

# Strategic Responses to Global Climate Change: Conflicting Pressures on Multinationals in the Oil Industry

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*ABSTRACT MNCs are increasingly facing global environmental issues demanding coordinated market and non-market strategic responses. The home country institutional context and individual company histories can create divergent pressures on strategy for MNCs based in different countries; however, the location of MNCs in global industries and their participation in 'global issues arenas' create issue-level fields within which strategic convergence might also be expected. This paper analyzes the responses of oil MNCs to climate change and finds that local context influenced initial corporate reactions, but that convergent pressures predominate as the issue matures.*

Trans-Atlantic responses by multinational corporations (MNCs) in the oil industry to the prospect of international controls on greenhouse gases have been strikingly different. U.S.-based companies such as Exxon and Chevron have aggressively challenged climate science, pointed to the potentially high economic costs of greenhouse gas controls, and lobbied against mandatory emission controls.<sup>1</sup> In addition to these political strategies, U.S. companies have invested little in alternative energy sources and some have even divested renewable energy assets in recent years. By contrast, BP and Shell, the two largest European companies, have accepted the scientific basis for precautionary action, expressed support for the Kyoto Protocol on greenhouse gases, and announced substantial investment plans for renewable energy.

These divergent strategies each represent a coherent blend of market and non-market strategies.<sup>2</sup> The American firms have been investing their resources primarily in political strategies to prevent a binding protocol and to defend their existing asset and competency base. The European firms have invested more

1 Bartsch and Muller (2000). The 1997 Kyoto Protocol to control greenhouse gases (GHG) could result in carbon taxes ranging from \$20 to \$350 per ton; a \$100 carbon tax is equivalent to \$13 per barrel of oil, or 30 cents per gallon of gasoline.

2 Baron (1995).

modest resources in political efforts to shape the emerging climate change regime, to generate positive public relations from this stance, and to develop new lower-carbon technologies and products. The differences among the companies defy simple explanation, however. The more obvious economic and technological characteristics of the companies, such as the carbon intensity of their production and reserves, are similar in profile.<sup>3</sup> Indeed most of these companies are large, integrated multinationals with comparable strategic capabilities, and they possess production and distribution operations throughout North America, Europe, and the Middle East. Given the degree of globalization in this industry and the undifferentiated product, we might expect a high degree of strategic convergence.

To explore this divergence, we review the theoretical literature on MNC strategies, which primarily emphasizes the tension between the pursuit of global integration and local responsiveness.<sup>4</sup> Our focus on climate change introduces a new element to this discussion, because there has been little scholarly attention given to the question of MNC strategies toward social and environmental issues negotiated within global arenas. We argue that MNCs generally need to respond with coordinated global market and non-market strategies to such issues. These strategies, while relatively unified and coherent for each MNC, might nevertheless differ among MNCs due to their embeddedness in particular home country institutional and market contexts, and the unique history of each MNC. However, the location of MNCs in global industries and their participation in 'global issues arenas' constitute common organizational fields within which strategic convergence might be expected.

This case study supplies a rich source of data with which to analyze the shifting balance of divergent and convergent pressures on MNC strategies; indeed, strategies were shifting while the study was underway. Home country and firm level context influenced initial corporate reactions, but convergent pressures at the global industry and issue level tended to predominate as the issue matured. The significance of the study extends to issues of public policy. The combustion of oil-based fuels accounts for nearly half of greenhouse gas (GHG) emissions in industrialized countries, yet oil companies control substantial technological, financial, and organizational resources that could be mobilized to address the problem. The study also has managerial relevance. Given the uncertainty and the high stakes involved, managers' need to avoid being trapped in an "iron cage" of institutionalized perspectives.<sup>5</sup>

### **Theoretical background**

The conflicting pressures on MNCs' strategies are well recognized in the International Business literature. Rosenzweig and Singh write that "On one hand, a multinational enterprise is a single organization that operates in a global

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3 Rowlands (2000).

4 Prahalad and Doz (1987).

5 DiMaggio and Powell (1983).

environment, with a need to coordinate its far-flung operations. On the other hand, an MNE is comprised of a set of organizations that operate in distinct national environments.”<sup>6</sup> Bartlett points to the benefits of economies of scale and global sourcing that derive from a unified strategy coordinated across an MNC’s global operations.<sup>7</sup> At the same time, he recognizes the considerable value of a multidomestic strategy, adapting to each country’s local culture, market conditions, regulatory environment, and technical standards. Bartlett argues that MNCs should pursue a “transnational” strategy, combining the benefits of global scale and learning with a degree of local responsiveness.

Corporate political strategies generally need to respond to local political and cultural contexts to a greater extent than product market strategies. Baron (1997) argues that “Non-market strategies... tend to be less global and more multi-domestic, that is, tailored to the specific issues, institutions, and interests in a country.”<sup>8</sup> Similarly, Hansen and Mitchell found that foreign subsidiaries of MNCs adapt their political strategies to meet host country conditions, though foreign firms tended to try to avoid high-profile activities.<sup>9</sup> However, this emphasis on multi-domestic non-market strategies may not hold for industries that are more global in scope. Lin’s study of American chemical multinationals in Asia indicated that these companies adopted non-market strategies based on their home-country environment; moreover, they worked through an international industry association and multilateral trade organizations to internationalize the self-regulatory American model.<sup>10</sup>

Oil industry responses to climate change are likely to reflect this more global pattern. First, climate change is a global issue with an emerging inter-governmental institutional infrastructure emerging out of multilateral negotiations. While other environmental concerns, such as automobile and power plant emissions that affect local air quality, are also widely regulated in many countries, standards and mechanisms are largely national or regional in scope. By contrast, issues such as climate change, ozone depletion, and genetically modified organisms are negotiated and regulated in the context of international environmental regimes, within unified multilateral arenas;<sup>11</sup> MNCs thus have little choice but to develop unified company-wide positions regarding the scientific, regulatory, and economic aspects of such regimes. The cost of failing to do so became evident for Shell in the mid-1990s, when Shell Europe moved toward acceptance of the need for internationally agreed greenhouse gas emission controls while Shell U.S. was still a member of the Global Climate Coalition (GCC), the industry association which lobbied aggressively against any such measures. This inconsistency complicated the company’s efforts to pursue a particular political strategy, and became a severe liability when it was publicized by environmental NGOs, leading Shell U.S. to leave the GCC in 1998. Clearly, implementation techniques, such as the channels of political

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6 Rosenzweig and Singh (1991), p. 340

7 Bartlett (1989).

8 Baron (1997).

9 Hansen and Mitchell (2001).

10 Lin (2001). See also DeSombre (2000).

11 Haas, Keohane and Levy (1993); Young (1994).

access, might vary from country to country, but the broad terms of support or opposition to international emission controls need to be coherent and coordinated.

