery operated standalone systems that do not need to be fed into the grid. This chapter highlighted factors beyond those traditionally identified (currency risk, political risk, and sovereign risk) to include local technical problems that need to be corrected if for investors to consider green energy projects in the region.

The question of why sub-Saharan countries like Ghana that have implemented regulatory

energy reform, were not been able to attract FDI within the green energy sector, while other countries like India, China and Mexico have succeeded in attracting foreign investors for green energy initiatives is partially answered by examining local impediments. Several success stories like Uganda emerged in sub-Saharan Africa, and it was revealed that such nations tailorized their climate finance policies to overcome local issues and barriers. This study found that countries like Uganda identified specific financial risks that were germane to green energy projects within their country, and proposed possible solutions for mitigating investor concerns. These solutions explored the connection between public policy, finance and private investments and the optimum domestic policies for mitigating investor risk concerns.

The collection of papers has revealed one simple truth: the panacea of implementing an enabling regulatory structure to attract certain investments into a region has proven to be a simplistic solution to the problem of sustainable development in sub-Saharan Africa. Despite many sub-Saharan nations implementing an enabling regulatory framework as recommended by international organizations like the World Bank, this did not address the local barriers to finance. This research has shown that specific regional climate finance initiatives must be undertaken to address local problems. Examples of this approach have been adopted in the Ugandan example. However, clear investment barriers appear to exist to prevent foreign investors from initiating high capital projects such as solar PV plants within the region. For example, several green energy projects have been approved in Ghana (with an energy license being issued by the governing body), despite this approval, the projects have had difficulty acquiring construction financing. With respect to energy and development, attracting FDI must include changes to the structures and processes that go beyond mere regulatory changes to include local factors that address barriers to investments.

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