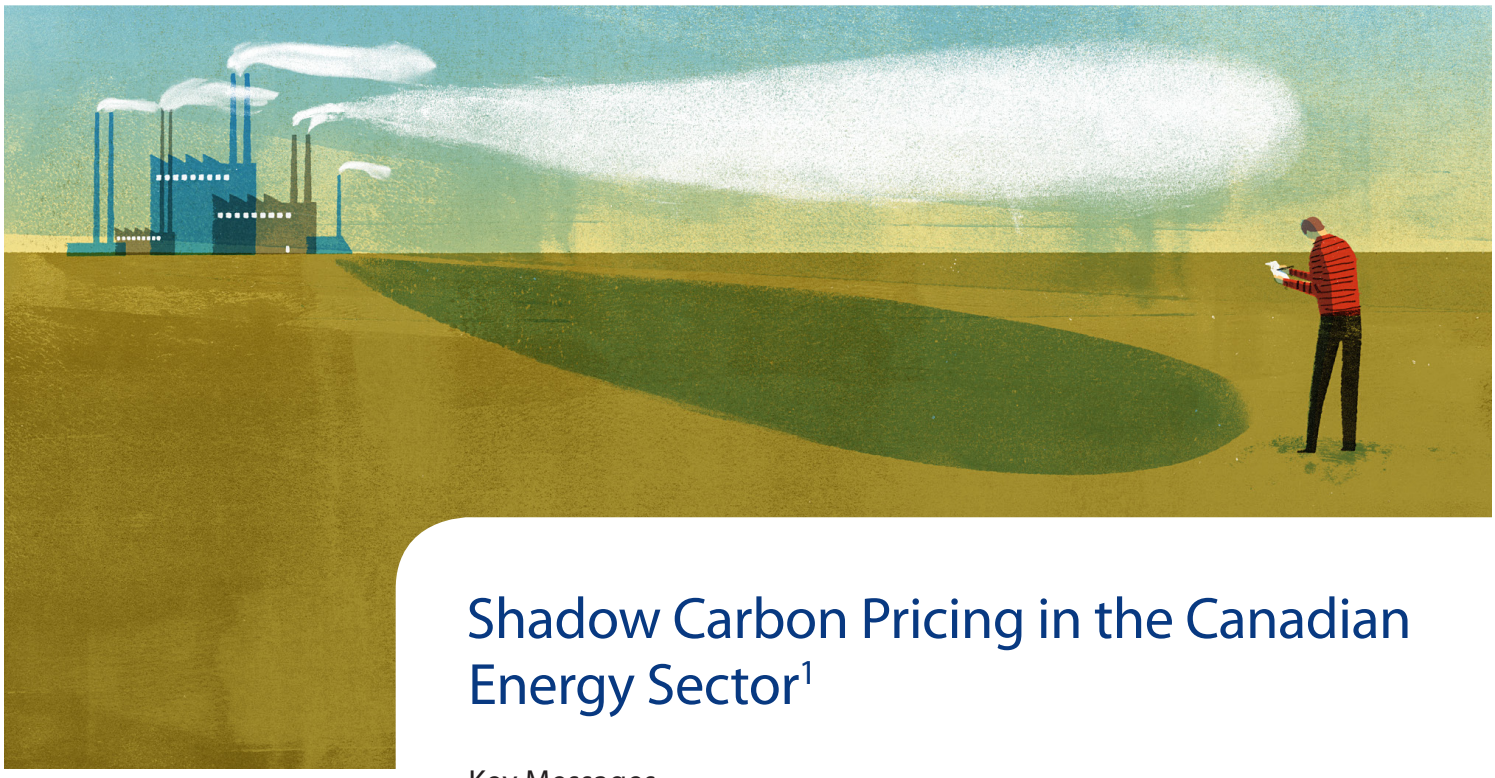
SP Sustainable Prosperity

Policy Brief March 2013

FOR A LOW CARBON ECONOMY



Shadow Carbon Pricing in the Canadian Energy Sector[1]

Key Messages

- Shadow carbon pricing is the voluntary use of a notional market[2] price (a "shadow" price) for carbon in internal corporate financial analysis and decision-making processes. A shadow carbon price is generally expressed in terms of dollars (currency) per tonne of carbon dioxide (CO_2) or carbon dioxide equivalent (CO_2e).
- Many companies in Canada in a variety of sectors are using a shadow carbon price (SCP). In order to gain a better understanding of how and why companies in a carbon-intensive sector are using a SCP, Sustainable Prosperity surveyed[3] ten energy sector companies operating in Canada (BP, Shell, Suncor, Statoil, Devon, Cenovus, Penn West, Enbridge, Ontario Power Generation, and SaskPower). All ten companies have some experience in using shadow carbon pricing; seven formally[4] and three informally. A review of the literature suggests that using a shadow carbon price has become an industry standard for the oil and gas sector.
- Among the seven companies that formally use a shadow carbon price, the price ranged from C$15/tonne to C$68/tonne. The top of the range represents a price projection for future years: C$48–$68/tonne for 2020 and up to 2040.
- For the companies surveyed, the main driver for using a SCP is to prepare, both from a risk and opportunity perspective, for the expected future scenario where carbon pricing will

Sustainable Prosperity is a national research and policy network, based at the University of Ottawa. SP focuses on market-based approaches to build a stronger, greener, more competitive economy. It brings together business, policy and academic leaders to help innovative ideas inform policy development.

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1 Sustainable Prosperity would like to thank Stratos Inc. for conducting the interviews and providing the analysis on which this *Brief* is based. Sustainable Prosperity would also like to thank Tyler Elm, Chairman, Energy and Environment Committee at the Canadian Chamber of Commerce and former Vice President, Corporate Strategy and Business Sustainability at Canadian Tire and John Dillon, Vice President, Policy and Corporate Counsel, Canadian Council of Chief Executives for their thoughtful comments and contributions to this *Brief*. Responsibility for the final product and its conclusions is Sustainable Prosperity's alone, and should not be assigned to any reviewer or other external party.

2 A market price for carbon is different than carbon costs, such as the Social Cost of Carbon (SCC) or the Marginal Abatement Cost (MAC). The SCC represents the marginal cost of global damage from climate change, and is used by policy-makers to examine the benefits of climate policy in a cost-benefit analysis. A shadow carbon price may or may not be based on or influenced by the SCC or MAC.

