

**EXTERNAL RISK DRIVERS AND RISK  
MANAGEMENT STRATEGIES  
IN RESPONSE TO GOVERNMENT'S CLIMATE  
CHANGE POLICIES**

Binh Bui

School of Accounting and Commercial Law

Victoria University of Wellington

# **EXTERNAL RISK DRIVERS AND RISK MANAGEMENT STRATEGIES IN RESPONSE TO GOVERNMENT'S CLIMATE CHANGE POLICIES**

## **ABSTRACT**

The aim of this study is to explain the external drivers of the risk exposure and risk management strategies of electricity generators in response to New Zealand Government' climate change policies. This study proposes a theoretical framework that builds upon the categorisation of environmental strategies and applies such categorisation in a risk perspective. The findings of this study show that over time, risk exposure increased due to changes in the mixture of environmental risks, market opportunities and regulatory uncertainties. Such risk exposure in turn drove changes in organisations' risk management strategies. Organisations move from stable and reactive strategies to anticipatory, proactive and creative strategies. The desired impacts on risk reduction of these strategies also moved accordingly, from reducing consequences of the risk, to reducing or enhancing the likelihood or avoid/seek the risk. It is also found that regulatory uncertainties are the major constraint to investments in low-carbon technologies and carbon credit purchases.

**Paper type:** Empirical

**Keywords:** climate change, policies, risk, risk management strategies, environmental strategy

## 1. INTRODUCTION

Risk management as a topic that receives significant attention from both academics and professionals, not least because of the increasing uncertainties and changes characterising today's business environment. The proposed introduction of emissions trading scheme (ETS) in the different countries around the world as a preferred policy to combat climate change has added to the existing internal and external risks that businesses are exposed to in their operating environments. A number of scholars argued that organisational risk and uncertainty have an external control over organisations and it determines organisational behaviour and performance (Hannan and Freeman, 1977; Aldrich, 1979; McKelvy, 1982). However, little empirical insight is available regarding the risks emerging from such ETS for specific industries and businesses, as well as the impacts of such risks on business strategies. Even less is understood about how organisations choose their strategies to respond to and mitigate the risks perceived in their operating environments, especially when these environments are increasingly driven by climate change concerns.

The aim of this study is to examine and explain the external drivers of the strategies organisations choose to manage their ETS-related risk exposure and the changes that have been, or planned to be, undertaken to realize these strategies. Towards this aim, the paper has two main objectives, including i) to identify the risk exposure of businesses under an ETS and how such risk exposure grows over time, and ii) to examine the changes in risk management system, practices and strategies response to mitigate such risk exposure. This study proposes a theoretical framework that utilizes the categorisation of environmental strategies of Azzone and Bertele (1994) and applies such categorisation in a risk perspective (AS/NZS 4360:2004) so as to facilitate the assessment of risk and enable the explanation of a particular corporate response to a particular risk exposure context. The context and subject for investigation are five biggest electricity generators in New Zealand. A case study approach is employed to guide the study, involve collecting publicly available information and interview data and analysing them using triangulation and thematic coding techniques.

The findings of this study shows that over time, there are changes in the mixture of environmental risks and market opportunities and regulatory uncertainties, which determine the level of risk exposure confronting organisations. Such risk exposure in turn drives corresponding changes in organisations' risk management strategy. Evidence is found for risk management strategies in consistency with Azzone and Bertele's (1994) framework. However, a differentiated mixture of these strategies, rather than one single strategy, is found for each firm and this mixture and the relative importance of each strategy constituting it changed over time. As the environmental risks and market opportunities increase to high degrees over the investigated period, organisations moved from stable and reactive strategies to anticipatory, proactive and creative strategies. The desired impacts on risk reduction of these strategies also moved accordingly, from reducing consequences of the risk, to reducing or enhancing the likelihood of the risk, actively avoid or seek the risk and share the risk with external organisations (AS/NZS 4360:2004). There is also increased involvement of operational and strategic functions over time, to include not only production and logistics but also product design and development, strategic investment and growth, sales and marketing, accounting, finance and risk management. However, due to the

perceived high level of regulatory uncertainties associated with the government's climate change policy, actual investments in renewable generation and carbon credit purchases have been limited and even delayed. Therefore, by applying a risk perspective, this study offers risk-based explanations for the drivers of organisations' strategy choices in relation to climate change policy and regulations. The findings of this study contribute to and extends prior literatures in strategic environmental management and risk management.

The paper is organised as follows. First, a background on the climate change policies of New Zealand Government is provided, with a discussion of their potential impacts on organisations' risk exposure and the presentation of the research question. Next, prior literature is reviewed so as to develop a theoretical framework to address the research question. Methodology section will follow to outline the choice of subjects and methods for collecting and analysing data. Next, the findings and discussion of findings are presented. The paper is concluded with the Conclusion section, in which limitations of the study and opportunities for future research are also discussed.

## **2. NEW ZEALAND CLIMATE CHANGE POLICIES AND IMPLICATIONS FOR RISK MANAGEMENT**

This section provides a context of the evolution of the New Zealand Government's Climate change policies from 2002 to 2009. It also highlights the implications of these policies, and on businesses' risk exposure and risk management strategies.

### ***2.1. Development of Government's climate change policies (GCCPs)***

The New Zealand Government recognizes that New Zealand needs to do its share to help the world deal with the challenge presented by climate change (New Zealand Government, 2007a). On 19 December 2002, the New Zealand Government ratified the Kyoto Protocol (MfE, 2009). Accordingly, New Zealand is liable for any excess in Greenhouse Gas (GHG) Emissions above the 1990's levels over the period 2008-2012. GHG emissions in New Zealand are expected to grow by about 30% above the 1990's levels by 2010 if nothing is done to reduce emissions (MfE, 2009). Without appropriate domestic policy measures, strong growths in emissions levels will continue and New Zealand is likely to suffer substantial financial liabilities for its Kyoto obligations.

The Labour-led New Zealand Government has developed and revised different policy packages over the years in order to meet its Kyoto obligations. On 29 April 2002, the government announced its preference for carbon tax as a key measure of its climate change policy package. Following the report titled "Review of Climate Change Policies and Next Steps", the Government decided that New Zealand would no longer proceed with the proposed Carbon Tax. In October 2007, the Government announced its new package of climate change policies, including an Emissions Trading System (NZ ETS) and supporting sustainability initiatives (MfE, 2008). The NZ ETS is to be implemented on a nation-wide level, including all sectors and all gases (New Zealand Government, 2007a). The Climate Change Bill, which outlines the operational mechanisms of the ETS and the moratorium on new thermal generation, was passed into law (and became the Climate Change Act) on 20 September 2008.

In 2008 the National Party won the election and became the new government. As a result of its agreement with the Act Party, the National-led government set up an ETS

Review Select Committee to review the NZ ETS as initially designed under the Labour-led government.<sup>1</sup> In August 2009, in preparation for the upcoming Copenhagen negotiation on climate change in December, the government adopted a mid-term emissions reduction target of 10% to 20% by 2020, contingent on the actions from other developed and developing countries. The report including the recommendations from the ETS review committee was released on 31<sup>st</sup> August and based on these recommendations an ETS review Bill was drafted and tabled in Parliament in September 2009. The period in which the review was undertaken and subsequent changes to the ETS as well as the likelihood with which the ETS review Bill will be passed by the Parliament have caused substantial policy and regulatory uncertainties for businesses, as discussed in more depth in the next section.

### ***3.2. Risk implications of the Climate Change Policies***

The GCCPs, in particular the ETS, are likely to increase the risk exposure faced by New Zealand businesses. Among the first to be required entry into the NZ ETS, electricity generators are the first to experience the impact of the ETS on its operations, and ultimately its performance. Internally, firms will have increased compliance costs related to the measurement, monitoring and reporting of emissions in accordance with ETS requirements. Furthermore, for thermal-based generators, the emissions from their generation activities will expose them to substantial emissions liabilities and costs. This liabilities and costs are likely to fluctuate with price changes in the domestic and international carbon markets, and the participation in the latter also exposes the firms to foreign exchange risks.

There are also increased uncertainties in the economics of fossil fuels available for existing and future electricity generation, mostly due to the uncertainty relating to the flow-on impact of emissions costs onto prices of fossil fuels. Ultimately, the costs resulting from settling the emissions liabilities are likely to have direct impact on organisational profitability depending on the level of increase in wholesale and retail electricity price to offset such costs.

