Pergamon

European Management Journal Vol. xx, No. x, pp. xxx–xxx, 2007

0263-2373 $32.00

doi:10.1016/j.emj.2007.07.001

EMJ 1207
28 July 2007 Disk Used

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No. of Pages 13

North American Business Strategies Towards Climate Change

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Business has become a key part of the fabric of global environmental governance, considered here as the network which orders and regulates economic activity and its impacts. We argue that businesses generally are willing to undertake limited measures consistent with a fragmented and weak policy regime. Further, the actions of businesses act to create, shape and preserve that compromised regime. We examine three types of indicators of business responses in North America: ratings by external organizations, commitments regarding emissions, and joint political action. We find business response to be highly ambiguous, with energetic efforts yielding few results.

Keywords: Business strategy, Climate change, Governance, Carbon trading

Business has become a key part of the fabric of global environmental governance (Levy, 2005). In their role as investors, polluters, innovators, experts, manufacturers, lobbyists, and employers, corporations are central players in environmental issues. The recognition by governments and NGOs that large firms are not just polluters, but also possess the organizational, technological, and financial resources to address environmental problems, has stimulated consideration of ways to harness and direct these resources toward desirable goals. This acknowledgement of corporate potential has occurred, not entirely coincidentally, in a period of growing concern at a 'governance deficit' at the international level (Haas, 2004; Newell and Levy, 2006; Slaughter, 2004).

During the 1990s, much of the energy of North American business, particularly in sectors related to fossil fuels, was directed toward preventing an international regime to impose caps on emissions of greenhouse gasses (GHGs). Indeed, industry groups such as the Global Climate Coalition and the Climate Council played a major role in preventing the United States from joining the Kyoto Protocol (Levy and Egan, 2003). More recently, many businesses have adopted a more constructive stance that acknowledges the reality of climate change and its responsibility for addressing the issue (Margolick and Russell, 2004). Increasingly, climate change is framed as an opportunity rather than a burden. A recent report from Ceres, a coalition of investors, firms, and environmental organizations, typifies the emerging optimistic view:

> Companies at the vanguard no longer question how much it will cost to reduce greenhouse gas emissions, but how much money they can make doing it. Financial markets are starting to reward companies that are moving ahead on climate change, while those lagging behind are being assigned more risk... Shareholders and financial analysts will increasingly assign value to companies that prepare for and capitalize on business opportunities posed by climate change (Cogan, 2006, : 1).

This new approach is reflected in high-profile corporate initiatives, such as 'Beyond Petroleum' from BP and 'Ecoimagination' from GE, which indicate that business is taking climate change seriously and anticipates some profitable opportunities. Simultaneously, investors are increasingly alert to the financial risks of neglecting climate change as a strategic issue. Sectors, such as agriculture, insurance, tourism, and real estate, face potential risks from

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EMJ 1207
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ARTICLE IN PRESS
No. of Pages 13

the physical impacts of climate change, such as rising sea levels and more frequent and intense storms. Fossil-fuel related sectors are recognizing the inevitability of carbon constraints, with significant impacts on markets and costs. The Carbon Disclosure Project, representing investors with more than $31 trillion in assets, collects annual data from large multinational corporations about their climate-related risks (Lash and Wellington, 2007). Groups such as the Investor Network on Climate Risk and the Climate Group have played an important role recently in highlighting the risks and opportunities facing various sectors and encourage companies to assess and manage these risks rather than ignore them (The Climate Group, 2005). A more proactive stance is likely to provide companies with some protection against litigation and damage to their reputation and litigation (Wellington and Sauer, 2005), as well as more influence in shaping the detailed mechanisms of climate governance systems, such as allocation and trading of carbon credits.

Meanwhile, local government and voluntary initiatives have emerged in response to the perceived lack of guidance from national and international authorities. In the United States and Canada, individual states and new regional associations are formulating policies in areas usually reserved for Federal action. Recent agreements include the Regional Greenhouse Gas Initiative (RGGI) covering nine Northeastern and Mid-Atlantic States, and the Western Regional Climate Action Initiative, signed by five Western governors; both are centered on emission-trading mechanisms for achieving reductions in greenhouse gas (GHG) emissions. The prospect of mandatory cap-and-trade systems is stimulating a reconsideration of corporate climate strategies. Business journals and consultants proffer advice on carbon management systems that entail, among other activities, assessing risks, conducting emissions inventories, setting targets, and assigning responsibilities (Hoffman, 2006).

These business initiatives represent real and significant organizational changes and financial investments on the part of firms. Yet, the contrast between this beehive of corporate activity and the relentless upward trend in emissions presents something of a paradox. Global carbon emissions in 2005 were 28% higher than in 1990, and show no sign of slowing (EIA, 2005; Wynn, 2006). United States emissions were estimated to be 17% higher in 2005 than 1990 (EIA, 2006), while even many who are parties to Kyoto, including Canada, are on a trajectory to miss their Kyoto targets (UNFCCC, 2005). The disconnect between the growing wave of business action and these disappointing results raises some important concerns. Even more puzzling is the resurgence of corporate political activity in the United States against climate policy initiatives, particularly those emerging at the state level. This renewed opposition to regulation is occurring in the same sectors, and even companies, that are embracing a range of carbon-related initiatives and strategies.

To explore this apparent paradox, we examine the political economy of the emerging global governance regime for GHG emissions. Global governance here refers to:

> the multiple channels through which economic activity and its impacts are ordered and regulated. It implies rule creation, institution building, monitoring and enforcement. But it also implies a soft infrastructure of norms, and expectations in processes that engage the participation of a broad range of stakeholders (Newell and Levy, 2006, p. 149).

This conception of governance, which has become prominent in international relations, displaces government from its traditional, sovereign role in establishing and securing order (Rosenau, 1992). Instead, governance is viewed as a more diffuse form of authority and control operating through a network of actors at multiple levels. Within this system, states act as economic agents concerned about their 'competitiveness' (Palan *et al.*, 1996), while firms are important political actors with significant policy influence. Bargaining over regime structures and processes engages actors in a complex set of strategic maneuvers in the economic, discursive, and political spheres (Braithwaite and Drahos, 2000; Prakash and Hart, 1999). Markets and the private decisions of firms are themselves part of the fabric of governance, as the day-to-day production, research and marketing practices of large MNCs are decisive in shaping environmental impacts.

