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# When and Why Does it Pay to be Green?

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# Executive Summary

According to widely held beliefs, environmental protection is associated with an increase in costs for businesses imposed by the government. Over the last decade, this view has been challenged by a number of analysts. They have identified many possibilities, from a conceptual or theoretical point of view, whereby firms could offset the costs of sustaining the environment with higher profits.

First, a better environmental performance can lead to an increase in revenues through the following channels: i) a better access to certain markets; ii) the possibility to differentiate products, and iii) the possibility to sell pollution-control technology. Second, a better environmental performance can lead to cost reductions in the following categories: iv) regulatory costs; v) cost of material, energy and services; vi) cost of capital, and vii) cost of labour.

The purpose of this report is to provide empirical evidence supporting the existence of these opportunities and to assess their magnitude. For each of the seven possibilities identified above, we provide a discussion of the mechanisms involved and a systematic view of the empirical evidence available. The objective of this paper is not to show that a reduction of pollution is always accompanied by a better financial performance, it is rather to argue that the expenses incurred to reduce pollution can sometimes be partly or completely compensated by gains made elsewhere. Through a systematic examination of all the possibilities, we want to identify the circumstances most likely to lead to a “win-win” situation, i.e., better environmental and financial performance.



## A slow awakening

Since the publication of the Bruntland Report in 1987 and the subsequent Earth summits in Rio de Janeiro (1992) and Johannesburg (2002), sustainable development has become one of the foremost issues facing the world. That is, sustainable development can be understood as development that maintains the quality of the Earth's natural systems so that they can continue to meet the needs of today's population without compromising the ability of future generations to meet their own needs. We have begun to recognize that natural systems can be especially vulnerable to human activity because of limited adaptive capacity, and some of these systems may undergo significant and irreversible damage<sup>1</sup>. Furthermore, recurrent smog alerts, acid rain, holes in the ozone layer, global warming and the loss of biodiversity are among the growing evidence that such a calamity is indeed possible –and occurring faster, in many cases, than scientists originally thought. That is why environmentalists in particular, and the general population more broadly, believe that the consequences of business-as-usual are frightening. Many corporations, accept the same conclusion, but the environment is often just one more thing to worry about. It looms in the future at a time when they are beset with many other, more immediate concerns. How then can firms be induced to participate in society's fight to manage the impact of human activity on the environment? Only by showing them that it is possible to offset the costs of sustaining the environment with higher profits.

We have begun to recognize that natural systems can be especially vulnerable to human activity.

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<sup>1</sup> Flannery (2005), provides an informative account of how fragile natural systems are.

Environmental protection is associated with an increase in costs for businesses.

***Why is environmental protection associated with a cost increase for companies?***

An important part of understanding why pollution controls lead to additional costs is the economic concept of negative externality - whereby the private cost of a good is less than the total social cost entailed in its production. This is precisely what occurs in the case of environmental problems. Because air and water belong to no one (or to anyone), economic agents may use them at zero cost, whereas the actual cost of this use for society is certainly higher. The most obvious example is a polluting factory. The owners of the factory and the customers for its goods do not have to bear the full costs of the pollutants that come out of its smokestacks. Failing to take that into account, the market sets the price of the factory's goods too low. Left alone, the market generates too much pollution compared with the desirable or optimal level. Government intervention is then legitimate in order to control pollution and reduce it to a tolerable level. In order to accomplish this the government has at its disposal a panoply of instruments, such as regulations, taxation or pollution permits which expose the producer to the true cost of their actions. Thus, environmental protection is associated with an increase in costs for businesses.

***Why is this view being challenged?***

Over the last decade, this view has been challenged by a number of analysts. In particular, the Porter hypothesis, argues that pollution is often associated with a waste of resources (material, energy, etc.), and that more stringent environmental regulation can stimulate innovations that may compensate for the costs of complying with these policies. In fact, there are many ways through which improving the environmental performance of a company can lead to a better economic or financial performance, and not necessarily to an increase in costs. Different possibilities have been identified from a conceptual or theoretical point of view for some time that seem to provide for just such a possibility.

These possibilities are summarized in Table 1.