3 Interviews were conducted by Stratos Inc. The general condition for company participation in this study was that information shared in the interview that was not otherwise publicly available would not be attributed.

4 Some companies defined criteria or thresholds for where shadow carbon pricing is applied.

become more widespread (within and across jurisdictions) due to regulatory requirements and policy regimes, and the price of carbon will increase over time.

- Some companies see shadow carbon pricing as a way to drive performance (operational efficiency and profit maximization) and create opportunities, including technological innovation and market access.
- Most companies use shadow carbon pricing at the project level – as part of evaluating options for large projects and for specific greenhouse gas (GHG) reduction projects. Four companies use it for strategic and business unit planning and decision-making, such as power system planning in the utility sector.
- The widespread formalized use of shadow carbon pricing in the Canadian energy sector suggests that many companies are prepared for carbon pricing. With the cost of carbon already largely "internalized" in the forward-looking planning and operations of some of Canada's energy companies, it may be fair to assume that the creation of a legislated carbon price at the national level would lead to minimal disruption in the energy sector.
- At the same time, while laudable, the use of a shadow carbon price by certain companies is not a substitute for the policy certainty of a regulated market price for carbon. Company action cannot be expected to substitute for government policy on this crucial issue.

About the Study

The bulk of the information in this *Policy Brief* is based on a series of interviews and analysis conducted by Stratos Inc. with ten large energy companies in Canada (listed in Table 1). The study focused on the energy sector, which for the purpose of this study includes oil and gas companies, power companies (utilities), and pipeline companies. Oil sands facilities and power stations (especially coal-fired) dominate the list of the largest greenhouse gas (GHG) emitters in Canada (>1 million tonnes per year). Steel mills also feature prominently on this list but are not covered in this study.

Table 1: Companies Interviewed

COMPANY	SUB-SECTOR	DESCRIPTION
BP	Oil and Gas	Integrated oil and gas, multinational, with oil sands assets
Shell	Oil and Gas	Integrated oil and gas, multinational, with oil sands assets
Suncor	Oil and Gas	Integrated oil and gas, primarily in Canada, with oil sands assets
Statoil	Oil and Gas	Integrated oil and gas, multinational, with oil sands assets
Devon	Oil and Gas	Oil and gas, gas pipelines, and oil sands assets, North American
Cenovus	Oil and Gas	Integrated oil, Canadian, primarily oil sands
Penn West	Oil and Gas	Oil and gas exploration and development (conventional, tight), Western Canada, joint venture in one oil sands project
Enbridge	Pipeline	Pipelines, large pipelines as well as residential natural gas distribution, North America
Ontario Power Generation	Power Utility	Provincial utility with coal, nuclear, natural gas, oil, hydro, and wind assets
SaskPower	Power Utility	Provincial utility with coal, natural gas, hydro, and wind assets

The objectives of this study were to understand:

- How extensively shadow carbon pricing is being used among a sample of Canadian energy companies;
- How it is being used internally and its impact on decision-making; and,
- The general motivations/drivers for its use.

The sample of companies interviewed was not randomized and therefore the proportion of companies using a shadow price within the sample may not be representative of the Canadian energy sector as a whole. Nine other companies were approached to participate in the study and either declined or did not respond. While we did not collect any information on why they did not want to participate, some companies may have declined because they do not use shadow pricing and therefore have little to share on this topic. Therefore, it is possible that the sample is biased towards companies that do use a shadow carbon price.

Interviewees were asked the following questions:

Extent of Use

1. Does your company currently use a shadow carbon price in any planning or decision-making processes?
2. If no:
   a. Have you used a shadow carbon price in the past?
   b. Have you ever considered using a shadow carbon price in the past?
   c. Are you considering or do you have a plan to start using a shadow carbon price?

Motivation

3. What are the drivers for using a shadow carbon price in your organization, or drivers for not using it (e.g. risk management, corporate policy requirement, other)?

Nature of Application

4. How is a shadow carbon price applied internally? How does it fit into planning or decision-making?
5. At which levels of the organization is it applied (e.g. corporate-wide, business unit, project)?
6. What price is used and how is the price set (what factors influence the price)?
7. What is the impact on decision-making? Can you provide examples? If it has not had an obvious impact, why not?

All companies interviewed for this study agreed to have their company name appear in the *Policy Brief*. However, to make the interviews possible, SP agreed to the following regarding attribution of information:

- The name of the interviewee will not appear in the report.
- Information obtained through interviews will be presented in a way that avoids attributing specific findings to specific companies (i.e. by presenting percentages, averages, and ranges). Where necessary we will exclude certain interview information from the report.

Where information is attributed to a specific company in this report, it is because it also appears in publicly available documents or the interviewee granted permission.

A final, important, clarification: interviewees were not asked about the policy implications of their business decisions. The messages and recommendations in this *Policy Brief* are Sustainable Prosperity's and do not necessarily reflect those of the companies.

The Knowledge Base

In Canada's energy sector, shadow carbon pricing is used as a risk-mitigation technique by investors, lenders and firms to incorporate a cost of carbon emissions into decision-making to inform options for large capital investments.

Definition

Shadow carbon pricing is the voluntary use of a notional market price (a "shadow" price) for carbon in internal corporate financial analysis and decision-making processes. A shadow carbon price is generally expressed in terms of dollars (currency) per tonne of carbon dioxide (CO_2) or carbon dioxide equivalent (CO_2e).

Usage

A review of the literature uncovers two principal uses for shadow carbon pricing:

- First, and most common in Canada's energy sector, shadow carbon pricing is used as a risk-mitigation technique by investors, lenders and firms to incorporate a cost of carbon emissions into decision-making to inform options for large capital investments.[5] It can in effect re-define the terms by which business decisions are made.
- A second and related use for shadow carbon pricing is its inclusion in decision-making regarding greenhouse gas (GHG) emission reduction investment options.[6] Investors, lenders and firms use shadow carbon pricing to compare GHG emissions reductions options over the long-term by using a shadow carbon price as a proxy for: a) the expected future price of carbon, b) the expected future marginal cost of abatement (MAC), or c) the expected future cost of purchasing offsets.[7, 8]

Use by Institutional Investors and Lenders

Institutional investors and lenders are increasingly making decisions based on their perception of the level of climate risk to which a company is exposed.[9] Some institutional investors and lenders, particularly those with a broader social mandate, have taken this approach one step farther, by incorporating a shadow carbon price into standardized environmental impact assessments and cost-benefit analyses.

