How Ratifying the Kyoto Protocol Will Benefit Canada's Competitiveness

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Executive Summary

> *Only those companies that innovate successfully will win. A truly competitive industry is more likely to take up a new standard as a challenge and respond to it with innovation. An uncompetitive industry, on the other hand, may not be oriented toward innovation and thus may be tempted to fight all regulation.*
>
> – Michael Porter, Director, Institute for Strategy and Competitiveness, Harvard Business School[1]
>
> *[W]e set our own target — to reduce our own emissions of greenhouse gases by 10 per cent from a 1990 base line by the year 2010. . . . Now, five years on, I'm delighted to announce that we've delivered on that target. . . . It came through a reduction in the amount of energy we need to use. . . . And we avoided unnecessary emissions. . . . And by applying simple efficiency — stopping leaks. . . . In aggregate the net effect of all those actions is that we've met the target, seven years ahead of schedule. And we've met it at no net economic cost — because the savings from reduced energy inputs and increased efficiency have outweighed all the expenditure involved.*
>
> — John Browne, Chief Executive, BP, March 2002[2]

A debate is currently raging in Canada about the costs and benefits of the Kyoto Protocol.[3] Opponents of the Protocol claim that Canada cannot afford to ratify, and therefore implement, the Protocol, because it would cause severe economic damage. Prominent in this rhetoric is the notion that the Protocol would damage Canada's economic competitiveness. "Competitiveness," however, is defined here in a very narrow, short-term sense. Opponents of Kyoto typically ignore or fail to mention the ability to

- save money through increased efficiency;
- pass costs on to suppliers or customers;
- realize savings and new business opportunities through innovation, and thereby improve Canada's positioning in both the short and long term;
- benefit from policy certainty that will facilitate the planning of future investments; and
- address the needs of vulnerable sectors or regions through flexible government policies.

Competitiveness is clearly a much broader concept than opponents of Kyoto would have us believe. This report surveys the real-world evidence of how initiatives to reduce greenhouse gas (GHG) emissions and address other environmental challenges have affected a broad variety of indicators of competitiveness. That evidence strongly supports the following findings:

- by taking a lead to address environmental issues, governments position firms in their jurisdictions to be more efficient and competitive in future markets (Chapter 2);
- governments can design policies in a manner that respects legitimate competitiveness concerns (Chapter 3);
- firms that take action to improve efficiency and reduce GHG emissions also improve their competitiveness (Chapter 4);
- major business opportunities are being created for innovative firms as a result of Kyoto (Chapter 5); and

[1] Michael E. Porter and Claas van der Linde (September 1995), *Green and Competitive: Ending the Stalemate*, Harvard Business Review.

[2] http://www.bp.com/centres/press/stanford/highlights/index.asp

[3] The Kyoto Protocol calls for Canada to reduce its emissions of greenhouse gases, net of (i) credits for forestry and agricultural "sinks" and (ii) purchases of international emissions units, to an average of 6% below the 1990 level during 2008–2012. By ratifying the Protocol, Canada would become legally bound by it.

- financial markets reward firms that are environmental leaders (Chapter 6).

Taken together, these findings provide a sound basis for concluding that Canada's competitiveness, when defined broadly, is likely to benefit, not suffer, from a decision by the federal government to ratify the Kyoto Protocol.

Government action on the environment can protect and enhance competitiveness

There is a wealth of literature demonstrating that government action on the environment can be a source of competitiveness. According to Michael Porter of the Harvard Business School, a country's prosperity is created — not inherited from endowments of natural resources — and it therefore depends on the capacity of its industry to innovate and upgrade. Innovation comes from individual firms, but is also fostered by judicious government regulation that reflects the specificities of the country. Porter and van der Linde[4] have demonstrated that properly designed environmental standards can trigger innovation that may partially or more than fully offset the costs of complying with them. While not necessarily accepted by all, Porter's hypotheses have nonetheless been confirmed by many other studies cited in Section 2.1.

There is a recurring tendency for targeted industries to significantly overestimate the costs of complying with environmental regulations prior to implementation — something Canada's policymakers should bear in mind when evaluating the current claims that ratification of the Kyoto Protocol will cause severe economic damage. Major initiatives whose costs were significantly overestimated include the Montreal Protocol, adopted to phase out ozone-depleting compounds, and the U.S. Acid Rain Program to reduce emissions of sulphur dioxide (SO_2) from fossil fuel-burning power plants. During the negotiations leading to the establishment of the Acid Rain Program, the targeted utilities argued strenuously that the Program would jeopardize their competitiveness. Estimates of marginal compliance costs and allowance prices were in the range of $300 to $1,000 per ton of SO_2.[5] In comparison, a typical SO_2 allowance price in 2000 was $150 per ton, while electricity prices remained stable through the 1990s.[6] Innovation was of key importance to the success of the Program.

The early development of the U.K.'s GHG emissions trading system, which began formal operation in April 2002, and the proactive role played by British industry in setting it up underline the fact that other countries are already moving ahead of Canada to set up regulatory regimes for GHGs that will advantageously position their firms for the future. The industrial sector in the U.K. pushed for the development of an early regulatory framework for GHG emissions in order to prepare itself to meet the country's Kyoto target on time and gain a strategic competitive advantage by being ahead of the game and able to build on and export new knowledge. In June 2000, the Confederation of British Industry stated that "business . . . continues to be involved in numerous activities which will help ensure that the U.K. meets its international commitments . . . The Government's attempt to promote a transition towards

[4] Michael E. Porter and Claas van der Linde (1995), *Toward a new Conception of the Environment-Competitiveness Relationship*, Journal of Economic Perspectives vol. 9, no. 4, p. 97–118.
[5] Robert W. Halm and Carol A. May (1994), *The Behaviour of the Allowance Market: Theory and Evidence*, Electricity Journal, Vol. 7, p. 28–33.
[6] Andrew Aulisi et al. (September 2000) *From Obstacle to Opportunity: How Acid Rain Emissions Trading is Delivering Cleaner Air*, Environmental Defense. Available at *http://www.environmentaldefense.org/documents/645_SO2.pdf*.

a low carbon economy has the potential, if properly framed, to establish the basis on which the U.K. could reasonably meet further commitments above and beyond those agreed at Kyoto."[7]

In sum, governments that take a lead in addressing environmental issues position firms in their jurisdictions to be more efficient and competitive in future markets. Canadians therefore have good reason to be concerned that a failure to ratify the Kyoto Protocol may condemn Canada to fall further behind jurisdictions in Europe and elsewhere who are ratifying the Protocol — not just environmentally, but also in terms of competitiveness.

Protecting and enhancing competitiveness: A policy design issue

While there is a lot of evidence that regulatory environmental initiatives can enhance competitiveness, it is obvious that this depends to at least some extent on the design of the initiatives in question. According to Porter and van der Linde,[8] "properly designed" regulation is regulation that motivates firms to innovate, since innovation is the fundamental driver of competitiveness. These authors list eleven criteria for innovation-friendly regulation (see Section 3.1). It is striking how well a "cap and trade" emissions trading system — the central policy instrument envisaged by federal and provincial governments in Canada to reduce GHG emissions from large industrial emitters under the Kyoto Protocol — satisfies these criteria, while giving governments essentially unlimited flexibility in addressing regional and sectoral vulnerabilities.

Environmental taxes are another policy measure that can satisfy Porter and van der Linde's criteria. Over the last decade, numerous European governments have implemented broad based ecological tax reform policies. These policies do not seek to increase the overall tax burden but rather to increase or implement new environmental taxes — mostly carbon or energy taxes adopted primarily with a view to reducing GHG emissions — while simultaneously reducing other existing kinds of taxes. Depending on which taxes are reduced, substantial economic modelling research cited in Section 3.2.2 has predicted the potential for increased competitiveness in the form of employment gains as a result of reductions in payroll taxes, or increased domestic spending and investment as a result of reductions in capital or income taxes.

Other key policy measures that could help Canada to make major GHG emissions reductions, such as renewable energy portfolio standards (requiring electricity retailers to source a minimum percentage of electricity from low-impact renewable sources) and fuel efficiency standards for road vehicles, can also meet Porter and van der Linde's criteria. In other words, with good policy design, the Kyoto Protocol can be implemented in Canada in a manner that protects and enhances competitiveness.

Corporate action on the environment enhances competitiveness

Leading firms worldwide are embracing environmental responsibility for competitive advantage. The strategy is simple: by being a leader in environmental protection, the firm is driven to be more innovative and create additional value for its customers and shareholders. One of the most important competitive advantages for environmentally leading firms is the identification, development and commercialization of new business opportunities. Substantial research completed by the top business schools in North America

[7] Confederation of British Industry (June 2000), *CBI response to the Government's UK Climate Change Draft Programme*. Available at http://www.cbi.org.uk.
[8] Michael E. Porter and Claas van der Linde (September 1995), *op. cit.*

and cited in Section 4.2 establishes the link between corporate competitiveness — both in terms of innovation and the ability to attract and retain the best employees — and environmental leadership. An in-depth study of corporate action on reducing GHG emissions by Margolick and Russell[9] demonstrates that an increasing number and variety of major U.S., Canadian and global firms have taken on significant GHG emission reduction targets. The authors find that the primary reason the corporate sector is taking on GHG reduction targets is competitiveness: "All of the companies see targets as improving their competitive market position by reducing production costs and enhancing product sales today, and in anticipation of regulatory and market environments of the future."

There is an abundant literature demonstrating corporate examples of saving money and becoming more competitive by implementing innovative environmental initiatives. Table 1 in Section 4.3 provides details of the initiatives of nine large firms with major operations in Canada, drawn from the oil and gas, electricity, chemicals, transportation and manufacturing sectors. These firms have successfully positioned themselves to reduce GHG emissions in anticipation of Kyoto ratification by adopting reduction targets that meet or exceed Kyoto levels. Highlights include the following:

- **BP**, by March 2002, had reduced global GHG emissions to 10% below 1990 levels at no economic cost, while basic earnings per share increased from $0.17 in 1998 to $0.36 in 2001;
- **Suncor** has committed to lowering GHG emissions (net of offsets) to 6% below 1990 levels by 2010 if Canada ratifies Kyoto and plans to invest $100 million by 2005 in alternative and renewable energy projects; revenues increased from roughly $2 billion in 1999 to $4 billion in 2001;
- in **DuPont**'s global operations, from 1990 to 2000, energy use remained constant, production increased by 10% and GHG emissions were reduced by 60% while the shareholder return increased fourfold;
- between 1995 and 2001, **Interface** (flooring products) reduced GHG emissions per unit of production in its Canadian operations by 64% while the company's waste reduction program produced savings of over $185 million worldwide.

Implementation of the Kyoto Protocol in Canada will provide rewards for these leading firms for their early action. On the other hand, the federal government's continued hesitation on ratification creates "policy uncertainty" that is harmful and costly for corporate decision making and competitiveness. A decision not to ratify would simply prolong this uncertainty given that Canada will not be able to avoid eventually participating in a global agreement to reduce GHG emissions.

Kyoto will create corporate business opportunities

Addressing global climate change through the Kyoto Protocol and subsequent agreements will also create opportunities for new firms to satisfy the ever-increasing demand for low-GHG technologies. There is already substantial growth in innovative new firms in Canada that are emerging in anticipation of the need for GHG reductions. Opponents of the Protocol tend to focus on the threat to established firms that have not positioned themselves well for GHG reductions while ignoring these emerging sectors that will benefit. While the drive to reduce GHG emissions will undoubtedly create many unforeseen business opportunities, the following three key emerging sectors will clearly benefit from the Kyoto Protocol.

[9] Michael Margolick and Doug Russell (November 2001), *Corporate Greenhouse Gas Reduction Targets*, Global Change Strategies International Inc. and Pew Center on Global Climate Change.

- **Low-impact renewable energy**. Under a Kyoto implementation scenario investment in windpower facilities in Canada could be worth up to $6.5 billion by 2010.[10] Hesitation over Kyoto is currently keeping Canada behind our competitors (including the U.S.) in windpower.
- **Alternative transportation technology**. Major firms such as Shell International[11] and DaimlerChrysler[12] expect hydrogen to emerge as the world's primary energy medium and fuel cells, especially in vehicles, to play an integral part in the hydrogen economy.
- **Energy efficiency technology**. Under a Kyoto implementation scenario, an estimated $21 billion could be spent on energy efficiency measures in Canadian buildings by 2010.[13]

The following firms are examples of small but rapidly growing Canadian companies positioning themselves to be competitive in a Kyoto implementation scenario. Canada's ratification of the Kyoto Protocol will assist these firms and similar ones in bringing new and improved products to the domestic market, enhance their ability to become significant exporters of Canadian technology, and provide an incentive for them to stay in Canada:

- **Vision Quest Windelectric** operates 67 windpower plants in Alberta. In September 2001, Vision Quest began delivering power to Calgary Transit's C-Train from 12 new 660 kW-rated wind turbines.
- **Ballard Power Systems, Inc.**, based in Vancouver, is a world leader in the development of fuel cells in automotive applications. Ballard is the fuel cell engine provider of choice for many major vehicle manufacturers. DaimlerChrysler and Ford equity ownership of Ballard recently stood at 23.6% and 19.5% respectively, investments worth hundreds of millions of dollars.
- **Iogen Corporation**, based in Ottawa, has developed a new enzyme-based technology to produce ethanol — for use in ethanol-blend gasoline that can be used in all modern cars — from straw, an agricultural byproduct. To date, Iogen has received a $15.8 million investment from Petro-Canada and a $US 29 million investment from Shell.

