

Climate change disclosures: An examination of Canadian oil and gas firms

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Abstract

The purpose of this paper is to examine: (1) to what extent Canadian oil and gas firms have adhered to the Canadian Institute of Chartered Accountant proposed guidelines respecting climate change disclosures in their annual reports, and (2) whether the disclosures of these firms can be influenced by their media visibility, the presence and operating characteristics of an environmental committee within the board of directors, their ownership structure, their audit firms, their political exposure and media visibility. The results show that the level of disclosure is very low; however, when the board of directors has an environment committee, the level of disclosure is higher. This is also the case for firms having significant political exposure and strong media visibility, and for those with a widely held ownership structure. Whether or not the audit firm is one of the Big Four, does not make any difference in the level of disclosure.

Keywords: *Voluntary Disclosure, Greenhouse Gases, Management's Discussion and Analysis (MD&A), Annual Report.*

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1. Introduction

According to the Intergovernmental Panel on Climate Change¹, the warming of the climate system is irrefutable, as is evidenced by observations of increases in global average air and ocean temperatures, the widespread melting of snow and ice and the rising global average sea level (IPCC, 2007). This global warming is partly due to greenhouse gas (GHG) emissions resulting from human activities (IPCC, 2007). For some organizations, this trend can have serious repercussions. Sectors such as agriculture, insurance, tourism and real estate face potential risks from climate change, such as a rising sea level and more frequent and intense storms (Kolk, Levy and Pinkse, 2008). For companies emitting greenhouse gases, the consequences can be even more numerous, including increased operating costs, reduced demand, reputational risk, legal proceedings, and fines and penalties. What's more, for these firms, this new reality changes stakeholders' information needs respecting their greenhouse gas emissions. These companies' stakeholders, notably investors, want to know not only how much GHG is being emitted, but also how firm managers use or take into account GHG emissions in their strategic planning. They also wish to know whether the firms evaluate the ensuing risks and financial repercussions, as well as whether they maintain data and control systems to quantify and control these emissions (Canadian Performance Reporting Board [CPRB], 2005).

¹ The Intergovernmental Panel on Climate Change (IPCC) was set up jointly by the World Meteorological Organization and the United Nations Environment Program to provide an authoritative international statement of scientific understanding of climate change.

² Canada has signed and ratified the Kyoto Protocol.

³ This document is intended to provide supplementary annual information required by securities regulators.

In Canada², as in other countries, securities regulators have long recognized the need for companies to provide environmental disclosures that would be material to investor decision making (CPRB, 2005). These disclosures are required in Annual Information Forms³, in financial statements or in the Management Discussion and Analysis (MD&A)⁴ section of annual reports (CPRB, 2005). Disclosures on climate change and GHG are, among others, covered by rules requiring public companies to publish information about the risks they face. The *National Instrument 51-102 Continuous Disclosure Obligations* adopted by the Ontario Securities Commission (OSC, 2004), as well as counterparts in other Canadian provinces, require public companies to dedicate a portion of their MD&A to a description of the risks that can materially affect their future performance.⁵ To help firms comply with these requirements, the Canadian Institute of Chartered Accountants (CICA) published (CPRB, 2005) a Discussion Brief addressing these types of disclosures in October 2005.

The CICA initiative is one of the first that addresses GHG disclosures presented in the MD&A. This initiative, in conjunction with Canada's sizeable oil and gas industry, provides us with the opportunity to examine the characteristics of GHG disclosures of corporations that generate significant quantities of GHG. This study thus has two objec-

⁴ The MD&A is a report that corporate management presents in its annual report to explain the organization's current financial situation, performance and future prospects. For a review of past studies on MD&A disclosures; see Cole and Jones (2005).

⁵ Annual MD&A reporting requirements, similar to those adopted by the SEC in 1980, were first instituted in Canada by the OSC in 1989 (Clarkson, Kao, & Richardson, 1999). According to the regulation, risks and uncertainties were one of the specific areas to be addressed in the MD&A.

tives. First, to examine to what extent Canadian oil and gas firms have adhered to the proposed guidelines respecting climate change disclosures in the MD&A section or in other parts of their annual reports. Second, to determine whether these disclosures seem to be influenced by media visibility, the presence and operation of an environment committee within the board of directors, ownership structure, the size of the audit firm, and the companies' political exposure.

