TÄLLBERG FOUNDATION

CLIMATE CHANGE AND CORPORATE STRATEGY

REPORT TO MISTRA AND THE GENERATION FOUNDATION

31 October 2006

Blasieholmstorg 8, S-111 48 Stockholm, Sweden. Phone: +46 8 440 56 90, Fax: +46 8 611 50 06.
www.tallbergfoundation.org

REPORT TO MISTRA AND THE GENERATION FOUNDATION

ON CLIMATE CHANGE AND CORPORATE STRATEGY

CONTENTS

EXECUTIVE SUMMARY

MISTRA and the Generation Foundation are exploring new research agendas that better meet the needs of business as they address the challenge of climate change. The Tällberg Foundation was commissioned to identify where global corporations sensed a gap in their knowledge in this area. The project goal was to define where new research could support business leaders in developing a strategic response to the effects of climate change that protects the future viability of their business and, importantly, recognising their role in mitigating climate change (see Research Proposal Annex 1).

For this project, in-depth conversations were carried out in August 2006 with senior representatives of nine global corporations lasting from 40 to 120 minutes, either face-to-face or by telephone (see List of Interviewees, Annex 2 and Overview of Participating Corporations, Annex 3). These conversations were structured around a questionnaire on the company strategy regarding climate change (see Annex 4).

The study revealed a high level of awareness of climate change. The participating companies are already taking action to reduce their greenhouse gas emissions. However, there was evidence that companies are having difficulty in looking deeper into the issue, and in planning a strategic response to its longer term effects. The problem was cited as too complex and with unusually high levels of uncertainty.

In an attempt to simplify the problem and understand where companies have the most doubts, three key findings have been defined and examined in this report.

First, companies are seeking assistance in translating the scientific information available on climate change into information upon which they can make strategic or investment decisions. Companies need a clearer picture of how the economics of the marketplace will look once society has begun to adapt to climate change.

Secondly, an important driver of changes to current business practice is the policy framework that will, inevitably, be put in place. The interviews resulted in a clearly articulated wish for an analysis of potential policy options for addressing climate change. A better understanding of the impact of changing legislation and regulation on business was considered critical to inform decision-making at board level and place climate change at the centre of company strategy. Legislation is also tightly coupled to consumption patterns, including public procurement, and thus to the future financial picture for business.

Thirdly, at the centre of the framework, the individual within the company is a key player. Each individual is not just business leader or employee but also citizen, consumer and voter. There was agreement throughout the study that an important task to undertake is the integration of climate change into the very centre of education – particularly business and economics education. Education of current managers and the sharing of best practices between businesses were also considered critical.

Corporate leadership is now slowly emerging. The picture emerging from the study was that while energy companies are now discussing climate change at board level, most companies are still asking their corporate communications departments or those responsible for the environment to manage the issue. For these companies, planning for a new marketplace that is sensitive to climate change has not started. It seems that, while accepting climate change as a reality, they are still struggling to picture how it will transform their business through altered consumption patterns, new legislation, rising costs of raw materials and logistics.

To better understand the position that business leaders find themselves in, a new knowledge base and new conceptual tools are needed. Part II of the report presents ideas for some such tools or conceptual models that will aid the evolution of business thinking in the face of climate change.

The conclusion of this study is that any attempt to provide assistance to the business community in tackling climate change strategically must go to the very heart of the issue – the difficulty that today's business leaders have in addressing the complexity and far reaching consequences of climate change on the market place.

Inspired by this conclusion, this study presents a proposal for a new curriculum for business education and a new research agenda into climate change and corporate strategy. This stems from the fact that the business community requires a better grounding in systems thinking and an understanding of the ecological and social context in which they operate. This must be provided by business education. Moreover, a financial representation of the costs of business activities to the ecological system would enable leaders to start to address the deeper implications of climate change to their business. Taken together, a proposed new research agenda and a new approach to business school curricula will both prepare to change the mindset of business leaders, and provide the fundamental materials to ensure a proactive business approach to climate change.

PREAMBLE

Climate change is, for the first time, forcing mankind to take stock of his relationship to the natural world. Before approaching the topic of corporate strategy and how business is addressing the challenge of climate change, we reflect briefly on the system which is their market place, and how it has evolved over the millennia.

All human activity takes place in a wider ecological, social and economic context. Humans as a species are indeed an integral part of the ecological system, as are millions of other species. We developed economic activity for our survival, welfare and wealth and this economic activity depends upon the transformation of energy, matter, water and air. Our present society is based on 200 years of incessant technological change in the pursuit of higher productivity and economic growth. In parallel, the human species has, during this time-span, multiplied at a rate unique in history. Technological change has made the growth of the human species possible and the growth of the human species has made economic activity explode at an unprecedented pace. Over this time, humans organised themselves into communities to improve productivity and security. Corporations are one such human community, focussed on the pursuit of profits and growth.

Human behaviour and the application of our technologies are now causing major imbalances in the ecological system – of which man is a part. We have been oblivious to the effects of our cumulative actions. Knowledge of our relationship to ecology has been incomplete, disorganised and very unevenly interpreted by cultures, value systems, religions, political ideologies, and levels of human development across the continents.

It has only been the piecemeal emergence of nature's reactions to the activities of Man that has made us aware of disturbances, new risks, new dynamics and new interdependences within the ecological system. These reactions are now better and better understood by scientists from a large variety of disciplines. We are starting to be able to understand the big picture. We are starting to understand Earth as a system and a number of thought leaders are providing us with attempts at mega theories, like James Lovelock's Gaia Theory. The scale of the problem is now emerging.

Innovation and technological change will be a necessary but not sufficient ingredient for dealing with the problem at hand. In the end, it is the change of human behaviour, lifestyles, social organisation, economic behaviour and governance that will secure the necessary change for our survival.

There is an emerging consensus that the problem of climate change is a common problem, that is, a political problem. Individual corporations can develop new technologies, new markets, new products and services, but they can only act with confidence in response to consumer demand. New innovations can only succeed if the consumer accepts them – and consumers can only buy innovations that are made available for purchase. Policy instruments influence both manufacture and price. The media and NGOs stimulate debate that further affects consumer choices. Thus, the market system depends on a tightly knit web of inter-

dependencies. This whole system must undergo transformation together to respond to the challenge of climate change.

This report seeks to capture the status of corporate thinking regarding the position of business in this society-wide response to climate change and builds on conversations with senior representatives from global corporations who have tried to articulate their needs in facing this challenge. The following chapters present and then analyse the study findings. The core challenge of climate change is the combination of its scope and ubiquity, its systemic nature and its complexity; energy use is responsible for climate change and energy underpins every aspect of our current lifestyle. It is clear that, just like the rest of us, corporations – the drivers of the economy – are facing a change to their business context that they do not fully understand.

PART I: DETAILED PRESENTATION OF FINDINGS

UNDERSTANDING HOW CLIMATE CHANGE IS CREATING A NEW BUSINESS ENVIRONMENT.

The strongest learning from this project is that even the front runners of the global business community are not finding a path through the complexity of the market-wide transformation destined to occur as a result of climate change. Scientific data generated by the research community has not been translated into information that business can use. Temperature change, melting ice, rising sea levels, fresh water shortages and extreme weather patterns will translate into changing energy prices, water rationing and altered consumer lifestyle choices – among many others. Companies will need to understand these changes and respond.

> *"The place where there is the least research being done is on adaptation. What is going to be needed to be done and where is it going to need to be done, to help companies and communities adapt to a climate change future – because it is going to occur, it's just a matter of degree."*
>
> *"We tend to view climate change as an energy generation issues, we need to look a lot more on the demand side."*

Most interviewees recognised the systems nature of the climate change challenge:

> *"[We need to] create mutual understanding on what must be done in different areas of society; business, academia, NGO's, the political system etc."*

But within all participant businesses, it is either an advisor or corporate social responsibility department that is asked to take care of climate change and then report to the board.