5 Elm, T and J. Harris. (2012, October 22). *The Benefits of Shadow Carbon Pricing.* Huffington Post, http://www.huffingtonpost.ca/tyler-elm/carbon-shadow-pricing_b_2001004.html.

6 Belfry Monroe, K. (2010). *Business, Risk, and Carbon Pricing: Business Preference for Climate Change Instruments in Canada.* Sustainable Prosperity, http://www.sustainableprosperity.ca/dl352&display.

7 Ibid.

8 Climate Northeast Partners. (2006, January 18–19). *GHG Project Selection and the Market Value of Carbon.* Presented at the Climate Leaders Partners Meeting in Marina del Rey, http://www.epa.gov/climateleadership/documents/events/jan2006/leahy.pdf.

9 Belfry Monroe, K. (2010). *Business, Risk, and Carbon Pricing: Business Preference for Climate Change Instruments in Canada.* Sustainable Prosperity, http://www.sustainableprosperity.ca/dl352&display.

The European Investment Bank[10] (EIB), for example, uses a shadow carbon price as a "non-financial value-add" in its cost-benefit analysis for projects and reports that this method has proven, "effective in promoting renewable energy and similar projects that otherwise would not have met required internal rates of return".[11] Despite receiving some criticism that its use of a shadow carbon price remains underdeveloped and that environmental considerations are marginalized within project design and appraisal, the EIB promotes the usage of shadow carbon pricing as a practice to be adopted by other development banks.[12]

Six financial institutions have developed The Carbon Principles and associated Enhanced Diligence Process, a framework for banks and their U.S. power clients to evaluate and address carbon risks in the financing of electric power projects.[13] Credit Suisse, a signatory to the Carbon Principles, states that, "the assumption of a price on carbon is now routinely built into both the base case and the sensitivity cases for coal-fired power plants in the US".[14]

Use by Energy Companies

Extent of Use

The first energy companies to use shadow carbon pricing across their operations were Shell and BP, beginning in 2002 or even earlier. Both companies created internal cap-and-trade systems with individual sites allocated tradable emissions permits based on past emissions.[15] Declining caps and the tradability of permits was expected to lead to company-wide emissions reductions. Both companies benefitted in terms of achieving actual reductions and gaining experience in both trading and understanding the costs of GHG abatement. However, without comparable external market and regulatory drivers, these internal systems were necessarily limited in their application. Both companies have since abandoned these particular systems in favour of shadow carbon pricing.

According to David Collyer, President of the Canadian Association of Petroleum Producers (CAPP), "Nexen's practice [of using a shadow carbon price in the economic analyses of projects] has become an industry standard among Canadian oil players, with virtually all companies planning with the expectation of rising costs of compliance with future greenhouse gas emission regulations over the life of their projects".[16] The interview results are consistent with the characterization provided by CAPP and suggest that the use of a shadow carbon price is widespread in the Canadian energy sector, at least among larger oil and gas producers.

Shadow carbon pricing in other sectors

The use of a shadow carbon price is not limited to the energy and financial sectors. Recently Canadian Tire stated that it has been using a shadow carbon price since 2008 to inform transportation, sourcing, product design, and other business decisions that have carbon and energy implications. Microsoft started using a shadow carbon price this year, by actually charging business units an internal carbon fee. It then uses the proceeds to buy Renewable Energy Certificates (RECs) and carbon offsets, to enable the company to become carbon neutral.

"Nexen's practice [of using a shadow carbon price in the economic analyses of projects] has become an industry standard among Canadian oil players, with virtually all companies planning with the expectation of rising costs of compliance with future greenhouse gas emission regulations over the life of their projects."

10 The European Investment Bank is the European Union's (EU) bank. It represents the interests of E.U. member states and helps implements EU policy.

11 Griffith-Jones, S. and J. Tyson. (2011). *The European Investment Bank: Lessons for Developing Countries.* Prepared for the United Nations University World Institute for Development Economics Research.

12 Ibid.

13 The Carbon Principles. (n.d.), http://www.carbonprinciples.org/.

14 Credit Suisse. (n.d.). *Shadow carbon pricing,* https://www.credit-suisse.com/responsibility/en/banking/popup_shadow_carbon_pricing.jsp.

15 World Resources Institute. (2002). *Changing Oil: Emerging Environmental Risks and Shareholder Value in The Oil And Gas Industry,* http://www.wri.org/publication/changing-oil.

16 McCarthy, S. (2010, December 9). Oil patch pricing carbon tariffs into new project. *The Globe and Mail,* http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/oil-patch-pricing-carbon-tariffs-into-new-projects/article1318994/.

All ten companies interviewed use a shadow carbon price. Seven of the ten companies interviewed use a shadow carbon price in a way that is formalized or standard practice in decision-making. The remaining three described informal, one-off, or pilot applications of a shadow carbon price.

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Among the interviewees, Suncor, Shell, Statoil, BP, and Cenovus have publicly disclosed their use of shadow carbon pricing. Other notable Canadian companies involved in the energy sector that were not interviewed but also disclose the use of a carbon price include: Transalta (Alberta power utility with significant coal-fired assets), Teck (mining company with ownership of one oil sands project to be developed in 2021), and Nexen (oil and gas producer).

OF THE 10 COMPANIES INTERVIEWED...	
Number of companies using a shadow carbon price in a formalized way	7
Number of companies using a shadow carbon price for the evaluation of projects	5
Number of companies using a shadow carbon price for business strategy planning or strategic decisions	4
Number of companies publicly disclosing their use of a shadow carbon price	5

Limitations

Several interviewees described the following limitations regarding the use of shadow pricing to manage the risks associated with future regulatory and market conditions:

- If the transition to a low-carbon economy does not result in a steadily rising and "onerous"[17] carbon price but simply in a dramatic decrease in the demand for petroleum hydrocarbons, then the use of shadow pricing will be an insufficient risk management strategy for large long-term projects in the oil and gas sector.
- The use of shadow pricing in project evaluation, which typically includes a net present value (NPV) calculation, faces the same drawbacks as integration of other environmental and social costs in a NPV calculation, in that the discount rate tends to undervalue costs incurred in the future (and by future generations) compared to costs today.
- Given the level of the shadow carbon prices that are currently being used, uncertainty in other factors such as the price of steel, commodity prices, and labour costs can have a greater impact on the economics of a project.
- The slow movement of climate change policy (in Canada and internationally) and the lack of stronger price signals are disincentives for using shadow carbon pricing for shorter term investments, such as those related to certain conventional oil projects.