Second, the tight linkage required between market and non-market strategies makes it difficult to pursue diverse political strategies if the market environment demands a global product and technology strategy. Oil is the archetypal global industry. It is a commodity with a uniform international price and the major companies tend to adopt global rather than multidomestic strategies, at least in their production and refining operations.<sup>12</sup> Although Rosenzweig and Singh thought it unlikely that MNCs would ever “face a global competitive domain, a global political domain, a global social domain, and a global technological domain”,<sup>13</sup> the engagement by oil companies with the climate issue comes close to this situation. Recognizing the need to coordinate their worldwide market and non-market strategies, most of the large oil MNCs have formed internal cross-functional “climate teams” for precisely this purpose. The large auto MNCs have also formed climate teams, but the position of these companies is more complex, due to the layering of the climate issue on top of a regional industry structure of production, marketing, and emission regulation.<sup>14</sup>

If oil MNCs pursue unified global strategies, the question remains as to how that strategy is determined. Exxon and BP both pursue global climate strategies, but these strategies differ substantially. One possibility is that strategy is set primarily in reference to the MNC’s home country conditions. Porter’s “diamond of competitiveness” links firms’ national origins with strategy.<sup>15</sup> The success of MNCs in international markets, according to Porter, is a function of four home country attributes: demand patterns, factors of production, the competitive environment, and a network of related industries. If these country-based attributes shape corporate capabilities, then the resource-based view of strategy suggests that they also influence strategic choices of markets and technologies.<sup>16</sup> Similarly, Huo and McKinley argue that national labor force characteristics affect strategy,<sup>17</sup> and Sethi and Elango, as well as Murtha and Lenway, contend that cultural, institutional, and political dimensions of the national environment drive corporate capabilities and strategies.<sup>18</sup> Pauly and Reich, challenging the notion of the truly global firm, concluded that the “legacies of distinctive national histories continue significantly to shape the core operations of multinational firms.”<sup>19</sup>

A second possibility is that the ongoing internationalization of sales, supply chains, and management structures can decouple MNCs from their domestic roots. Global, stateless corporations with ownership and management spread across multiple countries are, some argue, increasingly dissociated from any

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12 Grant and Cibin (1996); Yergin (1991).

13 Rosenzweig and Singh (1991), p. 343

14 Levy and Rothenberg (2002). See also Shaffer (1992).

15 Porter (1990).

16 Wernerfelt (1984).

17 Huo and McKinley (1992).

18 Sethi and Elango (1999); Murtha and Lenway (1994).

19 Pauly and Reich (1997) p. 3.

particular home country.<sup>20</sup> Vernon, whose product life cycle theory underlies the “demand” point of Porter’s diamond, had already recognized by 1979 that a network of subsidiaries could reduce an MNC’s information costs and increase responsiveness to international opportunities.<sup>21</sup> More generally, the “heterarchical” MNC can draw on country-specific advantages through its international network, regardless of country-of-origin.<sup>22</sup> As a result of competition in a common global industry, we might expect to see MNCs converge in their ‘international production networks’.<sup>23</sup>

### **Institutional Influences on Strategy**

There are two reasons for thinking that institutional factors are particularly important in explaining strategic differences in the oil industry. First, Oliver has argued that institutional influences are stronger under conditions of uncertainty,<sup>24</sup> because managerial discretion is higher when the economic consequences of actions are unclear. For oil companies facing the climate issue, great uncertainty surrounds the future of climate science, emission regulation, and markets for alternative technologies. The future of the Kyoto Protocol remains unclear, nor is there any degree of certainty concerning the future level of carbon taxes or credits. Moderate controls on emissions of carbon dioxide would adversely affect coal, a high carbon fuel, and benefit gas, a relatively low carbon fuel, but the impact on oil demand is less clear,<sup>25</sup> and there is no straightforward method for calculating optimal strategies *a priori*. Investments in renewable energy sources might yield first mover advantages in vast new markets or could prove to be a waste of money.

A second reason to look to institutional factors is that the traditional economic determinants of strategy, particularly the external competitive environment and internal resources and capabilities, are similar for the companies (see table 5). Their geographical profiles, in terms of distribution of reserves and markets, are quite comparable, and they all access the services of independent specialized exploration and drilling companies.<sup>26</sup> Perhaps more than any other industry, oil companies approach strategy in an internationally coordinated manner, while utilizing global sourcing, integration, and rationalization to achieve economies of scale and low costs.<sup>27</sup> As a result of their exposure to a common global industry

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20 Ohmae (1995); Reich (1991).

21 Vernon (1979).

22 Bartlett and Ghoshal (1986); Bartmess and Cerny (1993); Roth and Morrison (1992); Solvell and Zander (1995).

23 Ernst and Ravenhill (1999). Ernst and Ravenhill observed a partial convergence between American and Japanese MNCs in the electronics industry, partly attributable to Japanese emulation of the strategies of American MNCs.

24 Oliver (1991).

25 Bartsch and Muller (2000).

26 Rowlands (2000).

27 Ernst and Steinhubl (1999); Yergin (1991).

and possession of similar technological and economic resources and capabilities, the oil companies might be expected to pursue similar strategies.

Institutional theory offers the potential to explain the different strategies pursued by European and U.S.-based oil companies. Institutional environments are associated with particular organizational fields, which comprise "those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resources and product customers, regulatory agencies, and other organizations that produce similar services or products."<sup>28</sup> In situations where managers have significant discretion, corporate strategy can be influenced by the location of firms in organizational fields with strong cognitive, normative, and regulatory pressures.<sup>29</sup> These institutional environments shape corporate perceptions and interpretations of technological and market potential, regulatory constraints, firm-specific capabilities, and other factors. Sharma, for example, found that differences in managerial interpretations were influenced by certain factors in the organizational context, including the legitimation of environmental issues as an integral aspect of corporate identity and the discretionary slack available to managers for creative problem solving.<sup>30</sup> These cognitive and normative frames of reference in turn affect the strategy formation process. Murtha, Lenway, and Bagozzi (1998), for example, argue that "key aspects of international strategic capabilities derive from managers' cognitive processes"<sup>31</sup> and Prahalad and Doz suggest that strategic change in MNCs begins with a reorientation of the mind-sets of senior managers.<sup>32</sup> The institutional drivers of strategy are important because, as Hoffman has argued, "the debate over environmental issues such as climate change is determined by which actors are engaged, what kinds of problems are debated, how those problems are defined, and what kinds of solutions are considered appropriate."<sup>33</sup>

Multinational corporations are subject to conflicting strategic pressures arising from the institutional environments of their home country, the host countries, and the global industry.<sup>34</sup> The distinct regulatory and cultural contexts of countries suggests that the home country environment is a coherent organizational field likely to exert a powerful influence on MNC strategy formulation, creating divergent pressures on companies headquartered in different countries.<sup>35</sup> Schneider and de Meyer link "perceptions and interpretations of the environment, the organization, and the strategic issue" with national cultures.<sup>36</sup> Sethi and Elango also note that cultural values and norms are an important element of the country of origin effect.<sup>37</sup> These institutional influences are likely to preserve the legacy of the country of origin, even in highly internationalized companies,

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28 DiMaggio and Powell (1991) p. 143.