Externally, the development of government climate change policy and initiatives have over the years has increased the public awareness of climate change. The result of this is an increasing expectation from the organisational stakeholders and the wider public for businesses to take responsibility in managing their environmental impacts, and in particular, carbon emissions. For thermal-based generators, the pressures are likely to be higher than other industries because of the nature of their business – discharging emissions from burning fossil fuels. Prior research shows that no action in reducing emissions would lead to expensive consequences for the firms (Hunt and Auster, 1990). Moreover, the increased awareness of climate change has also reinforced and accelerated the move to green consumerism where consumers prefer and demand “green and clean” products (Ottman, 1992; Elkington, 2004). Green consumerism is likely to change the competition landscape of many industries, including the electricity sector.

The Government’s climate change policy and potential accompanying environmental regulations are therefore likely to lead to changes and increases in the mixture of the external and internal risks characterising the environments in which businesses and in

---

<sup>1</sup> The National Government also removed the moratorium on new thermal generation investment in December 2008.

particular, electricity generators, operate. Without proper management, these risks can potentially damage a firm's competitive advantage and economic performance. Therefore, the aim of this research is to address the following question:

*What strategies have been employed by New Zealand businesses to manage and mitigate the changing business risk exposure emerging from the Government's climate change policies?*

In order to address this research question, a theoretical framework is developed as presented next.

### **3. LITERATURE REVIEW AND THEORETICAL FRAMEWORK DEVELOPMENT**

#### ***3.1. Risk and Risk management***

There are many definitions of risk available in the academic and professional literature (Rowe, 1977; Richie and Brindley, 2007; Collier, 2009). Risk can be conceptualised narrowly as probability or degree of loss as in accounting and finance, or more widely as "uncertain future events that could influence the achievement of the organization's strategic, operational and financial objectives" (IFAC, 1999). This paper considers risk in alignment with the latter definition. This definition allows the coverage of both negative and positive risk to the achievement of organizational objectives. As such, risk is not only something to be avoided or controlled, but could also be something to be captured and utilized. Accounting professions around the world have adopted similar definitions to IFAC (1999)'s definition (IRMA, 2002; Financial Reporting Council, 2003; Standards Australia, 2004).

There are two components to risk, including (i) probability – the likelihood of the event/incident happening that give rise to the risk, and (ii) the consequence – the level of impact of the risk on organisational performance. The product of these two components makes up the level of risk or the risk exposure. Risk management requires effective treatment of either or both of these components (Standards Australia, 2004b). Managing risk is about "identifying and taking opportunities to improve performance as well as taking action to avoid or reduce the chances of something going wrong" (Standards Australia, 2004b). Therefore, practitioners and standard setters make the business case that risk management is critical to the survival and growth of any business and therefore it needs to comprise a part of strategic management (Standards Australia, 2004a; Collier, 2009).

The next part reviews prior literature and develops a theoretical framework to understand the drivers of external risks associated with the GCCPs and the strategies businesses can adopt to manage these risks.

#### ***3.2. External risk drivers associated with GCCPs***

##### **3.2.1. Change in environment-related risks and opportunities over time**

In examining risk management strategies it is important to understand the external risk drivers of the risk exposure faced by New Zealand electricity businesses. This is because such understanding enables us to understand how the degrees and mixtures of risk exposure change over time, which in turn leads to adaptations in corporate

responses and attitudes towards environmental issues. Such understanding also assists in examining the impact of such changes on firm competitiveness and profitability.

Prior research suggests that organisational/managerial perceptions of environmental risks and market opportunities drive the importance that organisations place on environmental issues and the extent that the latter are integrated into decision making and business planning. Steger (1993) suggested the mix between environmental risks and market opportunities determine an organisation's environmental strategy. Lee and Green (1994) similarly suggested that organisations choose their product strategy based on the assessment of the product's environmental performance and its commercial performance. Accordingly, environmental performance of a product is considered a 'moving target' over time that responds to changes in societal expectations and strengthening environmental regulation (Ottman, 1992).

It can be argued that over time the environmental risks and market opportunities have changed for New Zealand businesses. Before the ratification of the Kyoto protocol (2002), emissions were merely an operational concern and emissions management and reporting was to comply with existing environmental regulations. When the carbon tax was cancelled in 2005 and an ETS developed from 2005, an ETS is considered more a financial liability and a cost (emissions-related) imposed on the business rather an opportunity to generate additional revenue and gain a competitive advantage. Since the ETS was introduced from 2007, as discussed in Section 3.2, it has the potential to bring about increases in both risks and opportunities for New Zealand businesses.

Therefore, it can be argued that the changing combination of environmental risks and market opportunities is an external driver of the changes in the degree and mixture of risk exposure confronting by New Zealand electricity generators. The second external driver of the risk exposure is regulatory uncertainties, discussed next.

### **3.2.2. Changes in climate change-related regulatory uncertainties**

Regulatory uncertainties change over time in correspondence with development and evolution in the government's climate change policy and they have important implications for organisations' choice of risk management strategies. During the process of the government developing its climate change policy, high level of uncertainty and risk is perceived, both in the objectives of the policy and the causality between the policy mechanisms and their ecological, social and economic consequences (Burchell *et al.*, 1980). In such a condition, Oliver (1991) argues that resistance and manipulation strategy towards public policy become less risky and in fact a preferred strategy for businesses to influence and reduce regulatory uncertainty (Oliver, 1991; Scott, 1991).

However, when climate change policy is announced, the regulatory uncertainty previously experienced were substantially reduced and pressures intensified regarding the need for businesses to demonstrate responsible behaviour regarding climate change. As a result, resistance strategy is no longer appropriate. A conformance strategy that focuses on complying with new regulations, or imitating others' actions so as to reduce production-related emissions is more appropriate (Oliver, 1991). More proactively, organisations can seek to introduce green products or research and develop low-emitting technologies to capture the growing market opportunities arising from climate change.

Therefore, it is the combination of environmental risks and opportunities and the regulatory uncertainty associated with the government’s climate change policy that gives rise to the differences and changes in the degrees and mixture of business risk exposures which in turn give rise to risk management strategies. The next section discusses the different strategies that firms can adopt to respond to this increased risk exposure.

### ***3.3. Choice of risk management strategies in response to climate change policies-related risks***

In response to the risks emerging and related to the ETS, businesses have to adopt effective management strategies. AS/NZS 4360:2004 risk management framework developed by Standards Australia and Standards New Zealand (2004) suggests a number of risk treatment strategies after the risks are identified and assessed. These strategies vary and differ depending on whether the risks are negative or positive, as summarised in Table 1.

**Table 1: Risk treatment strategies (AS/NZS 4360: 2004)**

<b>For positive risk</b>	<b>For negative risks</b>
1. Risk seeking: Proactively seek the opportunity to pursue that activity that gives rise to the risk	1. Risk avoidance: avoid the activity that may give rise to the risk
2. Increase the likelihood of the risk	2. Reduce the likelihood of the risk
3. Enhance the consequence of the risk	3. Reduce the consequence of the risk
4. Risk sharing: undertake activities with other organisations and entities to enhance the likelihood or consequence, and thereby sharing the gains and potential losses with them (outsourcing, contracting, partnership)	4. Risk sharing: undertake activities with other organisations and entities to reduce the likelihood or consequence of the risk, and thereby sharing the potential loss arising from the risk with them (outsourcing, contracting, partnership)
5. Retain the residual risk: retain the gain accruing to the organisation	5. Retain the residual risk: internally absorb the risk once it cannot be reduced any further.

Alongside risk management strategies prescribed in risk management standards, the literature has substantial theoretical and empirical evidence of how firms may develop their strategies to respond to risks and opportunities brought about a new environmental regulation. Most of these studies focused on identifying an organisation’s posture and approach to environmental issues. Dutton and Ducan (1987) presented a theoretical model which suggested that organisations can adopt four different strategies in response to the issues that have strategic implications on its performance. These strategies include No response, Resistance, Opportunistic and Strategic change. Hunt and Auster (1990) suggested five different stages of development of an organisation’s environmental management system that have different levels of impact on reduction of environmental risks. These five stages are Beginner (no protection), Fire fighter (minimal protection), Concerned citizen (moderate protection), Pragmatist (comprehensive protection), and Proactivist (maximum protection). Azzone and Bertele (1994) suggested five corporate strategies matching with five environmental contexts: stable, reactive, anticipatory, proactive, and creative.