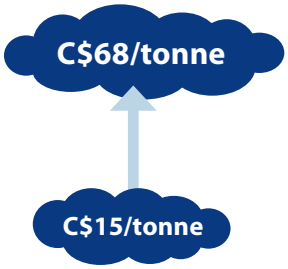
17 None of the interviewees shared what level of carbon price would threaten the economics of their projects.

Setting the Price

Among the seven companies that formally use a shadow carbon price, the price ranged from C$15/tonne to C$68/tonne. An average price for the companies interviewed cannot be determined because many companies provided a range (and not a single price) and the details of how the price is applied were not divulged. Different approaches are used to address uncertainty and expected increases over the life of a project or activity, including:

- Applying an increasing carbon price, linked to inflation.
- Applying an increasing carbon price, rising in a non-linear way to reflect an expectation of more aggressive carbon pricing in the future.
- Applying a baseline carbon price, but conducting a sensitivity analysis on that price. In some cases, the price range considered in the sensitivity analysis is specific to a jurisdiction.

Range of shadow carbon prices used (short and long-term)



Most of the companies interviewed have not changed (or changed very slightly) the reference level shadow prices since the inception of shadow carbon pricing in their organizations.

Factors Affecting Price

Overall, the primary factor determining the shadow carbon price among the companies interviewed was the expectation of a legislated carbon price, or the presence of an actual price signal, within the jurisdictions in which they operate. As most of the oil and gas companies interviewed have oil sands operations in Alberta, the price of C$15/tonne they pay to the Climate Change and Emissions Management Fund in Alberta to comply with Specified Gas Emitters Regulation (SGER) is seen as a baseline, or minimum price. The top of the range represents a price projection for future years. Interviewees referred to a number of regulations, emerging carbon market regimes, and government analyses that suggest increasing carbon prices in Canada in the near future. Three companies provided specific price ranges from current (or short-term) to prices in the future. These future prices were in the range of C$48–$68/tonne for 2020 and up to 2040.

Interviewees referred to a range of regulations, initiatives, and their future direction as price signals:

- Alberta's Specified Gas Emitters Regulation (SGER) uses a carbon price of C$15 but it is expected to increase, or perhaps double, in the near future.[18] British Columbia's carbon tax rates were increased by C$5/tonne on July 1, 2012 to the current C$30 per tonne of CO_2 equivalent emissions.

Interviewees referred to a number of regulations, emerging carbon market regimes, and government analyses that suggest increasing carbon prices in Canada in the near future.

18 Vanderklippe, N. (2012, August 13). Alberta eyes tougher carbon rules. *The Globe and Mail,* http://m.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/alberta-eyes-tougher-carbon-rules/article4477836/?service=mobile.

- The Québec cap and trade system for GHG emission allowances began on January 1, 2013 (first compliance period). Auctions will use a C$10/tonne floor price and a soft price ceiling of between C$40–50, both set to increase by 5% per year after 2012.[19]
- Social cost of carbon estimates used by the Government of Canada assessments of the *Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations* are C$26/tonne with an upper range of C$104/tonne for sensitivity analysis.
- Multi-state climate initiatives including the Western Climate Initiative (WCI) and the Regional Greenhouse Gas Initiative (RGGI). In California's recent first auction in November 2012, a ton of carbon sold for USD$10.09. In RGGI's September 2012 auction, the clearing price was USD$1.93 per CO_2 allowance.

Other specific factors and examples of approaches related to setting shadow carbon prices include the following:

- A designated group within the company examines a range of factors (e.g., market intelligence, internal assessments, specific developments in jurisdictions) and publishes a set of "standard parameters" for shadow carbon pricing across the company.
- An upper and lower range was established based on the Alberta price (low end) and Government of Canada forecast (high end). The range is reviewed on an annual basis, but has not change in recent years. For the purpose of evaluating projects and strategic planning, the value lies in exploring a range of carbon prices and the potential impacts on the project. Frequently adjusting or 'over-thinking' the lower and upper ends of the range does little to improve the value of this process.
- BP's experience with its internal emissions trading system and its work in the European Union (EU) on long-term pricing forecasts (which have not been realized) have informed its shadow carbon price.