In this paper we argue that the business community has played an important role in shaping the system of global GHG governance, and is generally willing to undertake measures consistent with a fragmented and weak policy regime, while at the same time taking political action to create, shape and preserve that compromised regime. To describe the action businesses take in regards to GHG governance, this paper examines the history and current nature of corporate responses to climate change In particular, we look at three indicators of the nature of corporate response: reports by outside organizations that document corporate responses and achievements; commitments to action undertaken by firms regarding emissions; and membership of firms in associations or alliances which take collective political action.

We try to explain the paradox between the energetic efforts of firms and the lack of meaningful results by considering the multiple dimensions of a firm's response. The position of firms is not merely for or against action on climate change, nor even along a continuum between those two extremes. Rather, a firms response to climate change occurs in many dimensions, including political, technological, organizational, financial, and public relations components. The prospect for a relatively weak carbon regime, the considerable uncertainty associated with

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EMJ 1207
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ARTICLE IN PRESS
No. of Pages 13

markets and technology, and complex nature of possible responses all contribute to firms' responses being ambiguous on many dimensions. Firms are subsequently placing greater emphasis on management processes, policy influence, and market image than on major investments in low-emission technologies; on emissions trading infrastructure over emissions reductions. The ambiguous response creates and legitimizes a vast, bureaucratic, complex GHG system, but one that does not actually require much in the way of emissions reductions.

This paper proceeds in four sections, beginning with the history of business response to climate change. We then examine three types indicators of business response: ratings by external organizations, commitments regarding emissions, and joint political action. In the discussion and implications section, we look at the prospects a governance regime firms are both responding to and creating. We conclude by placing ambiguous action and the resulting governance regime in historical context.

History of Business Response to Climate Change

Despite the considerable attention given to potential economic opportunities, the primary issue facing many sectors remains the 'regulatory risk' of higher costs for fuels and other inputs, and lower demand for energy-intense products (Wellington and Sauer, 2005). Measures to control the emissions of GHGs most directly threaten sectors that produce and depend on fossil fuels, including coal, oil, autos, power generation, and airlines. Other energy intense sectors include cement, paper, agriculture, and aluminum. Companies also face considerable 'competitive risk', as changes in prices, technologies, and demand patterns disrupt sectors and entire supply chains. Investments in research and development are highly risky, as low-emission technologies, such as those for renewable energy, frequently require radically new capabilities that threaten to undermine the position of existing companies and open the industries to new entrants (Anderson and Tushman, 1990; Christensen, 1997).

These risks are not restricted to any particular region, as many of the larger companies involved in these sectors are multinational corporations (MNCs) with operations and sales in multiple countries. Moreover, MNCs anticipated that GHG regulation, following the precedent of the 1987 Montreal Protocol for the control of ozone depleting substances, would be subject to a strong global governance regime encompassing most industrialized countries. It is therefore not surprising that, beginning in the early 1990s, a wide range of sectors responded aggressively to the prospect of regulation of GHG emissions. U.S.- based companies were particularly active in challenging climate science, pointing to the potentially high economic costs of greenhouse gas controls, and lobbying government at various levels. Businesses from across the range of affected sectors formed a strong issue-specific organizations, such as the GCC and the Climate Council, to coordinate lobbying and public relations strategies (Gelbspan, 1997; Leggett, 2000; Levy and Egan, 2003). Though these organizations were open to international members and were active at the international negotiations to forge a formal GHG regime, they were dominated by North American companies and focused much of their efforts on the U.S. administration. Meanwhile, U.S. energy and auto companies invested little in new technologies that could deliver short to medium term emission reductions(Levy, 2005).

European industry was far less aggressive in responding to the issue, and displayed a greater readiness to invest in technologies, such as wind power and diesel cars, that would produce modest but relatively quick GHG emission reductions. These divergent strategies defy simple explanation, particularly in the oil industry, where companies on both sides of the Atlantic are large, integrated multinationals with similar global profiles and strategic capabilities (Rowlands, 2000). Studies of the oil and automobile industries have pointed to the institutional environment of these firms as important determinants of their strategic responses (Levy and Kolk, 2002; Levy and Rothenberg, 2002; van de Wateringen, 2005). Corporate strategies are driven by perceptions of economic interest that are mediated by the different cultural, political, and competitive landscapes in the United States and Europe. Senior managers of European companies tended to believe that climate change was a serious problem and that regulation of emissions was inevitable, but were more optimistic about the prospects for new technologies. American companies, by contrast, tended to be more skeptical concerning the science, more pessimistic regarding the market potential of new technologies, and more confident of their political capacity to block regulation. Moreover, several large American companies had lost substantial amounts of money in investments in renewable energy and electric vehicles in the 1970s, and the painful lessons of that earlier era had become institutionalized in the companies.

By 2000, a convergent trend could be discerned as key firms on both sides of the Atlantic moved toward a more accommodating position that acknowledged the role of GHGs in climate change, and the need for some action by governments and companies. In the oil and automobile industries, companies were beginning to invest substantial amounts in low-emission technologies, and were engaging a variety of voluntary schemes to inventory, curtail, and trade carbon emissions. No obvious dramatic scientific, technological, or regulatory developments can account for these changes, but Levy (2005) has pointed to a number of factors. Most significantly,

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EMJ 1207
28 July 2007 Disk Used
ARTICLE IN PRESS
No. of Pages 13

MNCs are located in global industries with cognitive, normative, and regulatory pressures inducing some measure of convergence in their perceptions of the climate issue and of their interests (Scott and Meyer, 1994). On the economic level, competitive pressures and interdependence have compelled companies to respond to each other's moves (Levy, 2005). For example, Toyota's commercial launch of the Prius, a hybrid electric-small gasoline engine car, in the Japanese market in 1998, took the industry somewhat by surprise. Most American executives were initially dismissive of the prospects for the car in the United States, based upon GM's experience with electric vehicles. Nevertheless, the American auto companies were nervous that they might fall behind a competitor and introduced a number of hybrid vehicles by 2006. Similarly, Ford quickly followed Daimler-Benz in investing in fuel cell technology. In the oil industry, even Exxon appears to be softening its stance (Mooney, 2005) regarding climate science, while continuing to oppose mandatory emission controls.