**Table 1: Positive links between environmental and economic performance**

<i>Possibilities to increase revenues</i>	<i>Possibilities to reduce costs</i>
Green buying power	Regulatory costs
Possibility to differentiate products	Cost of material, energy and services
Selling pollution-control technologies	Cost of capital
	Cost of labour

Source : Lankoski (2006) adapted by the authors

Ultimately, an environmental revolution demands a “paradigm shift” from one set of assumptions to another. Technology sets the parameters of the possible; it creates the *potential* for an environmental revolution. The extent to which various companies exploit the possibilities inherent in new tools to save the environment and thereby create an *actual* environmental revolution will depend largely on convincing business leaders of the potential for profit. The purpose of this report is to provide empirical evidence supporting the existence of these opportunities and to “assess” their magnitude<sup>2</sup>. For each of the seven possibilities identified above, we provide a discussion of the mechanisms involved and a systematic view of the empirical evidence available. The objective of this paper is not to show that a reduction of pollution is always accompanied by a better financial performance, it is rather to argue that the expenses incurred to reduce pollution can sometimes be partly or completely compensated by gains made elsewhere. Through a systematic examination of all the possibilities, we want to identify the circumstances most likely to lead to a “win-win” situation, i.e., better environmental and financial performance.

There are many ways through which improving the environmental performance of a company can lead to a better economic or financial performance, and not necessarily to an increase in costs.

<sup>2</sup> This report is based on Ambec and Lanoie (2007) at <http://www.cirano.qc.ca/pdf/publication/2007s-20.pdf>

The rest of the report is organized as follows. Section 2 reviews the possibilities available to improve the environment, while increasing revenues. Section 3 shows how pollution reduction can lead to a cost reduction. Section 4 provides concluding remarks.

# A better environmental performance may mean more revenues

## 1.1 GREEN BUYING POWER

A better environmental performance may facilitate access to certain markets. First, generally speaking, reducing pollution and other environmental impacts may improve the overall image or prestige of a company, and thus increase customer loyalty or support sales efforts.

More specifically, to evaluate the potential of green companies to reach extra clients, it is useful to scrutinize the purchasing policies of public and private organizations, which increasingly use environmental performance (or performance with respect to sustainable development) as a criterion to choose suppliers of goods and services. This phenomenon is known as green purchasing. Many businesses now incorporate social responsibility considerations in their purchasing decisions. More specifically, a recent survey of the OECD, covering more than 4000 facilities in seven countries found that 43% of them assess the environmental performance of their suppliers.

Examples of private companies which have taken steps for the “greening of their supply chain” are summarized in Table 2.

A better environmental performance may facilitate access to certain markets.

**Table 2: Examples of socially responsible buying practices**

<i>Nature of the practice</i>	<i>Initiator of the practice</i>	<i>Examples</i>
Training/education of suppliers	Buying organization	Co-operative Bank introduced one of its furniture suppliers to a firm that could supply it with sustainable resources, after it was discovered the furniture manufacturer was unknowingly using endangered tropical hardwood.
Rating of suppliers' practices	Buying organization	Hewlett-Packard and Body Shop International both have a strict quantitative supplier rating system that takes into account their environmental improvement policies and implementation plan.
Imposing content policies on suppliers	Buying organization	DaimlerChrysler requires plastic parts suppliers to include 20 percent of recycled content in 2000 and 30 percent in 2002.
Discretionary intercompany initiative	Buyer and seller	Caterpillar worked with supplier BetzDearborn to develop a process to eliminate chrome pollution at a Caterpillar pin plant.

*Source : Maignan and Thorne McAlister (2003)*

Although much attention on corporate environmentalism has focused on the private sector, it is important to recognise the extensive economic and environmental importance of the public sector: it represents a major force in terms of the scale of its spending on goods and services. In this case, we can talk about green public purchasing (GPP). In 1998, it was estimated that government sector expenditure for consumption and investment represented 20% of Gross Domestic Product in OECD member countries, with government procurement accounting for 9% (after subtracting compensation for employees). Countries have taken a variety of approaches to the greening of public procurement, and examples of GPP in the United Kingdom, and the United States include:

- the U.K. Department of Environment, Transport and Regions has ordered that 10% of its electricity should come from renewable sources, and suppliers must provide independently verifiable documentary evidence that their timber has been lawfully obtained from sustainable forests;
- in the U.S., the Clinton administration has implemented orders that favour the use of recycled paper products by the government and its subcontractors;

The magnitude of GPP is difficult to assess, but it seems clearly present. In May 2001, The OECD environment ministers adopted the Environmental Strategy for the First Decade of the 21st Century, in which there is a recommendation “to improve the environmental performance of public procurement practices.”

It seems that most firms can actually obtain a better access to certain markets via an improvement of their environmental performance. At this stage, because green purchasing seems more developed in the public sector, the companies most likely to profit are firms selling to public organizations: (construction, energy services, transport equipment, medical products, and office equipment).

Countries have taken a variety of approaches to the greening of public procurement.

## 1.2 SELLING GREEN PRODUCTS AND SERVICES

When and if firms choose to differentiate themselves by creating greener products and services they may eventually exploit lucrative market niches. In this case, the overall effect will be an increase in revenues, because the extra cost can be transferred to consumers who are willing to pay more for environmentally-friendly products or services.