Financial markets reward environmental leadership

A further important category of evidence for the enhanced competitiveness of firms that are environmental leaders is provided by the financial markets. A recent report by Innovest Strategic Value Advisors,[14] a New York-based investment research firm, argues that the linkage between environmental performance and competitiveness will be especially strong with respect to corporate performance in addressing climate change. Integrating climate change into business decisions demonstrates a good risk management strategy, rewarded by the market. Numerous other studies demonstrate that financial markets reward firms that are environmental leaders. For example:

- In every sector rated by Innovest using its "EcoValue 21" rating system for environmental performance, companies receiving above average EcoValue 21 ratings outperformed below average companies by 300 to 1800 basis points, as measured by total stock market return.
- Since its inception in May 1990, the Domini Social Index (DSI) has outperformed the Standard & Poors (S&P) 500 index.[15] As of June 30, 2001 the DSI had recorded an annualized return of

[10] Environmental Affairs Branch, Industry Canada (March 2002), *The Kyoto Protocol and Industry Growth Opportunities*, draft 5, p. 14.
[11] Shell (2002), *Hydrogen-Based Sustainable Power for the 21st Century*, http://www.shellhydrogen.com.
[12] DaimlerChrysler (1999), *New Venture Aims to Create World's First Hydrogen Economy*, news release. Available at http://www.daimlerchrysler.com/news/top/1999/t90217_e.htm.
[13] Environmental Affairs Branch, Industry Canada, *op. cit.*, p. 20.
[14] Innovest Strategic Value Advisors, Inc. (April 2002), *Value at Risk: Climate Change and the Future of Governance*, CERES (Boston). Available at http://www.ceres.org.
[15] http://www.kld.com/benchmarks/dsi.html

16.3% over a 10-year period, compared with 15.1% for the S&P 500. On a five-year basis, the DSI had recorded an annualized return of 15.6%, compared with 14.5% for the S&P 500.[16]

- In Canada, the performance of 60 of the most socially and environmentally responsible firms can now be tracked with the Jantzi Social Index (JSI), established in January 2000. Return rates have regularly been comparable or superior to standard indices such as the TSE 100, the TSE 300 or the S&P/TSE 60.[17] The JSI dropped less on September 11, 2001 than those three standard indices.[18]

A closely related line of evidence shows that investors are increasingly demanding that firms meet high standards of environmental and social performance. According to a detailed study by the Social Investment Forum, there are now 230 mutual funds in the United States that incorporate social screening into the investment process, compared to 168 in 1999, 139 in 1997, and just 55 in 1995.[19] According to the same study, the value of socially or environmentally screened portfolios in the U.S. in 2001 was $2.03 trillion compared to a total of $19.9 trillion of professionally managed U.S. investment assets. Another study reported that 26% of U.S. investors say that the business practices and ethics of a company are extremely important to their investment decisions.[20]

A study conducted by Canada's Social Investment Organization shows that in mid-2000, socially or environmentally screened investments in Canada were worth almost $50 billion. The retail market for such investments grew by 75% between June 1998 and June 2000, more than twice the growth rate of the Canadian mutual fund market as a whole.[21]

Conclusion

To re-iterate, this report surveys the real-world evidence of how initiatives to reduce GHG emissions and address other environmental challenges have affected a broad variety of indicators of competitiveness. That evidence strongly supports the following findings:

- by taking a lead to address environmental issues, governments position firms in their jurisdictions to be more efficient and competitive in future markets;
- governments can design policies in a manner that respects legitimate competitiveness concerns;
- firms that take action to improve efficiency and reduce GHG emissions also improve their competitiveness;
- major business opportunities are being created for innovative firms as a result of Kyoto; and
- financial markets reward firms that are environmental leaders.

Taken together, these findings provide a sound basis for concluding that Canada's competitiveness, when defined broadly, is likely to benefit, not suffer, from a decision by the federal government to ratify the Kyoto Protocol.

[16] http://www.socialinvestment.ca/Intro4.htm
[17] http://www.mjra-jsi.com/jsi/statistical_review.asp?section=2&level_2=4&level_3=0
[18] Michael Jantzi Research Associates Inc. (2002), personal communication.
[19] Social Investment Forum (November 2001), *2001 Report on Responsible Investing Trends in the United States*. Available at http://socialinvest.org/areas/research/trends/2001-trends.htm.
[20] Walker Information (1998), http://www.walkerinfo.com/resources/whitepapers/docs/v7_n4_wi.pdf.
[21] Social Investment Organization (December 2000), *Canadian Social Investment Review 2000*. Available at http://www.socialinvestment.ca.

1. Introduction

1.1 Costs and benefits of Kyoto

A debate is currently raging in Canada about the costs and benefits of the Kyoto Protocol.[22] Opponents of the Protocol claim that Canada cannot afford to ratify, and therefore implement, the Protocol, because it would cause severe economic damage. Prominent in this rhetoric is the notion that the Protocol would damage Canada's economic competitiveness.

To date, the debate on Kyoto, its costs and benefits, and its effect on competitiveness, has not given due weight to all the elements entering into the economics of the Protocol. A balanced discussion would take into account the following nine factors, all of which affect competitiveness.

1. **Direct costs for emitters and energy users**. When governments introduce measures to reduce emissions, most emitters of greenhouse gases (GHGs) can expect to face increased costs associated with making investments in emission reductions. Since most GHG emissions are associated with energy use, energy users in general, and buyers of products whose lifecycle involves significant energy use, can expect to face price increases.

2. **Direct benefits from increased efficiency**. Most GHG emission reductions result from reduced use of fossil fuels. Energy users facing higher energy prices will respond by reducing their energy use through conservation and efficiency. Reduced purchases of fossil fuels and other forms of energy mean cost savings. The savings from increased conservation and efficiency may often outweigh the initial costs incurred (see, for example, oil giant BP in Section 4.3).

3. **Indirect costs and benefits**. The direct costs and benefits incurred by emitters and energy users will have ramifications throughout the economy as prices and quantities adjust and costs and benefits are passed on to suppliers, customers, and ultimately to individuals in their capacities as consumers, employees, shareholders and taxpayers. Once these ramifications have occurred, some sectors of the economy may turn out to be worse off, but others will be better off (see Chapter 5).

4. **Benefits to human health**. Most GHG emission reductions are achieved through reduced use of fossil fuels. This also results in reduced emissions of other pollutants, notably sulphur dioxide, nitrogen oxides and fine particulate matter. These are key contributors to local air pollution, which each year, according to the federal government, causes 5000 premature deaths across Canada and health problems costing more than $1 billion in hospital admissions, emergency room visits and lost working days in Ontario alone.[23] GHG emission reductions therefore mean fewer deaths, improved health and reduced healthcare costs. Using estimates of "willingness to pay," the federal and provincial governments' Analysis and Modelling Group has valued the reduced mortality in Canada resulting from implementing Kyoto at $300–500 million per year, a result that included neither the full range of pollutants nor all regions of Canada.[24]

[22] The Kyoto Protocol calls for Canada to reduce its emissions of greenhouse gases, net of (i) credits for forestry and agricultural "sinks" and (ii) purchases of international emissions units, to an average of 6% below the 1990 level during 2008–2012. By ratifying the Protocol, Canada would become legally bound by it.

[23] Environment Canada (2001), *Clean Air* Web site, http://www.ec.gc.ca/air/introduction_e.cfm. See also Ontario Medical Association (June 2000), *The Illness Cost of Air Pollution*. Available at http://www.oma.org/phealth/smogmain.htm.

[24] Analysis and Modelling Group (2000), *An Assessment of the Economic and Environmental Implications for Canada of the Kyoto Protocol*, National Climate Change Process, p. xvi.

5. **Avoided costs of climate change**. If GHG emissions continue to rise, scientists project impacts with major economic, social and environmental costs.[25,26] Estimating these costs is notoriously difficult, but one recent estimate by a group of insurance companies put them at $US 300 billion per year globally by 2050.[27] While the Kyoto Protocol is only a small first step towards preventing these impacts, a failure to take that first step is likely to delay global action to reduce GHG emissions by several years, thereby exacerbating the costs of climate change.

6. **Technological innovation**. Placing limits on GHG emissions, especially if it is done in a way that allows emitters to choose how to meet those limits (see Chapter 3), will spur innovation as emitters look for ways to achieve required emission reductions at the lowest cost. If Canada ratifies the Kyoto Protocol, it can expect to see a wave of technological innovation over the next few years. In the longer term (post 2012), Canada will be better positioned in terms of technological capacity to respond to the additional requirements to reduce GHG emissions that will undoubtedly be imposed by future international agreements.[28]

7. **Uncertainty for investors**. For the past several years, there has been great uncertainty as to Canada's long-term policy orientation on climate change. More than four years after the Kyoto Protocol was negotiated, the federal government continues to hesitate over its ratification. This hesitation significantly increases the financial risks faced by the private sector, which typically makes investments in capital stock with a lifetime measured in decades. A decision not to ratify the Protocol would simply prolong this damaging uncertainty by delaying Canada's eventual, inevitable participation in a global agreement to reduce GHG emissions.

8. **Policy options for sharing costs**. Arguably, much of the current opposition to the Kyoto Protocol in Canada arises not out of the overall macroeconomic costs, which are estimated to be modest at worst (see below), but out of the fear of individual sectors and regions that they will be asked to bear a disproportionate or inequitable share of any economic burden. It is therefore important to understand that governments have at their disposal policy options that provide great flexibility in sharing burdens. For example, under a domestic emissions trading system for large industrial emitters, governments can either provide free emission permits or can recycle the proceeds of auctioning emission permits to vulnerable sectors or regions.

9. **Canada's relations with its major international partners**. While the U.S. is Canada's biggest trading partner, there are also major trade flows between Canada and Europe, and Canada and Asia; Canada has close political relationships with both of these regions. In July 2001, Jean Chrétien sent a strong signal to the E.U. and Japan (both of which have now ratified the Kyoto Protocol) that Canada would also ratify the Protocol in 2002.[29] Deciding now to not ratify the Protocol could seriously

[25] Intergovernmental Panel on Climate Change (2001), *Summary for Policymakers, Climate Change 2001: Impacts, Adaptation and Vulnerability*. Available at http://www.ipcc.ch.
[26] Environment Canada (1997), *The Canada Country Study: Climate Impacts and Adaptation*. Available at http://www.ec.gc.ca/climate/ccs/ccs_e.htm.
[27] United Nations Environment Program (February 3, 2001), *Impact of Climate Change to Cost the World $US 300 Billion a Year*, news release.
[28] Climate scientists agree that global GHG emissions reductions of over 50% will be needed to achieve the objective of the United Nations Framework Convention on Climate Change, which is to stabilize the concentration of GHGs in the atmosphere. See Intergovernmental Panel on Climate Change (2001), *Technical Summary of the Working Group I Report*, p. 75–76. Available at http://www.ipcc.ch.
[29] On July 23, 2001, following the breakthrough in international climate negotations in Bonn, Germany, Jean Chrétien made the following statement, available at http://www.pm.gc.ca: "Canada entered this negotiation with the firm intent to bring it to a successful conclusion. And we succeeded. [. . .] I am confident that the agreement

damage Canada's standing with these partners, potentially impacting our ability to obtain favourable outcomes in many international processes, economic or otherwise.

The Analysis and Modelling Group (AMG), composed of federal, provincial and territorial government officials, has been charged by ministers with estimating the economic consequences of implementing the Kyoto Protocol in Canada. According to the AMG's most recent estimates,[30] the macroeconomic consequences of implementing the Protocol could range from a reduction in gross domestic product (GDP) of 1.7% by 2012 to an increase in GDP of 0.4% by the same year, superimposed on the underlying economic growth. As the economy is currently projected to grow by 31.0% between 2000 and 2012, that means Kyoto would either reduce that growth to 28.8% or increase it to 31.5%.[31] At either extreme, these are modest effects.[32] Another recent economic modelling study commissioned by the World Wildlife Fund and the David Suzuki Foundation found that, compared to a non-Kyoto scenario, policies to achieve more than half of the emission reductions required in Canada to comply with the Kyoto Protocol would actually result in an increase in GDP.[33]

The AMG calculations use economic models that take into account only factors 1–3 in the above list while ignoring factors 4–9. In other words, if the continuing debate on the economics of Kyoto is based on the AMG's work, it will be seriously flawed, ignoring several major factors affecting the Kyoto Protocol's effects on the economy and on competitiveness. In particular, the AMG's neglect of factor 6 (technological innovation) could lead to significantly overstated impacts on GDP. An inability to adequately capture innovation is a key reason why economic modelling results systematically overestimate the costs of environmental policy initiatives — as occurred, notably, prior to implementation of both the Montreal Protocol and the U.S. Acid Rain Program (see Section 2.2).

1.2 Kyoto and competitiveness

As noted above, the notion that the Kyoto Protocol would damage Canada's economic competitiveness is prominent in the arguments of opponents of the Protocol in Canada, which tends to focus on the U.S. administration's rejection of the Protocol. Those arguments have the following flaws:

- Opponents of the Protocol ignore the evidence provided by a number of international economic studies that the U.S. withdrawal from the Protocol has lowered the overall cost of the Protocol for Canada.[34] A key reason for this is the removal of U.S. demand for international emissions units

reached this weekend in Bonn opens the way for Canada's ratification of the Kyoto Protocol next year, following full consultations with the provinces, the territories, stakeholders and other Canadians."

[30] Government of Canada (May 2002), *A Discussion Paper on Canada's Contribution to Addressing Climate Change*, p. 41. Available at http://www.climatechange.gc.ca/discussionpaper.

[31] $1.31 \times 0.983 = 1.288$; $1.31 \times 1.004 = 1.315$.

[32] In addition, the AMG costs have been inflated as a result of assuming international emissions units available under the Protocol's trading mechanisms would cost $10–50 per tonne of carbon dioxide equivalent in 2010, while a representative range of recent international studies calculated prices in the lower range of $2–37. See Dirk Forrester, Natsource (January 14, 2002), *Gaining Advantage in the Global GHG Market: Kyoto Responses & U.S. Policy in Formation*, presentation to National Round Table on the Environment and the Economy information seminar, Halifax. Available at http://www.nrtee-trnee.gc.ca/EmissionsTrading/en/Day1-Seminars/Day1-Halifax/Dirk-Forrister_Halifax_Day1.htm.