Other studies discussed organizational strategies in relation to both environmental risks and opportunities. For example, Steger (1993) presented a matrix of combination of environmental and market opportunities, based on which four strategies are derived: indifferent, defensive, offensive and innovative. Nilsson and Rapp (2000) divided environmental strategies into three types: reactive, active and proactive, with reactive strategy pursued when environmental issues are considered negative risks, active strategy preferred when environmental issues considered both risks and opportunities, and proactive strategy for contexts where environmental issues are perceived primarily as opportunities. Other studies also followed a similar risk/opportunity classification in identify organizational responses (Sharma, 2000; Jansson *et al.*, 2000). Hart (1995) instead focused only on opportunities: he identified proactive strategies firms can adopt to respond to environmental issues and gain a competitive advantage.

The categorising schemes of these studies are significantly similar in the respect that they all rank environmental strategies along a continuum from reactive to proactive. Some categorisation is more detailed than the others, and they differed in terms of the organisational and external factors that they take into account to derive the potential organisational responses. Furthermore, most of these categories deal with issues of environmental risks and market opportunities. A risk perspective can be applied to highlight the differences and similarities between these categorisation schemes of environmental strategies, as discussed in the next section and summarised in Table 2.

**Table 2: Summary of prior studies on Choice of Environmental strategy based on different mixes of environmental risks and market opportunities**

Papers	Environmental Risk/ Market Opportunity mixes								
		Low environmental risks	Moderate environmental risks	High environmental risks	High environmental risks	Low environmental risks	Low environmental risks	High environmental risks	
		Low market opportunities	Low market opportunities	Low market opportunities	Potential market opportunities	Potential market opportunities	High market opportunities	High market opportunities	
	<b>Strategy orientation</b>	<b>Internally-orientated</b>			<b>Externally-orientated</b>				
	<b>Activity/functional focus</b>		Production/logistics	Production/logistics	Public relations (policy oversight + legitimacy management)	Public relations (lobbying)	Product design/ Sales & Marketing	R&D (technology search)	
<b>Factors considered</b>	<b>Choice of Environmental strategy</b>								
Steger (1993)	Market opportunities, Environmental risks	Indifferent		Defensive			Offensive	Innovative	
Dutton and Ducan (1987)	Issue urgency Capability to resolve	No response		Resistance		Opportunistic		Strategic change	
Hunt and Auster (1990)	Environmental risks and impact on environmental protection	Fire fighter Beginner	Concerned citizen		Pragmatist		Proactivist		
Azzone and Bertele (1994)	Organisational contexts and functions		Stable		Reactive	Anticipatory	Proactive	Creative	
Russo and Fouts (1997)	Organisational capabilities					Reactive		Proactive	
Rugman and Verbeke (1998)	Environmental-related market opportunities Management style			Compliance Defy/Resist			Opportunistic	Proactive	
Hart (1995)	Environmental strategies that create market opportunities			Pollution prevention			Product stewardship	Sustainable Development	
Jansson, Nilsson and Rapp (2000)	Environmental risks and market opportunities			Reactive			Active	Proactive	
Sharma (2000)	Environmental-related market opportunities			Compliance		Voluntary			

Table 2 integrates theoretical insights of prior studies in environmental strategies using a risk perspective. A matrix is set up in which specific mixtures of environmental risks and market opportunities are matched against different environmental strategies suggested by prior studies. Additionally, these strategies are represented by two common attributes: strategic orientation (internally versus externally-oriented) and activity/functional focus.

As shown in Table 2, there is substantial overlapping between prior studies in their categorisation of environmental strategies. Simultaneously, these studies differ in the depth and scope of risks/opportunities considered as well as the range of organisational functions covered as part of the environmental strategy. Some studies are solely focused on environmental risks, such as Hunt and Auster (1990) while others focused on only those strategies that can potentially generate a competitive advantage (Hart, 1995) and a few others focus on both risks and opportunities (Steger, 1993; Jansson et al, 2000). Some studies take into account organisational resources in determining its capability and discretion in dealing with environmental issues (Dutton and Duncan, 1987; Hart, 1995) while others chose to elaborate in detail different functions and activities those organisations can undertake in differing environmental strategies in response to changing institutional and competitive contexts (Azzone and Bertele, 1994; Russo and Fouts, 1997).

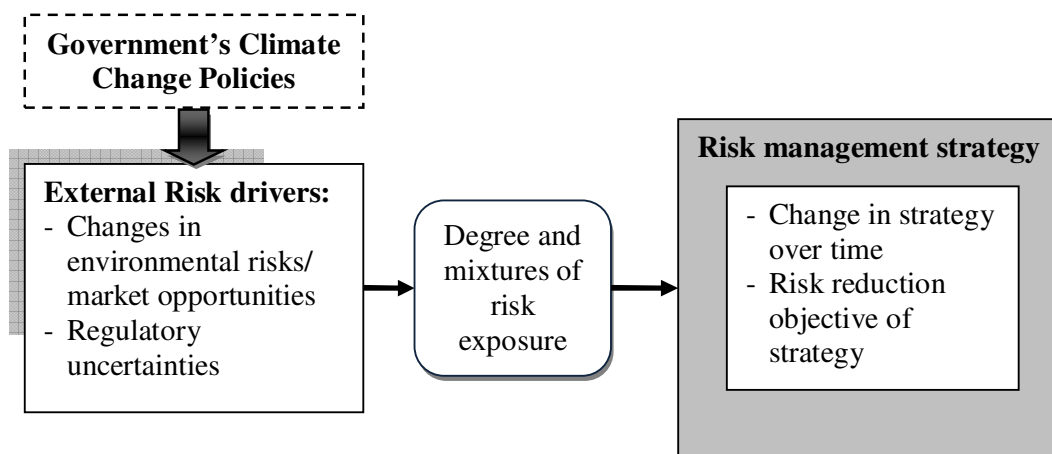
Accordingly, when we integrate these different choices of organisational environmental strategies with the risk contexts in which they operate, a clear link between risk, perception of risk and corresponding choice of environmental strategies to manage such risks can be established. Therefore, resistance or no action is an appropriate strategy when firms perceive that both environmental risks and market opportunities related to high environmental performance are low. However, in operating contexts where environmental risks are high, i.e. high-emitting industries and sectors, but low market opportunities, i.e. consumers do not value green products, firms focus and limit their efforts to compliance with existing regulations and thus pollution control (Dutton and Duncan, 1987; Hunt and Auster, 1990), as well as monitoring development and potential changes in government climate change policy (Azzone and Bertele, 1994). Firms operating in contexts characterised by low environmental risks but potential market opportunities, i.e. low-emitting sectors where consumers prefer green products, an offensive strategy which focus on green product design and development is more suitable to help firms create a competitive advantage (Hart, 1995; Hunt and Auster, 1990; Steger, 1993). To better enhance their competitiveness, firms also participate in policy process to compromise and bargain with the government for their advantage (Oliver, 1991). Finally, in sectors where there are high environmental risks and increasing market opportunities, firms have an incentive to pursue a proactive strategy that directs organisational resources into greening both product and production processes, as well as seeking technological breakthrough to enable radical emissions reductions (Azzone and Bertele, 1994). Simultaneously, organisations can seek to manipulate the source of the risks, i.e. the government and its policy making through various political techniques and strategies (Oliver 1991).

### ***3.4. Proposed Theoretical Framework***

The preceding theoretical development has developed a theoretical link between environmental strategies and environment-related risks. It also discussed the different

risk management strategies from a risk management framework perspective. External and internal risk factors that drive the choice of risk management strategies are also identified based on a review of prior literature. A theoretical framework is now proposed to capture these inter-relationships between risk context, risk exposures, and environment-related risk management strategies (Figure 1).

Change in risk management strategy is driven by external risk factors in an organisation's operating environments. These external risk factors determine the degree and mixtures of risk exposure faced by an organisation. Changes in environmental risk and market opportunities and regulatory uncertainties over time lead to a requirement for changes in risk management strategy in order for organisations to cope and respond to, and effectively mitigate its risk exposure. Figure 1 summarises these theoretical relationships.



**Figure 1: External risk drivers and Risk management strategy research framework**

To facilitate the analysis of environment-related risk management strategies, this study adopts the categorisation of environmental strategies developed by Azzone and Bertele (1994). This is because this categorisation is the one of the most comprehensive and inclusive in the literature. While many other studies focused on either a production or product-focused environmental strategy, Azzone and Bertele (1994) also considered the involvement of other organisational functions as part of an enterprise-wide risk management strategy. Therefore, in addition to production and product design, the role of public relations, research and development, accounting and finance functions are also considered. The range of strategies considered are not limited to pollution control and product stewardship (e.g. Hart, 1995), but also exploratory research projects of new technologies and lobby strategy. Additionally, Azzone and Bertele's framework matches environmental context and risk management strategy into five categories, including:

- **Stable context and strategy:** environmental issues are not strategically important and are mainly functions of production and logistics.
- **Reactive context and strategy:** environmental problems are not strategic, but require attention from legal and external relations to monitor environmental policy changes.