According to some surveys, more than two-thirds of consumers say they include environmental criteria in their purchasing decisions<sup>3</sup>. In addition, Sinclair-Desgagné (2004, p.6) writes that, “several companies (e.g. McDonald’s, Exxon, etc.) have seen at their own expense that consumer loyalty towards their products depends crucially on perception that these products be ecologically benign”. Clearly, consumer behaviour can have an important impact on sales.

In a December 2005 poll surveying Canadians on their travel intentions, the Hotel Association of Canada found that 60 per cent of respondents said a hotel’s environmental and ecological practices play an “important to extremely important” factor in their choice of lodging<sup>4</sup>. An actual example of a firm using environmentally-friendly behaviour as a sales strategy includes:

- the Chateau Lake Louise in Banff National Park works with Parks Canada to monitor water quality, air quality, plant life and fish life in the surrounding area as part of its strategy to bill itself as a “green” hotel and attract environmentally conscious visitors<sup>5</sup>.

Other examples of firms who have included environmental awareness into their product development process and benefited from it are numerous.

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<sup>3</sup> In the Gallup Environment Poll, conducted Mar. 11-14, 2007 : 70 % of respondents said that they had bought a product specifically because [they] thought it was better for the environment.

<sup>4</sup> The Globe and Mail, Friday, April 20, 2007, p. B8.

<sup>5</sup> Ibid.

“Several companies have seen at their own expense that consumer loyalty towards their products depends crucially on perception that these products be ecologically benign”.

- Patagonia, an American sports apparel company which launched a new line of clothing made from recycled PET (polyethylene terephthalate), or organic cotton. They recognized that their actions would convey a positive image to the public which made it a commercial success in spite of the higher price of these products<sup>6</sup>.
- Toyota is another firm that has successfully adopted this strategy. Sales of its first energy efficient hybrid car (Prius) increased by 139% in the United States from 2004 to 2005, and it has stated that in 2012, all of its models would be equipped with hybrid engines.
- Cascades, a Quebec producer of paper products and cardboard, has a strong reputation (supported by Greenpeace) as being the greenest paper company in the country, and its profitability is at least comparable to that of its competitors (*Revue Commerce*, August 2007).

It is also becoming more and more common to see companies emerging in the “green energy” market.

The development of the “biofood” industry serves as a further example of the success of this strategy, although in this case one can argue that, when buying these products, consumers are also looking at the health benefits associated with eating “bio”. This industry is sizable; for instance, the world market for biofood products was estimated at €23.1 billion for 2004, a rise of 9% over 2003. This represents almost 4% of the world food market.<sup>7</sup> In Europe, the market share for biofood is estimated at 7%. It is also becoming more and more common to see companies emerging in the “green energy” market, i.e., companies that have access to the grid in order to sell energy from renewable sources, such as biomass, wind or solar. A well-documented example is the Dutch enterprise PNEM, which generates electricity from a biomass-fired power plant (Hofman, 2005).

Based on current evidence, it seems that this differentiation strategy is more likely to be effective if: 1) the information about the environmental features of the product is credible (e.g. an eco-

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<sup>6</sup> Actually, sales of organic cotton (produced without chemical fertilizers or pesticides) soared worldwide from US\$245 million in 2001 to an estimated US\$1 billion in 2006.

<sup>7</sup> <http://seme.cer.free.fr/index.php?cat=filliere-bio>.

Solving environmental problems has become an important business opportunity for firms specialized in this area.

label); 2) there is a willingness-to-pay by the consumers (more difficult with low-end products) and 3) there are barriers to imitation by competitors. The variety of the examples available leads us to believe that a wide range of enterprises can actually achieve better environmental performance and obtain more revenues by using this strategy. Even firms producing fairly homogeneous goods that are usually difficult to differentiate, such as agricultural products or energy, can do so.

### 1.3 SELLING POLLUTION-CONTROL TECHNOLOGY

Solving environmental problems has become an important business opportunity for firms specialized in this area, and is often referred to as the eco-industry. Although, a detailed study of this industry is beyond the scope of this paper, we are interested in identifying situations where a company, in search for a better environmental performance, optimized their manufacturing process or waste management process by developing pollution control technologies. This can lead to technological breakthroughs that eventually can be sold to others. Companies adopting such a strategy may also enjoy a “first-mover” advantage, and may eventually lobby governments for stricter regulations.