[33] Alison Baillie et al. (April 2002), *The Bottom Line on Kyoto: Economic Benefits of Canadian Action*, World Wildlife Fund and David Suzuki Foundation.

[34] Environment Canada (March 2002), *Costs of Kyoto — What we Know*. Available at http://www.ec.gc.ca/minister/speeches/2002/020318_t_e.htm.

under the Protocol's emissions trading mechanisms (of which Canada expects to make significant use), causing a dramatic fall in the price that Canada can expect to pay for those units.

- Opponents of the Protocol frequently claim that the cost increases resulting from the need to make emission reductions and higher energy prices will cause a major shift of investment and even relocation by Canadian companies out of Canada, either to the U.S. or to countries that export goods to the U.S. in competition with Canada. This ignores the fact that many other factors affect investment and location decisions. Besides input costs, investors take into account exchange rates, taxation, labour costs, availability of skilled workers, types of policy measures used by governments to achieve social and environmental goals, physical infrastructure and political stability (or the lack of it). The claim that a modest change in just the first of those factors will dramatically tip the balance lacks credibility — especially given that Canada is currently considered the least costly place to do business among the seven leading industrialized (G7) countries.[35]

- Opponents of the Protocol argue that the U.S. is not acting on climate change, and that since the Canadian economy is strongly linked to that of the U.S., Canada cannot afford to act either. This fails to recognize the fact that governments in the U.S., especially at the state level, have, in fact, taken far more significant action to reduce GHG emissions than have governments in Canada, particularly in the areas of low-impact renewable energy and energy efficiency. It is true that the current U.S. administration has abandoned leadership on climate change, but there is nonetheless a much more substantial body of federal GHG-reducing measures in place in the U.S. than in Canada.[36]

- Last but not least, opponents of the Kyoto Protocol in Canada have defined competitiveness in a very narrow, short-term sense. When they talk about competitiveness, they are generally referring only to immediate direct costs incurred by major GHG emitters and energy users — factor 1 among those listed in Section 1.1. Opponents of Kyoto therefore ignore or fail to mention the ability to
  - save money through increased efficiency (factor 2);
  - pass costs on to suppliers or customers (factor 3);
  - realize savings and new business opportunities through innovation, and thereby improve Canada's positioning in both the short and long term (factor 6);
  - benefit from policy certainty that will facilitate the planning of future investments (factor 7); and
  - address the needs of vulnerable sectors or regions through flexible government policies (factor 8).

  Indeed, as already noted, all nine of the elements listed in Section 1.1 affect competitiveness to some degree.

Pursuing this final point, competitiveness is clearly a much broader concept than opponents of Kyoto would have us believe. However, it is not an easy concept to define, and this report does not attempt to provide a single definition. Neither does it attempt to make a full assessment of all nine of the factors outlined in Section 1.1 that enter into the economics of Kyoto. Instead, this report surveys the real-world evidence of how initiatives to reduce GHG emissions and address other environmental challenges have affected a broad variety of indicators of competitiveness.

[35] KPMG (January 29, 2002), *Canada, U.K. Rank First, Second in Lowest Business Costs of Nine Industrial Countries, KPMG Study Reveals*, news release. Available at http://www.competitivealternatives.com.
[36] Matthew Bramley (May 2002), *A Comparison of Current Government Action on Climate Change in the U.S. and Canada*, Pembina Institute. Available at http://www.pembina.org/publications_item.asp?id=129.

That evidence, presented in Chapters 2–6 below, strongly supports the following findings:

- by taking a lead to address environmental issues, governments position firms in their jurisdictions to be more efficient and competitive in future markets (Chapter 2);
- governments can design policies in a manner that respects legitimate competitiveness concerns (Chapter 3);
- firms that take action to improve efficiency and reduce GHG emissions also improve their competitiveness (Chapter 4);
- major business opportunities are being created for innovative firms as a result of Kyoto (Chapter 5); and
- financial markets reward firms that are environmental leaders (Chapter 6).

Taken together, these findings provide a sound basis for concluding that Canada's competitiveness, when defined broadly, is likely to benefit, not suffer, from a decision by the federal government to ratify the Kyoto Protocol.

2. Government action on the environment can protect and enhance competitiveness

2.1 General evidence

There is a wealth of literature demonstrating that government action on the environment can be a source of competitiveness.

Michael Porter, Director of the Institute for Strategy and Competitiveness at the Harvard Business School, is widely recognized as the leading specialist in this area. Porter has studied in depth the origins of the national competitiveness of several countries[37] as well as the competitiveness of many industrial sectors. According to Porter, a country's prosperity is created — not inherited from endowments of natural resources — and it therefore depends on the capacity of its industry to innovate and upgrade. Innovation comes from individual firms, but is also fostered by judicious government regulation that reflects the specificities of the country:

> *Government must strive to improve the business environment in many ways. It must not, however, limit competition or ease standards for safety and environmental impact. Such "help" actually retards competitiveness by stunting innovation and slowing productivity improvement.*[38]

Porter and van der Linde[39] have also demonstrated that properly designed environmental standards can trigger innovation that may partially or more than fully offset the costs of complying with them. In *Green and Competitive: Ending the Stalemate*,[40] the same authors build further on the topic, adding that pollution is often a form of economic waste:

> *When scrap, harmful substances, or energy forms are discharged into the environment as pollution, it is a sign that resources have been used incompletely, inefficiently, or ineffectively.*

While not necessarily accepted by all, Porter's hypotheses have nonetheless been confirmed by many other authors. For example:

- Arnold and Neubert[41] conducted an extensive project in the mid-1990s for the U.S. Environmental Protection Agency assessing the relation between "environmental pressure" — regulatory pressure in combination with stakeholder and market drivers — and competitive advantage. The project covered several major industry sectors and included detailed company case studies. The authors conclude that, "Environmental pressure can be a significant determinant of competitive advantage, particularly in industries with low profit margins, high pollution loads, and heavy resource and capital intensity."

[37] Michael E. Porter (March–April 1990), *The Competitive Advantage of Nations*, Harvard Business Review.
[38] Michael E. Porter (1998), *The Competitive Advantage of Nations*, Free Press (New York), p. xiii.
[39] Michael E. Porter and Claas van der Linde (1995), *Toward a new Conception of the Environment-Competitiveness Relationship*, Journal of Economic Perspectives vol. 9, no. 4, p. 97–118.
[40] Michael E. Porter and Claas van der Linde (September 1995), *Green and Competitive: Ending the Stalemate*, Harvard Business Review.
[41] Matthew Arnold and Brian Neubert (January 1997), *Competitiveness Project Summary*, Office of Policy, Planning and Evaluation, U.S. Environmental Protection Agency.

- Building on Porter's work, Jaffe and Palmer[42] looked at the statistical relationships between pollution control expenditures and measures of innovative activity and performance across industries and time. Their conclusion is that environmental regulations have a positive impact on innovation, reflected in the number of patent applications for environmental technologies.

- Goodstein,[43] in a study for the Economic Policy Institute, confirms the conclusion that environmental regulation has had no reliably measurable negative impact on the competitiveness of U.S. firms, but also finds that "industries that spent more money complying with environmental regulations actually demonstrated superior performance against imports from developed countries."

- Bhatnagar and Cohen[44] also studied the impact of environmental regulation on innovation. They looked at the performance of 146 U.S. manufacturing industry sectors between 1983 and 1992 and reached the conclusion that environmental innovation occurs in response to increases in abatement costs.

- Hoerner and Mutl,[45] in an economic modelling study conducted for the Center for a Sustainable Economy, examined the impact of an integrated energy-efficiency policy package assembled by the National Laboratories of the U.S. Department of Energy on the competitiveness of U.S. business. They modelled the impact of this package on aggregate cost and output price for 498 industry sectors. Their results show that the package would generate net savings for more than 80% of U.S. business (in gross output terms) and improve the aggregate competitive position of the U.S. economy in both import and export markets.

- A recent major study[46] by the Institute for Southern Studies assessed the 50 U.S. states according to 20 economic and 20 environmental performance indicators. The study found a strong correlation between the highest environmental standards and the best economic performance. Seven states ranked in the top 15 for both environmental and economic performance, while 10 states ranked in the bottom 15 for both.

- The *Global Competitiveness Report 2001–2002* published by the World Economic Forum[47] (WEF) contains a thorough comparative analysis of the growth prospects of 75 countries, based on an executive opinion survey in each country.[48] One of the criteria considered is whether complying with environmental standards "hurts competitiveness" or "helps long-term competitiveness by prompting improvements in products and processes." For the 22 developed countries included, the average response was 5.0 on a scale of 1 (compliance hurts

[42] Adam B. Jaffe and Karen Palmer (1997), *Environmental Regulation and Innovation: A Panel Study,* Review of Economics and Statistics, p. 610–619.
[43] Eban Goodstein (November 1997), *A New Look at Environmental Protection and Competitiveness,* Economic Policy Institute (Washington, D.C.). Available at http://www.epinet.org.
[44] Smita Bhatnagar and Mark A. Cohen (July 1999), *The Impact of Environmental Regulation on Innovation: A Panel Study*, Journal of Environmental Economics, submitted. Available at http://www.vanderbilt.edu/VCEMS/papers/innovate_rev.pdf.
[45] J. Andrew Hoerner and Jan Mutl (November 2000), *Good Business: A Market Analysis of Energy Efficiency Policy*, CSE Working Paper, Center for a Sustainable Economy. Available at http://sustainableeconomy.org/gb-execsumm.htm.
[46] Institute for Southern Studies (November 2000), *Gold and Green 2000*. Available at http://www.southernstudies.org.
[47] http://weforum.org.
[48] The underlying database has been forwarded by the WEF to the present authors.

competitiveness) to 7 (compliance helps long-term competitiveness). Average responses for Canada and the U.S. were 5.2 and 5.1 respectively.

2.2 Case studies

Recent history provides examples of major emission reduction initiatives whose impacts on the competitiveness of the targeted industries have been studied. Four such initiatives are discussed in some detail below.

The first two examples — the Montreal Protocol and the U.S. Acid Rain Program — illustrate a recurring theme: the tendency for targeted industries to significantly overestimate the costs of complying with environmental regulations prior to implementation. Canada's policymakers should bear this in mind when evaluating the current claims of some Canadian industry organizations that ratification of the Kyoto Protocol will cause severe economic damage. Hodges[49] conducted an extensive literature survey of comparisons between prior cost projections and actual costs of compliance with twelve environmental regulatory initiatives in the U.S. between the 1970s and the 1990s. He found that, "In all cases except one, the early estimates were at least double the later ones, and often much greater. . . . The evidence shows a clear pattern of overestimation. Case studies and retrospective analyses conducted for a variety of regulations show that, in all cases, emission reduction at the source is much cheaper than is generally expected. However, cleanup beyond the source [i.e., in the case of GHGs, trying to deal with the impacts of climate change] is often much more expensive than predicted."

2.2.1 The Montreal Protocol

The Montreal Protocol, adopted in 1987 and amended in 1990, aims to phase out worldwide production and consumption of chlorofluorocarbons (CFCs) and other ozone-depleting compounds. Canada played an important leadership role in the development and implementation of the Protocol — in sharp contrast to its current hesitation to commit to significant GHG emission reductions.[50] The Protocol entered into force in 1989 and was amended in 1990. The following discussion refers to the 1989 Protocol including its 1990 amendment.

The Protocol sets timetables for a staged phase-out of the production and consumption of CFCs (Group I) and halons (Group II), with different timing for developed and developing countries. The Protocol also bans the import of ozone-depleting products from non-parties, and "discourages" the export of technologies used in producing and utilizing ozone-depleting substances to non-parties.[51]

Opposition to the Montreal Protocol by industry groups was characterized by claims of negative impacts on the economy and on competitiveness. Governments also overestimated these impacts. Hodges[52] reports studies conducted by the U.S. Environmental Protection Agency on the cost of compliance with the Montreal Protocol targets:

[49] Hart Hodges (November 1997), *Falling Prices: Cost of Complying With Environmental Regulations Almost Always Less Than Advertised*, Economic Policy Institute (Washington, D.C.). Available at http://www.epinet.org.
[50] David Boyd (January 2002), *Up in the Air: Canada's Mixed Record on Ozone Depletion and Climate Change*, David Suzuki Foundation and the University of Victoria Eco-Research Chair. Available at http://www.davidsuzuki.org.
[51] Peter M. Morrisette (1989), *The Evolution of Policy Response to Stratospheric Ozone Depletion*, Natural Resources Journal, Vol. 29, p. 793–820.
[52] Hart Hodges (November 1997), *op. cit.*

> *In 1988, the agency estimated it would cost $2.7 billion to reduce U.S. consumption [of CFCs] by 50% within 10 years. By 1992 the estimate to totally phase out CFCs within eight years was only $3.8 billion . . . the estimated average cost of cleaning up CFCs fell by approximately 38%.*

As early as 1991, a technological and economic assessment of the impact of the Montreal Protocol conducted by the United Nations Environment Programme (UNEP) [53] was finding that alarmist claims of economic damage were unfounded. According to the UNEP assessment,

- "Innovation to replace CFCs has been rapid, effective, and economical. Previous fears have largely been groundless. . . . it has . . . been generally true that scientific, engineering, and entrepreneurial innovations have been sufficient to overcome the losses of Ozone Depleting Substances (ODS). Not only has it been technically possible to replace CFCs in a continuous expanding range of applications, but in many cases it also has been relatively inexpensive or even profitable to do so."
- Private sector firms and governments in the developed countries had moved faster than required the formal regulatory structure of the Montreal Protocol.
- A spirit of partnership and cooperation in sharing information widely had greatly accelerated the process of substituting for CFCs and lowered the economic costs.