Like the other MD&A disclosures, the narrative nature of climate change disclosures makes them a challenging subject for research. According to Cole and Jones (2005), it isn't easy to assess the quality of this type of disclosure because it's impossible to know what the firm's disclosures would have been if they had been complete, unbiased and accurate. The CICA Discussion Brief can serve as reference for assessing completeness. In the same vein, the relationships between climate change disclosures and the firms' different specific contextual variables can help assess the potential biases of these disclosures. If the firm's disclosure decisions are tied to these contextual variables, we may conclude that these disclosures are not neutral. This study thus supplements several previous studies on the quality of MD&A disclosures and on the determinants of specific MD&A disclosures (Cole and Jones, 2005). It contributes empirical observations that make it possible to document corporate practices in relation to this particular type of disclosure.

Background to Climate Change Disclosures

According to Eccles, Krzus and Serafeim (2011), investors are increasingly interested in environmental, social and governance information. In recent years, in addition to the market securities regulation, several initiatives have been introduced to improve firms' reporting of this type of information. The Global Reporting Initiative's Sustainability Reporting Guidelines, the world's most widely used framework, is one example.⁶ This Reporting framework sets out the principles and performance indicators that organizations can use to measure and report their economic, environmental, and social performance in stand-alone sustainability or corporate social responsibility reports (GRI, 2011). In 2010, 1,824 organizations around the world were recognized as using these Reporting Guidelines for their sustainability or corporate social responsibility reports (GRI, 2011). Climate change disclosures are, at least in part, covered by these Reporting Guidelines. However, up until now the voluntary publication of sustainability reports has been limited to large organizations.

The Carbon Disclosure Project (CDP) is another initiative that has been developed to respond to stakeholders' information needs in terms of climate change disclosures (Kolk et al., 2008). The CDP is an independent not-for-profit organization that developed a database of corporate climate change information from over 3,000 organizations in some 60

⁶ The Global Reporting Initiative (GRI) is a network-based organization that developed a sustainability reporting framework through consensus seeking from global business, civil society, and labour, academic and professional institutions (www.globalreporting.org/Home).

countries around the world (CBC, 2011). This database covers a firm's carbon strategies, GHG emissions, corporate arrangements for oversight of climate change and environmental risk, a firm's perception of risks and opportunities, and actions under way or planned to manage these risks and seize the opportunities. The information results from annual surveys to which a large sample of major publicly traded companies was invited to respond. This information is made available to institutional investors, corporations, policymakers and their advisors, public sector organizations, government bodies, academics and the public (CBC, 2011). Similarly to the GRI, firms' responses to the CDP are also voluntary, which means that the information is limited to a relatively small group of organizations.

The voluntary nature of environmental disclosures has been addressed in past studies from four different theoretical perspectives. The economic perspective predicts that firms with real and well-founded "good news" are likely to disclose this news to differentiate themselves from firms with "bad news" or "unfounded news" that cannot easily imitate them (Clarkson, Li, Richardson and Vasvari, 2008). A firm may also decide to retain information if it could be detrimental to the firm's position or reputation or if stakeholders are not aware that it has such information (Dye, 1985; Verrecchia, 1983).

According the legitimacy theory, organizations continually seek to ensure that they are perceived as operating within the bounds and norms of their respective societies. They attempt to ensure that stakeholders perceive their activities as "legitimate" (Deegan and Unerman,

2011). Environmental disclosures are one way for an organization to obtain this legitimacy.

Lindblom (1993) identifies four disclosure strategies that organizations can take to obtain, maintain, or restore their legitimacy. They can: (1) seek to educate and inform their "relevant publics" about changes in their actual performance; (2) seek to change the perceptions that their "relevant publics" have of them, but not change their actual behaviour; (3) seek to manipulate perception by deflecting attention from the issue of concern into other areas, and (4) seek to change external expectations of their performance (Deegan and Unerman, 2011).

Under the stakeholder theory, because different stakeholder groups have different views about how an organization should conduct its operations, various social contracts will be "negotiated" with different stakeholder groups, rather than one contract with society in general as posited by the legitimacy theory (Deegan and Unerman, 2011). Finally, other researchers claim that environmental disclosures can be a function of differences in political, social, economic and cultural environments (Freedman and Jaggi, 2011) or other corporate governance practices (Prado-Lorenzo and Garcia-Sanchez, 2010; Rankin, Windsor and Wahyuni, 2011). Studies on climate change disclosures have to date mainly been conducted from the latter perspective.