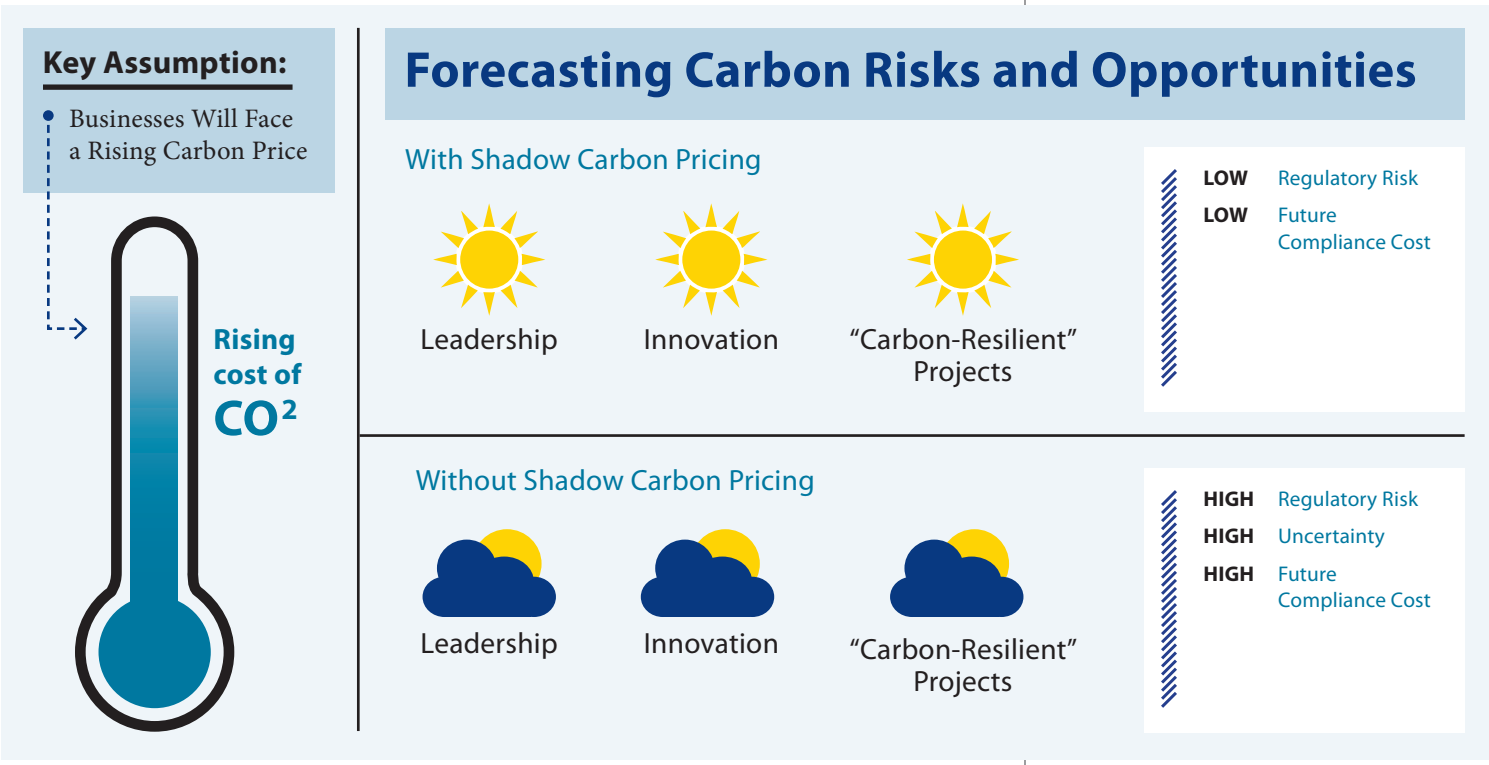
For companies using a shadow carbon price, there is an expectation that carbon pricing will become more widespread (within and across jurisdictions), due to regulatory requirements and the emergence of carbon pricing regimes, and that the price of carbon within those regimes will increase.

Drivers

For companies using a shadow carbon price, there is an expectation that carbon pricing will become more widespread (within and across jurisdictions), due to regulatory requirements and the emergence of carbon pricing regimes, and that the price of carbon within those regimes will increase. On that basis, the companies that use a SCP view it as prudent risk management practice, particularly for long-term capital intensive projects. For energy sector companies, a shadow carbon price is not only an input into long-term decision-making, but also re-defines the terms under which decisions are made by highlighting areas of vulnerability, assisting in determining risk mitigation methods and testing

19 International Emissions Trading Association (2012). *Greenhouse Gas Market 2012: New Markets, new Mechanisms, New Opportunities.*

Figure 1: Forecasting Carbon Risks and Opportunities



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Art Direction and Graphic: Jack Dylan

their sensitivity to alternative scenarios.[20, 21] Some companies also see it as a way to drive performance and create opportunities, including technological innovation and market access.

Primary Driver: Risk Management

Managing and quantifying the risk of higher costs associated with future constraints on carbon emissions was identified as the primary driver by all of the companies using a shadow carbon price in decision-making. This is reflected in the annual reports and the Carbon Disclosure Project submissions of the companies interviewed, which frequently cited climate change policy as a risk and provided shadow carbon pricing as an example of how this risk was being effectively managed. Both a regulatory (as currently being taken by the federal government) and a market-based carbon pricing approach (as currently undertaken by Alberta, British Columbia and Quebec) will lead to a rise in costs for companies, especially for those that are not proactive. It will also lead to increased costs for consumers, as companies pass costs on.

Managing and quantifying the risk of higher costs associated with future constraints on carbon emissions was identified as the primary driver by all of the companies using a shadow carbon price in decision-making.

20 Climate Northeast Partners. (2006, January 18–19). *GHG Project Selection and the Market Value of Carbon.* Presented at the Climate Leaders Partners Meeting in Marina del Rey, http://www.epa.gov/climateleadership/documents/events/jan2006/leahy.pdf.

21 Elm, T and J. Harris. (2012, October 22). *The Benefits of Shadow Carbon Pricing.* Huffington Post, http://www.huffingtonpost.ca/tyler-elm/carbon-shadow-pricing_b_2001004.html.

Drivers for using a shadow carbon price (from interviewees)

"Prudent risk management – there's going to be a cost, so we need to recognize that along with the other sources of variability in our economic analysis."

"We use shadow carbon pricing to: drive low-CO_2 design innovation, drive investment and design choices to develop a robust portfolio in CO_2 constrained world, reflect explicit and implicit price signals in the market, and quantify the risk of future constraints."

"For stress-testing our long-range planning."

A C$40 carbon price would add roughly C$2–$3 to the C$30–$40 per barrel production costs (2010 figures) for companies mining bitumen.[22] Likewise, a study by the World Resources Institute (2002) found that, given BP's carbon emission reductions of 10 million tons by 2002, if a C$5 per ton carbon price had been applied to only half of BP's operations in 2001, BP would have avoided approximately C$25 million in costs. Thus, risk-mitigation arguments for shadow carbon pricing have two parts: operational efficiency and profit maximization.[23] Under these conditions, carbon abatement moves from being primarily a matter of social responsibility and reputation, to one of cost management and strategic planning,[24] and helps explain why the practice of shadow carbon pricing has become an industry standard.[25]

Power utilities face an overlapping but different set of regulatory pressures compared to the oil and gas companies. The regulations for the coal-fired electricity sector *(Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulations)* will set a performance standard of 420 tonnes CO_2/GWh for new coal-fired units and units that have reached the end of their useful life.[26] Units that have reached the end of their useful life are, in general, those that have reached 50 years since starting to produce electricity commercially.[27] The regulations are expected to prevent continued coal-fired operation without significant modifications such as carbon capture and storage, or very high rates of biomass co-firing. SaskPower, whose electricity generating portfolio is dominated by coal-fired plants (43% of supply mix), will be affected by this regulation. Since Ontario Power Generation (OPG) will no longer use coal to produce electricity after 2014.[28, 29] the regulation is not expected to affect OPG. However in May 2010, the Province of Ontario (OPG's sole shareholder) issued a Shareholder Declaration and Shareholder Resolution directing OPG to develop a strategy to meet, on a forecast basis, targets of CO_2 emissions arising from the use of coal of 11.5 million tonnes per year for the period 2011 to 2014.[30]

Secondary Drivers: Innovation, Market Access, Leadership

A secondary driver for shadow carbon pricing identified by interviewees was to deliver performance improvements. Shadow carbon pricing can be used to demonstrate the opportunities associated with significant investments in carbon abatement or energy efficiency

22 McCarthy, S. (2010, December 9). Oil patch pricing carbon tariffs into new project. *The Globe and Mail,* http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/oil-patch-pricing-carbon-tariffs-into-new-projects/article1318994/.