- **Anticipatory context and strategy:** environmental problems can become a strategic advantage. Cooperation between R&D, Finance and production is needed to analyse evolution of industry norms and develop appropriate technologies. Lobbying for environmental policy changes or introduction /delay is very important.
- **Proactive context and strategy:** organisational mission is to provide green products; therefore external functions (marketing and sales) take a key role in identifying consumer needs and driving product innovation. Limited experimentation of green product strategy is likely. Cross functional cooperation is required to drive a green business portfolio.
- **Creative context and strategy:** environmental management becomes critical for long term survival. This lead to the requirement of monitoring and potentially transforming all technologies. Exploratory projects investment is required, along with budget and top management commitment cross-functional analysis.

The theoretical framework proposed above will be applied to examine and explain the changes in the risk management strategies adopted by organisations participating in New Zealand electricity in response to the planned NZ ETS. The next Methodology section outlines and discusses the methods used in data collection and analysis.

## 4. METHODOLOGY

### 4.1. *Research Sample*

This study adopts a case study approach (Yin, 2003) to investigate potential changes in environment-related risk management strategies of New Zealand electricity generators over the period from 2002 to 2009. Case study approach is used because it can reveal rich detail at organisational level the complexity and dynamics of organisational strategies, processes, characteristics. It also enables the investigator' focus on important external factors that can influence an organisation's environment-related strategy over time (Hopper, Otley and Scapens, 2001). Besides, macro-economic factors that relate to the electricity industry and New Zealand climate change policy in general are also investigated to provide the risk context to explain the common responses displayed across different generators over different time periods.

Five firms are chosen for in-depth case study. These five firms are vertically integrated and are both major generators and retailers, in aggregate making up more than 90% and 95% of New Zealand wholesale and retail electricity markets. This choice of organisations ensures that almost the whole population is covered, which minimises the selection bias and optimises the testing of the validity of the proposed theoretical framework. The other firms that participate in the New Zealand electricity industries are significantly smaller in size and are not vertically integrated. Therefore, focusing on the biggest five firms in this study's analysis controls for the effect of size and nature of organisational business on risk management strategy. Overall, it helps improve the quality of the findings.

In addition the comparability between the firms in terms of size and nature of business, these five firms possess different organisational characteristics that affect the mixtures and degrees of environmental risks and market opportunities that they

will be exposed to under an ETS. This study assesses that due to the differences in existing electricity generation portfolio, each of these firms is subjected to a differential risk exposure. Differences in such risk exposure in turn drives inter-firm differences in the risk management strategies undertaken in each given time period. The distribution of environmental risks and market opportunities across the firms under an ETS is illustrated in Figure 2. Firm A and Firm B are renewable-based generators, Firm C being rather balanced between renewable and thermal generation capacity, and Firm D and Firm E being predominantly thermal-based generators, with Firm E having the highest GHG emissions in the industry.

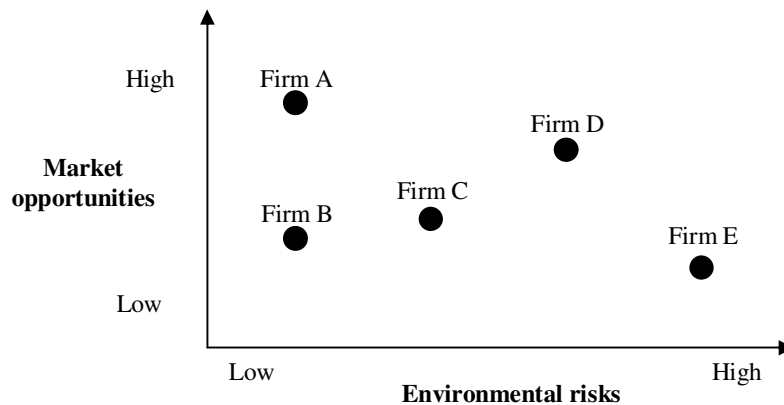


Figure 2: Distribution of environmental risks and market opportunities of case study firms

#### 4.2. Analytical methods

This study relies on both qualitative and quantitative methods in data collection and analysis. Data collected include interviews with electricity generators’ senior managers, risk and emissions trading professionals, industry association and lobby groups, electricity and climate change government regulators. The study also collects a wide range of publicly available documents that relate to electricity generators’ strategies and operations, including annual reports, environmental/sustainability reports, websites, press releases, their submissions to government’s policy consultation process, and articles/reports about the generators in the media in the period from 2002 to 2008.

Thematic coding and analytical tools are used to code and analyse the qualitative data. Thematic analysis gives the flexibility that can potentially yield “rich and detailed, yet complex, accounts of data’ (Braun and Clarke, 2006: 78). Accordingly, data from different sources and different stakeholder groups are compared, doubled-checked and verified against each other discoveries (Miller, Dingwall and Murphy, 2004). This reflects a method and data triangulation methods recommended in qualitative research literature (Jick, 1979; Denzin, 1989; Flick, 2009). Quantitative data are compiled and used for calculating different level of risk exposure facing each generator. The results from this calculation are triangulated against results gained from qualitative analysis. Between the interviews, an interactive pattern is adopted for interviews in which the investigator explicitly asked questions to gain cross-validation earlier interview data by later interviewees (Covaleski and Dirsmith, 1988). This multiple levels and steps of triangulation reduces the bias resulting from the use of a single method, while simultaneously adding additional insights and perspectives which would otherwise be impossible using a single research lens and approach. Triangulation also helps capture

more holistic, contextual and comprehensive picture of the electricity generators under study (Jick, 1979: 603).

## 5. FINDINGS

### *6.1. Changes in External Risk Drivers over time*

#### **Environmental risks**

Before 2002, environmental impacts resulting from electricity generation activities were an operational concern for production and logistics. Climate change was not an issue until the New Zealand government ratified the Kyoto Protocol in 2002. Emissions reporting and management were only part of the requirement of the existing resource consents regulated under the Resource Management Act 1992.

With the government's ratification of the Kyoto protocol in 2002, GHG emissions start to have potential strategic implications for electricity generators. This is because of the potential domestic climate change policy such as carbon tax or carbon pricing that can change the economics of renewable versus fossil fuels for electricity generation. However, it was impossible for electricity generators at that time to accurately estimate their risk exposure. However, there is an understanding among electricity generators that such a policy will lead to an emission liability and related obligations for thermal-based ones. These firms also recognize growing public awareness of climate change and increasing pressure for businesses to demonstrate responsiveness towards environmental concern and addressing climate change. This results in an anticipation that climate change policy will bring about reputational and competitive gain for renewable-based generators.

Towards the end of 2005, following a ministerial review, the government cancelled its plan for a carbon tax and investigated alternative policy options. However, with an ETS under implementation for electricity generation in European Union (EU) and in some states of the United States (US), it is becoming clear that a cap-and-trade ETS is the only option available as a climate change policy. The electricity generators started to formally recognize their potential climate change-related risks and opportunities in annual reports and various media releases.

The risks brought about by a proposed ETS for electricity generators are at a different degree and mixture than previously. Changes in relative economics between alternative fuels for electricity generation are the biggest risk concern. The economics of fuels are changed firstly because a charge on carbon will add additional cost to new thermal-based generation investment, thus making them as expensive as a renewable investment. Secondly, wholesale electricity prices are also likely to increase to reflect the carbon charge in thermal-based generation, thus enable existing renewable-based generation to make an adequate return. Because the wholesale market prices increase to reflect cost of carbon, essentially every electricity generator will be exposed to ETS cost. In both respects, an ETS will likely make renewable-based generation competitive in the short term with, and even cheaper in the long term than, thermal-based generation.

Associated with this change in fuel economics is the concern that an ETS will result in substantial emissions liabilities and thus 'disproportionate losses'<sup>2</sup> for some of the

---

<sup>2</sup> From a submission to the government by a thermal-based generator

thermal-based generators. Many called this ‘competitive at risk’ since the liabilities imposed by the ETS results in them being uncompetitive with their competitors.

Another direct impact on profitability of thermal-based generators as versus the renewable-based generators is compliance costs of the ETS. Lack of government guidance on reporting, monitoring and verifying systems and standards while the date of electricity generators into the ETS is approaching has caused substantial anxiety among the thermal-based generators and is a key issue that these firms addressed in their public appearances and submission to the government during the policy development process.