- Alcan, a major aluminium producer has developed and tested a spent potlining (SPL) treatment process, the Low Caustic Leaching and Liming (LCLL) process. Up to now, SPL was considered hazardous waste and had to be stored or put in a landfill. Using the new process Alcan will be able to recycle a large part of this waste. It is now building a new plant in Canada to treat its own SPL and, eventually that of other firms.
- Dupont, a large multinational company, gradually began to realize that environmental R&D investment could lead to future markets and revenue streams. For example, Dupont has more than 20 years experience in handling toxic and hazardous materials, and by taking pollution-prevention actions they have created excess capacity in their waste-handling facilities. Now customers’ waste can be accepted<sup>8</sup>.

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<sup>8</sup> Resetar, (1999), p. 70.



- Australian beer maker, Foster's Group Ltd., has developed a fuel cell in which bacteria consume water-soluble brewing waste such as sugar, starch and alcohol. Prof. Keller a wastewater expert from the University of Queensland said: "it is primarily a waste-water treatment that has the added benefit of creating electricity."

So far, we must say that it was difficult to find examples of companies that were able to benefit from such technological opportunities as a commercial by-product. This is an indicator that "selling pollution-control technology" as one way to turn an environmental problem into an increase in revenues is probably not a widespread phenomenon. The examples we found suggest that firms must already have research facilities, and a large amount of resources, to eventually sell a pollution-control technology that they have developed for themselves.

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<sup>9</sup> The Globe and Mail, Friday, May 03, 2007, p. B17.

## A better environmental performance may mean lower costs

In the long run, the force government can bring to bear on businesses is irresistible.

### 2.1 LOWER REGULATORY COSTS

While the United States has no national legislation or federal regulations governing the management of waste, city and state governments are starting to implement rules of their own. California's Electronic Waste Recycling Act, went into effect in January 2007 and focuses mainly on laptops, monitors, and cathode ray tubes and is expected to be a catalyst for tougher regulations across the nation. Ultimately, with all the mounting evidence on the potential hazards of not disposing of waste properly, governments will move to alter the situation more to its liking. Such action takes the shape of laws and regulations that make some business activities illegal and others clearly unprofitable. And in the long run the force government can bring to bear on businesses is irresistible. A business, therefore, will be far better off if it takes the initiative to look for new options while it still has a reasonable opportunity to influence the rules. Moreover, settlements imposed on losers tend to be much harsher than settlements arrived at voluntarily.

According to Dupont, the opportunity costs of expenditures in compliance activities are comparable to their expenditures for R&D investments. In 1994, Dupont spent \$765 million on capital equipment for compliance purposes and around \$435 million for

remediation, training, and other compliance operations.<sup>10</sup> Furthermore, the company has estimated that new waste-reduction technologies could reduce, or eliminate, \$300 million to \$500 million worth of expenses spent to comply with environmental regulations<sup>11</sup>. Thus, it would seem that a better environmental performance can lower expenses. In certain areas, less pollution can also lead to a lower amount of environmental taxes paid, or a smaller quantity of tradable permits to be bought.

Common sense must argue that the positive approach is the logical one, and has been recognized as such by certain business managers:

- In the United States, many firms would prefer to control their own destinies with regards to environmental regulations in order to avoid laws that are too burdensome or costly. According to a recent article in the *Economist*, “firms would prefer to see a consistent national system, without the uncertainty of environmental rules that change between states.<sup>12</sup>” Thus, there would be far less uncertainty and firms could make informed decisions over long-term projects.
- Caterpillar, an 82-year-old industrial giant with \$41.5 billion in 2006 revenues and 95,000 workers, emphasized in its 2006 Sustainability Report that: recycling industrial equipment saves raw materials and energy and reduces waste. What's more, if the U.S. takes steps to require manufacturers to take back their products, as the European Union has done, Caterpillar will be ready.

Obviously, the companies most likely to benefit from these regulatory costs reductions are those which are heavily regulated. Such as firms with high levels of toxic emissions (e.g. iron foundries), or firms with other polluting emissions such as the pulp and paper or energy sector.

The companies most likely to benefit from these regulatory costs reductions are those which are heavily regulated.

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<sup>10</sup> Resetar, (1999), p. 68.

<sup>11</sup> Ibid., p. 74.

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[http://www.economist.com/daily/news/displaystory.cfm?story\\_id=8579382&top\\_story=1](http://www.economist.com/daily/news/displaystory.cfm?story_id=8579382&top_story=1)

## 2.2 LOWER COST OF MATERIAL, ENERGY AND SERVICES

Porter has suggested that pollution is generally associated with the waste of resources, with raw material not fully used, or with lost energy (Porter, 1991, and Porter and van der Linde, 1995). From this, he argues that more stringent and flexible environmental policies (like taxes and tradable permits) would be fruitful for the economy, stimulating innovations that may compensate for the costs of complying with these policies. This is known as the Porter Hypothesis (depicted below) which indeed implies that reducing pollution can generate a reduction in expenditures on raw material, energy or services<sup>13</sup>.