23 Belfry Monroe, K. (2010). *Business, Risk, and Carbon Pricing: Business Preference for Climate Change Instruments in Canada.* Sustainable Prosperity, http://www.sustainableprosperity.ca/dl352&display.

24 D'Alquen, J. (n.d). *Beyond the Carbon Footprint: Attaining competitive advantage in a carbon-constrained world takes flexible cost management and long-term planning,* http://www.awarenessintoaction.com/whitepapers/Tradeslot-carbon-footprint-emissions.html.

25 McCarthy, S. (2010, December 9). Oil patch pricing carbon tariffs into new project. *The Globe and Mail,* http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/oil-patch-pricing-carbon-tariffs-into-new-projects/article1318994/

26 Canada Gazette. (2012, September 9). *Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations,* http://www.gazette.gc.ca/rp-pr/p2/2012/2012-09-12/html/sor-dors167-eng.html.

27 Ibid.

28 In 2007 the Government of Ontario issued a legally binding regulation requiring the cessation of coal-burning at Ontario's four remaining coal-fired power plants by December 31, 2014.

29 Ontario Power Generation Inc. (2011). *2011 Annual Report.* http://www.opg.com/pdf/annual%20reports/Annual%20Report%202011.pdf.

30 Ontario Power Generation Inc. (2011, November 24). *OPG Strategy to meet 2012 Emissions Target [Letter to Ontario Minister of Energy].* http://www.opg.com/safety/sustainable/emissions/OPG%20Strategy%20to%20Meet%202012%20CO2%20Emission%20Target.pdf.

technologies to boards of directors and investors.[31] Successful development of these technologies could prove valuable as a source of competitive advantage to early adopters or as a product to be sold.

Shadow carbon pricing can be used to demonstrate the opportunities associated with significant investments in carbon abatement or energy efficiency technologies to boards of directors and investors.

At a practical level, shadow carbon pricing was seen by a few companies as a good mechanism for ensuring a comprehensive assessment of potential costs and for ensuring that business units and projects compete for capital on an equal basis, notwithstanding the use of different carbon prices in different jurisdictions by some companies.

Some specific examples of motivations for using a shadow carbon price amongst the interviewees are:

- Four companies described shadow carbon pricing as a way to create "more robust projects" – projects with equipment configurations that minimize GHG emissions, are more energy-efficient, and are less likely to require retrofits over their life cycle.
- One company viewed shadow carbon pricing as a way to drive technological improvement and low-carbon innovation, and to position itself as an environmental leader in the oil sands.
- One company stated that GHG performance improvement through shadow carbon pricing will help them respond to scrutiny by foreign markets about the carbon footprint of oil sands oil and maintain access to those markets.

Company Policy Drivers

In companies where shadow carbon pricing is used, it is a standard practice or part of a procedure (e.g. project stage-gate process) rather than an explicit policy requirement. Some of the respondents, including Shell and Statoil, have public policy positions stating their support for carbon pricing as a mechanism to transition to a low-carbon economy. They view the use of shadow carbon pricing as a necessary practice aligned with their public position and vision for the future, rather than just a reaction to future cost uncertainty.

31 Climate Northeast Partners. (2006, January 18–19). *GHG Project Selection and the Market Value of Carbon.* Presented at the Climate Leaders Partners Meeting in Marina del Rey, http://www.epa.gov/climateleadership/documents/events/jan2006/leahy.pdf.

Most companies use shadow carbon pricing at the project level – as part of evaluating options for large projects and for specific GHG reduction projects.

Nature of Application

Most companies use shadow carbon pricing at the project level – as part of evaluating options for large projects and for specific GHG reduction projects. Four companies use it for strategic and business unit planning and decision-making.

Interviewees described a range of impacts of shadow carbon pricing on decision-making including:

- **Project evaluation:**
  - *Decision to proceed or not proceed with a project or major investment* – for example, prioritizing the development of natural gas reservoirs with lower CO_2 content.
  - *Decisions on the adoption of certain technologies and practices* – for example, decisions to inject CO_2 for enhanced oil recovery or simply to sequester carbon.

- **Strategic Decision-Making:**
  - *The overall approach to decision-making* – reinforcing the value of scenario planning, and to helping motivate and focus the organization on performance improvement in carbon intensity, and steam to oil ratios.

Figure 2 summarizes the level of the organization at which a shadow carbon price is used, and how it is being used in the various energy sub-sectors surveyed.

Figure 2: Nature of Application of Shadow Carbon Pricing

CORPORATE/STRATEGIC LEVEL

Oil and Gas
- Analysis of groups of business activities and long-range plans
- Acquisitions (projects, companies)
- Decision to enter new jurisdictions

Power Utility
- Power system planning
  - Operating decisions (integration into power system models)

Pipeline
- Informing policy engagement and customer strategy related to future carbon pricing for natural gas distribution

PROJECT LEVEL

Oil and Gas
- Project evaluation
  - Major projects with significant GHG emissions
  - GHG reductions and energy efficiency projects
- Equipment/technioogy selection

Power Utility
- Decisions on modifying, retiring, or building new energy assets (coal, gas, hydro, etc.)

Source: Sustainable Prosperity

Project Evaluation

All five of the oil and gas companies interviewed who use a shadow carbon price apply it in their project evaluation process – as a criteria in the financial analysis to determine whether or not to proceed with a project. The shadow carbon price introduces an additional cost throughout the life of the project, effectively lowering the internal rate of return for carbon-intense projects. All seven oil and gas companies interviewed have oil sands assets, although for some oil sands is not their core business in Canada. Oil sands projects are large and long-term (20–40 years) projects and produce significant GHG emissions. In 2009, total reported GHG emission from Alberta oil sands facilities were 41.9 Mega tonnes (Mt).[32] For carbon prices ranging from C$10 to $100/tonne, these emissions represent from C$400 million to $4 billion dollars in costs per year for the industry.