> *"It will be discussed at board level when we give them an update on the progress of our environmental and sustainability strategy."*

Unlike other more familiar business risks, such as launching a new product, the short term costs of steps to mitigate climate change are not being calculated in relation to long term financial risk or business opportunity. This is due to an incomplete understanding of the complex effects that climate change will have on business in the future.

A frequent request during the interviews was for assistance in simplifying this complexity. Companies require a translation of the scientific information on climate change into scenario illustrations of possible new business environments, not least from an economic perspective.

> *"How would the fundamentals of how we do business change over time in the face of the potential disruption we will experience over the next 30 years? We need scenario planning and thought leadership."*

In some companies there are pockets of awareness; managers who see climate change causing difficult to predict effects on their market predictions for long term business.

> *"Some units have done scenarios, e.g., for China. Many of the global markets look very positive until you factor in the effects of climate change on water scarcity and fights over oil as the prices rise – when the fundamental assumptions of this market will dramatically change."*

Some see big changes ahead which would seriously impact their core business:

> *"What structural changes are expected? When will transport be so expensive that the transport structure will change?"*
>
> *"It's a big concern as to whether climate change will have a big effect [on health]; increased morbidity rates, increased disease vectors changes, in the sense of diseases being in places they have not been previously"*

Ultimately, the major worry to the business community is the resulting costs to the bottom-line and, beyond the business, to economic growth in general.

During the interviews for the current project, it was clear that there is a need for a business-focussed approach to understand the financial implications of climate change, using

the language of risk and opportunity. A thorough financial analysis of climate change would move the issue out of the environment box and into the core business discussions.

> *"If I want to persuade our managing board that this is a major issue, I [should] talk about climate change in financial terms, in economic terms, in market development terms, in GDP terms, then [they'll] really understand."*

The two financial questions that need to be tackled in a business strategy are the cost to the business of changing current practice, and the long term effect of climate change on business success. A fuller comprehension of these two areas and of the cost-benefit equation is currently missing.

> *"We probably do not have the necessary knowledge to do the risk analysis on the impact of climate change on the business."*

There were a number of clearly exasperated comments regarding the need to convince shareholders that any significant investments related to climate change were a valid part of a business strategy.

> *"A big issue for company strategy is the view of the financial community that sees the cost of everything and the value of nothing".*

The financial community is, however, beginning to stir. Initiated by the United Nations, the UN Institutional Investor Summit on Climate Risk recognises the central role of investors in both stimulating and supporting the scaling up of new technology. This group, which has now convened twice, recognises climate change as a risk that requires concerted action from the business community. The below quote is from the introduction of a call for action to all financial sectors from institutional investors, companies and governments, written in 2005:

> *"Recognising that climate change embodies risks and opportunities of a significant magnitude for investors and our economy, and represents one of the greatest challenges facing our planet, we are compelled to seek improved approaches in responding to the fiscal ramifications of climate risk for institutional investors, fund managers and financial advisors, companies, and others."*

Some companies felt they had shareholders who would support a wide-sweeping strategic response to climate change, but for most, high returns on investment and business growth are still considered the key drivers and thus a significant consideration for strategy development.

> *"You can't spend 10 billion unless you know you are going to make a profit because there is a whole set of shareholders who will quite reasonably complain, asking why we are imposing a climate tax that our competitors do not impose upon them."*

A more general request from all companies interviewed was for some clearer 'economics of climate change', that would reflect the costs of potential legislation and the disruption that the physical changes climate change may bring to the wider global economy.

> *"There are still a lot of people who claim that trying to address climate change is bad for the economy"*

The overall economics of climate change is still in its infancy. Companies eagerly awaited the now published Report from the Stern Review on the Economics of Climate Change commissioned by the Cabinet Office and Treasury of the UK Government. We now know that the author, economist Professor Nick Stern, indicates that considerable extra costs will be incurred by waiting to address the rising emissions rather than investing in changes now. It remains to be seen whether this report will provide the clarity that the business community was waiting for.

In the States, the Carbon Mitigation group, working at the Princeton Environment Institute as a partnership between Princeton University, Ford and BP, has developed the Wedges approach. This model identifies ways to cut emissions using existing technologies in such a way that costs of mitigation can be estimated.

Critically, all interviewees felt that the debate on the economics of climate change must start in earnest.

> *"I would really like to move from that scientific debate to more on the economic debate, as I think that is the biggest constraint."*

THERE IS CONSENSUS THAT PUBLIC POLICY MUST SUPPORT CHANGES IN CORPORATE STRATEGY. PROLONGED UNCERTAINTY REGARDING THE FORM THIS POLICY WILL TAKE CAUSES CONCERN.

All companies interviewed felt that public policy will need to underpin any corporate or social response to climate change. All interviewees lamented the fact that that no clear statement of direction is emerging from policy makers, global or national.

> *"Here in the US, the lack of clear federal mandates on emissions is a problem. It would be much easier if we knew what the targets were."*

Costs to business from climate change will be linked to policy. Corporations currently do not know whether their future business environment will be shaped by punitive legislation or policy that stimulates certain markets through incentives.

> *"Certain industries know what they want. For example, the utilities, when planning to build a new power plant, need to know the costs for operating that plant going forward so they can cost it in. For the auto industry – although they would never say this publicly – they need to know if they are going to be held accountable at some point for the emissions that result from people driving their vehicles."*

Interviewees did not express strong opinions on which type of regulation may achieve optimum results for the climate and penalize business least. There was, however, agreement that research was needed to identify policy tools that could stimulate innovation, and create a customer base and marketplace favourable to 'climate-friendly' products. Unsurprisingly, a preoccupation for companies was that any policy should ensure a level playing field between competitors.

There was a hint of realism among companies that it would take time for leadership to emerge from the corporate world.

> *"Even the worst case scenario with respect to transport or energy would not stir our supply chain leaders because they would be perceived as something that would affect everyone."*

This illustrates a business reality – not all companies are front runners. There is therefore a need for policy to stimulate innovation. But, companies see a stalemate at the moment.

The only clear action taken to date that would drive global companies is the Kyoto protocol, with the European Emissions Trading Scheme the only initiative in implementation stage. These two do not provide enough clarity or security for companies operating in many different markets across the world to plan strategic investments, changes to business strategy, or even predict their markets 5 years from now.

> *"We're in a bizarre catch 22 situation - governments feel they can't act because it may penalise or antagonise the corporate environment. And companies, who see the challenge, would potentially invest in either solutions or other forms of climate mitigation, but need the certainty of long term regulation."*

There was agreement that informed business leaders can encourage national policy making, and even, as with the Gleneagles process, influence global forums. It is clearly working at State-level with California taking a lead position:

> *"… one of the reasons Schwarzenegger signed the legislation was because he'd seen business leaders in our meeting saying it was a good idea."*

A wide analysis of existing legislation and the identification of best practice legislation would be welcome by many interviewees. One interview identified as a potential area for study the different legislative approaches in the UK and Germany for stimulating use of renewable energy.

> *"Germany took a much more holistic view – 270 pieces of legislation that in one way or another went to support building of the renewables [market]. … [they] looked beyond price and recognised that they needed to align a whole set of people. In the UK, people would have said that that was interfering with the market."*

The power of cross-border policies to resolve blocks to progress was discussed, with the lack of a co-ordinating system for rail transport across Europe mentioned as an impediment to a climate-friendly supply chain.

> *"[There is] lack of innovation in society in the area of transport. The railway system in Europe does not help business move towards sustainable modes of transportation. An efficient European railway system is a way to reduce use of trucks and thereby considerable reduction of CO2 emissions. If this could be solved there would be an enormous impact on climate change in Europe."*

In both the Gleneagles statement and the principles from the UN Institutional Investor Summit, public procurement was cited as a powerful agent for change, not only in creating a secure market for climate-friendly products, but on the support this gives in the form of a public statement. This view was echoed in our findings.