The shift in the position of American industry can also be linked to changing competitive dynamics, strategic miscalculations, and the evolution of new organizations supportive of a proactive industry role. Efforts by the Global Climate Coalition and other industry groups to challenge the science sometimes produced a backlash from environmental groups that damaged the fossil fuel industry's credibility. Environmental groups in Europe and the United States issued a number of reports that documented industry support for some climate skeptics, and accused business of using its money and power to distort the scientific debate (Corporate Europe Observatory, 1997; Gelbspan, 1997; Hamilton, 1998). The growth of new organizations committed to a climate compromise further undermined the GCC's claim to be *the* voice of industry on climate. The Pew Center on Global Climate Change, formed in April 1998, provides not only a channel of policy influence for member companies, but also a vehicle for legitimizing the new position.

Perhaps the most significant change in the corporate landscape has been the diffusion and increasing legitimacy of the ''win-win'' discourse articulating the consonance of environmental and business interests. Groups such as the Pew Center actively promote this position; indeed, the win-win paradigm is a key discursive foundation for a broad coalition of actors supporting the emerging climate regime. A number of environmentally oriented business associations, such as the Business Council for Sustainable Energy, and the World Business Council for Sustainable Development, have adopted this perspective. Influential environmental NGOs in the US, especially the World Resources Institute and Environmental Defense (Dudek, 1996) have initiated partnerships with business to pursue profitable opportunities for emission reductions. Governmental agencies find win-win rhetoric attractive for reducing conflict in policy making. The apparent reconciliation of viable economic strategies with the environmental case for action on GHG emissions makes this 'win-win' language of ''ecological modernization'' very attractive (Hajer, 1995). Ecological modernization puts its faith in the technological, organizational, and financial resources of the private sector, voluntary partnerships between government agencies and business, flexible market-based measures, and the application of environmental management techniques (Casten, 1998; Hart, 1997; Schmidheiny, 1992). This optimistic stance has been buttressed by claims of significant cost savings, such as BP's announcement in January 2003 that its success in reducing emissions by 10% (relative to 1990) had also generated $600 million in cost savings. Wal-Mart's CEO recently stated that reducing greenhouse gases would ''save money for our customers, make us a more efficient business, and help position us to compete effectively in a carbon-constrained world'' (Lash and Wellington, 2007: 96). These initiatives generally entail substantial public relations and advertising efforts to rebrand the companies as green, particularly around climate change, combined with substantial investments in research and development for low-emission technologies and products.

An Empirical Assessment of Current Business Responses

Corporate action on climate change appears to be spreading rapidly and growing in intensity. The Pew Center and the Climate Group, two organizations dedicated to promoting business action on climate change, have documented positive steps taken by numerous companies as well as the consequent financial and environmental benefits (Margolick and Russell, 2004; The Climate Group, 2005). Much of the corporate activity on climate change is stimulated by the perception of long-term market opportunities in new high-margin, low-emission products and technologies, as well as cost savings from lower energy use (Begg *et al.*, 2005; Margolick and Russell, 2004; Reinhardt, 2000; Romm, 1999). The development of markets for trading carbon credits presents a further stimulus.

Despite this growing tide of corporate activity, no meaningful progress is being made concerning global GHG emissions, and pockets of strong corporate political opposition remain. It would be easy to conclude from observing contemporary patterns of production, consumption, and power generation that we are largely conducting 'business as usual', with only marginal changes in a few niche markets. An examination of this apparent paradox requires a more detailed consideration of various dimensions of business response strategies. Firms pursue multiple strategies that include political, technological, organizational, financial, and public relations compo-

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EMJ 1207
28 July 2007 Disk Used
ARTICLE IN PRESS
No. of Pages 13

nents. Uncertainty regarding the regulatory, technological, and market environment has led to considerable diversity in responses. Here we focus on three indicators of corporate response to climate change. The first, and most detailed, is an analysis of reports by outside organizations that document corporate responses and achievements, and in some cases rate them with scores. Second, we consider various commitments to action undertaken by firms regarding emissions trading. These commitments are generally expressed through participation in associations or alliances in which members commit to individual action. Third, we note business membership in associations or alliances which take collective political action, some in opposition to mandatory emission controls and some in support of various forms of action. Our methodology does not encompass a comprehensive survey or statistical analysis of all these various business initiatives and responses, but rather is intended to convey a representative snapshot of the current state of business responses.

Reports on Business Responses

Four reports by outside groups are analyzed here: by the environmental group Ceres (Cogan, 2006), The Climate Group (2005), the Pew Center on Global Climate Change's Business Environmental Leadership Council (BELC) (Pew, 2006), and a survey of Canadian GHG emitters conducted by Deloitte (2006). The Climate Group is based in London while the other organizations are US-based, though they all have international activities and offices. The reports have different criteria for inclusion and evaluation, but overlap in coverage helps to provide a reasonable indicator of corporate responses. Cogan Cogan (2006) profiled 100 of the largest firms in ten carbon-intense industries from energy, industrial, and transportation sectors. All firms have significant US operations but are headquartered in various countries, except for the electric power industry, which includes US firms only. Cogan assessed corporate governance on climate change based on board oversight, management execution, public disclosure, emissions accounting, and strategic planning. The companies were scored with a 100 point checklist, with mean 48.5.

The Climate Group (2005) describes the achievements of 74 companies that have made measurable progress on GHG emissions or other climate-related action, and have benefited financially from doing so. The data are derived mostly from the companies themselves, and inclusion is based on cooperation. The Pew Center's BELC is a membership organization. Membership requires a commitment to supporting climate change science and the responsibility of the business community to take action. Their website (Pew, 2006) lists company profiles, goals and achievements. Joining the Pew Center is a response strategy that was originally an action in opposition to the anti-Kyoto Global Climate Coalition.