29 Scott and Meyer (1994).

30 Sharma (2000).

31 Murtha, Lenway, and Bagozzi (1998) p. 97.

32 Prahalad and Doz (1987).

33 Hoffman (1999) p.1369

34 Gooderham, Nordhaug and Ringdal (1999); Kostova (1999); Westney (1993).

35 Rosenzweig and Singh (1991); Kostova and Roth (2002).

36 Schneider and de Meyer (1991) p. 308.

37 Sethi and Elango (1999).

because most MNCs still concentrate their senior management responsible for strategy in the country of origin. One possible explanation for the differences among the oil companies is thus that climate strategies are formulated in the context of cognitive frames and regulatory systems reflecting home country environments. It is widely believed, for example, that European consumers and regulators are more concerned than their American counterparts about the natural environment, and are more likely to make economic sacrifices for environmental benefits.<sup>38</sup> These differences are likely to influence corporate forecasts of consumer demand for fossil fuels and alternatives, as well as their expectations concerning the likelihood and stringency of regulation.

The country of origin effect is not the only way that institutional pressures can lead to strategic heterogeneity. Each company's unique history and culture affects its response to institutional pressures. Companies that experienced a history of losses associated with alternative energy sources are likely to institutionalize a negative view toward the future prospects of such technologies.<sup>39</sup> While some companies still believe environmental regulations are a burdensome imposition, others are embracing the notion that proactive environmental management practices can offer 'win-win' strategic opportunities.<sup>40</sup> Within the MNC itself, strategies and practices developed in the home country are not necessarily transmitted evenly to all subsidiaries. Kostova argues that such transfer is hindered when home and host countries possess different institutional profiles.<sup>41</sup>

While country of origin and individual company differences create divergent pressures on strategy, MNCs competing in global industries are subject to the convergent pressures generated by a common industry-level field. The progressive delinking of oil industry MNCs from their home countries and the growing importance of the global oil industry as the dominant organizational field constitute an important force for strategic convergence among oil MNCs. The trend toward cross-border mergers and acquisitions, such as BP-Amoco, reinforces this orientation. The major oil companies refine and sell petroleum products in each other's markets, so they are subject to similar sets of regulatory pressures. Given the keen awareness of interdependence in a global oligopoly and the difficulty of differentiating their products, companies are likely to copy each others' moves to prevent rivals from gaining undue advantage.<sup>42</sup> Industry interdependence also takes a collaborative form, within industry associations and in alliances and joint ventures. Executives read the same trade journals and the same industry studies. Participation in the global oil industry thus exerts cognitive, normative, and regulative pressures toward convergence.<sup>43</sup>

The emergence of climate change as a 'global issues arena' constitutes a second convergent influence. Little scholarly attention has been paid to the implications for MNCs of the multilateral negotiations and binding international

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38 Kempton, Craig and Kuennen (1995); Kempton and Craig (1993).

39 Levy and Rothenberg (2002).

40 Porter and van der Linde (1995); Reinhardt (2000).

41 Kostova (1999).

42 Chen and MacMillan (1992); Chen and Miller (1994); Knickerbocker (1973).

43 Scott and Meyer (1994).

treaties associated with issues such as climate change, ozone depletion, and biodiversity. The network of actors involved in a global issues arena interact frequently and develop their own organizational frameworks, thus constituting sub-fields with isomorphic pressures. The senior managers responsible for climate-related strategy in the major companies know each other well and meet regularly at international negotiations, conferences and other events. They interact within issue-specific sub-groups of organizations such as the International Chamber of Commerce, which are developing institutional structures around the climate issue. These managers are therefore likely to develop common cognitive and normative frames, so that they come to view climate science and the threats and opportunities arising from regulation and new technologies in similar ways.

To sum up the theoretical framework, oil MNCs facing the climate change issue are expected to develop unified company-wide strategies, but these strategies might vary across firms. Institutional pressures are likely to be important determinants of responses to climate change due to the high level of uncertainty associated with the issue and the similarity of economic determinants of strategy for the companies. The oil MNCs are subject to two sources of divergent institutional pressures, stemming from their home country environments and each individual firm's history and experiences. Two sources of convergent pressures are participation in the global industry and in the climate change issue itself.

The balance of divergent and convergent forces is liable to shift over time. We posit that divergent pressures initially predominate, as local context influences initial corporate reactions to emerging social and environmental issues, but that convergent pressures increase as an issue matures. When a new issue such as climate change first emerges, uncertainty is very high regarding the scientific issues, technological alternatives, and potential regulatory responses. In the absence of significant inter-firm communication and coordination, firms are likely to respond based on their existing institutionalized repertoires of understanding that are company-specific and related to their home country's national cultural and regulatory contexts.

Over a period of time, a more sophisticated understanding of the science emerges and mechanisms for regulating emissions, monitoring, and enforcement become institutionalized. In the case of climate change, this maturity was signaled by the release in 2001 of the Third Assessment Report of the Intergovernmental Panel on Climate Change, the voluminous official output of collaborative efforts by more than two thousand scientists to inform the international negotiating body concerning climate science, likely impacts, and approaches to mitigation.<sup>44</sup> The report, drafts of which were available during 2000, significantly strengthened the scientific consensus concerning the anthropogenic causes of climate change and its likely severity. A number of corporate scientists also were drafted to participate in writing and reviewing the report, integrating them to some extent into the 'epistemic community' associated with this

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<sup>44</sup> The report is commissioned by the IPCC and produced under the auspices of the World Meteorological Association and the United Nations Environmental Programme. Available at <http://www.ipcc.ch>



regime.<sup>45</sup> Detailed mechanisms for emission trading and for funding technology transfer to less developed countries were devised at the fifth Conference of the Parties (COP-5) in Bonn in 1999 and at COP-6 in the Hague in 2000. By this stage, corporate representatives from a core group of oil, coal, automobile, and chemical companies had been meeting several times a year at negotiation sessions, conferences, and industry associations. As the companies became more aware of their competitors' responses and more enmeshed in issue-specific international regulatory and scientific institutions, they began to coordinate their responses to the issue within cross-national industry associations and issue-specific working groups. These intense interactions strengthened the issue-level organizational field within which strategic convergence might be expected.

### **Methodology**

The purpose of this study was to examine why companies in the oil industry, with similar internal competencies and external market conditions, might pursue such different strategies. In our study, which was based on an inductive approach,<sup>46</sup> the initial hypothesis was that trans-Atlantic differences in oil company responses were a function of the home country institutional environment. Exxon and BP were selected because they are frequently held to epitomize the divergent responses of American and European firms.<sup>47</sup> Shell is the only other large integrated European oil major. Texaco was included partly for reasons of access and partly because its strategy has recently diverged from Exxon's. The four companies thus enabled us to study inter- and intra-regional similarities and variations, providing a limited degree of theoretical replication.<sup>48</sup> While case studies have obvious limitations regarding generalizability, recent mergers have resulted in the industry being dominated by four super-majors. Our research encompassed the dominant partner in three of these companies and Texaco was acquired by Chevron subsequent to the study. The applicability of the findings to other sectors is obviously more tentative and problematic, and requires further research.