The risk exposure also increased over time for thermal-based generators as firms increasingly recognized that carbon price is likely to rise rather than fall in the future and so are their emissions costs/liabilities. In response to this, firms may want to buy carbon credits early to satisfy their future ETS obligations. However, there are difficulties choosing which type of carbon credits to buy. There is significant variations in quality and price of carbon credits available on the international market and the lack of consistent verification standards made the judgement of the credibility of carbon credits contracts extremely difficult.

While firms have recognized a change over time in societal expectations towards environmental concern and responsibility by businesses, they hold differing perceptions towards the impacts of such change in each firm’s competitiveness and resulted loss/gain in customer numbers. While renewable-based generators are very positive about their reputational gain, thermal-based ones doubt whether this change in societal expectations can lead to substantial change in customer behavioural and thus impairment in their retail competitiveness.

### **Market opportunities**

While the ETS imposes substantial emissions costs and resulted losses for thermal-based generators, it simultaneously creates competitive gains for renewable-based ones. This is because renewable-based generators are not exposed to any emissions-related costs and liabilities and therefore they have a cost advantage over their thermal-based competitors. They also have price competitiveness because they do not have to increase their retail price while thermal-based generators have to in order to off-set the impact of emissions costs on their profitability. Several interviewees pointed to this fact that renewable-based generators also have revenue gain when they benefit from a general wholesale electricity price increase (to reflect carbon costs of thermal-based generation) while not being exposed to any direct emissions costs.

The ETS leads to competitive advantage for renewable-based generator not only from a cost perspective. The development in climate change policy domestically and internationally over time has driven the changes in customers’ preference for green and cleans electricity and green initiatives, such as energy efficiency and carbon neutrality. Early adopters of these green initiatives are believed to have gained a competitive advantage. However, over time, as these pressures grow, green initiatives become a pre-requisite, everyone adopts them and the competitive advantage of early mover is lost. The result is that there are new market opportunities arising from energy efficiency initiatives which reduces customers’ energy bill and thus improves their satisfaction and potentially increases a firm’s competitiveness.

The demand for energy efficiency and green electricity in turn has driven new investment opportunities and investors and shareholders’ preferences for sustainable



projects. At the same time, the ETS in its current form can lead to delays in new less-environmental friendly investments due to the lack of assistance from the government to mitigate the impact of carbon costs.

### **Regulatory uncertainties**

There are substantial regulatory uncertainties perceived by electricity generators in relation to the impacts of the ETS and the design of the scheme itself. Firstly, the government's use of different carbon prices to back up estimates the ETS's macro-economic impacts has caused significant doubts over the government's integrity in policy-making and the merits of the scheme.

Though the ETS was legislated late 2007, it only revealed the basic principles while substantial operational details and guidance were left to regulators to develop. Furthermore, following the change of government late 2008, a parliamentary review of the ETS was initiated which has effectively put the originally proposed ETS on suspension. This has caused substantial uncertainty regarding over all the critical issues of the ETS, including allocation of carbon credits, entry point of different sectors (including electricity generators), compliance point (upstream or downstream of the supply chain), compensation for disproportionate loss, as well as the monitoring/reporting/verifying requirement of carbon emissions and carbon credits. These uncertainties in turn lead to increased uncertainty regarding the likelihood and consequence of the climate change-related risks.

As a result, many electricity generators have put on hold their existing investment projects, reluctant to initiate new ones, or to implement significant strategic changes to their internal structure and operations. Furthermore, the prospect that NZ ETS may be delayed to align with the Australian ETS (AS ETS) has also had substantial impacts on the existing risks facing electricity generators. Some of these risks include the impacts of these uncertainties on the balance between supply and demand in New Zealand carbon market and the value of the carbon credits existingly held by New Zealand businesses.

Regulatory uncertainties also relate to the politics around the ETS and carbon trading domestically and internationally. Many interviewees expressed that the view that climate change has moved from being an environmental issue to a trade and political issue. The politics around the design of an ETS cause doubts for investors. Therefore, instead of incentivise the development of low-carbon technology, the ETS can actually delay it.

To summarise, over time there have been significant changes in risk exposure of electricity generators. These are driven by the changes in the external risk drivers, including the mixtures of environmental risks and opportunities and regulatory uncertainties. Prior to 2002, climate change was not a strategic issue. Emissions were a concern at only operational levels (electricity generation activities). However, since 2002 as the government ratified the Kyoto Protocol, there is an anticipation of a domestic climate change policy and climate change started to be recognized as a potentially strategic issue, especially for thermal-based generators. Climate change was at this time recognized more as risk than opportunity. Over time up until late 2008, the development of first a carbon tax, and then an ETS, have resulted in an increasing recognition of the environment-related risks as well as market

opportunities. The changes in external risk drivers over time are summarised in the shadowed section of Table 3.

In response to these changes in the degree and mixtures of risk exposure electricity generators have changed their risk management strategies over time. The common changes in the external risk drivers have led to these firms some similar risk reduction strategies, as summarised in Table 3 and discussed below.

**Table 3: Change in Risk exposure and Risk management strategy from 2002 to 2009**

	Prior to 2002	2002-2005	2006-Sep2007	Sep 2007-Sep 2008	Oct 08 - now
<b>Environmental risks</b>	Medium Compliance risks	High Potentially strategic	High Strategic	High Strategic	High Strategic
<b>Market opportunity</b>	Low	Potential/ Medium	High	High	High
<b>Regulatory uncertainties</b>	Low	High	Medium	High	High
<b>Stable</b> Reduce consequence	Pollution control				
<b>Reactive</b> Monitor risk	EMS installation	Monitor policy changes			Monitor policy changes
Reduce consequence				Plans to pass emissions costs onto consumers	
<b>Anticipatory</b> Enhance likelihood		Policy participation PREs projects	Trial of energy efficiency	Lobbying	Lobbying
Reduce likelihood		Lobbying		Lobbying	Lobbying
<b>Proactive</b> Risk assessment		Cross-functional analysis Strategic-level monitoring			
Avoid risk			Plans to move to renewable generation	Move to renewable generation	Renewable generation caution
Seek risk				Green Marketing	
Enhance consequence		Limited trial of energy efficiency products	Energy efficiency product introduction	Energy efficiency product introduction	
Reduce consequence		EMS improvements Disclosure increase	Environmental /Emissions audits Operational efficiency CSR	Carbon credit strategy Operational efficiency CSR	Carbon credit strategy <b>on hold</b> Operational efficiency CSR
<b>Creative</b> Share risk Reduce/enhance consequences/ likelihood		CCS search	R&D green technologies CCS/carbon project partnerships		

## **6.2. Change in risk management strategies over time in response to external risk drivers**

Table 3 shows the different risk management strategies in electricity generators over time. The findings of this study reveal that over time the changes in the external risk

drivers related to climate change and government policy has significant influences on the adaptations in risk management strategies employed by these firms.

### **Before 2002: moderate environmental risks, low market opportunity**

Prior to 2002, environmental issues were primarily risks for electricity generators. Emissions are monitored through an environmental management system (EMS) but not integrated in the risk management system. This reflects a reactive environmental strategy which focuses on pollution control rather than pollution prevention. Pollution control aims at compliance and minimizing reputational, financial and legal consequences arising from non-compliance. The main risk therefore is associated with non-compliance, and the strategy aims at primarily avoiding the risk, through minimizing the number of non-compliance incidents. Two of the investigated firms reported their emissions externally, but only a measure of total emissions for generation activities, and there is no break-down by fuel type. Interviews with managers at these firms revealed that the quality of reporting and monitoring of emissions for this period was limited, undertaken at a sufficient level to satisfy the general resource consent requirements from the regulators.