The Ceres rankings point to the relatively poor performance of US-based companies. Note that the emphasis here is on management and reporting rather than emissions. The 'top ten' list (Table 1) includes four companies from North America, five from Europe, and one from Japan. North American firms are somewhat under-represented among the best performers, but all the bottom twelve companies are from the United States (Table 2).

Ceres also found significant differences between industries. In general, chemicals, electric power, and automotive firms have the highest scores; air transport, food, coal, and oil the lowest; and industrial equipment, metals, and forest products in the middle. The differences, however, between firms within industries are much greater than the differences between industries – the oil industry contains both the highest and lowest scores. This suggests that the existence of significant space for discretionary managerial action despite competitive and other pressures to conform.

In the oil industry, four European companies (BP, Royal Dutch Shell, Statoil, and Total) all rank well above their North American counterparts in climate governance; BP, Total, and Shell have also documented real reductions in carbon emissions (The Climate Group, 2005); BP and Shell are members of the BELC (Pew, 2006). In contrast, among US oil compa-

Table 1 Top Ten Firms in Corporate Governance, Rated by Ceres

BP	Oil and Gas	UK	90
DuPont	Chemicals	US	85
Royal Dutch Shell	Oil and Gas	Netherlands	79
Alcan	Metals	Canada	77
Alcoa	Metals	US	74
AEP	Electric Power	US	73
Cinergy	Electric Power	US	73
Statoil	Oil and Gas	Norway	72
Bayer	Chemicals	Germany	71
Nippon Steel	Metals	Japan	67

Source: (Cogan, 2006).

Table 2 Bottom Twelve Firms in Corporate Governance, Rated by Ceres

UAL	Airline	US	3
Williams	Oil and Gas	US	3
ConAgra	Food	US	4
Bunge	Food	US	5
Foundation	Coal	US	5
Southwest	Airline	US	6
Murphy	Oil and Gas	US	6
Phelps Dodge	Metals	US	6
Arch	Coal	US	8
AMR	Airline	US	9
PepsiCo	Food	US	9
El Paso	Oil and Gas	US	9

Source: (Cogan, 2006).

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EMJ 1207
28 July 2007 Disk Used
ARTICLE IN PRESS
No. of Pages 13

nies, only Chevron ranks above average on the Ceres report, only Sonoco is a member of the Pew group, and no US oil firm appears in the Climate Group study. Similarly, the London-based coal and minerals company Rio Tinto scores above average on Ceres and is a member of the BELC, while no US coal producer has any positive indicators.

The metals and mining industry clusters into three groups, but not purely along home country lines. The aluminum industry is dominated by North American firms (International Aluminium Institute, 2006). Alcan in Canada and Alcoa in the United States both rate highly in climate leadership (Cogan, 2006), participate in the Business Environmental Leadership Council, and have documented large reductions in GHG emissions below 1990 levels (The Climate Group, 2005). Three overseas steel firms, Nippon of Japan, BHP Billington in Australia, and Anglo American in the UK have above average Ceres scores; while the US steel industry plus Mittal Steel of the Netherlands have very low Ceres scores. The good performance of aluminum manufacturers can be explained, in part, by the high energy intensity of the traditional process, which presents more opportunities for reducing GHG emissions and for cost savings.

The automotive industry also groups into three clusters, largely on the basis of nationality. Japan-based Toyota and Honda rate well, according to Ceres, and have large emission reductions documented by the Climate Group; US-based Ford and General Motors are above average according to Ceres and GM has modest achievements in the Climate Group report; the German manufacturers Daimler, Volkswagen, and BMW all have below average Ceres scores. In contrast with these indicators, it is noteworthy that the European Union has much more stringent fuel efficiency standards than either the United States or Canada, and European manufacturers as a group use advanced diesel technology and lighter cars to achieve substantial efficiency improvements (An and Sauer, 2004; Levy and Kolk, 2002).

The forest product industry, which has a large presence in North America, has been attributed with widely varying indicators. There may be significant opportunities in the sector for reducing power consumption, for biomass power and co-generation, and in management of carbon sinks inherent within forests (Cogan, 2006). Indeed, paper company Norske Canada has some of the most dramatic achievements documented, a 60% reduction in CO2 from 1990 to 2004 (The Climate Group, 2005). While US-based International Paper and Montreal's Abitibi lead in the Ceres ratings, it is lower ranked Weyerhauser and Georgia-Pacific that are able to document progress according to BELC (Pew, 2006).

Deloitte's (2006) survey of 80 large Canadian GHG emitters, primarily in the oil and gas, manufacturing, and power generation sectors, highlights the gap between corporate attention and action. Despite the focus on Canada, the results are likely to be typical of North America as a whole. Though 80% of firms ranked GHG emissions management as an issue of moderate to critical importance, half of the companies still do not include emission management in their overall risk management strategy. The survey found that 91% of respondents claimed to have the management capability to complete a GHG emissions inventory, and 84% had actually completed an emissions inventory. Nevertheless, only 46% said they had the capability to execute the purchase or sale of emission credits and only 40% had established internal emissions targets and schedules.

The most striking feature of business responses to climate change, as reflected in these reports, is their inconsistency, ambiguity, heterogeneity, and limited scope. The heterogeneity in response reflects not only the degree to which a firm is acting, but also which of many possible actions it takes. The persistence of differences between firms in otherwise homogenous industries is one indicator of a tentative response. The large differences in the way the same firms are viewed by different outside evaluators suggest a degree of ambiguity as well as the difficulty in measurement and comparative assessment. For example, Japanese auto manufacturer Nissan has a corporate governance score below the German manufacturers – the lowest rated automaker by Ceres. Yet it has documented GHG emissions reductions on par with highly ranked Toyota and Honda (The Climate Group, 2005). Among industrial equipment manufacturers, large American and European firms (Swiss ABB, GE and UTC in the US) are noted for their corporate governance (Cogan, 2006; Pew, 2006), but poorly ranked Caterpillar has documented greater GHG reductions than UTC, while ABB and GE do not appear in the Climate Group Report.