Following the analytic induction method, the first round of data collection pointed to the need to extend the theoretical framework to account for multiple sources of divergent and convergent strategies.<sup>49</sup> Another iteration of data collection and analysis led to further refinement of the framework, in which we

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45 Haas, Keohane and Levy (1993).

46 Manning (1982).

47 Rowlands (2000).

48 Yin (1989).

49 Data were collected from a series of semi-structured interviews conducted in the summer of 2000 in the U.S. and Europe with a total of sixteen senior corporate managers responsible for strategy, public affairs, and environmental concerns. In addition, we interviewed staff in industry associations, government agencies, and environmental non-governmental organizations (NGOs). Interview lasted about one hour and some involved multiple participants. Some interviews were recorded and transcribed, and detailed notes were taken where recording was not permitted. Additional material was gathered through an extensive review of secondary material. The data were sorted for analysis into large tables organized by company, topic, and timeline.

proposed that divergent pressures dominate early in the issue lifecycle while convergent pressures come to the fore as an issue matures. At this stage, a review by several colleagues provided some confidence that the data were congruent with the conceptual framework.

### **Global Trends in the Oil Industry**

The oil industry is dominated by a few large vertically integrated companies sharing many features. Most companies have traditionally been centralized due to the need for vertical and horizontal coordination. Following the first oil shock in the mid 1970s, the industry experienced increased competition, price volatility, and waves of consolidation. In response, companies engaged in large upstream investments and diversification. By the early 1980s, oil MNCs had all expanded into minerals, nuclear, coal and renewable energy.<sup>50</sup> Some companies ventured further afield to electricity generation and unrelated businesses such as office automation.

By the late 1980s, the oil companies shifted from diversification to focus strategies and an emphasis on shareholder value. The loss of subsidies for renewable energy was one factor in the U.S., but divestment and retrenchment in core oil, gas, and chemical sectors was a global phenomenon. The industry also witnessed a restructuring wave in which companies repurchased shares and attempted to construct lean, low cost operations in order to increase the return on capital.<sup>51</sup> The shift of direction from growth to operational efficiency led to a reduction of management layers and divisions, and a move from geographical to product-based divisions, usually defined as upstream, downstream and chemicals. Vertical deintegration was accompanied by decentralization as companies sought more flexibility in adjusting to volatile market conditions. Management increasingly saw companies as asset portfolios to be actively managed and displayed a willingness to trade within core business areas. Shell was the first to allow refineries to purchase oil outside the group, and all companies established oil trading divisions. Downstream operations became profit centers rather than captive markets.

The collapse of oil prices in 1998 triggered a wave of mergers and acquisitions. There was a general recognition that only 'megamajors' enjoying economies of scale would be able to survive, along with smaller specialist players in exploration and production.<sup>52</sup> Table 1 shows basic data on these megamajors.

BP merged with Amoco in 1998 and Arco in 1999, gaining geographic diversity and much larger gas operations. Exxon acquired Mobil in 1998 and Chevron bought Texaco in late 2000. Shell has eschewed mergers and instead continued its traditional reliance on internal competency development and on joint ventures and alliances. Recent mergers are summarized in Table 2.

As a result of these trends, the companies are all highly internationalized, in terms of their assets, employment, and revenues, as seen in Table 3. The

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50 Grant and Cibin (1996).

51 Grant and Cibin (1996).

52 Ernst and Steinhubl (1999); Stonham (2000).

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## Strategic Responses to Global Climate Change

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TABLE 1. Profile of major oil companies 1999

Company	Revenues (\$m)	Profits (\$m)	Assets (\$m)	Employees	Net proved oil (million barrels)	Net proved gas reserves (bn. cub. feet)
Exxon-Mobil	163,881	7,910	144,521	106,000	11,260	56,796
Shell	105,366	8,584	113,883	96,000	9,775	58,541
BP*	96,742	6,430	115,833	97,198	6,535	33,802
Texaco	35,690	1,177	28,972	18,363	3,480	8,108
Chevron (1998)	32,676	2,070	40,668	36,490	4,697	9,303

\* Includes Amoco, Arco. Source: *Fortune*, 24 July 2000; Reinhardt, 2000; Annual Reports.

companies form a global oligopoly and participate in a common global industry. As a result, they are likely to pursue global strategies, and they tend to move through phases of diversification, restructuring, and consolidation in a synchronized fashion. Texaco, before its merger with Chevron, was somewhat of an outlier, due to its smaller size and more domestic orientation.

TABLE 2. Recent mergers

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Company Merged with:

BP	Amoco: announced 8/11/98, effective 12/98. Arco, announced 4/99, effective 4/00
Exxon	Mobil: announced 12/98, effective 11/99
Texaco	Chevron: announced 10/16/00, effective 10/01

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### Oil Company Strategies on Climate Change

The responses of the four companies studied, summarized in Table 4, were internally quite consistent. Each company's web site and published materials portray a particular stance toward climate science, the Kyoto Protocol, and renewable energy technologies; interviewees of the same company in different countries broadly reflected these positions. Comparisons across firms showed significant variation, however. BP is widely considered to be the most responsive company on the issue. John Browne's landmark speech in May 1997 was the first acknowledgement in the industry of a case for precautionary action despite scientific uncertainty, and BP was the first company to leave the GCC, the major industry association opposing emission controls. In 1997 BP established a partnership with Environmental Defense to develop an internal carbon trading scheme and joined the Pew Center for Global Climate Change, which advocates for early action on the issue. In 1998 the company committed to reduce internal emissions by 10% by 2010, even while output was expected to grow 50%. BP's acquisition of Amoco greatly increased its investment in solar energy, making BP-Solarex the largest photovoltaics (PV) company in the world, with revenues expected to climb to \$1 billion within 10 years. BP sought to redefine itself as

TABLE 3. Internationalization of sales, assets, and employment

	Transnationality index* (mean of 3 ratios)			International sales (percent of total)			International assets (percent of total)			International employment (percent of total)		
	1990	1995	1999	1990	1995	1999	1990	1995	1999	1990	1995	1999
BP	66.74	66.34	73.70	73.02	61.12	69.10	53.32	66.78	74.71	73.87	71.11	77.30
Exxon **	66.49	68.76	68.0	78.15	79.58	71.78	58.83	73.05	68.79	62.50	53.66	63.55
Mobil	57.05	59.95		76.62	65.95		53.52	61.73		41.00	52.18	
Shell***	60.51	73.00	56.30	44.23	73.36	50.76	65.04	67.75	60.32	72.26	77.88	57.77
Texaco	37.02	45.82	NA	44.01	51.33	72.00	30.03	49.08	NA	37.01	37.03	NA

\* The transnationality index is the mean of the other three ratios.

\*\* 1999 data are for ExxonMobil.

\*\*\* For data after 1995, Shell reports international activities as those outside Europe rather than outside Holland and the UK, explaining the apparent decline in internationalization.