Parallels are already evident between these findings, and the case of climate change and the Kyoto Protocol. Regarding the unexpectedly fast pace of innovation, the Third Assessment Report of the Intergovernmental Panel on Climate Change (2001) found that,[54]

> *Significant technical progress relevant to greenhouse gas emissions reduction has been made since the [Second Assessment Report] in 1995 and has been faster than anticipated. Advances are taking place in a wide range of technologies at different stages of development, e.g., the market introduction of wind turbines, the rapid elimination of industrial by-product gases such as N_2O from adipic acid production and perfluorocarbons from aluminium production, efficient hybrid engine cars, the advancement of fuel cell technology, and the demonstration of underground carbon dioxide storage.*

Again, in the case of climate change, regarding the exceedance of formal regulatory objectives, one can point to the example of the U.K., whose government has taken on the voluntary goal of reducing GHG emissions by 20% below the 1990 level by 2010, substantially beyond the U.K.'s Kyoto Protocol target (under the E.U. burden sharing agreement) of an average 12.5% reduction by 2008–2012. The U.K. Climate Change Program justifies the 20% goal in terms of benefits, including benefits for business:[55]

> *The Kyoto Protocol is only the first step. In the longer term, bigger cuts worldwide — perhaps 60% or more — will be needed. There will also be many benefits for the UK from taking early action to cut our emissions. This approach is supported by many other stakeholders, including business and local authorities [municipalities].*

[53] United Nations Environment Programme (1991), *Montreal Protocol on Substances that Deplete the Ozone Layer: 1991 Assessment: Report of the Technology and Economic Assessment Panel.*
[54] Intergovernmental Panel on Climate Change (2001), *Summary for Policymakers, Climate Change 2001: Mitigation*, p. 5. Available at http://www.ipcc.ch.
[55] U.K. Department of the Environment, Transport and the Regions (November 2000), *Climate Change: The UK Programme, Summary*, p. 2. Available at http://www.defra.gov.uk/environment/climatechange/07.htm.

Returning to the Montreal Protocol, Environment Canada's report, *The Right Choice at the Right Time,*[56] presents estimates of global economic costs of compliance with the Protocol compared to economic benefits over the period 1987 to 2060[57] (a date when ozone depletion is expected to have been reversed). Costs are estimated to be $235 billion (in 1997 US dollars) while benefits (resulting from reduced damage to fisheries, agriculture and materials) are estimated at $459 billion, resulting in a net benefit of $224 billion. This benefit does not take into account health benefits, estimated to include one-third of a million fewer skin cancer fatalities.

It is unfortunate that Canada is not taking a similarly comprehensive approach to costs and benefits in the case of the Kyoto Protocol. As noted in Section 1.1, the federal and provincial governments' Analysis and Modelling Group is not considering the costs of climate change or the benefits to human health in its assessment of the economic effects of the Kyoto Protocol on Canada.

2.2.2 The U.S. Acid Rain Program

The overall goal of the Acid Rain Program, which targets fossil fuel-burning power plants throughout the U.S., is to achieve significant environmental and public health benefits through reductions in emissions of sulphur dioxide (SO_2) and nitrogen oxides (NO_x), the primary causes of acid rain. Signed into law in 1990 by George Bush, Sr. as an amendment to the Clean Air Act, the Program began operating in 1995.

The key feature of the Acid Rain Program is its "cap and trade" emissions trading system, whereby government sets an overall cap on emissions, and portions of the cap are allocated to individual emitters in the form of emissions allowances. In each compliance period, emitters have to surrender a number of allowances equal to their emissions over that period. This is exactly the kind of system that federal and provincial governments in Canada are envisaging as the central policy instrument to reduce GHG emissions from large industrial emitters in a potential package of measures to implement the Kyoto Protocol.[58]

During the negotiations leading to the establishment of the Acid Rain Program, the targeted utilities argued strenuously that the Program would jeopardize their competitiveness. Estimates of marginal compliance costs and allowance prices were in the range of $300 to $1,000 per ton of SO_2.[59] In comparison, a typical SO_2 allowance price in 2000 was $150 per ton, while electricity prices remained stable through the 1990s.[60] Hodges[61] reports that initial estimates of compliance costs to reduce sulphur dioxide were $4–$5 billion, while a study published in 1996 suggested that utilities had actually saved $150 million or more through measures taken to comply with requirements of the Program's first phase. Hodges cites another study that found that "real control costs have been two to four times lower than the [Environmental Protection Agency] estimates and four to eight times below industry estimates." He also

[56] Environment Canada (September 1997), *The Right Choice at the Right Time: Highlights of the Global Benefits and Costs of the Montreal Protocol on Substances that Deplete the Ozone Layer*. Available at http://www.ec.gc.ca/ozone/archive/choices/index_e.html.
[57] Using a 5% discount rate.
[58] Federal and provincial government design work on a potential future domestic GHG emissions trading system is being carried out by the Domestic Emissions Trading Working Group under the National Climate Change Process. See http://www.nccp.ca.
[59] Robert W. Halm and Carol A. May (1994), *The Behaviour of the Allowance Market: Theory and Evidence*, Electricity Journal, Vol. 7, p. 28–33.
[60] Andrew Aulisi et al. (September 2000) *From Obstacle to Opportunity: How Acid Rain Emissions Trading is Delivering Cleaner Air*, Environmental Defense. Available at *http://www.environmentaldefense.org/documents/645_SO2.pdf*.
[61] Hart Hodges (November 1997), *op. cit.*

cites a Wall Street Journal article from November 15, 1995: "Electric industry officials acknowledge that complying with the Clean Air Act . . . hasn't been nearly so expensive" as they originally thought.

A detailed review by Environmental Defense[62] demonstrates that the Acid Rain Program has been extremely successful:

> *The experience in the United States in the latter half of the 1990s belies the initial claims of opponents of the SO_2 emissions cap that it would preclude economic growth. Through emissions trading, electric utilities and the overall economy were able to integrate large reductions in emissions with economic activity and growth in electricity production.*

The Environmental Defense review highlights the importance of innovation in the success of the Program:

> *During Phase I [1995–99], innovation took its most obvious form in the development of low-cost "scrubbers.". . . Since the enactment of the SO_2 emissions trading program, the level of innovation in scrubber technology has changed dramatically . . . [in] the form of both improved technical performance and cost decreases . . . all forms of compliance—scrubbing, fuel-switching, investments in energy-efficient technologies, using non-sulfur energy sources, and changing the order in which electricity plants are dispatched—must compete with one another to succeed in the "compliance market.". . . Not only does this competition lower costs, but the flexibility of the program, together with the drive for cost reduction, allows operators and other investors to use a combination of compliance options in innovative ways. Before the enactment of the SO_2 program, for example, most observers assumed that expensive changes to the combustion technology of existing plants would be required for those plants to use lower-sulfur coal . . . Instead, power plant operators and investors in the fuel and engineering industries, motivated by competition in the compliance market, have developed alternative means involving fuel-blending and new fuel-blending technologies to use low-sulfur coal at much lower costs.*

The government of Canada is currently contemplating implementing the Kyoto Protocol with, as a central policy instrument, a cap-and-trade system for large GHG emitters akin to the system used in the Acid Rain Program. While GHG emissions are of course not the same as SO_2 emissions, the lessons of the Acid Rain Program regarding exaggerated prior cost projections and stimulation of innovation (and therefore competitiveness) should nonetheless be considered carefully.

2.2.3 Eastern Canada Acid Rain Program

This successful regulatory initiative, in which all Canadian provinces from Manitoba eastwards participated, was a "command and control" approach to reducing SO_2 emissions.[63] Beginning in 1985, the overall target was to cut 1980 emissions in half by 1994, through a series of federal-provincial bilateral agreements. Inco Ltd., at the time the largest single point emitter of SO_2 in North America, succeeded in reaching its emission reduction target within the ten-year implementation period by developing technologies that lowered both emissions and operating costs. This offset capital investment and protected international competitiveness for the company. Inco's $600 million investment "actually provided a

[62] Andrew Aulisi et al., *op. cit.*
[63] Thomas P. Lyon and John W. Maxwell (2001), "Voluntary Approaches to Environmental Regulation: A Survey" in *Economic Institutions and Environmental Policy*, edited by Maurizio Franzini and Antonio Nicita, Ashgate Publishing Ltd (U.K.).

modest return," stated Charles Ferguson, Inco's former Vice President of Environment, Health and Safety.[64]

2.2.4 The U.K.'s GHG emissions trading system

Throughout the E.U., there has been early and widespread recognition that climate change is a pressing reality necessitating early action — with the Kyoto Protocol at the centre of such action. Many industrial sectors have quickly realized that acting early confers a competitive advantage through the development of knowledge, capacity and new technologies. As already noted in Section 2.2.1, this tendency has been especially evident in the U.K.

The industrial sector in the U.K. pushed for the development of an early regulatory framework for GHG emissions in order to prepare itself to meet the national target on time and gain a strategic competitive advantage by being ahead of the game and able to build on and export new knowledge. As noted in Section 2.2.1, the U.K. government has taken on a voluntary GHG reduction goal that goes substantially beyond the country's Kyoto target.

At the heart of the U.K. framework is a GHG emissions trading system[65] that began formal operation on April 2, 2002. Open to all organisations operating in the U.K., it is the first economy-wide domestic GHG emissions trading system (Denmark has a system that began earlier but is limited to its electricity sector). Designed by a joint government-industry working group, the system allows firms to participate in three main ways:

- through a competitive bidding process (a type of auction), firms can negotiate a declining five-year series of annual emissions targets in exchange for a financial incentive, and then use emissions trading to meet their targets; thirty-four firms entered the system through the first auction conducted in March 2002;[66]
- six thousand firms that had earlier negotiated Climate Change Agreements to reduce emissions in exchange for an 80% discount in the Climate Change Levy (imposed on non-domestic energy use beginning in April 2001) can use emissions trading to meet the targets specified in their agreements;
- firms can generate project-based emission reduction credits, outside of the firm-level targets, that can be sold into the system.

While the system remains voluntary, its provision of financial incentives and flexibility in complying with pre-existing regulatory initiatives (the Climate Change Agreements) has ensured strong participation. The government is also proposing that two other climate-related regulatory initiatives be linked to the emissions trading system. Energy suppliers with "renewable energy obligations" and/or Energy Efficiency Commitments would be able to convert any over-compliance with those requirements into GHG credits that could be sold into the trading system. The government also intends to create linkages between the domestic and foreign/international emissions trading systems.

[64] Robert Kerr, Aaron Cosbey and Ron Yachin (1998), *Beyond Regulation: Exporters and Voluntary Environmental Measures*, International Institute for Sustainable Development and The Conference Board of Canada.
[65] Department for Environment, Food & Rural Affairs (August 2001), *Framework for the UK Emissions Trading Scheme*. Available at http://www.defra.gov.uk/environment/climatechange/trading/index.htm.
[66] Participants include Blue Circle Industries (cement), British Airways, BP, Dupont, Ford, Mitsubishi, Motorola, Rolls-Royce, Shell UK and UK Coal Mining.

It is too early to assess the impact of the U.K.'s GHG emissions trading system on competitiveness. However, it is very important to highlight the key motivations behind the development and implementation of the system, as explained by the U.K. government:[67,68]

- U.K. industry was keen to exploit the opportunities the international emissions trading mechanisms created by the Kyoto Protocol would bring, both at the European level and worldwide;
- in order to reduce policy uncertainty, industry, through the Confederation of British Industry (CBI, the leading employers' organization) and individual firms, requested that the government develop an appropriate regulatory response and worked with it to develop one;
- the system had to be flexible enough to adapt to, and seize opportunities offered by, the expected future extensions of GHG emissions trading markets;
- there was a belief that the early development of a domestic emissions trading system would ensure the U.K. government and business and the City of London were well placed to play a leading and influential role in both the development and use of future international systems.

The proactive approach of the CBI in pushing for the establishment of the UK emissions trading system is evident in the following statement, made in June 2000:[69]

> *In recent years, business has taken an active role in the development of climate change policy and continues to be involved in numerous activities which will help ensure that the U.K. meets its international commitments . . . The Government's attempt to promote a transition towards a low carbon economy has the potential, if properly framed, to establish the basis on which the U.K. could reasonably meet further commitments above and beyond those agreed at Kyoto. Such a process needs to be a smooth one sustaining competitiveness and avoiding economic disincentives.*

In other words, British industry believes that maintenance of its competitiveness and regulatory initiatives aiming *beyond* the Kyoto targets are compatible objectives as long as those initiatives are appropriately designed.

[67] Department for Environment, Food & Rural Affairs (November 2000), *A Greenhouse Gas Emissions Trading Scheme for the United Kingdom*. Available at http://www.defra.gov.uk/environment/climatechange/trading/index.htm.
[68] Olivia Hartridge (2002), U.K. Department for Environment, Food & Rural Affairs, personal communication.
[69] Confederation of British Industry (June 2000), *CBI response to the Government's UK Climate Change Draft Programme*. Available at http://www.cbi.org.uk.

3. Protecting and enhancing competitiveness: A policy design issue

While there is a lot of evidence that regulatory environmental initiatives can enhance competitiveness (see Chapter 2), it is, indeed, obvious that this depends to at least some extent on the design of the initiatives in question.