Commitments on Carbon Trading

Several private emissions trading schemes exist wherein firms agree to limit their emissions and trade GHG credits. Reasons for this might include a hope to prevent the imposition of mandatory restrictions, the shaping of future trading systems, establishment of baselines, or hope for a competitive advantage by gaining trading experience. The Chicago Climate Exchange, for example, is a private initiative by companies who voluntarily commit to limit GHG emissions and engage in trading to meet those commitments. The Chicago Climate Exchange (CCX) opened in October 2003 with twenty-two members, including American Electric Power and Ford. CCX (www.chicagoclimatex.com) now has about 60 full members who trade emissions, and many more that provide or purchase offsets. Full members have large GHG emissions and commit to reducing emissions from North American operations by one percent a

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EMJ 1207
28 July 2007 Disk Used
ARTICLE IN PRESS
No. of Pages 13

year for four years, and further reductions thereafter. Associate members have smaller emissions but wish to offset them, while Participating members are those that sell certified offsets.

The Federal government, in line with the current administration's stated preference for voluntary measures, sponsors some of these programs that entail commitments to action. The joint EPA/Department of Energy Climate Wise program (DOE, 1996) has disappeared, replaced by the EPA's Climate Leaders. Climate Leaders (www.epa.gov/climateleaders) enlists companies to set goals for emission reductions. One advantage listed is for companies to ''strategically position themselves as climate change policy continues to unfold.'' The Department of Energy's Climate VISION (Voluntary Innovative Sector Initiatives: Opportunities Now) (www.climatevision.gov) enlists trade groups to reduce their members' GHG intensity. However, voluntary action does not ensure that companies meet their existing commitments. A Government Accountability Office report (Stephenson, 2006) found that participants in the EPA's and the Department of Energy's voluntary emission reduction programs have not always met the conditions of those programs, and did not bear any consequences. This is not a problem only for voluntary programs, as many parties to the Kyoto accord are on a trajectory to miss their targets (UNFCCC, 2005).

As cap-and-trade systems become the basis for existing and proposed climate policies, some firms are anticipating that preparation for emissions trading could establish a strategic advantage, particularly for those with relatively efficient operations, opportunities for innovation, or simply a well-developed trading capability. Many large firms have called for a national cap-and-trade system to end the uncertainty posed by the emergence of multiple state and regional systems (Donnelly, 2007; USCAP, 2007). An advantage of CCX over the DOE and EPA programs is that the mechanisms are likely to be similar to future trading systems. The Climate Group and Pew Center reports do not tabulate climate trading, although make note of some firms who have adopted voluntary restrictions (Pew, 2006; The Climate Group, 2004). The Ceres report (Cogan, 2006) includes measures related to emissions trading in two of its scoring categories: up to 24 points of the 100 are for 'Emissions Accounting', a vital precursors to trading; and participation in emissions trading is one of three activities evaluated within the 32 point 'Emissions Management and Strategic Opportunities' score. Adopting emissions trading is cited as a way to ''gain experience and maximize credits'' (p.3) ahead of future requirements.

However, participation in trading schemes is uneven for even the supposed strategic leaders. The European Trading Scheme (ETS) mandates emissions accounting and trading for firms operating in Europe in particular sectors, but with various exclusions for smaller facilities and power plants. Firms with North American operations could choose to join the Chicago Climate Exchange. Of the top 13 firms rated in Strategic Opportunities by Ceres (Table 3), only Dupont, Bayer, and AEP are members of CCX (www.chicagoclimatex.com). Abitibi and International Paper, who have Strategy scores at the top of their industry if not overall, are members of CCX. Although Honda is the highest rated auto manufacturer by Ceres, Ford, with scores only average for automotive industry, is a current and founding member of CCX. Moreover, while voluntary trading is seen as both a way to reduce emissions and to gain experience in a carbon-constrained environment, the low trading prices ($3–4 during 2007) indicate that the limits are neither particularly constraining nor do they provide much of a signal to encourage emission reductions.

It is notable that cap-and-trade based systems have emerged as the centerpiece of policies designed to constrain carbon emissions. Emissions trading was originally advocated by the United States in international negotiations as a flexible mechanism that would encourage firms and countries to pursue economically efficient opportunities to reduce their emissions (Aulisi *et al.*, 2005). The European Union and some environmental organizations had expressed early concerns that highly flexible trading systems would raise problems regarding conditionality and verification, enabling companies and countries to evade their responsibilities through creative accounting and buying carbon credits of dubious origin (Haar and Haar, 2006). By 2006, however, the European Trading System accounted for 62% of the volume and over 80% of the value of total carbon trading worldwide, estimated by market analyst Point Carbon at €22.5 billion for 1.6 billion tonnes of carbon dioxide equivalent. This global market is expanding very rapidly, more than doubling since 2005 (Point Carbon, 2007).

Table 3 Top Thirteen Firms in Strategies, Rated by Ceres (out of 32)

BP	Oil and Gas	UK	29
Dupont	Chemicals	US	28
Royal Dutch Shell	Oil and Gas	Netherlands	27
ALCOA	Metals	US	24
Nippon Steel	Metals	Japan	23
Bayer	Chemicals	Germany	23
Statoil	Oil and Gas	Norway	22
AEP	Electric Power	US	21
ALCAN	Metals	Canada	21
Honda	Automotive	Japan	20
GE	Industrial Equip	US	20
ABB	Industrial Equip	Switzerland	20
Calpine	Electric Power	US	20

Source: (Cogan, 2006).

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EMJ 1207
28 July 2007 Disk Used
ARTICLE IN PRESS
No. of Pages 13

Business Political Action

Firms also express their response to climate change by participating in collective political action. Business associations such as the International Chamber of Commerce have made clear that the acknowledgment of business responsibility for emissions and their willingness to dedicate resources to addressing the issue entitle business to a significant role in policy development (ICC, 1995). Joining or funding alliances, industry associations, coalitions and the like allow businesses to engage in collective action, sometimes outside of their normal area of expertise. The trajectory of the Global Climate Coalition (GCC) is an illustrative example (Levy and Egan, 2003). Formed to be the industry voice on climate policy, firms began leaving GCC in the late 1990's as its positions became unpopular, and, as some would argue, its mission had been fulfilled: the United States withdrew from Kyoto in 2001. ExxonMobil remained the last major supporter until GCC deactivated in 2002.