No market opportunity is recognized by any of these firms in relation to climate change and renewable generation. In fact, renewable-based generators themselves perceived that pursuing 100% renewable generation was risky:

“When I first sat on the board, the management of the company was of the view that it isn’t prudent to be 100% renewable generation as we were. We had interest in co-generation and some fossil fuel based boilers around the country and of course, on the wholesale market, we would buy hedges that are based on non-renewable generated electricity. So it was the old thinking that you have to hedge yourselves internally based on being primarily renewable generator but also have some fossil fuel generation.” (Director of a renewable-based generation)

### **2002 – 2005: moderate and potentially strategic environmental risk, moderate market opportunities and high regulatory uncertainty**

From 2002, when these generators recognized that climate change and related environmental issues could have strategic implications on their cost, profits and competitiveness, firms have started to undertake improvements in their EMS so as to improve the quality of their emissions monitoring. There were also increases in the level and extent of environmental information reported externally. Interviews with senior managers of these firms also revealed that the implications of a government climate change policy has been addressed and discussed at strategic levels since 2002. During 2003-2004, some generators participated in negotiations with the government to enter in government-guaranteed projects to reduce emissions (PREs) through which they receive a number of carbon credits that are equal to the amount of emissions saved by the projects:

“[Renewable-based generators] have successfully negotiated arrangements with Government so that wind farm projects achieve breakeven status in 2004. These arrangements involve access to a portion of the carbon credits projected to accrue to New Zealand from reduced CO<sub>2</sub> emissions from thermal power stations relating to each wind farm project during the initial Kyoto commitment period (2008 and 2012).” (an archival document)

Simultaneously with these projects, firms improved their emissions measuring and monitoring as well as benchmarking their operations against international best-practices:

“Industries were quite supportive of negotiating with greenhouse agreements; there was a lot of goodwill, a lot of the measuring and monitoring started and underway, as well as the international benchmarking. A lot of money has been spent on that work.” (a lobby group representative)

Many firms also started to improve their operational efficiency and thus reduce energy use and resulted emissions in the anticipation that these actions will prepare them early for an upcoming domestic climate change policy:

“Lots of firms have made the changes in their operational efficiency late 1990s and early 2000s, in the hope that they will be acknowledged in the climate change scheme design.” (a lobby group manager)

### **2005 -2007: an ETS under development, high environmental risks and potential market opportunities, medium regulatory uncertainty**

From early 2006 with the cancellation of the carbon tax and a prospect that a cap-and-trade ETS is going to be introduced in a near future, businesses have grown to accept climate change and accept the reality of carbon pricing:

“Because industries, you know, they had their heads in the right space, they knew that this had to happen and they gave up fighting the thing, like “this is the new reality, this is going to be a business cost, and we have to deal with it” (a lobby group representative).

As a result, electricity generators started to take action at a strategic level to prepare themselves for the upcoming ETS. The Board of director and top management team had asked to report regularly on emissions level and international carbon price. Such information assists them to assess the potential risk exposure of the organisation when an ETS is passed into law and enforced. Cross functional analysis was conducted in firms to identify the risks and opportunities emerging from an ETS and climate change. However, the majority of focus in thermal-based generators in this process of risk identification/assessment is on negative risks, including potential liabilities and costs that an ETS may imposed on the business and how organisations plan to respond to mitigate these risks. As a result, an internal strategy was adopted in which operational efficiency is optimized so that lower-emitting plants (e.g. gas-fired) were used more than high-emitting ones (e.g. coal-fired), through which carbon emissions are reduced. There was little recognition of market opportunities potentially brought about by an ETS by thermal-based generators.

In contrast, renewable-based generators started to recognize their potential competitive advantage over competitors thanks to their renewable portfolio. A change in strategic thinking occurred at the board and top management levels and the result was the decision to brand the whole company and their product based on 100% renewable generation, rather than trying to mitigate their trading risks through fuel diversification. As commented by a past director of one renewable-based generator:

“What I and a number of colleagues said on the board “look, the world has moved on. Individual companies have branded themselves effectively in the space, why would [our company] not, with all our natural advantages, we should *move as much as possible into renewable space*, through generating entirely from renewable. In respect of that energy that has to be bought on the wholesale market for non-renewable space generation to meet retail obligations, why not buying offsets, so that you can really say “we are 100% renewable”. By doing all that, our company can be in a *powerful position in the market*”. We eventually got the management to buy into that vision.” (emphasis added by author)

As a consequence of this change in strategic thinking and positioning, renewable-based generators started to discuss publicly about the positive implications of climate

change and how their renewable-based generation portfolio has well positioned/prepared themselves for a low-emissions focused economy.

Additionally, all of these generators, thermal and renewable-based, stated that they participated and advised the government during its process of developing a climate change policy and New Zealand Energy Strategy (2002-2006). However, the process of write-up of a proposed ETS itself (2006-2007) by the relevant government departments was designed to minimize (and avoid) participation and thus influences from these generators on the policy design. This has resulted in relatively inactive political activity by electricity generators in this period.

### **2007 – 2008: high regulatory uncertainty, high environmental risks and market opportunities**

By 2007, most of firms have announced their climate change action plans which included strategic changes in their generation investment plans. The similarities between these plans are a strong shift to renewable and the intention to increase each firm's renewable generation portfolio. This is a stark divergence from these firm's previous generation strategies in which two firms pursued a primary thermal-based generation portfolio. This strategic change was in recognition of the changing risk mixture associated with the ETS, including emissions risks, changed economics of renewable fuels and the competitive gains of renewable generation.

Also in this period, firms started to experiment introducing energy efficiency initiatives for internal offices and customers. These initiatives were limited in scope and expenditure, mostly to 'test the water' relating to customer sensitivity and demand for energy efficiency products. Energy efficiency measures implemented for internal offices is a voluntary strategy to respond to an internal need to reduce energy use and waste and thus save operational costs for the firm under a carbon-constrained operating environment. Energy efficiency of production process (operational efficiency) also becomes more critical with carbon pricing. The ETS makes energy efficiency projects more financially attractive thanks to the emissions costs they save. Energy efficiency is also an effective strategy to respond to the growing public pressures for firms to take proactive action to tackle climate change.

In addition, most firms also started to adopt some form of CSR external reporting in which social, environmental and economic performance is simultaneously reported. The changes in external reporting format and content were built around a climate change focus, with a notable increase in the detail and scope of emission reporting.

Together, these proactive strategies helped reduce the consequence of climate change-related risks, including increased operation costs and reputational risks. Keeping reputation, and thus maintaining social legitimacy, by behaving ethically in relation to climate change is considered one of the key drivers behind these generators' climate change action plans. As put by one senior manager at a thermal-based generator:

“At our organisation, we believe in the science. We can't pretend that it [climate change] is not happening. So if we have some sense, we need to do something about it. You can't get customers buy-in, staff buy-in if you are not acting in a way that ultimately drive to a better world.” (a senior manager at one thermal-based generator)

Energy efficiency was also driven by the cultural change of the workplace, where the young generation employees increasingly demand climate change responsibility from their employers. Responding to the demands of the employees serve as a strategy of both employee attraction and retention. These initiatives to improve energy efficiency

also brought about financial benefits which in turn improve the generators' financial bottom line:

“Not only that those companies have good ethos, but generally, doing that stuff saves money. If you don't print everything out and read things on screen instead, you save yourself money. A lot of things that encourage the reduction of waste are good for the environment but they are good for the bottom line as well.” (an industry association representative)

Optimizing operational efficiency continues to be integrated as one of the key strategies to reduce generation-related emissions. Accordingly, firms optimized the use of higher-efficiency (e.g. gas-fired) plants while reducing the reliance of high-emitting fuel (e.g. coal). However, these firms recognize the little discretion they have in choosing which plant to run, due to the increasing in customer demands. A director of a thermal-based generator commented:

“There is less variation of energy use than it used to be between seasons, because in winter people run heater and heat pumps while in summer they use air conditioners. So we have less chance of choosing which one to run and which one not to run, we just have to run them all. There is little bit of opportunity to back off from coal and favour gas, but it's not quite as much choice as you might think.”

Renewable-based generators, on the other hand, started to execute strong marketing campaigns aimed at selling themselves as renewable generators with no emissions and accompanying sustainability measures including carbon neutrality. Their historical and future renewable portfolio and projects enable them to gain competitiveness over their thermal-based generators, despite the fact that other thermal firms also are heading in the renewable-focused direction.

“I think the ETS enhances our competitiveness. But ETS is simply a symptom of what we have already tapped into which is generally greater awareness of environmental concerns and the ability to have, quite honestly, sold ourselves as *the renewable generator*. The ETS is just going to help us further in their area. In contrast, due to [existing thermal plants], [a thermal-based generator] can never claim itself as clean, even though they are also moving towards renewable...”

## **2008 – 2009: change of government and high regulatory uncertainties**

With the change in government in September 2008, the ETS was subject to a parliamentary review. The strategies formulated during 2006-2008 were put on hold, including carbon credit strategy and renewable investment projects. Some decided to go ahead with these projects, but simultaneously watched closely for potential policy change. The impact of regulatory uncertainties on generators' carbon credit strategy is illustrated by the following quote by a thermal generator's senior manager:

“[buying carbon credits and buying from whom] is something we thought about, and thinking about, but before we can really do that, we need to know the exact structure that NZ and Australian schemes are. Because before we know that, we can't reach agreements.”