As concerns voluntary climate change or GHG disclosures, Freedman and Jaggi (2005) have examined whether firms from countries that ratified the Kyoto Protocol have more elaborate disclosures

than firms in other countries. The disclosures are then included in the annual reports, environmental reports and on the websites of the world's largest companies on Fortune's list. Their results corroborate their expectations. Furthermore, a company's size and activity sector are related to the scope of the disclosures. Similar results were observed by Freedman and Jaggi (2011) with more recent data (2007-2008 compared to 2003) and including the climate change disclosures available in the CDP. In this last study, climate change disclosures are more elaborate in the countries that ratified the Kyoto Protocol and set limits on greenhouse gas emissions.

The differences noted between firms' climate change disclosures led Freedman and Jaggi (2011) to conclude that mandatory disclosure requirements may be needed so that investors can make informed investment decisions. Similar results were also observed by Prado-Lorenzo, Rodríguez-Dominguez, Gallego-Alvarez and García-Sánchez (2009), who analyzed the relationship between climate changes disclosures presented on firms' websites. Size, activity sector (especially chemicals, metals, mining, motor vehicles and parts, and utilities), and the fact that the company has its headquarters in a country that has ratified, approved, adhered to or accepted the Kyoto Protocol are positively related to the scope of the voluntary climate change disclosures presented on the firms' websites.

Rankin et al. (2011) have examined whether companies' greenhouse emission disclosures included in their annual reports or stand-alone environment or sustainability reports are associated with environmental management systems,

corporate governance quality, environmental management committees, guidance provided by the Global Reporting Initiative and participation in the CDP. Their results show that a firm's decision to disclose information on greenhouse emissions is related to the implementation of an environmental management system, the quality of corporate governance, participation in and publicly available disclosures to the CDP, size, and the energy, mining and industrial sectors. Except for the quality of corporate governance and environmental management committees, their results are same for the extent and credibility of these disclosures measured using an index based on ISO 14064-1.

In examining the factors associated with the US S&P 500 firms' decisions to participate in the CDP, Stanny and Ely (2008) found that size, previous participation and foreign sales are positively related to a firm's decision to respond to the fifth CDP questionnaire. Prado-Lorenzo and García-Sánchez (2010) studied the impact of several variables relating to corporate governance practices on participation in the CDP, more particularly the percentage of independent directors, the holding of the position of CEO and Chairman of the board by the same person, the percentage of women directors, the firms' characteristics and the characteristics of the country in which they operate. Their findings show that the larger and most profitable firms disseminate a greater volume of information. The observed relationship with other variables seems less than conclusive.

Overall, these studies' results support the market securities regulation and accounting standards implication for these

types of disclosures. Accordingly, in October 2005, the CICA published the Discussion Brief on MD&A disclosure about the financial impact of climate change and other environmental issues that specifically covered climate change information as required to be disclosed under the *National Instrument 51-102 Continuous Disclosure Obligations*.

However, although the request for risk information concerning climate change is formalized, the descriptive nature of this type of disclosure allows managers some discretion in applying the guidance. Thus, as is the case for other voluntary disclosures respecting climate change or greenhouse emissions, the extent to which organizations actually follow the formulated guidelines may be questioned. This is the first objective of this study.

The second objective is to examine whether these disclosures appear to be influenced by the presence and operation of an environment committee, audit firm size, media visibility, ownership structure, and the companies' political exposure. Otherwise, managers' discretionary power cannot be unlimited and should normally be exercised within established parameters set out by the board of directors and the auditor. If the firm's activities are subject to climate change risks, managers' disclosure decisions can be influenced by the importance attributed to them by the board of directors since one of its responsibilities is to approve the contents of the MD&A before publication. In firms where this risk may be significant the board of directors may even be expected to have established an environment committee to oversee this issue and other environment-related concerns. Therefore, the relationship be-

tween the existence and operation of an environment committee within the board of directors and the scope of the climate change disclosures is worth examining.

Financial statement auditors can also influence the scope of voluntary disclosures included the MD&A. According to Clarkson, Fergusson and Hall (2003), one way for auditors to discourage litigation is to encourage their client firms to disclose more information about the threats they faced. In examining the voluntary disclosures concerning Year 2000 remediation in annual reports, it was noted that the companies whose auditors had a greater reputation at stake (the Big 6 audit firms) disclose more information. As mentioned above, the risks related to climate change can be highly significant for a number of organizations. Large audit firms are more likely to wish to reduce any risk of litigation by encouraging their clients to more closely comply with disclosure recommendations, even though they may be voluntary.