3.1 Policy design criteria

Porter and van der Linde have analyzed the type of policy designs that governments should apply to improve competitiveness. As noted in Section 2.1, these authors demonstrate in *Green and Competitive: Ending the Stalemate*[70] that properly designed standards can trigger innovations that lower the net cost of a product or improve its value. According to Porter and van der Linde, "properly designed" regulation is regulation that motivates firms to innovate, since innovation is the fundamental driver of competitiveness. They list the following criteria for innovation-friendly regulation:

1. focusing on outcomes, not technologies;
2. strict rather than lax;
3. as close to the end user as practical, while encouraging upstream solutions;
4. phased in;
5. using market incentives;
6. harmonized or in convergence with regulations in associated fields;
7. developed at the same time as other countries or slightly ahead of them;
8. in the context of a regulatory process that is stable and predictable;
9. with industry participation in setting standards from the beginning;
10. requiring strong technical capabilities on the part of regulators; and
11. minimizing the time and resources consumed in the regulatory process itself.

3.2 Examples of compatible policy measures

3.2.1 GHG emissions trading

It is striking how well a "cap and trade" emissions trading system satisfies Porter and van der Linde's policy design criteria listed in Section 3.1. As noted earlier, such a system is the central policy instrument envisaged by federal and provincial governments in Canada to reduce GHG emissions from large industrial emitters ("large final emitters") — accounting for some 35% of Canada's emissions — in a potential package of measures to implement the Kyoto Protocol. Governments have also been evaluating the use of such a system to cover all fossil fuel use, extending its coverage to 75% of Canada's emissions ("broad as practical").[71]

[70] Michael E. Porter and Claas van der Linde (September 1995), *op. cit.*

[71] Tradeable Permits Working Group (2000), *Using Tradeable Emission Permits To Help Achieve Domestic Greenhouse Gas Objectives*, National Climate Change Process. Available at http://www.nccp.ca/NCCP/national_process/issues/tradable_e.html#options.

A cap and trade system for GHG emissions would set a cap on the total emissions from covered emitters, while giving those emitters total liberty to choose which technologies to use to meet the cap (criterion 1). Governments could make the system as strict or as lax as they wish (criterion 2), depending on the level at which they set the cap. A cap and trade system could be introduced in, say, 2004 with a relatively loose cap that could be tightened annually (criterion 4). The market for tradeable emissions permits or allowances created by the system would create powerful market incentives to reduce emissions, as the U.S. Acid Rain Program (Section 2.2.2) has shown (criterion 5). Once Canada had ratified the Kyoto Protocol, the National Climate Change Process that already exists could provide a stable and predictable framework for regulatory development with the participation of industry and environmental groups (criteria 8 and 9), while the federal Climate Change Secretariat already has a large team of expert staff working full time on domestic emissions trading (criterion 10). Once a trading system was in place, it would require relatively little administration compared to other types of policy measures (criterion 11).

Regarding criterion 7, the important fact that governments in the U.S., especially at the state level, have taken far more significant action to date to reduce GHG emissions than governments in Canada was already noted in Section 1.2.[72] In other words, by implementing measures to comply with the Kyoto Protocol, Canada will initially be catching up with the U.S. rather than pulling ahead.

It is also important to recall that concerns expressed in Canada about the effects of the Kyoto Protocol on competitiveness frequently focus on regional or sectoral vulnerabilities. A domestic emissions trading system would give governments essentially unlimited flexibility in addressing such vulnerabilities by providing free emission permits or recycling the proceeds of auctioning emission permits to particular sectors or regions.

3.2.2 Environmental taxes (including carbon taxes)

Environmental taxes are another policy measure that can satisfy Porter and van der Linde's policy design criteria. Like an emissions trading system, an environmental tax provides a price signal to reduce emissions while leaving the market to respond to that signal as it sees fit.

Over the last decade, numerous European governments have pursued environmental performance improvements by implementing broad based ecological tax reform policies. Governments have viewed such policies as entirely consistent with their efforts to increase the competitiveness of their economies. These policies do not seek to increase the overall tax burden but rather to increase or implement new environmental taxes while simultaneously reducing other existing kinds of taxes. Depending on which taxes are reduced, increased competitiveness can be realized in the form of employment gains as a result of reductions in payroll taxes, or increased domestic spending and investment as a result of reductions in capital or income taxes.

Sweden, Denmark, the Netherlands, the U.K., Finland, Norway, Germany and Italy have all implemented ecological tax reform policies designed to address both environmental performance and economic competitiveness.[73] These countries have mainly used revenue from environmental taxes to finance reductions in personal income taxes and social security contributions. Sweden was the first country to implement an ecological tax reform policy in 1990 and Denmark followed in 1994. Both the Netherlands and U.K. implemented policies in 1996 and most recently Norway, Germany and Italy implemented

[72] Matthew Bramley, *op. cit.*
[73] Organization for Economic Cooperation and Development (2001), *Environmentally Related Taxation in OECD Countries: Issues and Strategies.*

ecological tax reform policies in 1999.[74] Empirical evidence of the positive effects of such policies on environmental performance is mounting.[75]

Most of the new environmental taxes implemented in Europe are carbon or energy taxes adopted primarily with a view to reducing GHG emissions. One example is the U.K.'s Climate Change Levy, introduced in April 2001. Imposed on non-domestic energy use, this tax is estimated to be fiscally neutral across British industry as a whole; revenues collected will be recycled to businesses through a reduction of 0.3% in employers' National Insurance contributions (payroll taxes), through financial incentives to participate in the GHG emissions trading system (see Section 2.2.4) and through other measures that are part of the U.K.'s overall climate policy.

It is too early to assess the impact of Europe's environmental taxes on employment and investment and hence the competitiveness of the economy at large.[76] However, substantial economic modelling research has predicted the potential for positive effects on competitiveness. The Organization for Economic Cooperation and Development (OECD) found that "positive employment effects can be expected if the revenues from environmental taxes are used to reduce labour taxation in general and employer/employee social security contributions [payroll taxes] in particular."[77] Hoerner,[78] Bosquet[79] and others[80] have obtained similar results. The OECD also found that positive effects on GDP could be expected from an ecological tax reform policy if revenues are used to cut capital taxes. Research by Bosquet revealed that increases in GDP might also result from reductions in social security contributions.[81]

3.2.3 Other measures

It is important to note that emissions trading and environmental taxes are not the only policy measures that can meet Porter and van der Linde's criteria. For example, renewable energy portfolio standards (requiring electricity retailers to source a minimum percentage of electricity from low-impact renewable sources) and fuel efficiency standards for road vehicles are key measures that could help Canada to make major GHG emissions reductions.[82]

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[74] Organization for Economic Cooperation and Development, *op. cit.*
[75] European Environment Agency (2000), *Environmental taxes: Recent Developments in Tools for Integration*, Environmental Issues Series, No. 18.
[76] Organization for Economic Cooperation and Development, *op. cit.*
[77] Organization for Economic Cooperation and Development, *op. cit.*
[78] Andrew Hoerner (2001), *Environmental Tax Reform: The European Experience*, Center for a Sustainable Economy (Washington, D.C.).
[79] B. Bosquet (2000), *Environmental tax reform: does it work? A survey of empirical evidence*, Journal of Ecological Economics, Vol. 34, p. 19–32.
[80] DRI/McGraw-Hill (1994), *The Potential Benefits of Integration of Environmental and Economic Policies: An Incentive-Based Approach to Policy Integration*, report prepared for the European Commission Directorate-General for Environment, Nuclear Safety, and Civil Protection (Kluwer Academic Publishers Group); A. Majocchi (1994), *The Employment Effects of Eco-Taxes: A Review of Empirical Models and Results* (OECD); Institute for Empirical Economic Research (1997), *What is the Cost of a Reduction in CO_2 Emissions?* (University of Osnabruck); Tellus Institute (1997), *Carbon Taxes with Tax Reductions in Minnesota* and *Ecological Tax Reform: Carbon Taxes with Tax Reductions in New York*; Albert Majocchi (1996), *Green Fiscal Reform and Employment: A Survey*, Environmental Resource Economics, Vol. 8, p. 375.
[81] B. Bosquet, *op. cit.*
[82] In the U.S., 12 states have implemented renewable energy portfolio standards and, in April 2002, the Senate also approved a national one (although it remains to be agreed to by the House of Representatives and the President). The government of Canada has committed itself to negotiate improved vehicle fuel efficiency standards with the U.S. as part of its Action Plan 2000 on Climate Change.

The key feature of renewable energy portfolio standards, fuel efficiency standards and similar measures that makes them compatible with protecting and enhancing competitiveness is that they set an objective while leaving producers and the marketplace to decide which technologies to use to meet the objective. They can also be implemented — as is being demonstrated in numerous jurisdictions — in conjunction with trading mechanisms involving, for example, "renewable energy certificates." In that example, an individual electricity retailer has the option of meeting a renewable energy portfolio standard either through sourcing electricity from renewable sources or through buying certificates earned by another retailer that has exceeded the standard. Any such trading mechanism, like emissions trading, will further lower overall costs.

4. Corporate action on the environment enhances competitiveness

4.1 The advantages of environmental leadership

> *[W]e set our own target — to reduce our own emissions of greenhouse gases by 10 per cent from a 1990 base line by the year 2010. . . . Now, five years on, I'm delighted to announce that we've delivered on that target. . . . It came through a reduction in the amount of energy we need to use. . . . And we avoided unnecessary emissions. . . . And by applying simple efficiency — stopping leaks. . . . In aggregate the net effect of all those actions is that we've met the target, seven years ahead of schedule. And we've met it at no net economic cost — because the savings from reduced energy inputs and increased efficiency have outweighed all the expenditure involved.*
>
> — John Browne, Chief Executive, BP, March 2002[83]

Leading firms worldwide are embracing environmental responsibility for competitive advantage. The strategy is simple: by being a leader in environmental protection, the firm is driven to be more innovative and create additional value for its customers and shareholders. Many Canadian firms have positioned themselves as environmental leaders in their sectors. The primary market drivers for leadership are illustrated in Figure 1. Firms on the leading edge of the curve depicted in the figure realize competitive advantage through a number of global market drivers. For example, leading firms tend to benefit from reductions in regulatory delay and the associated cost of gaining "public license to operate." Leaders also attract the best employees because these firms tend to be the most innovative and socially responsible. One of the most important competitive advantages for environmentally leading firms is the identification, development and commercialization of new business opportunities. These new competitive business opportunities are driven by innovation and lead the firm into new services and products.

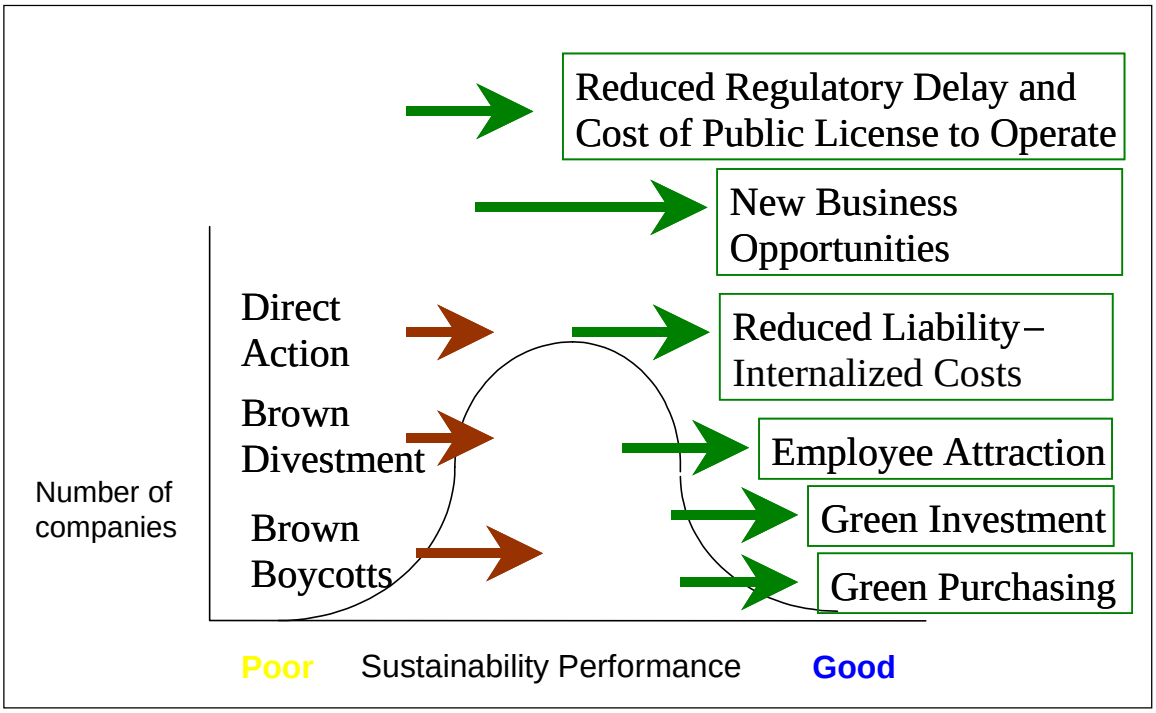
In anticipation of increasing government action to require GHG emission reductions, a number of major Canadian firms have began to position themselves as leaders within their sectors in addressing climate change, including Suncor, Dupont Canada, Shell Canada and Alcan. Implementation of the Kyoto Protocol in Canada will provide rewards for these leading firms for their early action, and motivate others to innovate. This drive for innovation will help ensure Canadian firms maintain their competitiveness in the global market.

It is critical to understand why leading firms are taking GHG reduction seriously and, through their actions, are positioning themselves to succeed under a Kyoto ratification scenario:

- First, 71% of Canada's GHG emissions are a result of energy (fossil fuel) consumption. GHG emissions therefore represent a waste and inefficiency in production systems. By improving energy efficiency, GHG emissions are reduced, financial savings are realized, and the firm's operations become more competitive.
- Second, design engineers who are given an incentive to reduce not only costs but also GHG emissions are finding innovative opportunities for process efficiency gains to which they were previously "blind." The additional design criterion of minimizing GHG emissions is forcing engineers to take a systems approach to design, leading to much greater financial savings and improved environmental performance.
- Third, leading firms understand that in the near future, regardless of the fate of the Kyoto Protocol, business will have to operate in a GHG-constrained global market. These firms are positioning themselves to gain a larger share of that market by being environmentally innovative.