> *"Public purchasing could influence much more by setting purchasing rules that benefits environmentally sound products and services."*

An important insight was that the positioning of climate change under environmental legislation has slowed its integration as a topic critical for sustainable economic growth.

> *"Without politicians willing to take it out of the box and treat it as an integral part of public policy, as defence, as healthcare, it remains as a subset of the environment, which is something that is necessary but not a principle driver – not something that you worry about to deliver economic growth."*

This mirrors the positioning of climate change within corporations as a Corporate Social Responsibility topic.

Finally, some recognised that effective legislation may not be in place in time to enable changes to be made as fast as is needed. This discussion raised an important question.

> *"How can companies respond to the challenges of climate change with the inconsistent or inadequate legislation (which is reality) that does not level the playing field – particularly with respect to competing with local businesses that do not operate to any internationally agreed standards?"*

This quote raises an additional question of how to manage extra risks that are associated with being a first mover. Such risks could, perhaps, be diminished by incentive schemes.

PUBLIC AWARENESS, SHIFTING DEMANDS, CUSTOMER CHOICE AND CHANGING MARKET BEHAVIOUR MAY POINT TO AN IMMINENT TIPPING POINT

Leadership from the public arena has been slow to emerge, but the number of forums, both public and corporate, new research projects initiated and the volume of writings focussing on climate change has ballooned. The media has only recently adopted climate change stories as worthy of newspaper front pages and long TV features. Reports of both the flow of scientific research and the bold statements of public figures are now appearing daily.

A true response from the general public seems to be only emerging slowly, however, and business is cautious to move too far ahead.

> *"Our bigger problem is that there has to be a customer. It is not clear who the customer is."*
>
> *"What will be the signals from the consumer that will help companies adapt? They are not currently sending signals to cosmetics manufacturers telling them to use less packaging"*

In the present project, all companies interviewed were already looking at energy efficiency and reducing emissions. Only two companies are considering steps beyond this, such as investing in new product development, as a means to tackle climate change and prepare for a new business context – and even these two are not making significant changes to the core business just yet.

In most cases, this is because they don't feel the market is ready.

> *"How can we be sure that the political and public support will be in place after 2015 for the necessary investments to be made now? Is there a way to research the movement of this consensus such that companies feel able to rely on that being in place?"*

Frustrations regarding the lack of pull for climate-friendly products from consumers came through clearly in several of the interviews.

"An interesting area to research is therefore people behaviour and what is stopping them from buying environmentally sound products and services? The technology is there, the products are available and affordable. For example, customers are changing mobile phones twice a year but do not change energy supply to renewable energy. What does it take to change attitude?"

There is a role for public policy to change people's purchasing habits, thereby stimulating a market that is in someway disadvantaged at the outset.

"How can policy makers play a part in consumer choices? Fiscal policy can have a huge impact on what people do. Are there other mechanisms that could be encouraged?"

For some, the relationship between politicians and voters, who are the ultimate consumers of commercial activity, is the one that will resolve the stalemate.

"…when you move climate to being as important as health or defence – things that the general population holds the government accountable for, then…you build that consumer/voter concern and awareness. My view is that if you get these two right, you will never have to build business strategy, because once you have a customer, business will move remarkably quickly, changing to serve that customer."

However, according to most, politicians were not creating this change and developments in the media and marketing may shape consumer choices more strongly than policy.

"I'm hopeful that we are at a tipping point [with climate change] where business and companies like ours can create the consumer, like the computer companies have done. No-one knew they needed and iPOD 10 years ago, and now everybody needs one. We need to teach the consumer that they need a more sustainable product"

The tightly inter-related market system in which companies operate was described as causing paralysis by some interviewees as they wait for pull or push from either side.

> *"We only do new things when our suppliers or customers ask for them."*
>
> *The principle thing that is missing is the right supply side capacity. We need to build suppliers and contractors, and the skills there.*

For manufacturers of fast moving consumer goods, there has been a recent, unexpected stimulus to the market for products that promote good environmental practice in the form of the new strategy from Wal-Mart. This is a clear illustration of how a belated partnership between manufacturers and retailers can create change.

> *The role of the retailer – our direct customer – is key. The new strategy of Wal-Mart has changed the attitude of [our] US business dramatically – from those who resisted sustainable initiatives most, to the business demanding precisely this.*

It is difficult to predict from where the first moves toward substantial change will come. This situation differs from a normal business environment assessment in many ways, not least because of the depth of change necessary, its potential to redefine lifestyles and thus significantly change markets. A tipping point may occur where consumers desire to prevent protect the planet for their children causes a change of consumption patterns so abrupt that corporations are simply not prepared.

The emerging need for assistance in shaking out of this paralysis led to the coining of a phrase during the interview process, namely "choreography for change". Some companies are waiting for a choreographer to emerge and show then the steps.

Companies reflect the voice of the individual in society, by responding to the consumer and through the knowledge-base and values of their leaders and employees. The lack of awareness throughout the business was cited frequently as an impediment to progress in addressing climate change. New graduates joining the company, particularly those who have studied economics or business, were considered unaware of sustainable development in general and climate change in particular, as part of the future business environment.

A current lack of awareness of climate change within business means that the need to enact significant change now is not universally recognised.

> *"When you match up what are the most important sustainability issues, material to the business and the competitive environment we are in, climate change does not map out as a highly material issue, based on where we operate. We see the risks associated with climate change, the actions [reductions in emissions and energy saving measures] that we have put in place are in balance at the moment – for the business"*

To counter embedded resistance within companies, all interviewees agreed that climate change should be integrated into the higher educational system. Both universities and business schools must provide the view of climate change as an integrated part of economic growth, technology and general knowledge, not as a sub-set of environmental studies.

> *When people are learning environmental scanning for business, climate change should be part of that as it is a key element of the business environment. It should be embedded in business thinking. We should be making sure that people who are running businesses are doing some kind of scenario planning that enables them to make good strategic decisions.*

Despite this awareness of the need for a wider knowledge and awareness of climate change in business schools, no-one in the interviews acknowledged the complexity of this pedagogic task. The role of ecology and philosophy in developing a systems understanding of the global marketplace and its social and natural context is not recognised. This reflects the common educational background from which today's managers graduate.

Regarding the role of general employee awareness, and their role as citizens and voter, the need to 'spread the word' was mentioned several times; with all business leaders interviewed applauding the efforts of Al Gore. Another key area regarding communications that emerged was the importance of sharing best practice among companies who succeed in changing internal culture.

> *I think [Company] would be encouraged to take this lead if it were presented with other success stories, tangible initiatives*
>
> *"Another thing that leaders do not realise is the power of their statements in public. If a large business says publicly, for example, that from the year X they will only allow carbon-neutral fuelled cars in their global business fleet – this will have an enormous impact on the car manufacturers"*

Leadership is needed from the corporate world. It is emerging slowly in high profile as individuals such as Lee Scott, Richard Branson and Rupert Murdoch make public statements of commitment to change. All eyes will on them now to see whether there will be a deep transformation to the way each of these leaders then run their businesses to follow their words. This is a key step to providing a guide for the wider business community, particularly for the smaller and medium sized companies for whom risk taking is even more challenging for their survival.

A note regarding the findings from this study is that the interviews were carried out in August 2006 and painted the above picture of the situation regarding climate change and corporate strategy. Discussion of the topic has been moving remarkably fast since then. While it is important to bear in mind the timing of the interviews, the findings and conclusions remain relevant.