For those who already went ahead and buy carbon credits, or those who had carbon credits granted from the projects to reduce emissions (PREs), the challenge is to decide whether to hold onto their carbon credits, or to sell them at the current market price to avoid further dropping of carbon prices due to potential delay of the ETS:

“So therefore if you bought credits in NZ and you got liability in 2009 and 2010, you will wonder now whether you should hold on to those credits or whether you should try and get rid of them.” (a carbon market expert)

With high regulatory uncertainties of this period, lobbying was a strong focus, with most firms making submissions to the parliamentary select committee in charge of the

ETS review. The political attitude held by generators has changed in this period compared to the last one, mostly because of the change in government and resulted change in approach to public consultation:

“The fact that the opposition is not that strong this time around is may be a reflection of there has been a change in government. They expect to be listened to without having to fight through the nails, they expect better hearing. You take a different one and different style and approach when you feel that the government is open to your suggestions and ideas, as opposed to the approach that you take when you feel that the government completely shuts down from any discussion on the matter and then you have to take the debate to the wider public.” (a lobby group representative)

Other strategies, including CSR reporting, reviewable-based R&D projects and energy efficiency products are continued, however. This is because most of the risks and opportunities remained similar to the previous period. They include an increased customer demand for green products, societal pressure for businesses’ environmental concern, and the need to be flexible to cope with future regulatory uncertainties.

## **6. DISCUSSION OF FINDINGS**

In summary, due to the changes in external risk drivers over time, including environmental risks, market opportunities and regulatory uncertainties, electricity generators have changed and revised their risk management strategies. These strategies moved from a stable context in the period prior to 2002, to a mixture of reactive, anticipatory and proactive strategies from 2002 to 2007, and to a mixture of anticipatory-proactive and creative strategies from 2007 to 2009. Over time, as the environmental risks become high and strategic, there is a shift towards proactive and creative risk management strategies that aim to respond to risks before they actually occur. Depending on the generator, these strategies can aim to either mitigate or enhance the risks, through addressing their likelihood or consequence. There is also a shift over time in functional involvement in risk management strategy: from production/logistics focus to R&D, strategic growth, product development and sales and marketing. This results correspondingly in an increase in the external orientation in the risk management, addressing the risks related to customers, the public perceptions and the government, rather than a purely internal orientation previously where the strategy focused on production activities.

Over time, while firms have generally moved to more proactive and creative strategies to manage their risks, reactive approaches remain an important part of the overall strategy. These reactive approaches included the monitoring of policy changes and the pass-on of emissions costs to consumers. The monitoring remains important because it constitutes the strategic screening critical for firms to understand their risks contexts, based on which appropriate strategic responses can be made. The pass-on of emissions costs reflects the perceived difficulty of many firms in further reduce emissions from their existing generation plants while they significant investments in low-emitting technology to enable significant emissions reductions is made risky by the recent extreme regulatory uncertainties.

As the environmental risks and market opportunities related to climate change increased in scope and intensity over time, similar risk management strategies were adopted across the electricity generators. The most obvious change was the move of all the generators to increase their ‘green’ generation portfolio through extensive renewable investment projects. This is in recognition of the changing economics of

renewable versus fossil fuels, which make renewable projects financially attractive to these firms. Besides the long term investment plan, the thermal-based generators also adopted a short-term carbon credit strategy in which they aim to manage and reduce their emissions costs through forward/early carbon credit purchases. In addition, in respond to an emerging market for green and energy efficiency products, electricity generators started to diversify into this product line and find it as an effective strategy in gaining them improved reputation and profits. Internal energy efficiency initiatives were also common across different generators, reflecting a need to save cost (through reductions in paper and electricity usage), and responding to the increase in climate change concerns among existing and prospective employees. In addition, there was a general industry-wide trend of adopting CSR and carbon neutrality and increasing disclosure on emissions and climate change and environmental management. These are the generators' strategies to conform to the increased societal pressures of environmental concern and the need to maintain organisational social legitimacy.

The study also found that regulatory uncertainties have significant influences on which strategy firms adopt to manage their risk exposure. Regulatory uncertainties are also the reason for many organisations to delay/ hold off their planned investments in carbon credits purchases/ renewable generation projects. Such delays enable the organisations to avoid later regrets in their investments due to a future change in the government climate change policy that can make those investments unviable. Regulatory uncertainties have also led to the increasing importance of external and legal relations function in lobbying activities. These lobbying strategies are possible and acceptable because of the learning curve both the government and businesses experience in seeking to develop an appropriate policy response to climate change. Lobbying is also a preferred venue through which firms can influence the Government's climate change policy and thus manage the source of their risks. This reflects the increasing pro-activeness in the way that firms respond to and mitigate their risk exposure: rather than reacting to the risk once it occurs, firms have become proactive to mitigate the risk's likelihood by influencing the source and the driver of the risk itself.

## **7. CONCLUSION**

Based on a review of prior literature in risk management and environmental strategy, this study has proposed a theoretical framework to explain the external drivers of an organisation's risk exposure and the impacts of such exposure on firm choice of risk management strategy. To test this framework, multiple case study approach is adopted in which five electricity generators were investigated in-depth. Data collected and analysed include publicly available documents and interviews with internal managers, regulators and external experts in emissions trading and climate change.

The findings supported the proposed framework and its key argument that the mixture of environmental risks, market opportunities and regulatory uncertainties is the key external driver of an organisation's risk exposure in a carbon-constrained operating context. The findings also suggest that over time organisations move to more proactive and creative approaches in response to the risks of strategic import but high uncertainty (customers and product market, carbon market, R&D risks) while maintaining their stable and reactive approaches for risk of high likelihood but low strategic import (generation-related emissions). Proactive and creative strategies aim to either avoid or seek the risk, reduce or enhance its occurrence while stable and



reactive strategies aim to reduce the risk's consequences once the incident causing the risk already occurs. The choice to manage risk at different levels, across different organisational functions and using different strategies ensure that firms maximise their risk reduction objective.

This study is subject to a number of limitations. Firstly the choice of investigation to New Zealand electricity industry limits the findings' generalisability to other industries and other countries. The choice of one industry also makes the study unable to investigate the industry impact on the risk orientation and strategies of organisations. However, the contribution study is in its attempt to combine and integrate risk management and environmental management literatures so as to develop a framework to explain risk management strategies in response to environment-related risk exposure. This theoretical framework should be exposed to further testing with a wider sample, probably one that include multiple industries or different countries in which an ETS is underway or being developed. In expanding the sample to multiple industries, industry impact on organisational risk management strategy can also be tested. Additionally the influences of internal factors, such as size, structure, organisational emissions level, have not been investigated within the scope of this study. Future research can aim to examine how internal organisational factors can drive inter-firm differences in their choice of risk management strategies.

It is increasingly recognized that environmental regulation, such as an ETS, can bring about substantial business risks that reaches beyond the traditional environmental management framework. Therefore, having an enterprise-wide assessment of ETS-related risks and formulating appropriate risk management strategy in response become a necessity. The changes in business environments and the increasing importance of GHG emissions on an organisation's social legitimacy, profitability and market competitiveness require a corresponding change in business strategic thinking. Academics play an important role in this changing context, by aiming to providing coherent conceptual/theoretical frameworks to assist businesses re-oriented their strategic thinking as well as finding empirical evidence for existing best practices domestically and internationally. This study represents one of the first efforts towards achieving such aim.

## **REFERENCES:**

- Aldrich, H. (1979), *Organizations and environments*, Prentice-Hall, Englewood Cliffs, NJ.
- Alkaraan, F. & Northcott, D. (2006), "Capital investment decision-making: A role for strategic management accounting?", *British Accounting Review*, Vol. 38, No. 2, pp. 149-73.
- Alkaraan, F. & Northcott, D. (2007), "Strategic investment decision making: The influence of pre-decision control mechanisms", *Qualitative Research in Accounting and Management*, Vol. 4, No. 2, pp. 133-150.
- Ansoff, H. (1965), *Corporate strategy: An analytic approach to business policy for growth and expansion*, McGraw-Hill Companies.
- Ansoff, H. (1975), "Managing strategic surprise by response to weak signals", *California Management Review*, Vol. 18, No. 2, pp. 21-33.
- Azzone, G. & Bertelè, U. (1994), "Exploiting green strategies for competitive advantage", *Long Range Planning*, Vol. 27, No. 6, pp. 69-81.
- Bonardi, J. P., & Keim, G. D. (2005). Corporate Political Strategies for Widely Salient Issues. *The Academy of Management Review*, 30(3), 555-576.