[83] http://www.bp.com/centres/press/stanford/highlights/index.asp

Figure 1: Primary market drivers for corporate environmental leadership



Leading firms have already planned for Canada to ratify the Kyoto Protocol. As noted in Section 1.1., the federal government's continued hesitation on ratification significantly increases the financial risks faced by the private sector, which typically makes investments in capital stock with a lifetime measured in decades. This "policy uncertainty" or "regulatory uncertainty" is harmful and costly for corporate decision making and competitiveness. A decision not to ratify would simply prolong this uncertainty given that Canada will not be able to avoid eventually participating in a global agreement to reduce GHG emissions. The firms cited above — Suncor, Dupont Canada, Shell Canada and Alcan — are all members of the "Engaged Group of Companies," which, like U.K. industry (see Section 2.2.4), has been pressing the federal government to implement a GHG emissions trading system in Canada as soon as possible.[84] Ratification of the Kyoto Protocol would substantially increase the probability of that occurring.

4.2 What the business schools are saying

Substantial research has been completed by the top business schools in North America on the link between corporate competitiveness and environmental leadership.

Research by Michael Porter and Claas van der Linde at the Harvard Business school (cited in Section 2.1 for their work on the link between environmental regulation and competitiveness) has shown that

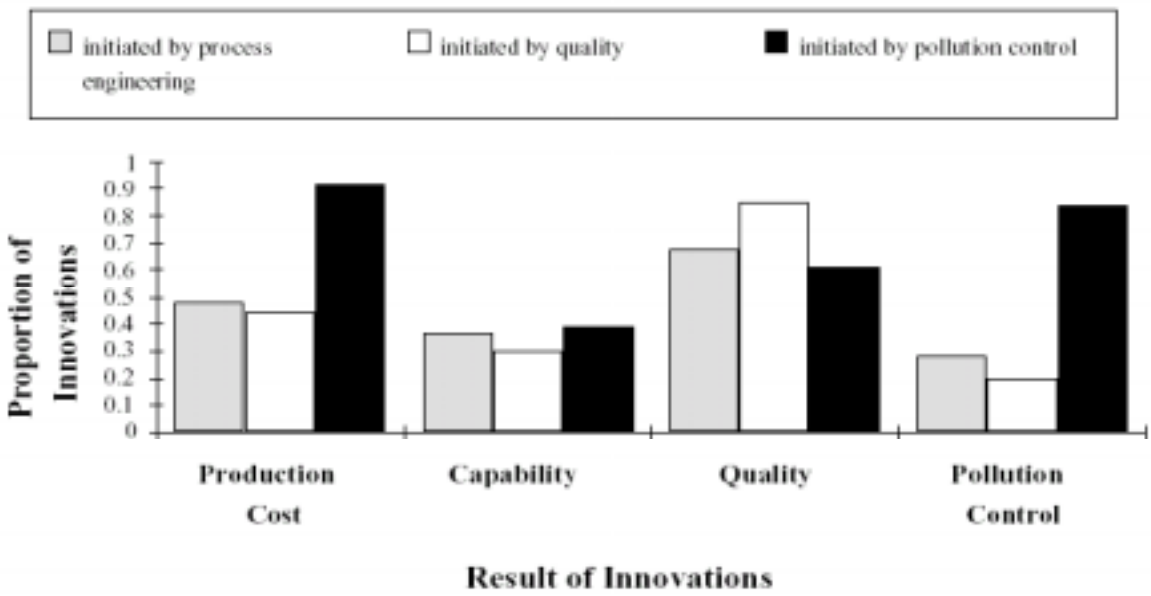
> *Only those companies that innovate successfully will win. A truly competitive industry is more likely to take up a new standard as a challenge and respond to it with innovation. An*

[84] More information about the Engaged Group can be obtained from Peter Dickey at TransAlta, in Calgary.

> *uncompetitive industry, on the other hand, may not be oriented toward innovation and thus may be tempted to fight all regulation.*[85]

An empirical study of 652 companies completed by Andrew King of the Stern School of Business (New York University), shows that a very significant proportion of innovations are driven by environmental initiatives, as illustrated in Figure 2.[86]

Figure 2: The importance of environmental initiatives as drivers for innovation



Porter and van der Linde demonstrate that, contrary to common corporate belief, a firm can be at the same time "green and competitive." According to them, the inherent fixed tradeoff of ecology versus the economy is a static view, in which everything except regulation is held constant. They call this attitude "static thinking" and write: "Static thinking causes companies to fight environmental standards that actually could enhance their competitiveness."[87]

A firm's ability to innovate also depends critically on the employees it can attract and retain. Environmental performance can be a significant factor here. Preliminary research results obtained by Cathie Ramus, from the Donald Bren School of Environmental Science & Management (University of California at Santa Barbara) show that a significant number of students in one business school were willing to give up, on average, $US 18,000/year in salary and bonuses to work for an organisation they believed cared about the natural environment, the community and its employees.[88] Margolick and Russell[89] confirm that "corporate performance on environmental and social issues is a factor in employee

[85] Michael E. Porter and Claas van der Linde (September 1995), *op. cit.*
[86] A. King and M. Lenox (2001), *Does it Really Pay to be Green?* The Journal of Industrial Ecology, Vol. 5, p. 105–116. Available at http://www.stern.nyu.edu/~aking/pays.pdf.
[87] Michael E. Porter and Claas van der Linde (September 1995), *op. cit.*
[88] Cathie Ramus (2002), Donald Bren School of Environmental Science & Management, personal communication.
[89] Michael Margolick and Doug Russell (November 2001), *Corporate Greenhouse Gas Reduction Targets*, Global Change Strategies International Inc. and Pew Center on Global Climate Change.

recruitment and retention." In their survey of firms that have taken on voluntary GHG reduction targets, "Many of the managers . . . remarked that EHS [environment, health and safety] reports are avidly scrutinized by employees throughout the corporation."

Arnold and Neubert's[90] investigation of Porter's hypothesis that innovative companies responding to environmental regulation gain competitive advantage, conducted for the U.S. Environmental Protection Agency and covering several major industry sectors, concluded that

> *Businesses that identify synergy between environmental goals and business goals, and integrate environmental considerations into the business process, are most likely to gain a competitive advantage from environmental investments.*

4.3 Case studies

An in-depth study of corporate action on reducing GHG emissions by Margolick and Russell[91] demonstrates that an increasing number and variety of major U.S., Canadian and global firms have taken on significant GHG emission reduction targets. Firms from all types of sectors — including energy, resource, floor coverings, computers, health care and nutrition products, computers, cameras and digital equipment, supermarkets, pharmaceutical and hotel accommodation — have taken on reduction targets.

The authors find that the primary reason the corporate sector is taking on GHG reduction targets is competitiveness:

> *All of the companies see targets as improving their competitive market position by reducing production costs and enhancing product sales today, and in anticipation of regulatory and market environments of the future.*

In Canada, as of May 2002, 106 entities have reached the Gold level in the Voluntary Challenge and Registry (VCR),[92] which requires setting GHG emissions reductions targets, keeping an inventory, and reporting on verifiable results achieved versus targets. All the major GHG-emitting industry sectors are represented. Many of these firms are expecting Kyoto-level reductions to be required and have prepared for this through strategic investments. Many, through taking initiatives to reduce GHG emissions, have also realized significant costs savings, better management practices, public recognition of their actions, and improved competitiveness.

There is an abundant literature demonstrating corporate examples of saving money and becoming more competitive by implementing innovative environmental initiatives.[93] Table 1 summarizes the initiatives of nine leading firms.[94] The examples chosen, drawn from a variety of sectors — oil and gas, electricity, chemicals, transportation and manufacturing — are all large firms with major operations in Canada. GHG

[90] Matthew Arnold and Brian Neubert (January 1997), *op. cit.*
[91] Michael Margolick and Doug Russell, *op. cit.*
[92] http://www.vcr-mvr.ca
[93] See, for example, Michael E. Porter and Claas van der Linde (1995), *Toward a new Conception of the Environment-Competitiveness Relationship, op. cit.;* D.J. Lober, (1998), *Pollution Prevention as Corporate Entrepreneurship*, Journal of Organizational Change and Management, Vol. 11, p. 26–37; J. Hill et al. (1994), *Benefiting Business and the Environment*, Institute of Business Ethics, London; R.P. Bringe and D.M. Benforado (1994), "Pollution Prevention and TQEM" in *Environmental Strategies Handbook*, edited by R.V. Kolluru, McGraw–Hill; Joseph J. Romm (1999), *Cool Companies: How the Best Businesses Boost Profits and Productivity by Cutting Greenhouse Gas Emissions*, Island Press;
[94] Detailed information sources are available on request from the authors.

reductions or energy reductions (which translate directly into GHG reductions) feature prominently in every case.

These firms have successfully positioned themselves to reduce GHG emissions in anticipation of Kyoto ratification. Many of them have adopted Kyoto-level reduction targets, and some have gone beyond in realization that the Kyoto Protocol is only the first step in meeting the global challenge of climate change. Most notable of all is the recent announcement made by BP's Chief Executive John Browne, cited at the beginning of Section 4.1.

Table 1: Examples of innovative corporate environmental initiatives

Firm	GHG and environmental positioning, initiatives and reductions	Financial performance	Specific examples
Oil and gas sector			
BP	• Original goal was to voluntarily reduce its global GHG emissions to 10% below 1990 levels by 2010 • By March 2002, had reduced GHG emissions to 10% below 1990 levels at no economic cost • Future target is to contain net emissions at current levels for the next decade	• The GHG reduction target was met at no net economic cost — the savings from reduced energy input and efficiency outweighed the expenditures • Basic earnings per share have increased from $0.17 in 1998 to $0.36 in 2001	• An Australian BP refinery cut carbon dioxide (CO_2) emissions by 19% between 1995 and 1998 • The successful GHG reduction was met as a result of many energy efficiency projects including o A Texas refinery that saved $5 million and 300,000 tonnes of CO_2 equivalent o A chemical plant in Korea that cut costs by $4.5 million and CO_2 emissions by 49,000 tonnes
Suncor	• Committed to lowering GHG emissions (net of offsets) to 6% below 1990 levels by 2010 if Canada ratifies Kyoto • In 2000, the GHG intensity per barrel produced was 16% lower than 1990 levels but production was 54% higher • Plans to invest $100 million by 2005 in alternative and renewable energy projects • Action between 1990 and 2000 resulted in a reduction of 10.6 million tonnes of CO_2 equivalent compared to business as usual	• Revenues increased from roughly $2 billion in 1999 to $4 billion in 2001	• A partnership with Enbridge Inc. to build and operate a $20 million wind power project (SunBridge) is expected to offset 33,000 tonnes of CO_2 annually
Shell	• Original target was to reduce global GHG emissions to 10% below 1990 levels by 2002 • Target was achieved and surpassed: GHG emissions in 2000 were 11% below 1990 levels • Shell Canada has committed to reduce GHG emissions from its conventional facilities to 6% below the 1990 level and lifecycle emissions from its oilsands developments to 6% below the average lifecycle emissions of oil imported into North America	• In 2001, Shell achieved its second highest earnings result • Shell plans to spend between $0.5 and $1 billion on new energy (mainly wind and solar) between 2002 and 2007	

Firm	GHG and environmental positioning, initiatives and reductions	Financial performance	Specific examples
Electricity sector			
TransAlta	• In March 2000, set the goal of zero net CO_2 emissions from existing Canadian operations by 2024 • Met the 1994 commitment to reduce net GHG emissions to 1990 levels in the year 2000 (using offsets and renewable energy investment) • From 1990 to 2000, net GHG emissions per MWh were reduced by 23% • In the year 2000, emission reductions from purchased offsets equalled 1,774,000 tonnes of CO_2 equivalent	• Net earnings per share increased from $1 to $1.27 from 1999 to 2001	• A major new offset project was announced in 2000: the Uganda Cattle Feed Project allows TransAlta to provide the Global Livestock Group Inc. with financing to manufacture, distribute and sell a feed supplement proven to improve the digestive process of cattle and thus reduce the methane released; this project will give TransAlta 20 million tonnes of CO_2 equivalent reductions during the Kyoto commitment period (2008 to 2012)
Chemicals sector			
DuPont	• Environmental and safety "goal is zero" • Target is to reduce global GHG emissions by 65% from 1990 levels by 2010, hold total energy use flat from 1990 and, by 2010, source 10% of the global energy use from renewables • Since the early 1990s, over $50 million has been spent on GHG emission reductions • From 1990 to 2000 energy use remained constant, production increased by 10% and there were reductions of o GHG emissions by 60% o air toxics by 70% o air carcinogens by 90%	• Since the early 1990 initiatives, the shareholder return has increased fourfold • From 1997 to 2000, sales, diluted earnings per share and dividends per share have increased or levelled off	• From 1993 to 1997, DuPont's New Jersey Chambers Works achieved reductions per unit of product of o 30% for energy use o 50% for CO2 emissions • During the same period, production increased by 9% and energy bill savings exceeded $17 million per year