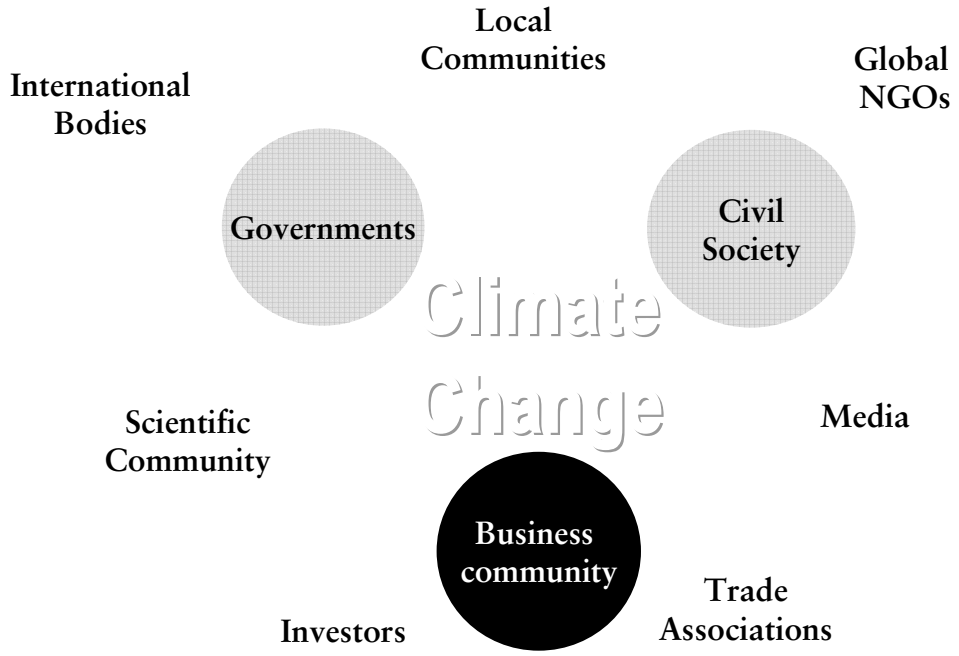
PART II: ANALYSIS – CLIMATE CHANGE AND CORPORATE STRATEGY

In the past chapter, we presented the main findings of the interviews conducted for this study. In this chapter, we draw out the main messages from the study. To do this, we have chosen to structure our analysis in three parts using diagrammatical thought models that illustrate the key concepts that have been discussed. These models scratch the surface of the more extensive work that would need to be done to illustrate these concepts.

First, interviewees lamented the complexity of the system response needed to address climate change. We present a simplified graphic to analyse this inter-related system that we call the market place. In this part we also illustrate the time scale for some of these changes. Second, we illustrate how corporations are moving at different speeds with regard to the evolution of their strategic thinking with respect to climate change.

Finally, we assess how the different sections can be brought together through systems thinking. This model places the role of the individual as central to the whole system and illustrates how the impact of climate change on the company and the strategic planning for a climate-sensitive future depends upon personal actions. This thinking leads us to make our conclusions and a proposal for research in the field of climate change and corporate strategy.

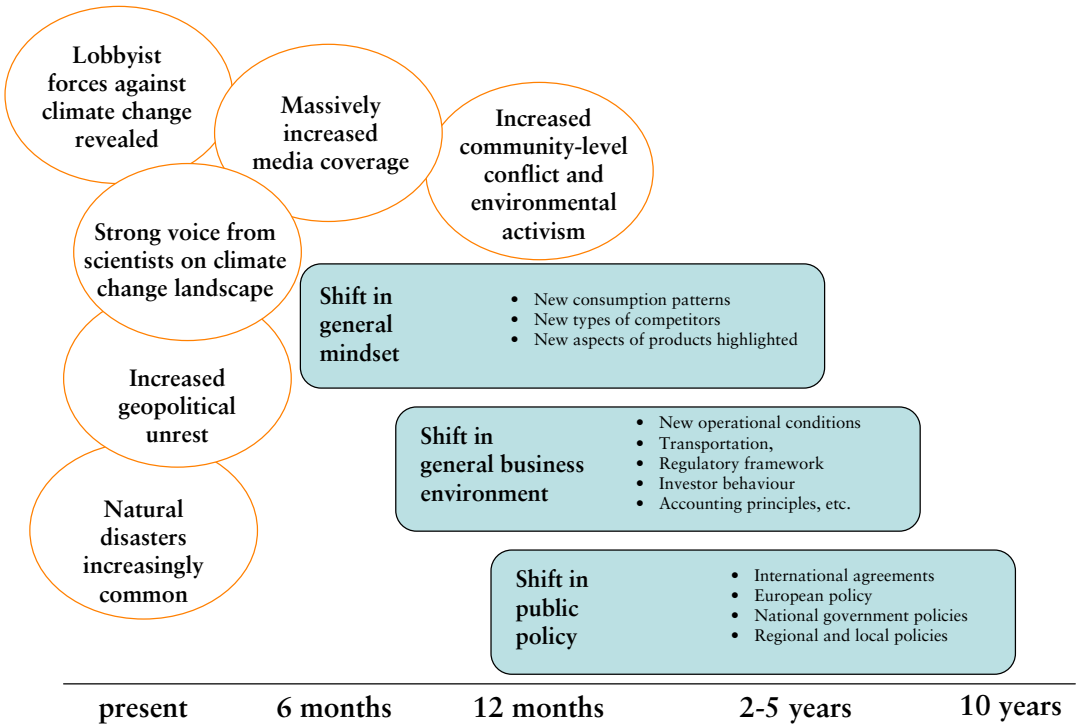
MODEL ONE: THE BUSINESS COMMUNITY IS ONE OF MANY INTER-RELATED PLAYERS TACKLING CLIMATE CHANGE



Climate change is a systems problem, and companies sit within the same ecological system that includes their suppliers, their market and wider society. Each of these individual stakeholders are uncertain of the role they need to play to address climate change in relation to other sectors of society. Figure 1 presents a scheme of the major players and seeks to illustrate how these all exert pressure on the three major institutions in modern society, the government, civil society, and the business community. The individual plays pivotal roles in each of these institutions, as voter, citizen and consumer that will determine the outcome of any attempt to change the system.

Companies say that they can only make what they are sure will sell and market research does not yet say that the consumer is ready for climate-friendly product. But on the other hand, consumers can only respond to clearly presented new ideas, or new products that are on the shelf. One interviewee admitted: no-one knew that they needed an iPod ten years ago. Maybe the consumer does not always lead.

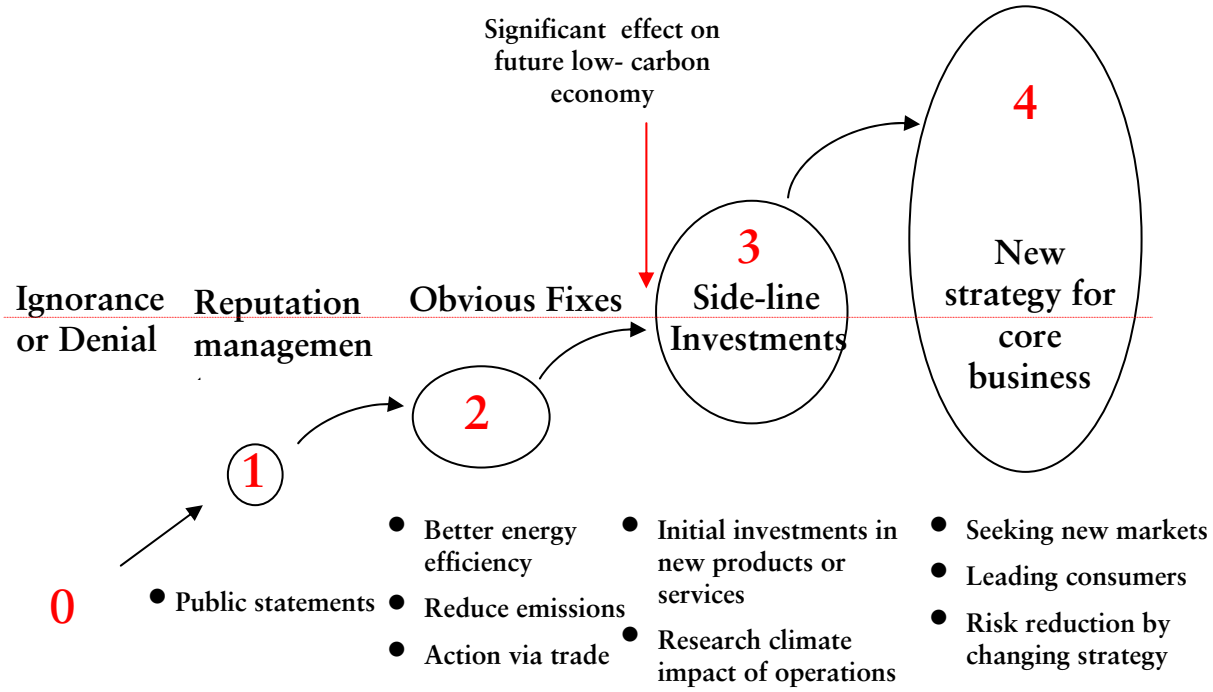
The uncertainty over who should respond to climate change first, and how, causes a paralysis, be it the company itself, its customers, its suppliers, or, indeed, the regulators of industry. Each player in the system waits for the others to move. Companies are currently not prepared to take a risk, for example, that there are no buyers for their products, no return on investment, or that they lose out competitors in the market place.