Nevertheless, several other organizations, primarily US-based business associations and conservative think tanks, continue to act in opposition to climate change regulation at all levels. These include the Coalition for Affordable and Reliable Energy (www.careenergy.com), the Cooler Heads Coalition (www.globalwarming.org), the American Council for Capital Formation (www.accf.org) and the Center for Energy and Economic Development (www.ceednet.org). The model legislation by the American Legislative Exchange Council (Greenblatt, 2003) and ballot initiatives throughout the West attempt to limit the ability of States to enact environmental policy. These organizations typically mount a multipronged attack: casting doubt on climate change science, highlighting costs of emission limits, opposing government limits in general and international agreements in particular. The Competitive Enterprise Institute (CEI) advertisements in 2006 attacking the concept of carbon dioxide as a pollutant (Zabarenko, 2006) parallel a 2004 talk by the head of Canada's largest oil company (Morgan, 2004). The Cooler Heads Coalition resumed its activities in February of 2007 (www.globalwarming.org) as a project of CEI, but some prior supporters, including ExxonMobil, have ceased funding. In February 2007, shortly after the release of the Fourth Assessment Report of the IPCC, the American Enterprise Institute (AEI) offered a $10,000 incentive to scientists and economists who write papers challenging the IPCC findings. The AEI continues to receive significant funding from ExxonMobil and many other companies in the energy sector.

Other organizations occupy more proactive positions on climate change. Organizations such as the Pew Center and the Business Council for Sustainable Energy, which have been around since the mid-1990s, constitute a counter-movement to the AEI, CEI and other oppositional industry organizations. More recently, the United States Climate Action Partnership (USCAP) was launched with considerable publicity in early 2007 as a coalition of major businesses and environmental organizations advocating mandatory cap and trade (www.us-cap.org); they support eventual international agreement but want the United States to take immediate action. They call for relatively modest reductions, but with mandatory limits, broad coverage, and accountability of offsets (USCAP, 2007). USCAP appears to be attempting to shape the emerging emissions regime in anticipation of future regulations; it is calling for features of benefit to member businesses, such as credit for pre-regulation action and carbon price limits. In March 2007, USCAP's position was joined by 65 investor groups and financial companies who called for Federal legislation and significant GHG reductions by 2050 (Donnelly, 2007). The firms involved expressed a desire for greater certainty in emissions regulation; they may also prefer uniform Federal action to a patchwork of State and regional rules.

Yet there is not a simple alignment of those in favor versus those opposed to action on climate change; indeed, some companies can simultaneously be members of multiple organizations and initiatives with apparently conflicting agendas. One indicator of being in favor of action is participation in voluntary schemes. The U.S. Department of Energy's Climate VISION (Voluntary Innovative Sector Initiatives: Opportunities Now) (www.climatevision.gov) enlists trade groups to reduce their members' GHG intensity. However, about half of the organizations participating in Climate VISION are also members of CARE (www.careenergy.org), which strongly supports coal power and opposes to any emissions caps. In these cases organizations are at the same time making a commitment to solve climate change problem, advocating voluntary and market based solutions instead of mandatory ones, and questioning whether there is a climate change problem at all.

Part of the recent upsurge in corporate political activity comes in response to the development of programs for mandatory emission trading at the State level in North America. Two multi-state agreements in particular illustrate the local policy trend. The Regional Greenhouse Gas Initiative (RGGI) initially included seven States – Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont – which signed on to a model rule that would institute a cap-and-trade program covering CO2 emissions from power plants. Although they had recently abandoned RGGI, Massachusetts and Rhode Island announced their intention to rejoin in January 2007. Maryland, Pennsylvania, and the Eastern Canadian Provinces are observers in the RGGI process (www.rggi.org). On the West coast, the Western Regional Climate Action Initiative is an agreement between Governors of Arizona, California, New Mexico, Oregon and Washington to set a

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EMJ 1207
28 July 2007 Disk Used
ARTICLE IN PRESS
No. of Pages 13

GHG emission target and develop a market based system for meeting it. This is the latest action in States that have been working individually and in various combinations towards emissions trading systems (information and press release at www.pewclimate.org). These regional cap-and-trade systems do not impose severe restrictions and are designed to limit the price of carbon credits and any increases in power generation costs. RGGI, for example, will become effective in 2009 and cap emissions in the power sector at approximately current levels until 2015, after which the emissions cap will be incrementally reduced by 2% a year. Although RGGI is initially targeted toward emissions from power generation facilities, the program includes an offset mechanism that would encourage companies in other sectors to engage in product and process innovations that reduce GHG emissions. While these other sectors would not be constrained by a cap, the potential offsets would offer benefits to non-power emitters of CO2 as well as emitters of other GHGs, such as HFCs, methane and sulfur hexafluoride (SF6). Participants in these initiatives expect them to become the prototypes for a national multi-sector mandatory emissions trading scheme whose caps could be ratcheted down as political opportunities arise.

More than half of US states are addressing climate change in some manner; many are drafting climate change action plans and enacting renewable portfolio standards, which require a growing percentage of generation to be from renewable sources (Rabe, 2006). In response to State actions, some business organizations have mobilized to oppose local as well as national and international regulation. The US auto industry is vigorously contesting efforts by California and New York to exert direct regulatory control over vehicular carbon emissions (Hakim, 2005). Various California business groups have been attempting to slow its moves towards regulating emissions (Baker, 2006). Corporate lobbying has been implicated in the (temporary) withdrawal by Massachusetts RGGI in early 2006 (VanDeveer and Selik, 2006). Another business oriented group, the American Legislative Exchange Council (ALEC), has been developing model legislation at the state level to limit regulation of GHGs, and claims almost a third of all legislators in the country as participants (Greenblatt, 2003; Rabe, 2006).

While some US-based organizations oppose regulation at all levels on libertarian principles, others act more narrowly to preserve their economic interests. The libertarian CEI opposes GHG limits, ethanol subsidies, and clean coal subsidies (www.cei.org), while the industry group CARE opposes GHG limits but supports research funding for coal and ethanol (www.careenergy.com). The Associated Industries of Massachusetts (AIM) has opposed RGGI from its inception, praised former Governor Romney for abandoning the pact, and condemned Governor Patrick for rejoining it. AIM stated that it would be costly for Massachusetts to act ahead of Congress (www.aimnet.org).