Firm	GHG and environmental positioning, initiatives and reductions	Financial performance	Specific examples
Dow Chemical Company	• Goals for 2005 include a reduction of global emissions below 1994 levels by o 75% for priority compounds o 50% for chemicals o 50% for the amount of waste and waste water generated per unit of production o 20% for energy use per unit of production • 2000 sector leader for the Dow Jones Sustainability Index	• In 2000, earnings before interest and income taxes rose 8% to $2.8 billion on sales of $23 billion, achieved in very difficult industry conditions (including a more than 50% increase in energy costs)	• Between 1981 and 1993, 575 energy saving projects were implemented in Dow's Louisiana Division with an average annual rate of return of 204%, representing a total cost savings of $110 million per year; these projects became larger and more profitable as the years progressed
Transportation sector			
Toyota	• Target is to reduce energy consumption per unit of production by 15% below 2000 levels by 2005 • "Vehicle Life Cycle Goals" include development of cleaner vehicles, more efficient manufacturing, "greener" sales, distribution and service and recycling end-of-life vehicles • Toyota Prius was the first mass-produced, hybrid gasoline-electric vehicle (produces half the CO_2 of a normal car) • Other innovative vehicle research includes Proton Exchange Membrane fuel cell	• Between 1998 and 2001 there was a 30% increase in worldwide production of Toyota vehicles • Experienced a 13% increase in net income from 2000 to 2001 • As of April 2002, global sales of Toyota hybrid vehicles have topped 100,000	• One California plant cut its total energy consumption by one-third while more than doubling its output • In 1998 all of Toyota's Southern California plants began purchasing 100% renewable power

Firm	GHG and environmental positioning, initiatives and reductions	Financial performance	Specific examples
Manufacturing sector			
3M	• From 1990 to 2000, pollution prevention and control programs have reduced o volatile organic air emissions by 88% o releases to water by 82% o solid waste by 24% • From 1975 to 1999, 3M's Pollution Prevention Pays (3P) program o prevented 807,000 tons of pollutants o saved $827 million • Also from 1975 to 1996, 3M achieved an energy efficiency improvement of 58% per unit of production	• Over the last three years, net sales, operating income and diluted earnings per share have all increased • Savings of over $500 million achieved between 1990 and 2000 due to cutting costs of raw materials, compliance, disposal and liability	• A 1994 initiative to improve motor efficiency opportunities in 3M headquarters brought about four key improvements for the system; together, these improvements reduced electricity consumption by 41% which resulted in a total savings of $77,600
Interface (flooring products)	• Goal is to be a zero-waste company • Target is to reduce non-renewable energy use per unit of production by 15% from 1996 levels, and to source 10% of total energy supply from renewable energy by 2005 • The 10% renewable energy target was achieved in 2001, four years early • From 1996 to 2001, there was a reduction of non-renewable process energy (weighted average unit consumption) of over 18% • Between 1996 and 2001, there was a 26% decrease of average water consumption per unit of product	• Between 1995 and 2001, the waste reduction program saved the company over $185 million • Sales grew from $600 million in 1993 to $1.1 billion in 1997 • From 1994 to 1998 costs were cut by $76 million and the savings reinvested in green power and other sustainable technologies	• In the Canadian operations, energy use per unit of production was reduced by 57% from 1996 to 2001 and GHG emissions per unit of production were reduced by 64% from 1995 to 2001

5. Kyoto will create corporate business opportunities

5.1 New sectors that will benefit from Kyoto

Chapter 4 showed how leading large firms worldwide and in Canada are embracing environmental responsibility for competitive advantage — notably through GHG reductions. These well-established firms are positioning themselves to adapt and succeed in a scenario where the Kyoto Protocol is implemented and then succeeded by further international agreements requiring even deeper cuts in GHG emissions.

Addressing global climate change through the Kyoto Protocol and subsequent agreements will also create opportunities for new firms to satisfy the ever-increasing demand for low-GHG technologies that also minimize other environmental impacts such as air pollution. There is already substantial growth in innovative new firms in Canada that are emerging in anticipation of the need for GHG reductions. Opponents of the Protocol tend to focus on the threat to established firms that have not positioned themselves well for GHG reductions while ignoring these emerging sectors that will benefit.

This is not to imply that the only sectors that will benefit from Kyoto are small, emerging ones. The likelihood that several large, established sectors will also benefit from Kyoto is underlined by the latest results of economic modelling of Kyoto implementation commissioned by the federal and provincial governments' Analysis and Modelling Group (AMG). Sectors whose GDP is projected, in at least two out of four modelling runs, to increase faster in the Kyoto scenario than in a business-as-usual scenario include forest products, chemicals, metallic minerals, machinery and equipment, transportation equipment, and consumer goods and services.[95]

While the drive to reduce GHG emissions will undoubtedly create many unforeseen business opportunities, three key emerging sectors that will clearly benefit from the Kyoto Protocol are the following:

- **Low-impact renewable energy**. The fact that 18% of Canada's GHG emissions currently come from electricity production[96] explains why low-impact renewable energy will be a key growth area as Canada reduces its GHG emissions. According to Industry Canada's analysis of the AMG's modelling work (see above), under a Kyoto implementation scenario investment in windpower facilities in Canada could be worth up to $6.5 billion by 2010.[97] Windpower is already enjoying spectacular growth as the world's fastest growing energy source. Between the beginning of 2001 and the beginning of 2002, total operating capacity worldwide grew by 38% to reach nearly 25,000 MW.[98] The average growth rate over the past five years has been 30%.[99] This growth is being encouraged, in part, by incentives provided by governments who want their countries to take a strong position in this new industry. Hesitation over Kyoto is a key reason why governments in Canada have still not put in place incentives that match the level provided, for

[95] Government of Canada, *op. cit.*
[96] Environment Canada (May 2002), *General Trends for Year 2000 Greenhouse Gas Emissions Data*, media backgrounder; Ken Olsen, Environment Canada (May 3, 2002), personal communication.
[97] Environmental Affairs Branch, Industry Canada (March 2002), *The Kyoto Protocol and Industry Growth Opportunities*, draft 5, p. 14.
[98] http://www.windpower-monthly.com/windicator
[99] American Wind Energy Association (March 2002), *Global Wind Energy Market Report — Wind Energy Turns in Strong Performance in 2001*. Available at http://www.awea.org/pubs/documents/GlobalWEMarket2002.pdf.

instance, in the U.S.[100] Operating windpower capacity in the U.S. grew by 66% between 2001 and 2002 to reach 4,245 MW, while Canada's capacity also grew by nearly 50% but languishes at only 207 MW, despite vast wind resources. [101]

- **Alternative transportation technology**. A further 18% of Canada's GHG emissions currently comes from road vehicles.[102] Yet the fuel efficiency of personal vehicles in North America has actually been falling for the past 15 years.[103] This creates a huge growth potential for alternative transportation technologies such as renewable biomass fuels, natural gas engines and hydrogen fuel cells. Major firms such as Shell International[104] and DaimlerChrysler[105] expect hydrogen to emerge as the world's primary energy medium and fuel cells to play an integral part in the hydrogen economy. The attractiveness of fuel cell vehicles goes beyond their potential for more efficient operation and zero tailpipe emissions. They also have the potential to use zero-emission fuel sources, thus eliminating all lifecycle GHG emissions from vehicle operation. The development of fuel supply infrastructures for fuel cell vehicles in Canada can be accelerated through initiatives to reduce GHG emissions. The federal government recently provided the Canadian Transportation Fuel Cell Alliance with $23 million to do just that over the next five years.[106]

- **Energy efficiency technology**. Firms specializing in energy efficiency technology are also growing fast. Programs like Toronto's Better Buildings Partnership (BBP) and the Greater Vancouver Regional District's Green Buildings Initiative, which support the construction and retrofit of energy efficient buildings, are creating new business opportunities for such firms. Canada has a vast untapped potential to reduce GHG emissions through improved energy efficiency in buildings, industry and other sectors. The BBP, for example, aims to reduce GHG emissions from just one sector in one city by three million tonnes of CO_2 per year — 0.4% of Canada's total emissions — while creating 90,000 person-years of employment.[107] The Buildings Issue Table under the National Climate Change Process estimated that under a Kyoto implementation scenario, an estimated $21 billion could be spent on energy efficiency measures in Canadian buildings by 2010.[108]

5.2 Case studies

The four firms described below are all small but rapidly growing Canadian companies positioning themselves to be competitive in a Kyoto implementation scenario — one in the electricity sector and three in the transportation sector. There are many such companies; the sample below is by no means intended to be exhaustive. Canada's ratification of the Kyoto Protocol will assist these firms and similar ones in

[100] Canada's Wind Power Production Incentive (WPPI), announced in the December 2001 federal budget, represents a substantially smaller incentive than that provided by the U.S. federal wind energy Production Tax Credit.
[101] http://www.windpower-monthly.com/windicator
[102] Environment Canada (May 2002), *op. cit.*
[103] U.S. data is available in Office of Transportation and Air Quality (September 2001), *Light-Duty Automotive Technology and Fuel Economy Trends, 1975 Through 2001, Executive Summary*, U.S. Environmental Protection Agency. Available at http://www.epa.gov/OMS/cert/mpg/fetrends/s01001.pdf.
[104] Shell (2002), *Hydrogen-Based Sustainable Power for the 21st Century*, http://www.shellhydrogen.com.
[105] DaimlerChrysler (1999), *New Venture Aims to Create World's First Hydrogen Economy*, news release. Available at http://www.daimlerchrysler.com/news/top/1999/t90217_e.htm.
[106] Natural Resources Canada (200), *Backgrounder: Canadian Transportation Fuel Cell Alliance*. Available at http://www.nrcan.gc.ca/css/imb/hqlib/200144ea.htm.
[107] See http://www.climatechangesolutions.com/english/municipal/stories/buildings/toronto-bbp.htm.
[108] Environmental Affairs Branch, Industry Canada, *op. cit.*, p. 20.

bringing new and improved products to the domestic market, enhancing their ability to become significant exporters of Canadian technology, and providing an incentive for them to stay in Canada.

- **Vision Quest Windelectric**,[109] based in Calgary, is a 100% Canadian owned, private company that provides green power products derived from new renewable energy resources, primarily wind. Incorporated in 1996, Vision Quest's total area under lease, option or negotiation is now greater than 8,000 hectares with potential for more than 550 MW of wind electric energy development. At present, it operates 67 windpower plants in Alberta. Four have a 600 kW peak output and annual production of around 1.75 million kWh. The remainder have a 660 kW peak output and annual production of about 2 million kWh. In September 2001, Vision Quest began delivery of windpower to Calgary Transit (via electricity retailer Enmax). The Calgary C-Train uses 26 million kWh of electricity every year, now provided by 12 new 660 kW-rated wind turbines.

- **Ballard Power Systems, Inc.**, based in Vancouver, is a world leader in the development of fuel cells in automotive applications. Founded in 1979 under the name Ballard Research Inc. to conduct research and development in the field of high energy lithium batteries, in 1983 Ballard began developing proton exchange membrane (PEM) fuel cells. Proof-of-concept fuel cells followed in 1989, and from 1992 to 1994 sub-scale and full-scale prototype systems were developed to demonstrate the technology. Today, these systems have evolved into pre-commercial prototypes proving the viability of the Ballard fuel cell as an alternative to conventional technologies. Ballard's focus is now on working with its strategic partners to develop competitive products for mass markets by reducing cost and implementing high volume manufacturing processes.[110] In 2001, Ballard earned $61 million in revenue and spent $83 million on research and development. Each of the largest vehicle manufacturers in the world is now developing fuel cell vehicles, and many are expecting them eventually to replace the internal combustion engine. Ballard is the fuel cell engine provider of choice for many major vehicle manufacturers. DaimlerChrysler and Ford equity ownership of Ballard recently stood at 23.6% and 19.5% respectively,[111] investments worth hundreds of millions of dollars.

- **Iogen Corporation**,[112] based in Ottawa, is a leader in the production of ethanol for use in ethanol-blend gasoline that can be used in all modern cars. Iogen has developed a new enzyme-based technology to produce ethanol from straw, an agricultural byproduct. Ethanol produced in this way is a form of renewable energy with very low life-cycle GHG emissions. With a $15.8 million investment from Petro-Canada in 1997, Iogen built the world's first and only demonstration scale facility producing ethanol from wheat straw. Iogen intends to commercialize this new process broadly through turnkey plant construction partnerships. In March 2002, the federal government's Climate Change Action Fund awarded Iogen a three-year, $2.7 million contract for the development of improved enzymes for bioethanol production.[113] On May 8, 2002, Shell announced its purchase of a $US 29 million equity stake in Iogen, an investment that Iogen

[109] http://www.greenenergy.com/visionquestmain.html
[110] http://www.ballard.com/corporate.asp
[111] DaimlerChrysler (October 2, 2001), *DaimlerChrysler and Ford Increase Ownership of Ballard Power Systems*, news release. Available at http://www.daimlerchrysler.com/index_e.htm?/news/top/2001/t11002_e.htm.
[112] http://www.iogen.ca
[113] Iogen Corporation (March 25, 2002), *Bioethanol Gets $5.4 Million Boost*, news release. Available at http://www.iogen.ca.

intends to use to accelerate the development of the world's first commercial-scale straw to ethanol plant.[114]

- **Westport Innovations Inc.**,[115] based in Vancouver, has been in operation since 1997. Over its lifetime it has purchased approximately $12.9 million in capital equipment and assets and invested $12.4 million in strategic partnerships with eFuels, Crofuels and Edge Technologies. In the last year its number of employees has grown by 80%. Westport's compression ignition, natural gas engine technology takes advantage of the efficiency benefits of a diesel engine and the lower emissions of natural gas combustion to provide a cleaner and more cost-effective engine without sacrificing performance. Initiatives to reduce air pollution are the primary reason for the company's initial market success and partnership with many vehicle manufacturers, but the considerable GHG reduction potential makes the technology attractive worldwide.

[114] Iogen Corporation (May 8, 2002), *Shell Invests in Green Fuel Technology*, news release. Available at http://www.iogen.ca.
[115] http://www.westport.com/investors/financial.php. See *Annual Report 2000–2001*.