The figure above shows that changes within wider society are already taking place as a result of climate change and that more are expected. Smaller signs of change are also now appearing everywhere within society in response to the climate problem. Each change has repercussions on other sectors, nudging each to make small adjustments to their behaviour toward the creation of an economy that is sensitive to climate change. It is increasing clear that this must eventually emerge.

An alternative scenario to this gradual nudging change is that there will come a tipping point in which the whole system will be convulsed by a sudden change, in which companies will be the ones that take the largest hit if they are unprepared. The effects of this evolution on each and every business, whether gradual or abrupt, will be profound.

MODEL TWO: DIFFERENT PHASES FOR COMPANIES AND CLIMATE CHANGE



Climate scientists have recently expressed frustration at the slow pace of acceptance from the business community that climate change is relevant to them. The interviews in this study clearly showed that companies are responding at different speeds to possibility that they may need to adapt their business models to climate change. As with most situations requiring change, the early stages are characterised by denial:

1. Denial – "It is not true"
2. Denial of relevance – "It is true, but it is not happening us"
3. Denial of urgency – "It is happening us but not now"
4. Denial of responsibility – "It is happening us but someone else is taking care of it"

The size, sector and leadership of business are all critical in determining how quickly the board can leave denial behind and begin to plan a response to climate change.

The graphic above shows four stages of corporate response to climate change, each deeper in its considerations of company activities. When major changes to emissions and energy efficiency in company-wide activities are made, and the core business has been assessed competitivity in a climate-sensitive future, the company can be said to have started to reduce the climate change risks for future generations.

Many businesses and even entire business sectors have not begun to see the relevance of climate change to their daily activities. These are stuck at a stage of denial that we call phase 0. Once past this phase, the evolution of a company's response to climate change can be described in four progressive phases.

Phase one is represented by an early awareness of climate change and an acceptance that it is a problem for society. A typical reaction to an emerging external issue is for those responsible for a company's reputation to be asked to generate appropriate public statements and to scan company operations for practices that are not in-line with these statements. Examples of areas that risk earning a company the reputation of being climate "unfriendly" are the unnecessary use of excessively energy-intensive raw materials or activities that clearly waste energy.

In phase two, a company will begin to ensure that they have addressed the more pressing concerns regarding climate change, such as taking steps to improve energy efficiency and begin to reduce of emissions of greenhouse gases. These will be, however, only be the easily avoidable impacts on climate change that also save money, such as reducing energy wastage in offices and factories. In phase two, no significant investments in re-engineering factories or any changes to core business are made.

The internal mechanism to implement this second phase of response to climate change is often by setting targets. All the companies we interviewed are taking phase two activities seriously, although there are some highly advanced approaches to both energy efficiency and emissions reductions that could be implemented should a serious response to climate change become a core part of business strategy.

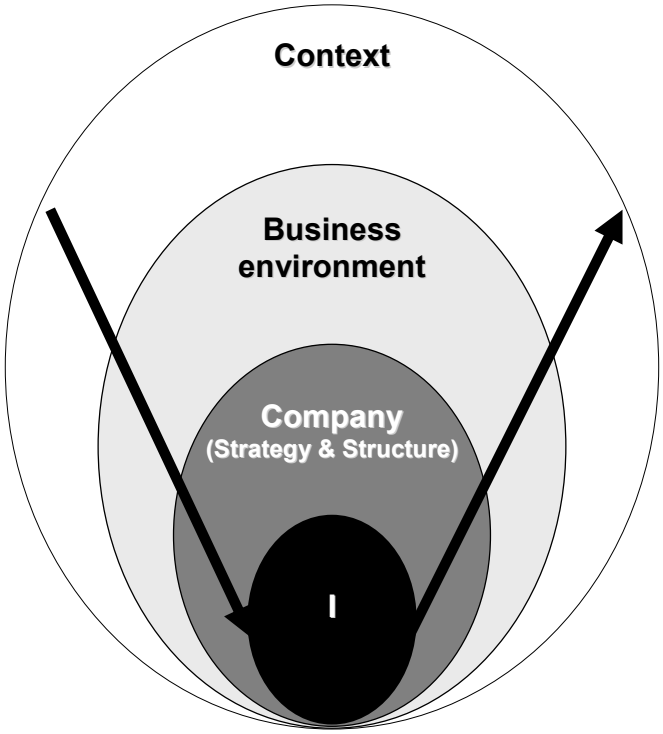
The third phase is where a company recognises that the future may require substantial changes to the core of their business strategy. Here it may make investments in climate-aware innovations within its existing sector of operations and investigate an alternative focus for a business model. Investment may also be increased in the activities it was undertaking in phase two, such as the purchasing of emissions free energy, changing certain manufacturing practices, or reviewing their approach to transport. The core of the business strategy, and thus the main engine for growth and profit will, however, remain unchanged.

Phase four is the point when the actual core business activity of the company alters to respond to the demands, risks and opportunities brought about by climate change. Significant investments are made in new areas, and the core business focus begins to shift towards a new way of working, new product lines or services, new primary materials and a new approach to interacting with the ecological, social and political system in which the business sits.

Many companies, mainly smaller, mainstream businesses, are not yet in phase one. No large businesses have yet entered phase four, although some niche companies, often small or medium sized enterprises have emerged with a core business based on climate-aware technology, products or services.

The companies interviewed for this project were almost all well immersed in phase one activities, were aware of the problem and are making assessments with respect to emissions and energy efficiency. Some had gone beyond managing their emissions and were assessing their product portfolio and its position in a low-carbon future. Pockets of denial, however, still remain. Within the interviews some comments indicate that not all businesses are feeling either the urgency or the responsibility to respond, stating that they are not a key player in finding the solution for halting climate change.

MODEL THREE: THE INDIVIDUAL AT THE HEART OF NECESSARY CHANGE



Climate change is an issue towards which it will be increasingly hard to only have a rational, professional attitude. Its impact, ubiquity and complexity are unparalleled. Still, we need tools to aid our thinking and our discussions, through which we can place the climate change issue in perspective. The figure above, called the "onion", can provide one such tool.

It presents a graphic description of the different layers that surround a decision-maker, an individual – in this case for instance a corporate CEO. In a generic discussion (regardless of the issue) we can place this person quite naturally at the centre of his/her world. Around, in a first layer lies the organisation, its structure, strategy and operations. This organisation however, does not operate in a vacuum, but rather in a market, a business environment with customers, suppliers, competitors, investors and other stakeholders. Finally, this market itself is embedded in a context – social, political, economic, technological and ecological.