Source: Scope database Erasmus University/UNCTAD.

TABLE 4. Summary of Corporate Positions and Responses to Climate Change<sup>1</sup>

Position/response	BP	Exxon	Shell	Texaco
Climate science View on Kyoto Protocol	Precautionary principle Broadly supportive	Science too uncertain for action Opposed	Precautionary principle Broadly supportive	"Need to move beyond science" Supports mandatory controls, but not Kyoto specifically Left February 2000
GCC membership	Left 1996	Stayed until end of individual memberships in 2000	Left April 1998	California Fuel Cell Partnership, WBCSD
'Pro-active' partnerships	Pew Center, EPA Climate Wise Program, California Fuel Cell Partnership, trading system with EDF, EPA voluntary greenhouse gas reporting, WBCSD, International Emissions Trading Association	California Fuel Cell Partnership (since early 2001) <sup>2</sup>	Pew Center, California Fuel Cell Partnership, WBCSD, International Emissions Trading Association	
Trading and monitoring of GHGs	Started measurement and internal trading in 1997; appointed external accountants in 6/1999 to verify internal system. <sup>3</sup>	Internal measurement of emission data	Began reporting CO <sub>2</sub> emissions and global warming potential over 1998 in externally verified HSE report. Launched internal trading in 1/2000. <sup>4</sup>	Internal measurement of emission data
Quantitative GHG targets	Target set 9/1998 to reduce emissions by 10% in 2010 relative to 1990 <sup>5</sup>	NA	Target set 10/1998 to reduce GHG more than 10% by 2002. <sup>6</sup>	NA
Main investments in renewables	Owens Solarrex, world's largest PV producer. Invested \$100 m. in 5/2000 in online green retail electricity company. <sup>7</sup>	NA	Solar factories in Germany, Japan and Netherlands. Announced renewables investments of \$500 m. in next 5 years in 10/1997. <sup>8</sup> Solar joint venture with Siemens and EON since 2001.	Invested \$67.3 m. for 20% interest in ECD (advanced batteries, fuel cells and solar technology). <sup>9</sup>
Main fuel-cell activities	Partnership with Ford in 2000.	Exxon-GM and Toyota in 2000.	Daimler and Ballard since 1998	Texaco Energy Systems in 1999.

<sup>1</sup> Where no sources are given, data are derived from company interviews and the official web site.

<sup>2</sup> "ExxonMobil joins fuel cell partnership," *Financial Times*, 27 March 2001.

<sup>3</sup> "Top 25 UK companies seek emissions trading," *Times of London*, 28 June 1999; Reinhardt, 2000, p. 10.

<sup>4</sup> "Shell oil group launches internal carbon emission market," *Financial Times*, 27 January 2000.

<sup>5</sup> Reinhardt, 2000, p. 10.

<sup>6</sup> "Shell to cut by 10% emissions of greenhouse gases by 2002," *Dow Jones Newswires*, 16 October 1998.

<sup>7</sup> "BP Amoco and others plan to invest up to \$100 million in GreenMountain," *Wall Street Journal*, 3 May 2000.

<sup>8</sup> "Solar expansion planned by Shell," *Financial Times*, 7 October 1997.

<sup>9</sup> "Texaco takes alternative fuel cell step," *New York Times*, 2 May 2000.

an energy company and believed that competitive advantage could be secured through a positioning that is “distinctive in the eyes of governments, consumers, and regulators”.<sup>53</sup> This new profile became explicit with the launch of a new ‘green starburst’ logo and the slogan ‘BP = N Beyond Petroleum’ in July 2000.

Shell has broadly followed BP’s strategy, though with a lower public profile, and the company’s literature stresses a broader commitment to sustainable development than BP’s focus on climate change. Shell has accepted the scientific need for action on greenhouse gas emissions and has established internal emission reduction targets. Shell International Renewables was set up in 1998, consolidating existing businesses but with a new commitment to invest \$500 million over five years in renewables, primarily in PV and wind. More recently, it has invested in power generation and distribution. Shell also has claimed to be repositioning itself more broadly as an energy company.

Exxon has taken the firmest stand in the industry against GHG controls. In addition to citing scientific uncertainties and the exclusion of developing countries from emission controls, the company has warned of the dire economic consequences of Kyoto commitments.<sup>54</sup> Exxon advertised its own efforts to promote internal energy efficiency, fuel cell research, and carbon sequestration. Managers expressed the view that the company’s profitability, the envy of its competitors, was due to its focus on core businesses and lean cost model.

Texaco, a U.S. oil company, began to shift position in 1999 toward the European position. Texaco’s managers acknowledged that the debate has moved beyond science toward policy prescription, and that the political momentum toward mandatory controls was unstoppable. Under CEO Peter Bijur, Texaco spent \$67 million in 2000 to acquire 20 percent of Energy Conversion Devices (ECD), which has technological capabilities in advanced batteries and PV.

The responses of the oil companies are summarized in Figure 1.<sup>55</sup> A number of classifications of environmental strategy have been developed, which generally portray a continuum from resistance, through passive compliance, to more proactive and innovative responses.<sup>56</sup> We adopt Gladwin and Walter’s two-dimensional typology because it is richer in its portrayal of strategic options, though we use labels for each quadrant that are more self-evident and accord with terminology in recent literature. In the climate change context, ‘cooperative’ means support for mandatory emissions controls and investment in renewable energy technologies; the second dimension refers to the degree of assertiveness with which a company supports or opposes regulatory efforts. The value of the matrix is illustrated in its depiction of Texaco’s strategy as uncooperative but passive; on a one-dimensional continuum, Texaco might appear simply neutral, somewhere between Exxon and the European companies.

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53 Reinhardt (2000).

54 Exxon web site accessed September 2000. [http://www.exxon.com/exxoncorp/news/publications/global\\_climate\\_change/globe3.html](http://www.exxon.com/exxoncorp/news/publications/global_climate_change/globe3.html)

55 Adapted from Gladwin and Walter (1980).

56 Hunt and Auster (1990); Russo and Fouts (1997); Steger (1993).

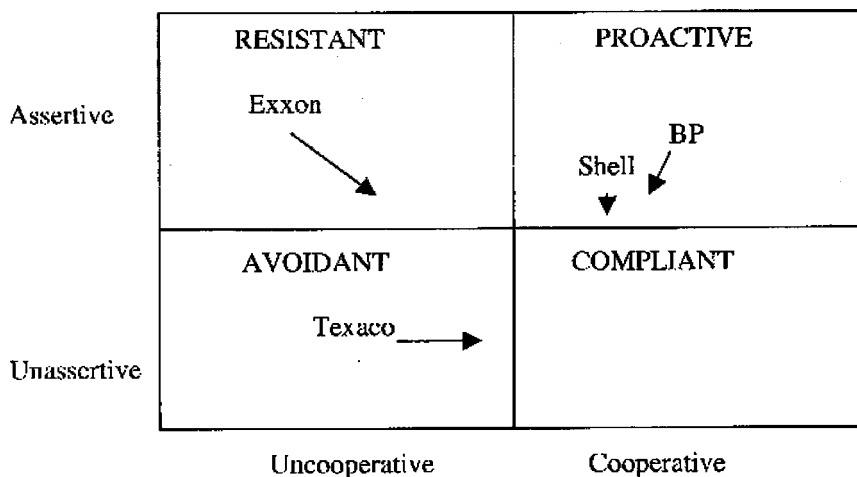


FIGURE 1. Responses to climate change.