Some companies only apply shadow carbon pricing to larger projects or those with significant GHG emissions. Two companies stated that they apply shadow carbon pricing to all project evaluations, but that larger projects with significant GHG emissions (above a certain threshold, e.g. 100,000 tonnes of CO_2e per year) are subjected to additional sensitivity analysis using a wide range of carbon prices. One company stated that carbon costs (including the use of a shadow price) are considered at each "stage gate" of their project evaluation process. For the two companies that do not formally use a shadow carbon price, project evaluation is also the process where shadow carbon pricing has been applied informally.

One company emphasized that applying a shadow carbon price across different jurisdictions provided an equal basis for competing for capital. In this case, even projects located in jurisdictions where carbon pricing was not at all imminent were subject to the same shadow carbon price. However, two other companies described evaluation processes involving different starting points or different ranges of shadow prices depending on the jurisdiction. These approaches recognize the differences in business risk between jurisdictions, but are still rooted in the belief that all of their projects will ultimately be exposed to carbon pricing through an international regulatory regime or market.

Four companies also use a shadow price to evaluate GHG reduction/energy efficiency projects. Since these projects help reduce emissions and may create opportunities for offsets, shadow carbon pricing helps them meet the hurdle rate.[33] Recognizing that this approach may still be insufficient to advance these types of projects, one company stated that it has a dedicated fund for energy efficiency projects to ensure that they are prioritized. In this case, the shadow price is only used to track the incremental benefits after the

Cenovus uses an internal carbon price model to project estimated costs of GHG emissions over the company's long range plan. The carbon price range used for this exercise is C$15–$65/tonne of CO_2e. Potential investments in GHG emissions reduction activities are measured against this model for return on investment and projected reduction in GHG emissions. Starting in 2011 Cenovus plans to develop marginal cost abatement curves internally to assess quick wins on potential emissions reductions activities and technologies.

BP factors a carbon cost into investment decisions for new projects including new access projects (i.e. new country), major projects, and acquisition negotiations above a particular threshold (i.e. another facility or company). The standard carbon cost is based on an estimate of the carbon price that might realistically be expected in particular parts of the world.

32 Alberta Energy. (2012). Oil Sands Facts and Statistics. http://www.energy.alberta.ca/oilsands/791.asp.

33 The required rate of return in a discounted cash flow analysis above which an investment makes sense (and below which it does not).

project has been implemented and this analysis sometimes generates the impetus to pursue aggregation[34] of projects into offsets.

Unlike most other GHG reduction and energy efficiency projects, carbon capture and storage (CCS) projects are also large projects in their own right. CCS, a process where CO_2 is converted into liquid and pumped underground to be sequestered indefinitely in porous rock formations, is seen as an important technology for mitigating GHG emissions from the energy sector. The National Roundtable on the Environment and the Economy (NRTEE) reported a cost range of about C$60 to $140/tonne of CO_2 for CCS.[35] Shell has stated that carbon pricing is necessary to advance the application of CCS in the industry and recently announced the approval of its Quest CCS project.[36, 37] SaskPower is also proceeding with a CCS project at its Boundary Dam Power station. While the use of shadow carbon pricing at Shell and SaskPower may have benefitted the business case for these projects, their approval is also based on broader strategic considerations and significant provincial and federal funding.

Shell considers the potential cost of a project's CO_2 emissions in all major investment decisions. Large projects with significant emissions (>100,000 tonnes) receive more scrutiny than small or low CO_2 emission projects, but every project undergoes a basic shadow pricing analysis. For large projects, sensitivity analysis is used to explore regulatory regime scenarios resulting in different prices GHG emissions and associated costs are factored in at each stage gate of the project development process. At a more strategic level, exposure to carbon pricing is also included in the examination of the company's portfolio.

Strategic Decision-Making

Two oil and gas companies shared specific examples of the use of a shadow carbon price in strategic planning and decisions. Other interviewees referred to the use of carbon pricing to inform corporate-level risk discussions, but do not formally use shadow prices in decision-making at that level. Examples of the processes interviewees use to apply a shadow carbon price in decision-making are:

- The strategic planning group examines the potential impact of carbon prices on groups of business activities to inform recommendations to senior management.
- Senior management and the board review the impact of a variety of carbon-constrained scenarios on the corporate strategy using a range of shadow carbon prices over a 10 year period.
- Corporate decisions to enter a new country involve a shadow price analysis appropriate to that jurisdiction.

34 Aggregation puts together geographically and/or temporally dispersed activities that reduce emissions in a similar manner to streamline the process of qualifying and quantifying emissions offsets (IISD, 2011)

35 NRTEE (National Roundtable on the Environment and the Economy). (2009). *Achieving 2050: A Carbon Pricing Policy for Canada (Technical Report),* http://nrtee-trnee.ca/wp-content/uploads/2011/08/carbon-pricing-tech-backgrounder-eng.pdf.

36 Shell's Quest CCS project received C$745 million from the Alberta government over 10 years and C$120 million from Ottawa's Clean Energy fund, with a zero net present value as one of the conditions of the government funding Shell may be able to generate revenue from the sale of carbon credits (it gets double credit in Alberta for each tonne sequestered) and also the sale of CO_2 to oil and gas companies for enhanced recovery projects. (Healing, D. (2012, September 5). *Shell and partners approve carbon capture and storage project: Government-backed project to be operational by late 2015.* Calgary Herald. http://www.calgaryherald.com/business/Shell+partners+approve+carbon+capture+storage+project/7194713/story.html#ixzz2AOkCDoXQ)

37 Geddes, J. (2012, June 12). Shell CEO Peter Voser takes questions: Peter Voser talks with John Geddes about Arctic drilling, doing business with China, and why he deserves to be paid $15 million. *Maclean's,* http://www2.macleans.ca/2012/06/12/on-arctic-drilling-doing-business- with-china-and-why-he-deserves-to-be-paid-us15-million/.