In a more climate change specific description, again applying the model to a corporation with its CEO at the centre, the same illustration can be used (this time described from the outside in): The context is provided by the knowledge-base around the issue in our societies – rapidly evolving science and the highly dynamic general discussion. The operating environment is dominated by the evolution of those factors that influence the company's climate change stance and strategy: regulatory frameworks, consumer behaviours and behaviours of other stakeholders, etc. Then, inside the organization itself, the issue has a dynamic of its own, affecting different parts of the operations in different ways. And finally, the individual tackles the question from the perspective of his/her own standpoint.

From the perspective of change and change management, the "onion" emphasises two things. Firstly, the fact that genuine and profound change of an organisation stems from changed mindsets in the people that form the organisation (beginning at the decision-making levels, but spreading throughout). And secondly, that the change process must involve clarifying for the individual leader the nature and scope of the shifts and changes in the context, in the market/business environment and in the organisation (symbolised by the arrow on the left) before discussion how the individual's new behaviour and actions can influence each layer going out (arrow to the right).

These models help to centre our thinking on the task of the individual who, at a time of transition, must be in a position to not only grasp the challenge but also see where, in the words of more than one interviewee, there are levers that are in his/her power to pull and create change. The study findings recounted that business managers and leaders are not clearly seeing either the problem or the areas where they are responsible for creating change. By looking at the problem schematically, the complex challenge of climate change to the business community can begin to be unravelled.

PART III: CONCLUSION AND PROPOSAL FOR RESEARCH

It is taking all sectors of society some time to digest the news that the climate is changing and that this will significantly alter the conditions in which we live and conduct our business. The course of scientific consensus-making has now come to an end and the next task is for society to respond. This study has looked specifically at the response of global corporations and how research can stimulate the change process needed from this influential sector of society.

Scientists around the world are generating data predicting dramatic changes to the world's physical environment. These data are essential to the progress of the debate. Still, they do not describe how climate change will play out in terms of the physical, social, legislative and economic environment in which business will find itself in the next 10 to 15 years – or even for the remainder of this decade.

Climate change is a true systems problem. It cannot be addressed without a long term viewpoint or an understanding of the interdependencies between the business environment, wider society and ecology. To survive and flourish in a future where the operational impacts on the climate must be tightly controlled and where the physical environment is increasingly unpredictable, an evolution of thinking by business leaders is needed.

The obvious omission in business operations and economics of the costs to nature needs to be rectified. This can only be done by introducing a deep appreciation of the global social and ecological system in which business sits. For this to take place, a new approach to educating the business leaders of the future and a well-grounded systems-based cost analysis are required.

Today, climate change is generating extraordinarily high levels of uncertainty in the business community, resulting in inaction. Uncertainty regarding climate change covers four critical areas.

What will happen:

- Uncertainty regarding the physical consequences of climate change and the speed and severity of change
- Uncertainty regarding the consequences to the business environment, in terms of nature, timing and costs of the changes

How to act:

- Uncertainty regarding the role played by business in influencing the response to climate change of society as a whole
- Uncertainty regarding the critical actions to take within the business, and the cost and efficacy of these actions

This study clearly showed that companies are navigating within existing business models in their approach to the climate change challenge. There is little sign yet that any boards are thinking about changing core business practice, or even evidence that this is considered a possibility. As scientific predictions of even graver effects of climate change continue appear, these business models will be challenged. For example, companies base their models on the current market economy, and legislators assume that small adjustments to this market economy will provide a route out of the problem. These assumptions may not hold. Another assumption by business is that the necessary speed of change requires action from policy makers. But will political leadership be sufficient or must business leaders play a role?

The findings in this report highlight three areas where interviewees indicated a wish for greater clarity. 1) The financial implications of climate change for business. 2) The characterization of an optimum legislative framework. 3) The design of a pedagogic approach to integrate climate change into the way that people think about the business environment and corporate strategy. Although companies participating in the project differ in the level and depth of their appreciation of the climate change problem, the above three areas of need emerged from all nine interviews.

The report concludes that companies are asking for help to manage the complexity of climate change, before they can begin adapting their strategy. In our analysis, it became clear that the heart of the issue was the management of complexity at the level of education and approach to business as a part of the wider system. The request for a better understanding of policy tools and a policy framework for climate change is a specific area of study that can be developed elsewhere.

In addressing the central issue of understanding how to prepare business and its leaders for tackling climate change there is an important role for a player such as MISTRA in initiating new research in this area. The study conclusion incorporates a research proposal that MISTRA could instigate in order to accelerate the necessary changes in the business community.

We propose that research into Climate Change and Corporate Strategy should be approached in two parallel segments: first, the definition of a new research agenda exploring how climate change can be integrated into business strategy, specifically the development of new methodologies for integrating the costs of ecological effects and environmental depletion into the cost structure of a business; second, the design of a new curriculum for educating business leaders of the future, and training current executives.

By funding this research, MISTRA will encourage sustainability thinking in the business research community. When faculty and researchers in business schools spend time probing more deeply into the need for a systems-based approach to the true cost of doing business, this thinking will more automatically feed into and shape the education of both current and future business leaders.

CASE FOR A NEW RESEARCH AGENDA

A new research agenda is required that explores how climate change can be integrated into the core business strategy of a global company, and develops new methodologies for calculating the full cost of business today to the ecological systems that support us.

Climate change will impact global businesses in all areas, from investor relations to supply chain practices and relationships with customers, suppliers and legislators. Operating in this new business environment will demand a change in strategic thinking. What would a corporate strategy (or business plan) that fully addressed the impacts of climate change look like? We recommend that MISTRA fund research into how to rework a business strategy such that it is appropriate for a climate-sensitive future marketplace.

Areas to include in this investigation are*:

Strategy
- How to deal systemically with issues that affect the entire company (e.g., first wave environmental awareness, IT, Y2K, etc.).

Leadership
- Interactions between company leaders and legislators in developing public policy.
- Motivating cultural change throughout a business – beyond awareness raising.

Finance
- New methodologies for accounting for costs to the ecological system (see below)
- The financial implications of climate change on P&L, both in the short and longer term, referring to the work of centres such as Harvard, Potsdam, Tyndall.

Marketing
- Customer behaviour change (choice, levels of consumption, etc)
- The role of marketing, R&D/innovation and even the entire business model in consumer lifestyles.

Organisation
- Integrating climate change mitigation into the fabric of company operations, looking beyond energy efficiency measures and emissions controls.

Operations and logistics
- Strategic risk management and climate change – identifying and mitigating risks throughout the company, from manufacturing sites to transport.

The ecological costs of business practice are currently excluded from companies' finance and balance sheets. Current product life-cycle analyses typically excludes activities of the entire business, such as executive air travel, fleets of cars and the impact of company activities on fresh water reserves, etc. A methodology for developing a comprehensive cost/benefit analysis that addresses impacts of daily business activities and products on the planet and climate is needed. A small number of representative products can serve as tools for this research, such as a car, a standard 'ready-meal', a mobile phone, a cosmetic, a pair of training shoes and a piece of furniture such as an office chair.

(*This list suggests example areas to be investigated. It is not intended to be conclusive)

Based on this new approach to the climate economics of business, it will be come clearer to global companies how they can integrate climate change into business strategy. Moreover, the methodology developed by this research will underpin the teaching of a new curriculum for business administration and economics.

CASE FOR DESIGNING A NEW CURRICULUM

The leader of a corporation today will not be able to steer a business towards success in the next few decades without an appreciation of the system, both social and ecological, in which the business operates. The business community thus requires a systems thinking-based curriculum for business and economics schools, and for executive training colleges.

Climate change has shown without doubt that to avoid the mistakes of the past industrial age, education for business leaders must provide a thorough grounding in the components of systems thinking and manage to instil a capacity for managing the inter-relatedness of these components.

The educational systems from which current business leaders emerge rely to a large extent on a reductionistic approach – breaking down complexity into disciplines and into manageable parts. While tools for managing both the complexity and the uncertainty of the current challenge are therefore certainly urgently needed, climate change is a systems problem and should be addressed more fundamentally through a better education and practice of systems thinking.