Numerous studies have observed a positive relationship between firm size and environmental disclosures by including climate change disclosures (Stanny and Ely, 2008; Prado-Lorenzo et al., 2009; Prado-Lorenzo and Garcia-Sanchez, 2010; Rankin et al., 2011). Large firms are likely to receive more attention from the media, policy makers, and regulators, leading to higher levels of voluntary environmental disclosures in order to avoid being penalised by this political exposure (Watts and Zimmerman, 1986; Prado-Lorenzo et al., 2009). As for climate change and GHG disclosures in the Canadian context, it may be said that the larger the firm, the greater the pressure to comply with the proposed disclosure guidelines and thus prevent the imple-

mentation of more rigorous and more constraining requirements (Freedman and Jaggi, 2005; Cormier and Gordon, 2001; Bewley and Li, 2000; Alnajjar, 2000; Clarkson, Kao and Richardson, 1999).

A firm's level of climate change and GHG disclosures could also be affected by the active oversight of stakeholders and the degree of monitoring by the media or other means. Since this monitoring focuses on the activities of the firm, it can only reap the benefits of publishing more information (Cormier and Magnan, 2003). Several studies found that increased media attention, which enhances firms' visibility, leads to higher levels of environmental disclosure (Cormier and Magnan, 2003; Cormier and Gordon, 2001; Brown and Deegan, 1998; Deegan and Gordon, 1996). We will analyse this possibility. Finally, we extend our analysis to include ownership structure. When managers decide to voluntarily disclose information, whether it be environmental or any other type of information, they choose to reduce the information asymmetry between themselves and the shareholders (Lajili and Zeghal, 2005; Broberg, Tagesson and Collin, 2010). Moreover, this information asymmetry may be more or less important depending on whether a firm's ownership is closely or widely held. If a firm's ownership is closely held, there is less pressure to release information publicly since the principal shareholders already have access to it. According to the economic theories, when a firm's ownership is widely held, its managers decide to voluntarily disclose information to reduce information asymmetry or again, according the legitimacy theory, to take advantage of the situation to manage or

acquire the "legitimacy".

Thus, our second research objective is to examine the link between climate change and GHG disclosures, and different characteristics of the firm such as:

- a. the presence of an active environment committee within the board of directors;
- b. the size of the audit firm;
- c. the firm's political exposure;
- d. the firm's media visibility; and
- e. the firm's ownership structure.

2. Research Design

Sample

Our analysis is based on the climate change disclosures presented in the MD&A or in the other parts of the annual report of Canadian public oil and gas corporations⁷ in 2007. These firms are unanimously recognized as important emitters of GHG.⁸ They also in large part contribute to Canada's position as the world's seventh largest oil producer (Natural Resources Canada, 2011).

The choice of restricting the sample to oil and gas firms is motivated by various arguments. First of all, Cole and Jones (2005) observed that the nature of the information set out in MD&As varies considerably from one sector to another. As well, Cormier and Magnan (2003) note that disclosure models are particular to activity sectors. Therefore, Cole and Jones (2005) suggest targeting firms

⁷ US Standard Industrial Classification Code 1311 (Crude Petroleum and Natural Gas) and 1321 (Natural Gas Liquids).

⁸ Between 2004 and 2007, emissions associated with mining, oil and gas extraction alone rose by 56.7%, largely due to increased activity at the Alberta oil sands (Environment Canada, 2007).

in the same sector where the presentations and definitions are more homogeneous, which helps prevent measurement errors due to differing definitions. As well, this strategy enables us to more easily identify the trends of firms in a similar sector (Clarkson et al., 2008). Finally, by specifically studying disclosures on climate change, our study allows us to verify the degree of implementation of the CICA proposed guidelines (Clarkson et al., 2008).

To be included in the sample, the firms had to meet the following criteria: (1) operate in the oil and gas sector and have production activities; (2) have its head office in Canada; (3) be listed on the Toronto Stock Exchange; and (4) have their 2007 annual report available in the SEDAR⁹ database. All the firms that meet these criteria are included in the sample. The final sample is composed of 64¹⁰ Canadian public oil and gas firms with production activities.

Disclosure measures

To measure the extent of climate change disclosure, most of the research has used an index developed for the end of the analysis (Freedman and Jaggi, 2005; 2011; Prado-Lorenzo et al., 2009; Rankin et al., 2011). In the same vein, we developed a disclosure index using the content-analysis technique that focuses on the substance of what is disclosed rather than on counting the lines of disclosure (Freedman and Jaggi, 2005). The index is based on the CICA climate change disclosure recommendations. The CICA (CPRB, 2005¹¹) guidelines

recommend disclosing and discussing climate change information relating to risk, strategy, key performance drivers, impacts and results. We analysed climate change disclosures for each firm, coded them in function of the proposed elements¹² and weighted them according to the level of detail disclosed. Coding of the climate change disclosures was conducted independently by two research assistants and, in case of disagreement, the opinion of the professor in charge of data collection prevailed. The coding index is presented in the left-hand side of the Table 1.