Both of the utilities interviewed (SaskPower and OPG) use a shadow carbon price in their power system models (computer models) to inform planning decisions on generating options (operating and build options) to address different regulatory and carbon market scenarios or other constraints. Decisions on generating options include selecting the mix of generating assets (e.g. hydro, wind, coal, nuclear, etc.), deciding how the assets will be operated, modifying or retiring existing assets, and constructing new assets.

Other Applications

Enbridge's activities will be impacted by the emerging cap-and-trade systems in Quebec and California, since it will have to pay a carbon price on the natural gas it distributes to customers. The company is using a range of carbon prices to explore its options with respect to flowing costs through to customers and the implications for marketing, billing and information technology (IT) costs, offset purchases, and demand side management. However, it does not consider this to be a formal application of shadow carbon pricing in internal decision-making.

OPG has also used shadow carbon pricing to optimize the dispatch of coal generation in the Ontario electricity market. As it operates its coal plants between now and the end of 2014 (date of phase-out), OPG has to meet a complex set of requirements related to reliability, annual CO_2 limits, and other rules and conditions of the Ontario electricity market.[38] To meet overall system reliability, OPG must ensure that sufficient fuel (coal) is available and that units remain in good condition by minimizing short operating cycles.[39] Due to low power demand and low natural gas prices, the use of a shadow price has not been necessary to create a financial incentive to limit the dispatch of coal units.

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38 Ontario Power Generation Inc. (2011, November 24). *OPG Strategy to meet 2012 Emissions Target [Letter to Ontario Minister of Energy].* http://www.opg.com/safety/sustainable/emissions/OPG%20Strategy%20to%20Meet%202012%20CO2%20Emission%20Target.pdf.

39 Ontario Power Generation Inc. (2011). *2011 Annual Report,* http://www.opg.com/pdf/annual%20reports/Annual%20Report%202011.pdf.

Impact on Decision-Making

Interviewees described a range of impacts of shadow carbon pricing on specific decisions, with some examples detailed below.

Project Evaluation

Shadow carbon pricing helped drive the following decisions to proceed or not proceed with projects:

- Approving CCS projects (Shell and SaskPower) in combination with other drivers including government funding and other strategic considerations.
- Prioritizing the development of natural gas reservoirs with lower CO_2 content.
- Approving energy efficiency projects including co-generation projects.
- Declining certain major investments based on their carbon footprint.[40]

Shadow carbon pricing helped drive decisions to adopt the following technologies and practices:

- Reinjection of CO_2 and H_2S waste stream from an *in-situ* oil sands operation, where the usual practice would be to extract sulphur and vent CO_2.
- Injecting CO_2 for enhanced oil recovery and sequestering that CO_2 in the formation.
- Using grid electricity instead of generating electricity from readily available natural gas at a gas processing facility in BC, where electricity is generated primarily from hydro.

Strategic Decision-Making

Some interviewees also described less quantifiable impacts of shadow carbon pricing on the approach to decision-making and the achievement of corporate objectives:

- Galvanizing the company in driving towards sector-leading carbon intensity performance (kg CO_2e/barrel) which in turn maximizes the long-term value of assets.
- Motivating the creation of offsets and the development of protocols and procedures to maximize future offset opportunities.
- Reinforcing the value of scenario planning and risk/opportunity analyses.

40 Interviewees declined to provide specifics on the investments that did not go forward based fully or partially on future carbon costs.

- Driving performance in reducing steam to oil ratios (for oil sands projects), allowing sustained production and growth with comparatively smaller plants and lower energy usage and emissions.

A few interviewees stated that shadow carbon pricing helps advance design options with lower carbon impacts and energy efficiency and retrofit projects, more often than actually influencing the go/no-go decision on a major project. Some of these respondents emphasized that for their organizations other cost factors, such as the price of steel, labour, environmental assessments, and commodity price differentials, have a much larger impact on project economics than shadow carbon prices (at their current levels). Carbon costs may contribute to a no-go decision on an already risky project, but alone do not make or break a project.

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Implications for Policy-Makers

This *Brief* is meant as an overview of the concept, drivers and usage of shadow carbon pricing, in the context of certain energy companies' experiences. Based on the overview, Sustainable Prosperity believes that the following conclusions are of direct relevance to policy-makers engaged in the development of climate change policy in Canada:[41]

1. Current carbon pricing systems in Canada provide varying levels of policy certainty for companies. Alberta and BC's carbon prices are fixed at a set rate, whereas Quebec's incoming cap-and-trade system, part of the Western Climate Initiative and linked to California's system, will have little price certainty beyond a floor price. Other jurisdictions are considering carbon pricing, but there is little clarity about their future direction. Even more challenging for companies is the implicit carbon price imposed by the Federal regulations that seek to limit carbon emissions in specific sectors.

2. In the face of this and future uncertainty of carbon costs, some companies, especially those that are carbon-intensive, are using a shadow carbon price to assess the vulnerability of their operations to a cost of carbon. Their investment, planning, and technology decisions and choices are increasingly informed by a shadow carbon price.

3. The shadow carbon prices that Canadian energy companies are using are relatively close to actual carbon prices in applicable Canadian jurisdictions, yet have an upper range significantly below carbon prices estimated to be necessary by 2020 and beyond to successfully shift Canada to a lower GHG emissions pathway under various policy scenarios.[42]

4. At the same time, as long as shadow carbon prices are voluntarily applied and not regulated, there is unlikely to be an impact on the price of the energy that consumers face. Without that transparency, one of the chief advantages of a pricing instruments – its ability to influence the behaviour and choices of companies and consumers – is muted.

5. While many of the companies are familiar with the integration of carbon pricing into their business processes and are testing the economics of their projects for a range of prices, there was little indication that shadow carbon pricing is being used to manage the risk of more significant carbon abatement costs in the future.

6. The findings of this survey suggest that Canadian energy companies have displayed admirable leadership in developing shadow carbon price-based planning and strategy to internalize carbon costs. At the same time, this leadership is no substitute for a clear public policy regime around carbon pricing that levels the playing field between companies, engages consumers, and establishes pricing levels commensurate with the attainment of our national emissions reduction obligations.

41 These statements represent the views of Sustainable Prosperity, not of the interviewees.

42 National Roundtable on the Environment and the Economy (NRTEE). (2009). *Achieving 2050: A Carbon Pricing Policy for Canada (Technical Report)*, http://nrtee-trnee.ca/wp-content/uploads/2011/08/carbon-pricing-tech-backgrounder-eng.pdf.