The elements missing from current business administration courses are an introduction to ecological systems and life sciences, cognitive sciences, and philosophy. The goal of a new curriculum would be to achieve full integration of the thinking necessary to address climate change throughout existing programmes. Climate change is relevant to all interfaces between the company and its business environment, both internal and external, from finance to innovation, product distribution and investor relations and crucially, to the way the company activities affect the natural resource base of the planet and the fine balances that maintain not just the climate, but ecosystems, ground water reserves, air purity and soil fertility. The list could go on. A new curriculum would prepare future executives for steering business through in the new ecological reality that is upon us.

ANNEX 1. LIST OF EXECUTIVES INTERVIEWED

ABN AMRO:	Richard Burrett, Managing Director, Sustainable Development
BP:	Chris Mottershead, Distinguished Advisor, Energy and the Environment
Ericsson:	Jonas Roupé, Director of Strategy, Ericsson Global Services
IKEA:	Thomas Bergmark, Social & Environmental Manager and Evamay Lawson, Project Leader Social & Environmental Affairs
J&J, USA:	Brian Boyd, Worldwide Environmental Affairs, USA
Swiss Re:	Chris Walker, Managing Director of Greenhouse Gas Risk Solutions
Unilever:	David Duncan, Senior Vice President R&D, Home and Personal Care, and Adrian Nelson, Vice President R&D, Home and Personal Care, Strategy and Capability
Vattenfall:	Arne Mogren, Vice President, Public Affairs
AB Volvo:	Anders Johannesson, Vice President Environmental and Public Affairs and Inge Horkeby, Director Corp. Environmental Auditing

ANNEX 2: OVERVIEW OF PARTICIPATING CORPORATIONS

ABN AMRO

About ABN AMRO and its business
ABN AMRO is an international bank with headquarter in Amsterdam and its history goes back to 1824. The company focus on consumer and commercial clients in local markets and focus globally on select multinational corporations and financial institutions, as well as private clients.

ABN AMRO has four customer segments: Personal Banking, Private Banking, Business and Commercial, and Corporate and Institutional. The strategic focus is on the mid-market segment.

The bank ranks eighth in Europe and 13th in the world, based on total assets. ABN AMRO has more than 4,500 branches in 53 countries and a staff of over 110,000 people. The total assets of EURO 986 billion (as at 30 June 2006).

ABN AMRO has:
Five Client Business Units. Netherlands, Europe, N America, Latin America, Asia.

- About 20 million consumer clients and small to larger businesses worldwide
- ABN AMRO is among the world's leading players in these businesses.

Two global Client Business Units to serve clients with global needs.

- The BU Private Clients provides private banking services to wealthy individuals and families and has EURO 133 billion in Assets under Administration (as at 30 June 2006).
- The BU Global Clients serves 550 multinational clients.

Three Product BUs: Global Markets, Asset Management and Transaction Banking.

- Global Markets develops products for commercial clients across the globe.
- Transaction Banking covers all payments and trade in the bank for retail, private client, and commercial markets.
- Asset Management, one of the world's leading asset managers, operates from over 20 locations worldwide and manages EURO 180 billion (as at 30 June 2006) worth of assets for private investors and institutional clients.

Services

- Creates cost savings through consolidation and standardisation
- Focuses on further exploiting new market solutions for support services with the aim to achieve better products and services for clients at lower costs.

Group Functions

- Basic functions are governance, standard and policy setting, and sharing expertise across the company.

Segments

- Consumer Client Segment
- Commercial Client Segment

ABN AMRO about climate change and sustainability
The bank formulated their corporate values in 1997: Integrity, Teamwork, Respect and Professionalism. ABN AMRO believes sustainable development is based on creating long-term value for their shareholders, clients and employees; contributing to society; and being engaged with and transparent about what they stand for. Sustainability is defined as an "advancing globalisation; sensitivity towards corporate governance scandals; the gap between rich and poor; climate change; terrorism and a growing global population – these are all issues that raise many challenges, not just for society at large, but also for our organisation, employees, clients, suppliers and other stakeholders".

ABN AMRO and its role in the debate on climate change:
Today, ABN AMRO does not specifically highlight climate change as a key strategic issue, although it is present within their values under the sustainability label.

They state their ambition to adapt to the global changes in a proactive manner, as a leader. They acknowledge that they have a strategic role to play in addressing these issues, and therefore they take social, ethical and environmental factors into consideration in their financial services.

ABN AMRO has developed a concept called 3P – people, planet and profit – and they aim to value it in everything they do. They are, however, very clear that, although they strive for transparency, the banking business is depending on confidentiality and therefore there are limits to what they can communicate.

ABN AMRO also played an active role in initiating and formulating the Equator Principles, a set of voluntary guidelines for addressing social and environmental risk in project financing, based on the policies and standards set by the World Bank and the International Finance Corporation (IFC).

Comprehensive risk management is a core competency of ABN AMRO. They have taken a deliberate decision to position a dedicated Group Sustainable Development department within the Group Risk Management organisation. They have several new financial products that are environmentally aware, and are developing several more.
Some of the new environmentally aware financial products include:

- Developing risk management services to help clients lower climate change risk
- Trading and clearing of EU allowance futures on the European Climate Exchange.
- Trading EU allowances over-the-counter through their commodity trading desk
- Monetising EU allowances
- Marketing carbon credits from "clean development mechanisms and joint implementation" projects to clients under the EU Emissions Trading Scheme;
- Offering investment advice and identifying new opportunities in new markets.

BP

About BP and its business
BP is one of the world's largest energy companies. BP is divided into three main business segments: Exploration and Production; Refining and Marketing; and Gas, Power and Renewables. BP operates in 100 countries with well-established businesses operating across four regions; Europe, North and South America, Australasia and Africa. The business focus on fuel for transportation, energy for heat and light, retail services and petrochemicals products for everyday items BP has over 96,000 employees.

BP's main activities are exploration and production of crude oil and natural gas; refining, marketing, supply and transportation; and the manufacture and marketing of petrochemicals. BP also declares a growing presence in gas and power, and in solar power generation

In 2005 the turnover was 262 billion and BP had 28.500 service stations and 19 refineries, exploration in 26 countries. The core BP brands are ampm (USA); Aral (Germany); ARCO (USA), Castrol, Wild Bean Café.

BP about climate change and sustainability
BP's position on climate change policy is that they support precautionary actions to limit GHG emissions, even though they refer to that aspect of the science as still subject of expert debate. BP's stated view is that the goal must be to stabilize GHG levels through sustainable long-term emission reductions. They also support a prudent limit to the world's temperature increase of about 2° C above pre-industrial temperature. BP believes this can be achieved using a mixture of existing and emerging technologies.

BP work relevant to this report is defined in three areas; climate change, BP Alternative Energy, and sustainable transportation. BP is investing in a range of technologies to generate power with low emissions. Their intention is to build a long-term business from cleaner energy. BP predicts that this will be the first energy business dedicated to the development and wholesale marketing and trading of low-carbon power from different technologies at a relatively high scale. BP also works with sustainable transport which includes extending the use of cleaner fuels, bio-fuels and lubricants.

In 2005 BP launched the BP Alternative Energy, low-carbon energy business, investing $8 billion over 10 years to generate and market cleaner power from solar, wind, hydrogen and gas. BP has been active in climate change for almost a decade and has a wide range of cleaner energy technologies, including CO_2capture and storage.

BP and other energy companies together with the UK, US and Norwegian governments support the CCP project (CO_2 Capture and Geological Project) which aims to develop new technologies that reduce cost of CO_2 capture and geological storage. Today CCP focuses on

safety and security of geological storage and reducing technology cost and performance uncertainties

BP has launched an $8 million project at Imperial College London, UK to research the use of energy in cities. The project will explore in detail how energy, people and material flow through the city and how much money and energy could be saved in the future. In Salah (Algeria), BP has established a $30 million science project to take advantage and learning from the CO_2 capture and storage initiative at a BP's operation site in Algeria.