FIGURE 1 : The Causality Chain Behind the Porter Hypothesis



The main limitation regarding the Porter Hypothesis is that it goes against the grain of current thinking. Profit maximizing firms, it is widely held, will not ignore profitable investments in innovation, regardless of the level of regulation, in an economy with perfect markets.

Given the objective of this article, it is relevant to review briefly the literature which tests the Porter hypothesis empirically. There are two different types of studies. A first set estimates the impact of environmental regulations on the firm's innovation policy and technological choice measured by their investment in R&D, new

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<sup>13</sup> The services we have in mind here are mainly wastewater treatment, garbage collection or use of recycling facilities.

capital and new technologies, or successful patent applications. These studies are designed to test the first premise of the Porter Hypothesis which argues that more stringent environmental regulations enhance innovation (left part of the causality chain). In the second set of studies, the aim is to test the impact of environmental regulation on measures of firms' business performance such as productivity and costs.

The main conclusions from the relevant literature on the impact of environmental regulations on innovation, technology, productivity and costs are<sup>14</sup> :

- there is a weak impact of more stringent environmental regulation on innovation;
- most papers show a negative impact of environmental regulation on productivity<sup>15</sup>.

Clearly, the Porter Hypothesis is an important issue that will continue to draw more research. At this stage, even if it cannot be generalized to the “whole” economy, it is clear that some firms, through better use of energy, or materials, have been able to reduce emissions and costs at the same time. Let us look at a few well known examples:

- British Petroleum (BP) was able to reduce its CO<sub>2</sub> emissions to 10 % below their 1990 level at no cost through optimization of the production process, elimination of leakages, reuse of waste, etc.
- Adobe Systems made five changes at their headquarters (ranging from automatic faucets to motion sensors), which involved an initial investment of around USD \$250,000 for annual savings of around USD \$ 246,000.
- Managers at GM's Flint manufacturing plant realized that they were using a lot of energy over the weekends, even

There is a weak impact of more stringent environmental regulation on innovation.

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<sup>14</sup> A complete survey on the empirical literature related to the Porter Hypothesis can be found on pages 9-11 of <http://www.cirano.qc.ca/pdf/publication/2007s-20.pdf>

<sup>15</sup> For a recent test of the Porter Hypothesis with a unique database from the OECD, see Lanoie et al. (2007).

There is a movement toward “eco-efficiency” which implies that many changes can be both *economical* and *ecological* at the same time.

though the machines were idle. Systematic weekend shutdown procedures were implemented, so that two years later the company had generated annual savings of approximately USD \$250,000.

- Dow Chemicals is well known for its WRAP (Waste Reduction Always Pays) Award program, which was implemented in 1986. “Since the program began, Dow has given the WRAP Award to 395 projects. Worldwide, the projects account for the reduction of 230,000 tons of waste, 13 million tons of wastewater, and 8 trillion BTUs of energy. The (net) value of all these projects totals roughly US\$1 billion.

In the same vein, Katz (2003) shows, from a sample of 33 green buildings, that the financial benefits of green design are over 10 times the additional cost associated with building green.

Actually, there is a movement toward “eco-efficiency” which implies that many changes can be both *economical* and *ecological* at the same time<sup>16</sup>. In fact, the set of opportunities to reduce at the same time pollution and the cost of energy, material and services seems relatively large. Lanoie has collected more than 50 examples, over the past eight years, of companies that were able to reduce both pollution and the cost of resources, energy and services<sup>17</sup>. These opportunities are more likely to emerge in firms where the production process is flexible, and communication channels work well so that new ideas can be transmitted to decision makers. Furthermore, the possibility of occurrence is also higher in industries where the competition is fierce so that cost reductions are important, and in industries where market based instruments (like pollution taxes or tradable permits) exist.

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<sup>16</sup> According to the World Business Council for Sustainable Development there are seven principles for eco-efficiency: i) reduce the material intensity of goods and services; ii) reduce the energy intensity of goods and services; iii) reduce toxic dispersion; iv) enhance material recyclability; v) maximise sustainable use of renewable resources; vi) extend product durability; and vii) increase the service intensity of goods and services.

See [http://www.wbcsd.com/projects/pr\\_ecoeficiency.htm](http://www.wbcsd.com/projects/pr_ecoeficiency.htm)

<sup>17</sup> For more information see Lanoie and Tanguay (2000, 2004).

## 2.3 LOWER COST OF CAPITAL

Capital is the lifeblood of any business. Whether the money is needed to finance a new company, facilitate growth or simply fuel existing operations, finding it is never easy and can be costly. Maintaining a positive environmental corporate image may help firms cope with this problem, in three distinct ways: by gaining access to green funds, borrowing more easily from banks, and improving their stock price performance.