Derived from Gladwin and Walter (1980). Positions as of 1998; arrows indicate subsequent movement.

The common emphasis on economies of scale and core energy businesses makes the oil companies highly sensitive to external threats such as GHG controls. Gladwin and Walter argued that security of supply and stability in demand were the “jugular veins” of the oil industry,<sup>57</sup> and any threat would likely trigger an assertive, uncooperative response, labeled ‘resistant’ here. While Exxon is clearly in this quadrant, we explore below why the companies diverge in their responses.

## Divergent Pressures in the Oil Industry

### *The Home-Country Effect*

Three factors related to the MNCs’ home countries could create divergent pressures on their strategies: the home country’s economic and physical resources, national economic and industrial policies, and cultural values and institutional norms.<sup>58</sup> Oil was discovered much earlier in the U.S. than in Europe and many fields are now quite depleted. Illustrating Porter’s logic, several interviewees mentioned that US companies have developed sophisticated technologies for enhancing oil extraction. Although this could result in a more optimistic view of the adequacy of global oil supplies, companies expressed only minor differences on this point. All expected oil production to peak around 2020 to 2030, with a slow subsequent decline, though Shell’s estimate was toward the earlier end of the range. Moreover, the companies concurred that regulation and new technologies rather than inadequate supply would drive the market for alternative energy. Don Huberts of Shell Hydrogen was quoted as saying “The

57 Gladwin and Walter (1980).

58 Sethi and Elango (1999).

stone age did not end because the world ran out of stones, and the oil age will not end because we run out of oil.”<sup>59</sup>

Inconsistent industrial policy in the U.S. toward renewable energy appears to be a more important factor in explaining trans-Atlantic differences. Large subsidies initiated under the Carter administration were abruptly cut under Reagan. One Exxon manager stated that “we are not looking to get into any business supported by government subsidies. We lost more than \$500 million on renewables, and learnt a lot of lessons.” European companies lacked this history of large losses. Moreover, where policy in the U.S. generally favored oil exploration through various subsidies, European policies of high fuel taxation and support for rail rather than road transportation signaled a less secure future for oil.

Overall, home country economic and resource conditions are unlikely to affect competencies very much because the oil companies can tap their subsidiaries for technologies and resources. The home country might, however, have more impact on perceptions, which are framed in the context of cultural values and institutional norms. The conventional wisdom is that “Europeans demonstrate their considerable concern about environmental issues in their behavior as voters, consumers, corporate managers, and policy makers ... [while] people in the United States are more individualistic, more concerned about their lifestyles than about the environment, and more ideologically averse to regulation”.<sup>60</sup> A survey by Kempton and Craig supported this view, finding that Europeans expressed more concrete concerns about environmental impacts on future generations and viewed their responsibility for sustainability as part of their national identity and heritage.<sup>61</sup>

In our study, interviewees from European companies expressed explicit concern for their legitimacy and image. A BP manager stated that “as a company trying to act with corporate social responsibility, is it sensible to turn a blind eye to this issue? Our response was no.” Similarly a Shell executive discussed the ramifications of negative publicity following the execution of Ogoni activist Saro Wiwa in Nigeria and the Brent Spar incident:<sup>62</sup> “Here in Europe it can be hard to go to church and show your face. There is a real concern for legitimacy and what the community thinks. There is a fight for the hearts and minds of the public; this is a long-term force affecting our business.” Following the Brent Spar incident, consumer boycotts were organized in European countries and Shell’s market share dropped noticeably in Germany. One of Shell’s long-term planning scenarios, termed People Power, discussed the risk of significant public pressure. Exxon, by contrast, saw little value in improving its image: “If we appear more green, it might get us a better seat at the policy table, but the real question is whether it would improve our access to resources and markets. BP and Shell actually attract counter-pressure for talking green but not doing enough. There is a Norwegian saying that ‘the spouting whale gets harpooned’.

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59 Economist “Fuel cells meet big business.” *The Economist*, July 24 1999.

60 Levy and Newell (2000).

61 Kempton and Craig (1993).

62 described in Livesey (2001).



Greenpeace has demanded that they pull out of fossil fuels altogether". This evidence suggests that public environmental concern is stronger in Europe than the U.S., and that European firms are more attuned to it.

In the political arena, the American system of business-government relations is often characterized as adversarial compared to the corporatist arrangements in Europe, where key stakeholders engage in more collaborative bargaining.<sup>63</sup> Several U.S. managers acknowledged that adopting an adversarial stance concerning climate change did not cost them much credibility with regulators; one Exxon manager stated "they cannot ignore us anyway; we are the big elephant at the table." While American companies generally had considerable experience and expertise in contesting policy in the technocratic realm using scientific and economic studies,<sup>64</sup> European managers viewed regulation as inevitable and thought that an adversarial approach would only hurt their credibility and political access. In any event, the European companies lacked credible climate scientists, while Exxon's Brian Flannery, who played a key role in developing the company's climate strategy, had published articles in scientific journals and was engaged in the international scientific review process. For American oil companies and industry associations, aggressive challenges to regulation were a legitimate mode of business.

### **Individual Company Differences**

Conventional explanations for divergent strategies would point to the different competencies and market positioning of companies. As noted above, oil MNCs participate in a global industry, which gives them access to similar technologies and markets and reduces the home country factor in shaping corporate strategy. Table 3 shows that the companies have similar international profiles. Rowlands found that economic factors could not account for the climate strategies of BP and Exxon; indeed, Exxon had a higher proportion of operations in the developing world, which are exempt from carbon controls under the Kyoto Protocol, and its fuel mix has a lower carbon intensity, making it less vulnerable to regulation.<sup>65</sup> Gas is a relatively low carbon fuel, demand for which is likely to rise sharply in a carbon constrained world. In table 5 below, we examine the fuel mix for the companies in the study, and find little difference in the ratio of gas to total reserves among the companies. BP does have a lower ratio of oil reserves to current production, which could raise concern over reserve depletion and increase the incentive to search for substitutes, but company interviewees did not view resource depletion as a strategy driver.

Interview data also supports the view that the oil companies share similar competencies and strategies in their core businesses. One Shell manager commented that "Exxon has a similar set of competencies as Shell; we have comparable operations in terms of reserves, upstream and downstream operations". Similarly, an Exxon interviewee noted that: "The real question is whether

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63 Vogel (1978).