Other variables measures

- The firm's environment committee within the board of directors: the presence (1) or absence (0) of a committee was noted. The level of activity of the environment committee was measured by the number of members, the number of independent directors, and the number of meetings.
- The size of the firm's auditor: 1 if one of the Big Four, otherwise 0.
- The firm's political exposure was measured by the size of the firm as expressed by its total assets (Stanny and Ely, 2008).
- The firm's media visibility was measured by the number of times a firm was mentioned in *The Globe and Mail* in 2007 (Gamerschlag, Moller and Verbeeten, 2011). *The Globe and Mail* is a newspaper with the largest business readership in Canada.

⁹ SEDAR (System for Electronic Document Analysis and Retrieval) is the system used for electronically filing most securities-related information with the Canadian securities regulatory authorities (www.sedar.com).

¹⁰ These firms are listed in the Appendix.

¹¹ The final version was adopted at the end of 2008 (CICA, 2008).

¹² The data were collected in the MD&A and the other sections of the Annual Report, excluding the financial statements and their notes.

- The firm's ownership structure was determined by tracking the mention of a principal shareholder in the 2007 "Information circulars and proxy statements". A firm that mentioned the presence of a shareholder holding more than 10% of voting shares was considered as a closely held ownership firm (0) and one that did not meet the criterion was considered as a widely held ownership firm (1).

3. Results and Discussion

Descriptive statistics

As indicated in the right-hand column of Table 1, a sizable percentage of firms disclose very limited information about climate change. For each of the five components studied, 57.81% do not disclose any information on the risks related to the regulation to reduce GHG; 79.69% do not provide any information on their strategies to manage GHG; none of them mention any key performance

Table 1
Climate Change Disclosure Index

Items	Score	% of firms
<i>Risk</i>		
The firm does not disclose information on the risks related to the regulation to reduce GHG	0	57.81%
The firm discloses a general statement that its GHG must now be managed as required by regulation	1	12.50 %
The firm discloses the name of the regulation that requires it to manage its GHG	2	6.25 %
The firm discloses the name of the regulation that requires it to manage its GHG and provides details on the regulation	3	23.44 %
<i>Strategy</i>		
The firm does not provide information on its strategies to manage its GHG	0	79.69%
The firm mentions that it has strategies to manage GHG without explaining them	1	3.12 %
The firm explains its strategies to manage its GHG emissions	2	12.50 %
The firm explains its strategies to manage its GHG emissions and discloses specific targets to achieve	3	4.69 %
<i>Key performance drivers</i>		
The firm does not disclose any information on key performance drivers	0	100%
<i>Impact</i>		
The firm does not disclose the impact of the GHG regulation on its operations	0	65.62%
The firm discloses the impact of the GHG regulation on its operations	1	34.38 %
<i>Results</i>		
The firm does not disclose the results of the implementation of strategies to reduce GHG	0	93.75%
The firm discloses the results of the implementation of strategies to reduce GHG	1	6.25 %

drivers; 65.62% do not disclose the impact of the GHG legislation on their operations; and, finally, 93.75% of them do not publish information on the results of the implementation of any strategy to reduce GHG. However, the index lists some items where a certain percentage of firms publish some information. Under risk, 23.44% disclose the name of the regulation that requires them to manage their GHG and provide details on

the regulation. Regarding strategy, 12.50% explain their strategies to manage their GHG emissions and 34.38% disclose information on the impact of the GHG legislation on their operations.

The values presented in the second column of Table 1 have been used to compute a total score of disclosures on a scale from zero to eight (the sum of the maximum score for each of the catego-

Table 2
Descriptive statistics (64 firms)

Continuous variables	Mean	Stand. dev.	Median	Maximum	Minimum
Disclosure score	1.78	2.24	0	8	0
Environment committee (23 firms)					
<i>Number of members</i>	3.74	1.48	3	8	2
<i>Independent members</i>	79%	26.6%	94%	100%	0%
<i>Number of meetings</i>	2.68	2.40	2	8	0
Political exposure - assets (\$'000s CAD)	377,632	931,725	281,225	46,565,326	31,235
Media visibility (number of articles)	26.14	59.72	4	319	0
Sales (\$'000s CAD)	2,138,573	5,742,666	86,889	25,069,000	1,273
ROA	-0.6%	11.8%	0%	32.0%	-35.0%
Stock yield	4.27%	55.25%	-5.0%	238.0%	-69.0%
Dichotomous variables	Number of firms	Percentage of firms			
Big Four audit firm	58	90.63 %			
Non Big Four audit firm	6	9.37 %			
Widely held ownership	23	35.94 %			
Closely held ownership	41	64.06 %			

ries presented [Risk: 3; Strategy: 3; Key Performance Drivers: 0; Impact: 1; Results: 1]). The average score is very low at 1.78.