First, some financial researchers, believe that the increase in the number of green (or ethical) mutual funds has increased the quantity of money available to firms that respect certain environmental criteria. More specifically, assets in U.S. socially screened funds have increased by 258% between 1995 and 2005, which is a rate of growth faster than the average of other professionally managed funds. In France, the increase was 92% between 2002 and 2006, and in Canada, there was a dramatic increase from 65,5 to 500 billions \$ between 2004 and 2006. In 2005, nearly one out of every 10 dollars (9.4%) under professional management in the U.S. is involved in Socially Responsible Investing, rising to between 10 and 15% in Europe.<sup>18</sup> In sum, environmentally responsible firms have access to a source of capital that is growing rapidly, thereby making their cost of capital lower than for comparable firms.

Second, firms with a better environmental performance can borrow more easily from banks. Since most large banks now have a team of experts to evaluate the environmental performance of potential borrowers, particularly the size of potential liabilities due to contaminated assets. Moreover, roughly 40 international banks have adopted the “Equator Principles” to make sure that the projects they finance are developed in a manner that is socially responsible and reflect sound environmental management practices<sup>19</sup>.

Firms with a better environmental performance can borrow more easily from banks.

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<sup>18</sup> [http://www.socialinvest.org/areas/research/trends/sri\\_trends\\_report\\_2005.pdf](http://www.socialinvest.org/areas/research/trends/sri_trends_report_2005.pdf) and *La Tribune* March 1, 2007.

<sup>19</sup> <http://www.equator-principles.com/>

A business works  
best when it has a  
positive vision,  
good morale,  
definite standards,  
and high goals.

Third, shareholders in general may be influenced by information on the environmental performance of companies, and their reactions can be perceptible on the stock market. These movements may in turn influence the cost of capital. A large number of empirical studies have tried to identify the stock market reaction to news on environmental performance. Three main approaches are dominant in that literature: a) portfolio analysis; b) event studies; and c) long-term studies using regression analysis. We surveyed more than 40 studies using one of these methodologies and the vast majority of them show that a better environmental performance is associated with a better stock market performance (or at least, not worse)<sup>20</sup>. Rising share prices relative to the rest of the market may, in turn, lower the cost of capital. Firms being listed on the stock market are more likely to benefit from lower cost of capital following an improvement in their environmental performance.

#### **2.4 LOWER COST OF LABOUR**

A business works best when it has a positive vision, good morale, definite standards, and high goals. How long can a company prevail if its employees consciously or unconsciously, perceive their products processes or corporate goals as harmful to humankind. For example, as stated by two managers at Ciba Geigy:

- “People who feel proud of the company for which they work not only perform better on the job, but also become ambassadors for the company with their friends and relatives, enhancing goodwill and leading to a virtuous circle of good repute... Of course, this is impossible to quantify, but it seems clear that it is true ... This is especially important in recruiting talented young scientists, managers, and engineers, many of whom ... simply would not work for a company with a poor social and environmental reputation ...No one wants to work for a dodgy company, and the brightest people obviously have a choice” (Reinhardt, 1999, p. 11).

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<sup>20</sup> A survey of these studies can be found on pages 15-27 of <http://www.cirano.qc.ca/pdf/publication/2007s-20.pdf>



Similarly, De Backer (1999) provides anecdotal evidence that ISO 14001 has significant effects on employees' morale and productivity, much more than ISO 9000 certification. If this is the case, better environmental performance can indeed reduce the cost of labour by reducing the cost of illnesses, absenteeism, recruitment and turnover. A few analysts, like Lankoski (2006), have put forward this argument in favour of labour cost reduction. However, even if the argument is fairly compelling, to our knowledge there is no direct empirical evidence supporting it. In order to provide empirical evidence of labour cost reductions associated with less pollution, one would need a data base including observations on proxies of labour cost, such as turnover rates and absenteeism, and data on environmental performance. We are not aware of any database including all these elements, so a new survey would have to be designed to test this hypothesis. Such an exercise would certainly be helpful.

What types of companies could eventually reach labour costs reductions associated with a better environmental performance? Basic intuition suggests the following: 1) companies whose emissions can affect the health of their workers; 2) companies that seek to attract young well educated workers, like scientists and engineers, and 3) companies located in areas where sensitivity to environmental concerns is more acute (e.g., West Coast of North America).

## CONCLUSION

When environmental issues are presented to business people as just one more costly regulation “doing the right thing” becomes burdensome and intrusive.