64 Jasanoff (1990); Logsdon (1985).

65 Rowlands (2000).

TABLE 5. Gas and oil production ratios 1999

Company	Oil Production (th. bl/day)	Gas Production (bn. cub. feet/day)	Gas/ Oil + Gas production*	Oil reserves/ production	Refinery throughput (thousands barrels/day)
Exxon Mobil	2,517	10,308	69 percent	4.5	5,977
Shell	2,268	7,924	62 percent	4.3	3,137
BP	2,061	6,067	66 percent	3.2	2,522
Texaco	885	1,999	71 percent	5.3	1,491

Source: Annual reports.

\* In terms of energy equivalent: 1000 Cub. ft. of gas = 0.178 barrels of crude oil.

Shell or BP will forego any economic opportunity in oil because of climate change. We don't think so. They have a renewables division, but in their core oil and gas operations there is not much difference."

Significant differences did emerge, however, regarding perceptions of opportunities in renewable energy. Exxon's extensive experience with renewables may have given the company some technological advantages, but corporate thinking was colored by the history of extensive losses. This institutional history provided a pessimistic lens to evaluate future options. Lee Raymond, Exxon's CEO, claimed that fuel cell powered cars would reduce global oil consumption by less than 5% and viewed renewables as "a waste of money ... oil and gas will continue to be the dominant energy for the next 25 years".<sup>66</sup> Interviewees at Exxon had a very clear perception of their company's strategic strengths. One commented: "we have learnt from the experiment with diversification that businesses such as office products, with rapid product cycles and very different technologies, require competencies that Exxon lacks". The company's status as the most profitable of the oil majors created little stimulus to reconsider its strategy. Instead, Exxon focussed its efforts on fuel cell research and carbon sequestration, technologies which complement oil and thus enhance existing competencies.<sup>67</sup> Moreover, Exxon's strategic planning was tightly centralized, leaving little room for dissent on the climate issue.

Other oil companies, lacking Exxon's history of losses, interpreted opportunities in substitute technologies more optimistically. BP's CEO John Browne stated that renewables could account for 5% of revenues by 2020, and 50% by 2060.<sup>68</sup> Shell's long-term planning scenarios envisage that renewables will account for 30–40% of global energy by 2060. While these statements are not inconsistent with Exxon's projections, they are more sanguine. BP, Shell and Texaco expressed the belief that significant first mover advantages might accrue in renewables, but that new competencies would take time to build, so early investments were warranted. For Shell, this approach was a continuation of

66 The Economist "Energy Survey." *The Economist*, Feb. 8, 2001.

67 Abernathy and Clark (1985).

68 Financial Times, November 2, 2000 p. 30.

the company's institutional history of organic, internal growth. Managers thought that Shell's expertise with offshore rigs could be applied to wind energy. The company's scenario planning process emphasized a longer time horizon than Exxon and deliberately set out to incorporate diverse perspectives and challenge conventional thinking. For Texaco, one impetus to reevaluate strategy was the financial crisis caused when oil prices fell below \$15 a barrel at the end of the 1990s. Texaco managers also expressed the belief that their gasification technologies could generate hydrogen for fuel cells.

### **Convergent Pressures**

Over time, some convergence in the companies' climate strategies has become apparent. Texaco began to move in 1999 and even Exxon has recently softened its stance; its 2000 Health Safety and Environment Report acknowledged that scientific evidence warranted some precautionary action on emissions and it has invested in fuel-cell programs. The European companies, while investing in renewables, have maintained the vast majority of their assets in traditional businesses. The trend toward convergence is not driven by any fundamental change in the external environment; climate science has continued its slow evolution, without the equivalent of the dramatic discovery an 'ozone hole' that triggered drastic controls on ozone-depleting gases.<sup>69</sup> Considerable uncertainty still remains concerning the magnitude and timing of climatic impacts, if not their direction and cause. Though subsidies for wind and photovoltaics have stimulated substantial growth in these markets, no technological breakthroughs have occurred for renewable energy, and markets for oil and gas, as well as for coal in the U.S., appear secure for the next quarter century. Despite the signing of the Kyoto Protocol in November 2000, ratification and implementation remain uncertain, particularly after the U.S. withdrawal. Environmental groups have not enjoyed any sudden upsurge in support, neither has the fossil fuel industry lost its economic muscle. Rather, we argue that the convergent trend is driven by institutional pressures that shape managerial expectations and perceptions, and which stem from participation in a common global industry and issue arena.

Organizational changes are one source of this pressure. Oil companies have abandoned geographic structures and moved toward globally integrated business units, increasingly based in subsidiary locations. Moreover, it is only during the 1990s that senior management has become internationalized, further reducing the institutional dominance of the home country. It is likely that this geographic dispersion of senior managerial authority reduced the impact of the home country environment on strategy and increased corporate sensitivity to public and regulatory pressures. Exxon, Mobil and Texaco still had only American board members in 1995, but annual reports indicate that an increasing number of senior executives have spent significant portions of their careers outside the home country. Texaco's CEO Peter Bijur, appointed in 1996, had extensive experience in Canada and Europe, and he formed a new team of senior vice-presidents, all with substantial international experience. Texaco managers

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69 Parson (1993).

explicitly associated the change in the company's position on climate with the appointment of Bijur and his openness to European perspectives.

Global competition and interdependence in the oil industry sensitized companies to each other's actions. The 1989 Exxon Valdez oil spill, for example, stimulated concern among competitors and constituted a "catalyst for change throughout BP".<sup>70</sup> Similarly, BP learnt from Shell's misfortune with the Brent Spar incident in 1995 that legitimacy and reputation can be more important than technical analysis.<sup>71</sup> In turn, the 1997 speech by BP's Browne caused other companies to reconsider their positions. One Texaco executive stated that "Texaco has always been stronger in engineering than public relations, but we're trying to change. We saw how much mileage BP got from Browne's speech." Texaco also began inventorying greenhouse gas emissions in 1998. An interviewee commented that "we looked at how BP and Shell were inventorying their emissions and evaluating the business impact of greenhouse gases. Texaco took the best pieces of their protocols". Exxon closely monitored these developments, and one interviewee noted that "if emissions trading becomes real, it would only take a few months for us to come up with a system."

Participation in industry associations and climate change meetings provided arenas within which expectations concerning science, policy, markets, and technologies tended to converge. Key managers responsible for climate strategy in each of the companies studied were on first name terms and had met each other frequently during many official negotiating sessions and conferences (see table 6). European companies have participated in the American Petroleum Institute and the GCC, while American companies attend European industry meetings. The London-based International Petroleum Industry Environmental Conservation Association (IPIECA), in which all the major oil companies participate, has four active working groups, including one on climate change. IPIECA has served as a particularly important venue for companies to discuss their views, and staff gave an example of how a series of meetings helped to reconcile differences. A July 1998 workshop on Kyoto implementation mechanisms produced a stalemate, with US companies concerned that any mention of possible mechanisms could imply agreement to a binding treaty. By 2000, IPIECA was able to produce a document representing a common approach to mechanisms.