Discussion and Implications

The indicators we examined show considerable ambiguity in the responses of the business community towards climate change. Various external organizations come to different conclusions when evaluating firms' achievements. Broad patterns seen in the ratings with respect to industry and home country in some cases contradict other indications. Voluntary emission trading schemes seem to represent greater investment in trading infrastructure than in emissions reduction. And firm and industry political action through various associations are sometimes seem at odds with their other actions and statements.

The review of corporate strategic responses to climate change sheds some insight into the paradoxical coexistence of a beehive of corporate activity on climate change yet with few tangible outcomes. Of course, it might simply be too early to evaluate the impact of corporate efforts; some investments in innovation are unlikely to yield short-term gains, and preparations for establishing the infrastructure for carbon trading are bound to take some time. Nevertheless, the results reported here suggest that business responses, especially in North America, are uneven and rather ineffective, at least in relation to the scale of action needed. Corporate responses tend to be directed toward organizational changes rather than emissions reductions per se. Here we argue that these corporate responses can be understood in the context of the emerging GHG regime. To the extent that a global regime can be said to exist, it is fragmented, and carries very weak price signals, and outside of Europe is still largely voluntary. The emerging GHG regime is simply not up to the task of a radical restructuring of energy and transportation markets.

Firms clearly pursue different response strategies with various degrees of vigor, depending on their exposure to climate risks, their sectoral location, their individual capabilities, and the idiosyncrasies of particular business leaders. Some firms emphasize innovation for reducing emissions while others plan to rely more on carbon trading. A central problem is that many businesses plan to continue to grow their sales at a rate fast enough to offset any reduction in emission *intensity* (per unit of output). Even the actions of many clear leaders in the business response to climate change are limited and tentative. The operating GHG emission reductions achieved by BP and Shell are a tiny fraction of the emissions produced by the use of their products (The Climate Group, 2005). GE's Ecomagination campaign amounts to 17 products with sales of $10 billion within a diversified

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EMJ 1207
28 July 2007 Disk Used
ARTICLE IN PRESS
No. of Pages 13

$150 billion revenue company, and R& D commitments of about 10% of the $14 billion GE invests in development (www.ge.com). The products other than wind turbines mostly comprise incremental improvements to efficiency and production processes for existing products, as would be expected to occur in normal technological development.

The emerging climate governance regime comprises a patchwork of market-based approaches, energy efficiency measures, voluntary corporate action, and weak regional trading systems. The incentives and sanctions in such a weak and fragmented regime may simply be inadequate in the face of the growing global economy and the risks of irreversible global climatic change (Azar and Dowlatabadi, 1999). While North American companies increasingly realize that climate change is a long-term issue to which they will need to develop market and technological responses, in the short term they face only modest political and economic incentives for strong action. The emerging regime comprises a relatively loose system of international governance involving significant contestation as well as collaboration among states, firms, non-governmental organizations (NGOs) and multilateral institutions (Levy and Prakesh, 2003; Newell and Levy, 2006). The reliance on voluntary measures, particularly in the United States, reflects a wider trend in environmental governance toward various forms of industry self-regulation (Cashore *et al.*, 2004; Delmas and Terlaak, 2001; Potoski and Prakash, 2005).

Ironically, it is largely the resistance of fossil fuel dependent countries and industries to more stringent regulation that has induced the fragmentation and flexibility of the current governance system. While these compromises have facilitated the evolution of a politically viable governance system, they are also the fundamental source of the weakness of this system. The specific mechanisms and targets agreed by the parties to the Kyoto Protocol helped to bring reluctant countries on board and accommodate industry opposition. The main elements of the Protocol include mandatory but modest emission targets, which are substantially weakened by broad and flexible mechanisms for implementation and weak enforcement (Grubb *et al.*, 1999). The inclusion of carbon sinks introduces considerable uncertainty and room for creative accounting, and the ability to buy carbon credits in international emission trading schemes enables countries of the former Soviet Union to sell large amounts of ''hot air'' credits. The Clean Development Mechanism and Joint Implementation further reduce the adjustment burden.

While the momentum of this fragmented multi-faceted regime is clearly gathering pace, there is not yet a firm regulatory or economic incentive for firms to adopt radical changes in their strategies. Recent trades on the Chicago Climate Exchange have been priced very cheaply, falling towards $3 per ton of CO^2, illustrating the weakness of a voluntary system. The RGGI program in the Northeastern United States will most likely include a 'safety valve' designed to prevent the price of carbon credits exceeding $10 a ton (VanDeveer and Selik, 2006), which is insufficient to drive substantial innovation or efficiency measures (Fischer and Newell, 2003; Krause *et al.*, 2002; Neuhoff, 2005). The proposed trading mechanism would also enable participants to purchase credits from external sources, such as the Clean Development Mechanism, generating concerns about the fungibility and verification of emission reductions. In Europe, carbon prices collapsed in 2007 to just about $1.50 a tonne after too many permits were allocated relative to industry demand. The current price for 2008 contracts, the first year of a new trading period, is around $15–20 per tonne.

Emissions trading systems are also beset by concerns relating to high transaction costs and the additionality of internationally traded credits (Michaelowa and Jotzo, 2005). An investigation of projects to incinerate HFC-23 in developing countries revealed that the revenue stream from carbon credits actually encouraged the production of refrigeration units, which generate significant emissions of GHGs in their manufacture and operation. Moreover, credits are being sold for several times the cost of generating them, with lawyers and accountants taking a substantial portion of the money (Bradsher, 2006). Overall, we see a huge investment of corporate energy in preparing the organizational and accounting infrastructure for emissions trading, but resulting carbon prices that are too low to induce any fundamental market changes.