When environmental issues are presented to business people as just one more costly regulation “doing the right thing” becomes burdensome and intrusive. Even if environmental protection did not require any additional costs, few managers would go out of their way to follow this course of action. This is because they recognize that the collective benefits from saving the environment are likely to be diffuse and not easily measured on their company’s bottom line. For example, the reductions in morbidity or premature mortality that can accompany cleaner air, the recreational opportunities that can result from water-quality improvement or the enhanced vitality of aquatic systems that might follow reduced pesticide use, are clearly beneficial to society. But are they beneficial to the firm (or the firm’s manager)?

By rethinking conventional assumptions our research shows that opportunities do exist to combine improving the environmental performance of a company with better economic performance. In demonstrating this we will help to secure the maximum contribution of businessmen toward the solution of the problems of tomorrow.

As we saw, better environmental performance can lead to an increase in revenues through the following channels: i) better access to certain markets; ii) the possibility of differentiating products; and iii) the possibility of selling pollution-control technology. Second, better environmental performance can lead to cost reductions in the following categories: iv) regulatory costs; v) cost of material, energy and services (this refers mainly to the Porter Hypothesis); vi) cost of capital; and vii) cost of labour. For each of these seven possibilities, we have presented the mechanisms involved, and a systematic view of the empirical evidence available. The objective of this report was not to show that a reduction of pollution is *always* accompanied by better financial performance, but was rather to show that the expenses incurred to reduce pollution can be partly or completely offset by

gains made elsewhere. Through a systematic examination of all the possibilities, we also aimed to identify the circumstances most likely to lead to a “win-win” situation, i.e., better environmental and financial performance. These circumstances are summarized in Table 3.

**TABLE 3 : POSITIVE LINKS BETWEEN ENVIRONMENTAL AND ECONOMIC PERFORMANCE – SUMMARY**

<i>Possibilities for increasing revenues</i>	<i>Circumstances making this possibility more likely</i>
i) Green buying power	More likely for firms selling to the public sector: (construction, energy, transportation equipment, medical products and office equipment).
ii) Differentiating products	More likely when there is: a) credible information about the environmental features of the product; b) willingness-to-pay by consumers; c) barriers to imitation and a wide range of possibilities.
iii) Selling pollution-control tech.	More likely when firms already have R&D facilities.
<i>Possibilities for Reducing Costs</i>	
iv) Regulatory costs	More likely in industries that are highly regulated, such as chemical, pulp and paper, metallurgical, etc.

v) Cost of materials, energy and services	More likely when: a) firms have a flexible production process; b) firms are in highly competitive industries where optimization of resources is important; c) firms are in industries where market-based environmental policies are implemented;
vi) Cost of Capital	More likely for firms with shares exchanged on stock markets.
vii) Cost of Labour	More likely for: a) firms whose emissions may affect their workers' health; b) firms that seek to attract young well-educated workers; c) firms located in areas where sensitivity to environmental concerns is important.

This table allows us to categorize firms according to whether they are likely to benefit from better environmental performance. For instance, an energy company located on the West Coast of the U.S. and selling part of its production to public authorities should expect to gain much from improving its environmental performance. However, firms which are generally less scrutinized by regulators, sell homogeneous products, are not listed on a stock exchange and have few employees may be less likely to benefit from better environmental performance (Lanoie and Llerena, 2007).

It is interesting to try to “forecast” how robust our arguments will be in the near future. On the one hand, there is clearly a wide range

of possibilities, however one must recognize that there are probably diminishing returns. For instance, with regards to cost-reduction, it is likely that there are some obvious “low-hanging” fruit, but once this fruit has been harvested more effort will be required. Similarly, the sales-enhancing potential of environment performance improvements is probably limited by consumers’ willingness-to-pay for environmentally-friendly products. On the other hand, many of the trends we have described in this paper are likely to become increasingly important in the future, among them socially responsible investing or employees looking to be hired by green companies.

Other temporal aspects are worth discussing. It is common for investments in environmental performance to occur in the short term (e.g., green buildings, extra cost for the purchase of a hybrid car, etc.), whereas the associated benefits are uncertain and may arise only in the longer term. Owing to this temporal asymmetry in the distribution of costs and revenues, the time period over which the economic impact is examined and the discount rate, have a considerable effect on the outcome of the examination. In most cases, the lower the discount rate and the longer the time period considered will lead to more win-win situations and vice-versa. More specifically, managers that focus on short-term returns for impatient shareholders are thus less likely to identify profitable opportunities for reducing pollution.