Although the 64 firms in our sample are all active in the oil and gas sector, they vary significantly in terms of respective assets, sales and earnings, and measures of return. As presented in Table 2, total assets range from \$31 million to \$46

billion and sales vary from \$1 million to \$25 billion. During the period under study, the measures of return are very high for some firms, while they are definitively low for others (Table 2).

Despite the fact that the environment should be a major concern, only 23 of the boards of directors of the 64 firms studied report having an environment committee. These committees are comprised of two to eight members (on aver-

Table 3
Disclosure scores

	Means	
Big Four audit firm ¹	1.78	
Non Big Four audit firm	1.83	
With an environment committee	2.22	
No environment committee	1.54	
Significant political exposure	2.45	**
Less political exposure	1.15	
Significant media visibility	2.55	**
Less media visibility	1.06	
Widely held ownership	3.17	**
Closely held ownership	1.00	

** Significant difference at the 0.05 level (one-tail, t-test)

¹ The small number of firms audited by non Big Four firms make it impossible to carry out the statistical test on this item.

age, less than four). Some 79% of these members are independent and one committee has no independent member. These committees meet less than three times a year, while one committee does not meet at all. Almost all of the firms (58 out of 64) are audited by one of the Big Four audit firms. In 2007, each firm was the subject of an average of 26 articles in *The Globe and Mail*. One firm received a substantial amount of attention with 319 articles, whereas another

received no attention whatsoever. Regarding ownership structure, 23 firms are widely held, and 41 are closely held.

Main results

Table 3 presents the mean comparison of the total score of disclosures on a scale from zero to eight. Although the overall disclosure scores are quite low, signifi-

cant differences were noted as to what was expected in terms of political exposure, media visibility and firm ownership. Contrary to our expectation, the level of disclosure of the companies audited by a Big Four firm is lower than that noted for companies not audited by a Big Four firm, even though the difference is very slight. However, the small number of firms audited by a firm that does not belong to the Big Four (six firms) makes it difficult to carry out the statistical tests.

To take our study further, we created binary variables from the Climate Change Disclosure items: overall disclosure, risk, strategies and impacts. Since none or very few firms disclose information about their key performance drivers or the results of their implementing strategies to reduce GHG, these items are not included in the analysis. These four variables are operationalized as follows:

- Overall disclosure: 1 if any mention of risk related to GHG or the firm's strategies to manage its GHG or the impact of the GHG regulation on its operation or the results of the implementation of strategies to reduce its GHG; otherwise, 0 (28 vs. 36 firms).
- Risk disclosure: 1, for any mention of risk related to GHG; otherwise, 0 (27 vs. 37 firms).
- Strategies disclosure: 1 for any mention of its strategies to manage its GHG; otherwise, 0 (13 vs. 51 firms).
- Impact disclosure: 1 for any mention the impact of the GHG regulation on its operations; otherwise, 0 (22 vs. 40 firms).

We cross-tabled these variables with the explicative nominal variables, environment committee and ownership structure, and applied Chi² tests to analyse the links¹³ (Table 4). We also compared

Table 4
Proportion and number of firms disclosing information by firm characteristics

	Overall disclosure	Risk disclosure	Strategies disclosure	Impact disclosure
Big Four auditors	44.83% (26/58)	43.10% (25/58)	20.69% (12/58)	34.48% (20/58)
Non Big Four auditors ¹	33.33% (2/6)	33.33% (2/6)	16.67% (1/6)	33.33% (2/6)
With an environment committee	47.83 (11/23)	43.48% (10/23)	34.78% ² (8/23)	34.78%(8/23)
No environment committee	41.46 (17/41)	41.46% (17/41)	12.20% (5/41)	34.15%(14/41)
Widely held ownership	73.91% (17/23) **	73.91% (17/23) **	34.78% ² (8/23)	56.52%(13/23) **
Closely held ownership	26.83% (11/41)	24.39% (10/41)	12.20% (5/41)	21.95%(9/41)

** Significant difference at the 0.05 level, * at the 0.10 level (Chi²-test)

1 The small number of firms audited by non Big Four firms makes impossible to carry out the statistical test on this item.