In the absence of a significant price signal from carbon trading, the basic economic and political forces that structure energy markets ensure the continued growth of fossil fuels for the foreseeable future. In the United States, the oil industry maintains sufficient political influence to secure subsidies and favorable tax treatment. The efforts of European oil companies exemplify how climate strategies frequently represent small niche markets that do not significantly impinge on existing core activities. Though BP and Shell have each committed to invest more than $1 billion in renewable energy, and have been particularly active in promoting their efforts in the media, these new businesses are miniscule in comparison with their core oil and gas operations, which continue to grow (The Climate Group, 2005). Oil MNCs on both sides of the Atlantic have converged on the view that constraints on carbon emissions are not likely to present a serious threat (Levy and Rothenberg, 2002). Oil production is expected to peak around 2020 to 2030, with a slow subsequent decline; at higher prices, vast reserves of oil shale and deeper ocean sources become viable. All the oil companies are well diversified into natural gas, the demand for which is booming, primarily for power generation, while renewables are not expected to

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EMJ 1207
28 July 2007 Disk Used
ARTICLE IN PRESS
No. of Pages 13

pose a major threat before mid-century due to cost and infrastructure limitations. Oil is used primarily for transportation, with no commercially feasible substitutes on the horizon, and any improvements in fuel efficiency, for example, from hybrids or advanced diesel, are more than offset by growth in vehicle sales and miles traveled, particularly in developing countries. Air transportation is also growing rapidly, and in any event is not covered by Kyoto. Biofuels such as ethanol from corn can slowly be incorporated into existing infrastructure and business models, but will supplement rather than substitute for oil as a liquid fuel.

Some substantial business opportunities clearly do exist. The rapid growth of markets for renewable and clean energy, and for energy efficiency, is one example. Global markets for wind, solar photovoltaic (PV), and fuel cell power are growing at an annual rate of approximately 20%, albeit from a tiny base, and are forecast to reach $115 billion by 2015, from a 2005 base of only $24 billion (Makower *et al.*, 2006). Markets for associated electronics, materials, construction, and services will also experience rapid growth. The global market for energy efficiency products, currently estimated at $115 billion, is projected to grow to over $150 billion by the end of this decade. These markets, however, present substantial market and technological risks, and many of the small firms active in these areas are currently in a precarious financial position. Moreover, the growing market for renewable energy is only slowing, rather than reversing, the growth of fossil fuel based generation; indeed, in the United States, that has recently been a resurgence of planned investment in coal-fired generation. In other sectors, the incentives for action are even less clear. In the insurance industry, for example, despite rising insured losses that many attribute to climate change, major North American firms are reluctant to take action on the issue due to a tradition of conservatism, relying on the federal government for disaster relief, and the lack of clear financial benefits from action (Haufler, 2006).

Conclusions

Given the prospect of a flexible and fungible carbon regime with weak caps, high transaction costs and low, if unpredictable, carbon prices, it is perhaps unsurprising that companies are currently placing more emphasis on management processes, policy influence, and market image than on major investments in risky low-emission technologies. Ahead of any mandatory caps, especially in advance of setting any baselines, investing in emissions trading infrastructure has a greater potential return than investing in reducing emissions. Firms seem to be responding to a vast, bureaucratic, complex GHG system, but one that does not actually require much in the way of emissions reductions. Yet firms also create and sustain this governance regime, both through their political advocacy, and through the legitimacy conferred by perceptions of success. External reports rate firms highly for small positive steps, reinforcing the 'win-win' discourse of ecological modernization.

When the United States first agreed to a binding international agreement in Geneva in July 1996, it provided an explicit assurance that industry interests would be integrated into the climate regime. Chief negotiator Tim Wirth promised that the United States would pursue ''market-based solutions that are flexible and cost-effective'', and that ''meeting this challenge requires that the genius of the private sector be brought to bear on the challenge of developing the technologies that are necessary to ensure our long term environmental and economic prosperity'' (Wirth, 1996). The emergent regime is sufficiently weak and flexible that it does indeed accommodate most business concerns about short-term disruption to markets, and many firms appear willing to engage in substantial organizational and technological efforts to work toward a long-term carbon constrained future. In a sense, companies are hedging their bets by investing in long-term alternatives while acting to preserve the value of their technological and market assets in the short to medium term. Simultaneously, however, the locus of regulatory activity is moving to the state level in the United States, and when these policy initiatives threaten to impose more immediate and stringent caps on emissions and to create a model for national regulation, business is reverting to its oppositional stance of the 1990s.

By examining several indicators of business response, we are able to discern the multiple dimensions of strategy that firms pursue. The existence of ambiguity even within indicators, such as profound differences between different rating reports and participation by firms in contradictory political associations, shows that these indicators do not separate the dimensions of strategy completely. Future research might be able to separate the dimensions more carefully, to better discern changes in each dimension as the responses to climate change evolve. Yet the ambiguities overall show how limited and tentative the emerging governance regime is.

Emissions trading represents the heart of a corporate compromise with pressures to address climate change, and it is the area in which we witness the greatest amount of corporate activity. Emissions trading represents the emerging consensus around market-based, low-cost policy instruments. While business and states are engaged in considerable organizational efforts to establish the infrastructure and capabilities for trading systems, the incentives for a major shift in resource allocation toward low-emission energy sources, products and technologies is mitigated by political pressures for highly flexible

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EMJ 1207
28 July 2007 Disk Used
ARTICLE IN PRESS
No. of Pages 13

trading schemes in which carbon prices will remain low.

Overall, we see a series of energetic efforts yielding ambiguous and tentative results. The implication is that we are not on a trajectory towards a genuine solution. Breaking the inertia of past practice is not sufficient. The global GHG regime appears to be institutionalizing within the middle ground, with marginal improvements on past practice but without reaching sustainability. A dramatic environmental 'shock', or an unlikely assertion of political leadership might well be required to provide the necessary impetus for change.

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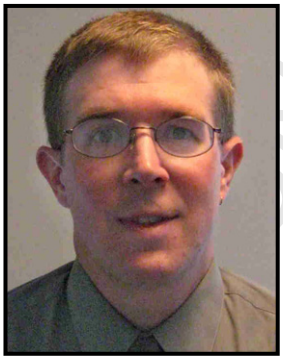

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Please cite this article in press as: Jones, C.A. and Levy, D.L., North American Business Strategies Towards Climate Change ..., European Management Journal (2007), doi:10.1016/j.emj.2007.07.001