6. Financial markets reward environmental leadership

Chapter 4 showed how leading large firms worldwide and in Canada are embracing environmental responsibility for competitive advantage — notably through GHG reductions. Chapter 5 showed how the challenge of addressing climate change through the Kyoto Protocol and subsequent agreements is also creating opportunities for new firms to satisfy the demand for low-GHG technologies.

A further important category of evidence for the enhanced competitiveness of firms that are environmental leaders is provided by the financial markets and those who analyse them. Numerous studies demonstrate a correlation between environmental and social performance of firms and rewards for those who invest in them. A closely related line of evidence shows that investors are increasingly demanding that firms meet high standards of environmental and social performance.

6.1 The correlation between environmental or social performance and financial performance

A recent report by Innovest Strategic Value Advisors, a New York-based investment research firm specializing in environmental finance and investment opportunities,[116] reviews the evidence linking environmental performance and competitiveness and argues that the linkage will be especially strong with respect to corporate performance in addressing climate change:

> *To an increasing degree, leading-edge financial analysts and investors are recognizing that there is a strong, positive, and growing correlation between industrial companies' "sustainability" performance and their competitiveness and financial performance, whether measured as return on investment, return on equity or total stock market return. . . . Of all the environmental challenges facing us today, however, climate change has the greatest potential to influence corporate competitiveness and profitability, the market's valuation of the company's stock and, by extension, the creation and erosion of shareholder value.*

The report highlights the potential damage to the competitiveness of firms that fail to address climate change:

> *In contrast to their European counterparts, many of whom have already begun to take action, few U.S. companies and institutions are responding to the threat in a proactive or constructive way. This attitude not only threatens the international competitive performance of U.S. companies and investors, it also runs the risk of jeopardizing the shareholder funds entrusted to their care by pension plan contributors and other investors.*

Using its "EcoValue 21" rating system for environmental performance, Innovest has also conducted numerous sectoral benchmarking studies.[117] Its recent study on the oil and gas sector noted that[118]

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[116] Innovest Strategic Value Advisors, Inc. (April 2002), *Value at Risk: Climate Change and the Future of Governance*, CERES (Boston). Available at http://www.ceres.org.

[117] For example, Innovest (March 2000), *The Electric Utility Industry, Hidden Risks and Value Potential for Strategic Investors*; Innovest (July 2000), *Global Integrated Oil and Gas Sector, Uncovering Hidden Value Potential for Strategic Investors, Sector Overview, Energy Convergence, Environmental Management, Global Climate Change Issues, Potential Risks and Liabilities.*

[118] Innovest (July 2000), *op. cit.*

> *In every sector rated by Innovest, companies receiving above average EcoValue 21 ratings outperformed below average companies by 300 to 1800 basis points, as measured by total stock market return.*

The study assessed 17 of the world's largest integrated oil and gas companies — among the world's largest corporate emitters of GHGs — and concluded that

> *BP Amoco, Royal Dutch/Shell, Suncor and Norsk Hydro are the companies we judge to have the best combination of environmental performance and the managerial capacity to convert that performance into shareholder value. At the other extreme, Occidental Petroleum and Imperial Oil are the lowest rated companies, which should be cause for concern from both shareholders and senior management.*

A study conducted by the Boston-based research firm KLD Research & Analytics, Inc.[119] shows that, since its inception in May 1990, the Domini Social Index (DSI), "the established benchmark for measuring the impact of social screening on financial performance," has outperformed the Standard & Poors (S&P) 500 index on a total return basis and on a risk-adjusted basis. As of June 30, 2001 the DSI had recorded an annualized return of 16.3% over a 10-year period, compared with 15.1% for the S&P 500. On a five-year basis, the DSI had recorded an annualized return of 15.6%, compared with 14.5% for the S&P 500.[120]

It appears that, relative to other investments, the stockmarket downturn in 2001 did not affect the strong performance of the socially and environmentally responsible mutual funds. Sixty-three percent of all socially responsible funds tracked by the Washington, D.C.-based Social Investment Forum earned one of the two highest rankings for performance from either Lipper, Inc., or Morningstar (two leading U.S. market analysts) or both.[121]

In Canada, the performance of the most socially and environmentally responsible firms can now be tracked with the Jantzi Social Index (JSI), a stock index consisting of 60 Canadian firms that pass a set of broadly based social and environmental screens. As the JSI has only been in place since January 2000, it is still too early to conduct a conclusive comparison of the JSI and standard stockmarket indices. However, return rates have regularly been comparable or superior to standard indices such as the TSE 100, the TSE 300 or the S&P/TSE 60.[122] The robustness of the JSI firms can also be assessed by the impact on them of the events of September 11, 2001. The JSI dropped less on that day than the three standard indices: a fall of 6.19% compared to falls of 6.98%, 7.38% and 7.24% respectively.[123]

Numerous other studies confirm that better environmental performance results in a higher stock price.[124] Here are some reasons why:

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[119] http://www.kld.com/benchmarks/dsi.html

[120] http://www.socialinvestment.ca/Intro4.htm

[121] Social Investment Forum (January 17, 2002), *Two-Thirds of Socially Responsible Mutual Funds Receive Highest Performance Ratings Through 2001*, news release. Available at http://socialinvest.org/areas/news//2001-Q4performance.htm.

[122] http://www.mjra-jsi.com/jsi/statistical_review.asp?section=2&level_2=4&level_3=0

[123] Michael Jantzi Research Associates Inc. (2002), personal communication.

[124] See, for example, Paul Ameer et al. (November 1996), *Does Improving a Firm's Environmental Management System and Environmental Performance Result in Higher Stock Price?*, ICF Kaiser International Inc.; Richard Read Clough (1997), *Impact of an Environmental Screen on Portfolio Performance: A Comparative Analysis of S&P 500 Stock Returns*, Winslow Management Company; Glen Dowell et al. (October 2001), *Do Corporate Global Environmental Standards Create or Destroy Market Value?*, Social Investment Forum.

- **Forward thinking**. Firms rated highly for their environmental performance are typically characterized by a forward-thinking attitude focused on concepts of eco-efficiency and innovation. Put simply, this leads to better management and therefore better financial performance. "Companies that assume that they can 'make it up as they go along' will lose out to competitors who strategically plan for ways they can turn challenges into opportunities."[125]

- **Corporate reputation**. Firms with good environmental performance acquire a reputation for quality, know the real value of that reputation and will take all the necessary steps to protect it. "The quality of a company's environmental management provides the outside world with a good indicator of the overall quality of its business management."[126]

- **Good risk management**. Integrating major environmental issues like climate change into business decisions demonstrates a good risk management strategy, rewarded by the market. Climate change-related risks that need to be managed include both the physical impacts of climate change (of particular concern to insurers, for example) and the financial liability represented by high corporate GHG emissions in scenarios where policies (such as emissions trading systems) are implemented that put a price on GHG emissions.[127]

- **Cooperative approach**. Firms rated highly for their environmental performance have typically understood and integrated a key ingredient of financial success that consists of recognizing the concerns, needs and values of stakeholders and building partnerships with them.[128]

6.2 Investor preference for firms with high environmental or social performance

Investors' increasing preference for firms that meet high standards of environmental and social performance is expressed in the popularity of socially responsible funds. According to a detailed study by the Social Investment Forum, there are now 230 mutual funds in the United States that incorporate social screening into the investment process, compared to 168 in 1999, 139 in 1997, and just 55 in 1995.[129]

Socially or environmentally screened portfolios now represent a significant proportion of investments. According to the same study, the value of socially or environmentally screened portfolios in the U.S. in 2001 was $2.03 trillion compared to a total of $19.9 trillion of professionally managed U.S. investment assets. This proportion is growing: the value of socially or environmentally screened assets rose more than 50% more quickly between 1999 and 2001 than the total value of professionally managed assets. According to one study, 26% of U.S. investors say that the business practices and ethics of a company are extremely important to their investment decisions.[130]

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[125] Deni Greene Consulting Services (August 2001), *A Capital Idea, Realising Value from Environmental and Social Performance*. Available at http://www.ea.gov.au/industry/sustainable/finance/capital-idea.html.
[126] Jerald Blumberg et al. (1997), *Environmental Performance and Shareholder Value*, World Business Council for Sustainable Development, p. 9. Available at http://www.wbcsd.org.
[127] Innovest Strategic Value Advisors, Inc. (April 2002), *op. cit.*
[128] Chad Holliday and John Pepper (April 2001), *Sustainability through the Market: Seven Keys to Success*, World Business Council for Sustainable Development. Available at http://www.wbcsd.org.
[129] Social Investment Forum (November 2001), *2001 Report on Responsible Investing Trends in the United States*. Available at http://socialinvest.org/areas/research/trends/2001-trends.htm.
[130] Walker Information (1998), http://www.walkerinfo.com/resources/whitepapers/docs/v7_n4_wi.pdf.

When markets fall, socially or environmentally screened mutual funds are also attracting and keeping investor assets better than their unscreened counterparts. The Social Investment Forum cites data for the first 11 months of 2001 showing that the 91% drop in dollars put into U.S. mutual funds compares to a corresponding fall-off for socially responsible funds of only 36%.[131]

A study conducted by Canada's Social Investment Organization shows that in mid-2000, socially or environmentally screened investments in Canada were worth almost $50 billion. The retail market for such investments grew by 75% between June 1998 and June 2000, more than twice the growth rate of the Canadian mutual fund market as a whole.[132]

Shareholder advocacy is also an indicator of investors' preferences. According to Social Investment Forum, 156 shareholder resolutions on "social responsibility issues" were voted on at U.S. shareholder meetings in 2001, 34 of which were on environmental issues (6 on climate change), and 6 on energy issues.[133]

[131] Social Investment Forum (January 17, 2002), *op. cit.*
[132] Social Investment Organization (December 2000), *Canadian Social Investment Review 2000*. Available at http://www.socialinvestment.ca.
[133] Social Investment Forum (November 2001), *op. cit.*

7. Summary and conclusions

Opponents of the Kyoto Protocol in Canada frequently claim that implementing the Protocol would damage Canada's economic competitiveness. But these opponents define competitiveness in a very narrow, short-term sense, generally referring only to immediate direct costs incurred by major GHG emitters and energy users.

Competitiveness is a much broader concept than opponents of Kyoto would have us believe. This report has surveyed the real-world evidence of how initiatives to reduce GHG emissions and address other environmental challenges have affected a broad variety of indicators of competitiveness.

Chapter 2 showed that governments that take a lead in addressing environmental issues position firms in their jurisdictions to be more efficient and competitive in future markets. Canadians therefore have good reason to be concerned that a failure to ratify the Kyoto Protocol may condemn Canada to fall further behind jurisdictions in Europe and elsewhere who are ratifying the Protocol — not just environmentally, but also in terms of competitiveness. There is a recurring tendency for targeted industries to significantly overestimate the costs of complying with environmental regulations prior to implementation — something Canada's policymakers should bear in mind when evaluating the current claims that ratification of the Kyoto Protocol will cause severe economic damage. The early development of the U.K.'s GHG emissions trading system and the proactive role played by British industry in setting it up underline the fact that other countries are already moving ahead of Canada to set up regulatory regimes for GHGs that will advantageously position their firms for the future.

Chapter 3 illustrated how governments can design policies in a manner that respects legitimate competitiveness concerns. A "cap and trade" emissions trading system — the central policy instrument envisaged by federal and provincial governments in Canada to reduce GHG emissions from large industrial emitters under the Kyoto Protocol — satisfies very well the criteria for innovation-friendly, i.e., competitiveness-friendly regulation, while giving governments essentially unlimited flexibility in addressing regional and sectoral vulnerabilities. Likewise, other policy measures are available that set objectives without specifying which technologies should be used to meet them. In other words, with good policy design, the Kyoto Protocol can be implemented in Canada in a manner that protects and enhances competitiveness.

Chapter 4 showed how, worldwide and in Canada, leading large firms that are taking action to improve efficiency and reduce GHG emissions are improving their competitiveness. A number of major Canadian firms have begun to position themselves as leaders within their sectors in addressing climate change. Implementation of the Kyoto Protocol in Canada will provide rewards for these leading firms for their early action. On the other hand, the federal government's continued hesitation on ratification creates "policy uncertainty" that is harmful and costly for corporate decision making and competitiveness. A decision not to ratify would simply prolong this uncertainty given that Canada will not be able to avoid eventually participating in a global agreement to reduce GHG emissions.

Chapter 5 showed how the challenge of addressing climate change through the Kyoto Protocol is creating major business opportunities to satisfy the demand for low-GHG technologies. There is already substantial growth in innovative new firms in Canada that are emerging in anticipation of the need for GHG reductions. However, hesitation over Kyoto is currently keeping Canada behind our competitors (including the U.S.) in new, rapidly growing industries like windpower. While opponents of the Protocol tend to focus on the threat to established firms that have not positioned themselves well for GHG reductions, they ignore these emerging sectors that will benefit. Canada's ratification of the Kyoto Protocol will assist the new firms that are developing low-GHG technologies in bringing new and

improved products to the domestic market, enhancing their ability to become significant exporters of Canadian technology, and providing an incentive for them to stay in Canada.

Chapter 6 presented abundant evidence that financial markets reward firms that are environmental leaders and cited expert opinion that the linkage between environmental performance and competitiveness will be especially strong with respect to corporate performance in addressing climate change. Integrating climate change into business decisions demonstrates a good risk management strategy, rewarded by the market. This reinforces the finding in Chapter 4 that firms that take action to reduce GHG emissions improve their competitiveness. Once again, implementation of the Kyoto Protocol in Canada will reward such firms, while hesitation on ratification or a decision not to ratify creates costly "policy uncertainty" that is harmful for competitiveness.

Taken together, these findings provide a sound basis for concluding that Canada's competitiveness, when defined broadly, is likely to benefit, not suffer, from a decision by the federal government to ratify the Kyoto Protocol.