2 The small number of observations makes it impossible to carry out this test.

the means of the explicative continuous variables representing the environmental committee's characteristics, the political exposure and the media visibility of the firm in Table 5. The results of the analyses presented in Table 4 confirm the pre-

ceding findings. For each type of disclosure, the firms audited by a Big Four audit firm, those whose board of directors has put in place an environment committee and those that are widely held disclose the information more fre-

Table 5
Means of the continuous variables representing the firms' characteristics¹⁴

	Overall Disclosure			Risk Disclosure			Strategies disclosure			Impact Disclosure		
	0	1		0	1		0	1		0	1	
Environment committee (23 firms)												
<i>Number of members</i>	3.08	4.46	**	3.08	4.60	**	3.47	4.25	**	3.40	4.38	**
<i>Independent members</i>	70.3%	87.0%		69.5%	89.7%	**	73.2%	87.9%		72.5%	89.3%	*
<i>Number of meetings</i>	2.56	2.8		2.5	2.89		2.27	3.25	*	2.67	2.71	
Political exposure – assets (\$'000,000s CAD)	971	7,130	**	1,530	6,590	**	1,150	13,500	**	1,980	6,890	*
Media visibility (number of articles)	7.17	50.54	**	8.87	49.82	**	9.22	92.53	**	14.12	49.09	*
Financial variables												
<i>ROA</i>	-1.9%	1.1%	**	-1.5%	0.6%	*	-2.4%	6.4%	**	-0.8%	0.0%	
<i>Stock yield</i>	3.2%	5.6%		3.87%	4.82%		-1.6%	22.0%	*	10.03%	-7.6%	

** Significant difference at the 0.05 level, * at the 0.10 level (one-tail t-test)

quently. The differences are statistically significant for the ownership variable, confirming that in the firms without an important shareholder, managers voluntarily disclose more climate change information.

As the results in Table 5 show, the operating characteristics of the environment committee within the board of directors seem to have an impact on the voluntary decision to disclose climate change information. In fact, although the number of meetings during the year do not appear to differ between a firm that discloses climate change information and one that does not, when the number of members and the percentage of members are higher, the firms disclose more infor-

mation about their risks, their strategies to manage their GHG emissions and the impact of the GHG regulation on their operations. The differences are significant for all types of disclosures concerning the number of members and significant only for the risk and the impact of the regulation on operations for the percentage of independent members. Positive relationships between the disclosure, regardless of its nature, and both political exposure and media visibility are also observed; each difference is statistically significant. These results are consistent with those observed in past

¹³ Here too, the small number of firms audited by a non Big Four firm makes it impossible to carry out statistical tests.

¹⁴ Considering that for certain variables, especially those related to the environment committee within the board of directors (representing only 23 observations), the statistical tests carried out and presented in Table 5 are non parametrical Kruskal-Wallis tests. These tests can be conducted with a minimum group size of 5 observations and the size of the groups needs not be equal (Kanjji, 2006).

studies (Stanny and Ely, 2008; Prado-Lorenzo and Garcia-Sanchez, 2010).

We extend the analysis to financial performance by using two financial variables: the return on assets (ROA) (Prado-Lorenzo et al., 2009; Rankin et al., 2011) and the stock yield. The results are presented at the end of Table 5. The disclosing firms, whatever the nature of the disclosure, show better financial performance measured with both the variables. However, the statistically significant results are observed principally with the ROA. Except for strategies disclosure, the results are not significant with the stock yield measure.

4. Conclusion

This study has two objectives. First, to examine to what extent Canadian oil and gas corporations have complied with the CICA proposed guidelines respecting climate change disclosures in the MD&A section or in other parts of their annual reports. Second, to examine whether these disclosures seem to be influenced by media visibility, the existence and operation of an environment committee within the board of directors, ownership structure, audit firm size, and the corporations' political exposure.

Overall, the findings indicate that Canadian oil and gas firms disclose very little climate change information. In most cases, they provide details on the regulation and disclose the impact of this regulation on their operations. Information about risk and strategies to manage GHG emissions is very rare and nothing is published about key performance drivers. In fact, we can conclude that the firms seem follow the CICA proposed

guidelines in their disclosures but possibly do not meet the requirements of the Canadian markets securities in terms of scope and details. Like the results of Freedman and Jaggi (2005, 2011), Rankin et al. (2011) and Solomon, Solomon, Norton and Joseph (2011), our results demonstrate that stakeholders' information needs are far from being filled and suggest that mandatory disclosure requirements may be needed to ensure more extensive and reliable climate change disclosure so that investors and other stakeholders can make informed decisions (Freedman and Jaggi, 2011). The simple requirement of market securities commissions and proposed guidelines from accounting standard setters definitely do not seem to be sufficient.