More broadly, these intense interactions promote the diffusion of new conceptual frames for considering the business-environment relationship. American companies have moved toward accepting the need for some precautionary action in the absence of definitive scientific evidence, though without endorsing Kyoto. While European companies were quicker to embrace the concept of *ecomodernism*,<sup>72</sup> suggesting the compatibility of environmental and business goals, this thinking has increasingly permeated industry-wide discussions. One example of this process was a series of open discussions in Washington D.C. in 1998 and 1999 on business and climate change organized by the Business Council for

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70 Reinhardt (2000).

71 Reinhardt (1998).

72 Hajer (1995).

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TABLE 6. Principal institutional settings for oil industry

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American Petroleum Institute (API)

International Petroleum Industry Environmental Conservation Association (IPIECA)

Europa: European oil refining and marketing industry

OGP: International Association of Oil & Gas Producers

World Economic Forum meetings, annually in Davos. Session on oil industry and climate, February 2000

International Chamber of Commerce, Working Group on Climate Change

Global Climate Coalition (GCC): all major oil companies were members till 1996

MIT Global Change Forum: Annual conference in Cambridge, Mass.

Framework Convention on Climate Change (FCCC)

- Conferences of the Parties, most years since 1990
  - Other subsidiary bodies meet several times a year, e.g., Subsidiary Body for Scientific and Technical Advice (SBSTA)
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Sustainable Energy. Michael Marvin, director of the organization, observed that “companies don’t come expecting to change their positions, but they move by a process of osmosis. At our meetings they talk about positive, reasonable solutions. It makes a big impact when Enron, ARCO, and Shell come out ahead on the issue.” Industry interactions also served to discipline companies attempting to move too far or too quickly on the issue. One BP executive reported that, following Browne’s speech “we got cold shouldered by some of our colleagues within the industry”.<sup>73</sup>

Convergence was evident in the companies’ perspectives on the future of the energy sector. Initially the oil companies had perceived climate change as a serious business threat, but over time the companies became less pessimistic. None of the oil company managers interviewed expected renewables to pose major threats to oil before mid-century due to cost and infrastructure limitations. The common view was that the outlook for core oil and gas businesses remained strong in the medium term; demand for gas for power generation was booming even without carbon controls, while oil would remain the primary fuel for transportation. Any improvements in fuel efficiency would be more than offset by growth in vehicle sales and miles traveled, particularly in developing countries, while radical technologies such as fuel cells still faced many cost and technical barriers. Air transportation was growing rapidly. The renewable energy operations of BP and Shell would thus remain small niche businesses. Exxon reportedly “tracks other companies’ developments of renewables, confident it could re-enter the renewable field in the future”.<sup>74</sup>

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73 Reinhardt (2000) p. 9.

74 Financial Times, May 16, 2001

## **Conclusions**

This study explored the strategic responses to climate change of four major oil companies in Europe and the U.S.. Conventional drivers of strategy could not adequately explain the marked differences observed in the companies' responses. Instead, the study focused on the influence of the institutional environment. MNCs facing global issues such as climate change are immersed in multiple institutional contexts, subjecting them to competing pressures. The disparate reactions of U.S. and European oil companies in the early phase of the climate issue were found to be related to regulatory expectations, norms concerning the conduct of business-government relations, and cognitive assumptions regarding the future of fossil fuels and substitute technologies. These regulative, normative, and cognitive influences were associated with the institutional context of the MNCs' home country as well as with the specific history of each company. The oil companies perceived climate change as a major threat, and, as predicted by Gladwin and Walter, three of them adopted assertive responses; Exxon adopted an adversarial political strategy while BP and Shell pursued more accommodative and technologically oriented strategies.

It is noteworthy that those companies with prior experience in renewable technologies were most reticent in investing in renewables in response to climate change. Strategic responses were, it seems, driven by the institutionalized memory of losses associated with prior investments, rather than by accumulated technological competencies. In general, managerial perceptions of markets, technologies, and regulatory prospects appeared more important as strategic drivers than any objective assessment of these factors. Indeed, it was the uncertainty surrounding these issues that afforded management considerable discretion and increased the influence of institutional factors. A significant managerial implication of this study is, therefore, that institutional frames provide strategic guidelines derived from historical and home country experiences, which are not necessarily relevant to future global market conditions. The failure of renewable energy markets to maintain growth in the 1980s does not doom their prospects for the twenty-first century. MNCs need to develop strategy based on a broad set of inputs gained from interactions with subsidiaries, industry associations, and NGOs.

As the issue matured, corporate perceptions were increasingly subject to convergent institutional pressures, which arose from the companies' common location in the global oil industry and from the emergence of climate change as a global issue arena. As a result of frequent interactions in these institutional environments, the companies have developed similar outlooks on markets and technologies. The emerging, more optimistic view of the future of the oil and gas business reduces the stakes and thus the need for assertive political or technological strategies. Moreover, companies are converging on the view that the flexible Kyoto mechanisms will provide only weak constraints on carbon emissions, reducing the cost of compliance. As a result, there are few rewards for proactively taking the risk of being a technological first-mover, and a resistant strategy that aggressively challenges policy may not be worth the cost in political and social legitimacy.

In terms of our typology of strategic responses, Exxon has become less vociferous in its political strategy opposing emission controls. While it still does not support mandatory emission controls, the company admitted in an October 4, 2002 advertisement in the New York Times that the risk of climate change was “widely recognized” and that doing nothing “is neither prudent nor responsible”; it is thus moving toward the center. Texaco has become somewhat more cooperative, but not more assertive, moving toward the ‘compliant’ quadrant. The European companies have remained focused on their core oil and gas businesses; BP has invested far more in acquiring other oil companies and building its gas position than in renewables. It has also become less outspoken on the issue. The European companies could still be considered proactive, but have moved somewhat toward the center. The arrows on Figure 1 depict these changes, illustrating the partial trend toward convergence. While all companies have moved their position, overall the convergent trend has been toward the European position. Partly this reflects the earlier insularity of the position of American companies and their unique relationship with the US administration. Moreover, as the issue matured and the scientific consensus strengthened, the stance of active denial became untenable.

We have argued that the institutional case is strong here because of the absence of major external shifts in the scientific, regulatory, political or technological spheres. In the final analysis, however, the distinction between rational-economic explanations and cognitive-institutional arguments is less than precise. Managers in the oil industry appear to have shifted their strategic calculations based on a rational reassessment of the situation, though this reassessment was itself embedded within changing institutional contexts. The crystallization of a scientific consensus with the publication of the Third Assessment Report in 2001, and its acceptance not just by policy makers but also in business circles,<sup>75</sup> was inherently a social process.<sup>76</sup> Similarly, the assessment of prospects for low-carbon and renewable energy technologies is related to wider institutional networks.<sup>77</sup> Markets are embedded in social and political structures, so their rationality is contingent upon these broader frames of reference.<sup>78</sup> Managers attempt to make rational calculations of the costs and benefits of various strategies, but these calculations are premised upon assumptions and forecasts that are themselves shaped by interactions with competitors, governments, the media, and other institutions.

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75 *Economist* (1999); Nauss (1999).

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78 Callon (1998); Fligstein (1996); Sharma (2000).

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