Lastly, from a sustainable development perspective, which is oriented toward a triple bottom line (economic, environmental, social), it would also be interesting to examine the social performance of firms and its relationship to economic performance.<sup>21</sup> We have deliberately tried to avoid mixing environmental and social performance, although in certain areas, such as ethical mutual funds, this is almost impossible. This is a difficult topic, since there is no clear consensus on the measurement of social performance but, given the importance of sustainable development in the minds of politicians, NGOs and academics, it is certainly worth making the effort.

Sales-enhancing potential of environment performance improvements is probably limited by consumers’ willingness-to-pay for environmentally-friendly products.

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<sup>21</sup> See in particular Margolis and Walsh (2001) and UNEP (2001).

# References

- AMBEC, S. et P. LANOIE. (2007), « When and Why Does it Pay to be Green? » <http://www.cirano.qc.ca/pdf/publication/2007s-20.pdf>.
- CUDDIHY, J., C. KENNEDY et P. BYER. (2005), « Energy Use in Canada: Environmental Impacts and Opportunities in Relationship to Infrastructure Systems », *Canadian Journal of Civil Engineering*, volume 32, pp. 1-15.
- EL BIZAT, K. (2006), « EMS and ISO 14001 Selected Topics for Discussion », *Mimeo*, HEC Montréal.
- FLANNERY, T. (2005), *The Weather Makers: How We are Changing the Climate and What it Means for Life on Earth*. HarperCollins, Toronto.
- FORTUNE (2006), *It's Easy and Cheap Being Green*, 16 octobre, p.26.
- GOODSTEIN, E. (1997), « Polluted Data », *The American Prospect*, volume 8, numéro 35.
- JACCARD, M. (2007), « Canada's Kyoto Delusion », *Literary Review of Canada*, volume 15, numéro 1, pp. 8-11.
- KLUGER, J. (2006), « The Tipping Point », *Time* (Édition canadienne), volume 167, numéro 14, pp. 30-37.
- KUNZIK, P. (2003), « National Procurement Regimes and the Scope for the Inclusion of Environmental Factors in Public Procurement », OCDE, *The Environmental Performance of Public Procurement Issues of Policy Coherence*, Paris, OCDE, 193-220.
- LANKOSKI, L. (2006), « Environmental and Economic Performance: The Basic Links », dans SCHALTEGGER, S. et WAGNER, M., *Managing the Business Case for Sustainability*, Greenleaf Publishing, Sheffield, 32-46.
- LANOIE, P. et G. TANGUAY. (2000), « Factors Leading to Green Profitability: Ten Case Studies », *Greener Management International*, 31, 39-50.
- LANOIE, P. et G. TANGUAY. (2004), « Dix exemples de rentabilité verte » *Risque et management international* 3, 85-106.
- LANOIE, P., J. LAURENT-LUCCHETTI, N. JOHNSTONE et S. AMBEC. (2007) « Environmental Policy, Innovation and Performance: New Insights on the Porter Hypothesis » <http://www.cirano.qc.ca/pdf/publication/2007s-19.pdf>.
- MAIGNAN, I. et D.T. McALISTER. (2007) « Socially Responsible Organizational Buying: How Can Stakeholders Dictate Purchasing Policies? » *Journal of Macromarketing*, volume 23, numéro 2, décembre 2003, pp. 78-89.

MARGOLIS, J.D. et J.P. WALSH. (2001), « Misery Loves Companies: Whither Social Initiatives by Business? », document de discussion, Harvard University, Cambridge.

PORTER, M. (1991), « American Green Strategy » *Scientific American* 264, 168.

PORTER, M. et C. VAN DER LINDE. (1995), « Towards a New Conception of Environment-Competitiveness Relationship », *Journal of Economic Perspective* 9, 97-118.

REINHARDT, F.L. (1999), Ciba Specialty Chemicals, *Harvard Business School*, Cambridge, étude de cas numéro 9-799-086.

RESETAR, Susan. (1999), *Technology Forces at Work. Profiles of Environmental Research and Development at DuPont, Intel, Monsanto, and Xerox*, Rand Corporation, Santa Monica.

ROGERS, J. (2007), « It's Not Easy Going Green », *InformationWeek*, numéro 1123, pp. 51-53.

SINCLAIR-DESGAGNÉ, B. (2004), *Corporate Strategies for Managing Environmental Risk*, CIRANO, série scientifique.

*The Economist*. « The Business of Climate Change », 23 janvier 2007.

UNEP - United Nations Environment Programme. (2001), *Buried Treasure Uncovering the Business Case for Corporate Sustainability*, [www.sustainability.co.uk/business-case](http://www.sustainability.co.uk/business-case).

WHITE, A. (2006), « The Greening of the Balance Sheet », *Harvard Business Review*, mars, pp. 1-3.

WILLARD, B. (2005) *The Next Sustainability Wave* Gabriola Island: New Society Publishers





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