In spite of the low level of disclosure, some factors are related to companies' inclination to disclose more information on climate change and GHG emissions. While an environment committee plays a positive role, a large number of firms have not set up such a committee. As concerns the other variables, our results confirm those of past studies. Like other types of voluntary disclosures, climate change disclosures by Canadian oil and gas firms seem to be related to the firm's widely held ownership structure, political exposure, media visibility and financial performance (Cormier and Magnan, 2003; Cormier and Gordon, 2001; Bewley and Li, 2000; Alnajjar, 2000; Clarkson et al., 1999; Brown and Deegan, 1998; Deegan and Gordon, 1996; Dawkins and Fraas, 2011; Gamerschlag et al., 2011).

This research has certain limitations. For example, we studied only Canadian oil and gas firms that are unanimously recognized as emitters of GHG. Accord-

ingly, our results should not be extended to other sectors of activity or other countries. Note that size of the sample is limited, although a sizeable portion of the firms in this sector engaged in production activities. Moreover, our data covers only the year just before the CICA officially adopted the guidance. Nevertheless, the CICA Discussion Brief was proposed at the time covered by the annual report, and at this time the Canadian market authorities asked firms to disclose risk information in the MD&A section of their annual reports. The fact that Canada has also signed and ratified the Kyoto Protocol implies a tightening of requirements with respect to GHG emissions for oil and gas firms.

These results raise some opportunities for future research. To verify whether reporting increases and improves over time, longitudinal studies should be completed to track the evolution of climate change disclosures over time. This can be also carried out in function of the political events related to compliance with and implementation of the Kyoto Protocol in Canada in a context of legitimacy theory. Given that Canada has the second largest reserves of crude oil in the world (Statistics Canada, 2009) and that Canadian oil and gas corporations are economically important, it would be interesting to compare the level and detail of disclosures of these Canadian companies with those of firms from other countries. Finally, in terms of governance, the responsibilities the board of directors grants to environment committees should be explored in detail to identify their possible impact on the level of voluntary climate change disclosures.

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Appendix
Firms included in the sample

Anderson Energy Ltd.	Imperial Oil Ltd.
Antrirm Energy Inc.	Jura Energy Inc.
ARC Resources	Mahalo Energy Corp.
Bankers Petroleum Ltd.	Midnight Oil Exploration Ltd.
Berens Energy Ltd.	Nexen Inc.
Birchcliff Energy Ltd.	Niko Resources Ltd.
Breaker Energy Ltd.	Nuvista Energy Ltd.
Bronco Energy Ltd.	Open Range Energy Corp.
Cadence Energy Inc.	Opti Canada Inc.
Canadian Natural Resources	Paramount Resources Ltd.
Candax Energy Inc.	Pebercan Inc.
Caspian Energy Inc.	Petro Andina Resources
Celtic Exploration Ltd.	Petrobank Energy & Res Ltd.
CInc.h Energy Inc.	Petro-Canada
Comaplex Minerals Corp.	Petrolifera Petroleum Ltd.
Compton Petroleum Corp.	Proex Energy Ltd.
Cork Exploration Inc.	Prospex Resources Ltd.
Corridor Resources Inc.	Rock Energy Inc.
Crocotta Energy Inc.	Saxon Energy Services Inc.
Delphi Energy Corp.	Bonnaterra / Silverwing Energy Inc.
Diaz Resources Ltd.	Storm Exploration Inc.
Duvernay Oil Corp.	Suncor Energy Inc.
Ember Resources Inc.	Synenco Energy Inc.
Encana Corp.	Talisman Energy Inc.
Fairborne Energy Ltd.	Trafalgar Energy Ltd.
Galleon Energy Inc.	Transglobe Energy Corp.
Gentry Resources Ltd.	Tristar Oil & Gas Ltd.
Geocan Energy Inc.	Twin Butte Energy Ltd.
Gran Terra Energy Inc.	UTS Energy Corp.
Heritage Oil Corp.	Verenex Energy Inc.
Highpine Oil & Gas Ltd.	Vero Energy Inc.
Husky Energy Inc.	Winstar Resources Ltd.