- Bowman, E. H. & Haire, M. (1975), "A strategic posture toward corporate social responsibility", *California Management Review*, Vol. 18, No. 2, pp. 49-58.
- Bregman, E. & Jacobson, A. (1994), "Environmental performance review: Self-regulation in environmental law", *Cardozo Law Review*, Vol. 16, No. pp. 465.
- Braun, V. & Clarke, V. (2006), "Using thematic analysis in psychology", *Qualitative Research in Psychology*, Vol. 3, No. 2, pp. 77.
- Bui, B., Hunt, C., and Fowler, C. (2008). A risk-focused Performance Management System Framework for Planning Change in Organisations subject to significant environmental pressures and uncertainty. CAGTR Working paper Series, Working Paper No. 61, 2008
- Burchell, S., Clubb, C., Hopwood, A., Hughes, J. & Nahapiet, J. (1980), "The roles of accounting in organizations and society", *Accounting, Organizations and Society*, Vol. 5, No. 1, pp. 5-27.
- Chandler, A. (1966), *Strategy and structure*, Anchor Books, Garden City, NY.
- Collier, Paul M. (2009). *Fundamentals of risk management for accountants and managers: tools & techniques*. Butterworth-Heinemann
- Covaleski, M. A. & Dirsmith, M. W. (1988), "The use of budgetary symbols in the political arena: An historically informed field study", *Journal of Financial Economics*, Vol. 13, No. 1, pp. 1-24.
- Dutton, J. E. & Duncan, R. B. (1987), "The creation of momentum for change through the process of strategic issue diagnosis", *Strategic Management Journal*, Vol. 8, No. 3, pp. 279-295.
- Eiadat, Y., Kelly, A., Roche, F. & Eyadat, H. (2008), "Green and competitive? An empirical test of the mediating role of environmental innovation strategy", *Journal of World Business*, Vol. 43, No. 2, pp. 131-145.
- Flick, U. (2009), *An introduction to qualitative research*, Sage Pubns Ltd.
- Knigh, F. (1921), *Risk, uncertainty and profit*, Houghton Mifflin Company, Boston.
- Gale, J., & Buchholz, R. A. (1987). The political pursuit of competitive advantage: What business can gain from government. *Business strategy and public policy*, 31-42.
- Gupta, M. (1994) "Environmental management and its impact on the operations function", *Environmental Management*, Vol. 15, No. pp. 8.
- Hannan, M. T. & Freeman, J. (1977), "The population ecology of organizations", *American Journal of Sociology*, Vol. 82, No. 5, pp. 929.
- Hart, S. L. (1995), "A natural-resource-based view of the firm", *The Academy of Management Review*, Vol. 20, No. 4, pp. 986-1014.
- Hopper, T., Otley, D. & Scapens, B. (2001), "British management accounting research: Whence and whither: Opinions and recollections", *The British Accounting Review*, Vol. 33, No. 3, pp. 263-291.
- Hunt, C. B. & Auster, E. R. (1990), "Proactive environmental management: Avoiding the toxic trap", *Sloan Management Review*, Vol. 31, No. 2, pp. 7-18.
- Financial Reporting Council. (2003). Combined Code on Corporate Governance. FRC PN 152. Financial Reporting Council, UK.
- IRM (2002), "Risk management. Vocabulary. Guidelines for use in standards (PD ISO/IEC Guide 73:2002)". Institute of Risk management.
- Irwin, A. & Hooper, P. (1992), "Clean technology, successful innovation and the greening of industry: A case-study analysis", *Business Strategy and the Environment*, Vol. 1, No. 2, pp.
- Jansson, A., Nilsson, F. & Rapp, B. (2000), "Environmentally driven mode of business development: A management control perspective", *Journal of Financial Economics*, Vol. 16, No. 3, pp. 305-333.

- Jick, T. D. (1979), "Mixing qualitative and quantitative methods: Triangulation in action", *Administrative Science Quarterly*, Vol. 24, No. 4, pp. 602-611.
- Learned, E., Christensen, C., Andrews, K. & Guth, W. (1969), *Business policy: Text and cases*, RD Irwin Homewood, IL.
- Lee, B. W. & Green, K. (1994), "Towards commercial and environmental excellence: A green portfolio matrix", *Business Strategy and the Environment*, Vol. 3, No. 3, pp. 1-9.
- Mckelvey, B. (1982), "Organizational systematics. Berkeley". CA: University of California Press, pp.
- Ministry for the Environment (Mfe) (2008), "History of climate change policy development", Ministry for the Environment, Wellington, Available at <http://www.mfe.govt.nz/issues/climate/policies-initiatives/history/index.html> (accessed 19 September 2008).
- MfE (2009). The Kyoto protocol. Available from: <http://www.mfe.govt.nz/issues/climate/international/kyoto-protocol.html>. Accessed 20 September 2009.
- Miller, G., Dingwall, R. & Murphy, E. (2004), "Using qualitative data and analysis - reflections on organizational research", Silverman, D., *Qualitative research: Theory, method and practice*. 2 ed, Sage, London.
- Mintzberg, H., Alhstrand, B. & Lampel, J. (1998), *Strategy safari*, The Free Press, New York.
- New Zealand Government (2007), *A framework for New Zealand emissions trading scheme*, Ministry for the Environment & The Treasury, Wellington.
- New Zealand Government (2007), *New Zealand climate change solutions: An overview*, Wellington.
- Oliver, C. (1991), "Strategic responses to institutional processes", *The Academy of Management Review*, Vol. 16, No. 1, pp. 145-179.
- Ottman, J. A. (1992), "Industry's response to green consumerism", *Journal of Business Strategy and the Environment*, Vol. 13, No. 4, pp. 3-7.
- Pfeffer, J. & Salancik, G. (1978), *The external control of organizations: A resource dependence perspective*, Harper & Row, New York.
- Pfeffer, J. (1972), "Size and composition of corporate boards of directors: The organization and its environment", *Administrative Science Quarterly*, Vol. 17, No. 2, pp. 218-228.
- Porter, M. E. & Van Der Linde, C. (1995), "Green and competitive: Ending the stalemate", *Harvard Business Review*, Vol. 73, No. 5, pp. 120-134.
- Porter, M. E. (1980), *Competitive strategy*, Free Press, New York.
- Power, M. (1997), "Expertise and the construction of relevance: Accountants and environmental audit", *Accounting Organisations and Society*, Vol. 22, No. pp. 123-146.
- Ritchie, B. & Brindley, C. (2007), "Supply chain risk management and performance", *International Journal of Operations & Production Management*, Vol. 27, No. 3, pp. 303-322.
- Ritchie, B. & Brindley, C. (2000), "Disintermediation, disintegration and risk in the SME global supply chain", *Management Decision*, Vol. 38, No. 8, pp. 575-583.
- Rowe, W. D. (1977), *Anatomy of risk*, Wiley, New York.
- Rugman, A. M. & Verbeke, A. (1998), "Corporate strategies and environmental regulations: An organizing framework", *Strategic Management Journal*, Vol. 19, No. 4, pp. 363-375.
- Rumelt, R. P., Schendel, D. E. & Teece, D. J. (1995), *Fundamental issues in strategy: A research agenda*, Harvard Business School Press, Boston.

- Russo, M. V. & Fouts, P. A. (1997), "A resource-based perspective on corporate environmental performance and profitability", *The Academy of Management Journal*, Vol. 40, No. 3, pp. 534-559.
- Scott, B. (1991), "Environmental regulation for competitive advantage", *Business Strategy Review*, Vol. 2, No. 1, pp. 1-15.
- Scott, W. R. (2001), *Institutions and organizations*, Sage Publications.
- Sharma, S. (2000), "Managerial interpretations and organizational context as predictors of corporate choice of environmental strategy", Vol. 43, No. 4, pp. 681-697.
- Standards Australia & Standards New Zealand (2004), *Risk management as/nzs 4360: 2004*, Standards Association of Australia.
- Standards Australia & Standards New Zealand (2004), *Risk Management Guidelines - Companion to AS/NZS 4360:2004*, Standards Association of Australia.
- Steger, U. (1993), "The greening of the board room: How German companies are dealing with environmental issues", Fischer, K. & Schot, J., *Environmental strategy for industry*. Island Press., Washington, DC, pp.
- Thompson, J. D. (1967), *Organization in action*, McGraw-Hill, New York.
- Venkatraman, N. & Camillus, J. (1984), "Exploring the concept of "Fit" In strategic management", *Academy of Management Review*, Vol., No. pp. 513-525.
- Wood, D. J. (1986), *Strategic uses of public policy: Business and government in the progressive era*, Pitman.
- Woods, M. (2009), "A contingency theory perspective on the risk management control system within Birmingham City Council", *Management Accounting Research*, Vol. 20, No. 1, pp. 69-81.
- Yin, R. K. (2003), *Case study research: Design and methods*, Sage Publications Inc.