BP's solar business has been operating for over 30 years. Today BP offers a wide range of products that include providing solar power to remote areas of the developing world.

The hydrogen power projects involve taking a fossil fuel and turn it into hydrogen and CO_2. The hydrogen can be used to generate electricity while 90% of the CO_2 can be captured and stored underground in oil and gas reservoirs.

BP and its role in the debate on climate change:
BP sees it own role as pursuing efficiency in their own operation, creating cleaner products for customers and contributing to an informed debate. BP advocates that emission caps should be introduced and that market mechanisms be used to enable economies to adjust to a carbon constrained world. BP also believes that policy should create a level of playing field that provides similar encouragement to different means of achieving emission reductions.

BP is also seeking ways to raise awareness among its customers. One example is their carbon footprint calculator which was introduces 2005 on their website.

BP is a member of the UK Low Carbon Vehicle Partnership is a group drawn from industry, government, academia and environmental NGOs that aims to accelerate the shift to low-carbon vehicles and fuels. BP is closely involved the work drawing up the Biofuels Assurance Scheme. The scheme aims to provide a framework for assessment of the overall performance of biofuels in cutting GHG emissions from the farm to the tank.

BP took a leading position in developing the petroleum industry view in on the EU biofuels directive. In UK BP is actively engaged with the government in formulating the Renewable Transportation Fuels Obligation requiring 5% of the motor fuel in the UK to come from renewable sources by 2010.

BP is part of Shipping Emissions Abatement and Trading, a cross industry group of oil and shipping companies that raises awareness of methods for reducing shipping emissions including emission trading.

BP was also active in the Clean Air for Europe (CAFE) and believes it contributed to improve the scientific basis to the directive.

ERICSSON

About ERICSSON and its business

Eriksson's origins date back to 1876. Today ERICSSON is a world-leading provider of telecommunications and fixed network operators. Over 1,000 networks in 140 countries utilize its network equipments and 40 percent of all mobile calls are made through its systems. ERICSSON invests heavily in R&D and is actively promoting open standards and systems. Mobile network account for more than two thirds of its sales

2005 ERICSSON had a total sales of SEK 152 billion (EURO 16,3 billion) and 56 000 employees. The ten biggest market (total sales) were US 12%, China 8%, Italy 7%, Spain 5% Brazil 5%, Sweden 4%, Mexico 4%, UK 3% Russian Fed 3% and Turkey 3%.

The business systems are:
Mobile systems: Market leader with app. 30 percent global share of the addressable market, i.e. open non-proprietary standards. Including radio base stations, core network infrastructure and the increasingly important service layer.
Wireline systems: Supplier of broadband multi-service communications equipment and services to fixed network operators.

Transmission and transport: Offer a complete, end-to-end portfolio of transmission and transport equipment for mobile, fixed and other types of networks. The largest supplier of microwave radio links in the world.

Service layer: A leading complete service-layer portfolio with products, solutions and services for both fixed and mobile network operators. Strong position within pre-paid, billing, intelligent networks and mobile multimedia services (MMS).

Services: Expertise in consulting, systems integration, managed services, network deployment and optimization, education and technical support services. 15,000 dedicated Global Services professionals on the ground in 140 countries.

ERICSSON about climate change and sustainability
ERICSSON offers products and services with “excellent environmental performance and the lowest possible energy consumption”. ERICSSON has for many years been one of the leading companies in their industry in assessing life cycle impacts, and has perhaps the most advanced and complete data system in the telecom industry. Its main focus in decreasing the environmental impact of its products is to work continuously to improve energy efficiency. One of the cornerstones of Eriksson’s environmental efforts is 'Design for Environment' program, which gives product designers detailed guidelines for designing products.

In each of the past three years, it has enhanced its portfolio with new products that will reduce the total CO2 emission, over their lifetime, by 10 percent compared with the prior year's product portfolio.

ERICSSON and its role in the debate on climate change:
Telecommunication has the potential to reduce environmental impact, allowing people to communicate over distance and time -- instead of using cars or other means of transportation to meet face-to-face. ERICSSON states that “the ability to transport ideas, not people, will pave the way for a world more environmentally responsible and will improve quality of life for millions of people”. The use of wireless solutions will make it possible to meet demands from both the developed and developing worlds.

The ERICSSON environmental policy states:
Ericsson shall develop, produce, and offer products and services with excellent environmental performance, enabling our customers to minimize their environmental impact.

There are very few, if any, public statements about the climate change issue.

IKEA

About IKEA and its business
The IKEA Concept is based on offering a wide range of well designed, functional home furnishing products at prices so low that as many people as possible will be able to afford them.

In 2005 the IKEA Group sales was EURO 14,8 billion and 410 million people visited the IKEA stores worldwide. IKEA has 90000 employees in 44 countries. The IKEA Group has 46 trading service offices in 32 countries and 1300 suppliers in 53 countries. The product range includes 9500 items and the catalogue was printed in 160 million copies.

The top five sales countries are Germany 19%, USA 11%, UK 11%, France 9% and Sweden 8%. Europe is by far the top sales region, 81%. The top five purchasing countries are China 18%, Poland 12%, Sweden 9%, Italy 7% and Germany 6%. Europe is also the biggest purchasing region, 67%.

In the Supply Chain IKEA focus on child labour and forestry issues.

IKEA about climate change and sustainability
IKEA strongly believes that taking an environmentally responsible reproach is the only sensible way to run a healthy and sustainable business and looks at the big picture, from saving energy to reducing CO2 emissions.

The goal is to reduce the energy consumption in relation to the quantity of products sold at IKEA stores and cubic meters moved in the distributions centres. Investment in renewable energy is primarily from “green” electricity.

IKEA has decided to reduce CO2 emission causes by transportation of IKEA products and people and is working towards more environmentally adapted transport solutions.

IKEA points out the need of awareness, knowledge and responsibility. Training is an essential part of the environmental work at IKEA. The goal is to create awareness knowledge and a sense of responsibility. All co-workers receive basic training in these issues. Additional, in depth and social training is given to local environmental co-ordinators and auditors in the supply chain.

Anders Dahlvig, president and CEO of the IKEA Group declares that IKEA works toward sustainable business with complete commitment as they believe in sourcing from emerging markets.

IKEA and its role in the debate on climate change:
IKEA is a member of several international networks, working on developing methods to calculate the impact of transports on the environment as well as strategies that will enable them to influence world wide development of environmentally adapted transport solutions.

IKEA endeavours to locate its stores in areas served by efficient public transport and encourage its employees to use reduce journeys by car. IKEA also believes it is important to make their customers aware of how traffic affects CO2 emissions and are informing them of alternative means of transports to and from the store.

The main stakeholders are customers, employees/co-workers, suppliers, NGO's and authorities. Some of the projects that IKEA is currently working with the following projects and stakeholders related to the climate change issue are:

Business Leaders' Initiative on Climate Change, BLICC, a forum for companies to measure, report and reduce CO2 emissions. IKEA and Body shop initiated the BLICC in 2000

Clean Cargo Working Group (CCWG) is organised by Business for Social Responsibility (where IKEA is also a member). The CCWG promotes sustainable goods transportation.

The Green Power Market Development group is run by the World Resource Institute (where IKEA is a member). Together with Nike, Holcim, Interface and DuPont, IKEA is developing tools and strategies that increase the use of electricity generated from renewable sources.

IKEA also works with Forest Stewardship Council, Greenpeace, UNICEF and WWF

JOHNSON & JOHNSON

About Johnson & Johnson and its business
Johnson & Johnson, through its operating companies, is the world's most comprehensive and broadly based manufacturer of health care products as well as a provider of related services, for the consumer, pharmaceutical, and medical devices and diagnostics markets. The more than 230 Johnson & Johnson operating companies employ approximately 116,200 people in 57 countries.

The Business Segments are:
Consumer; skin and hair care, sanitary protection, wound care, oral care, baby care and non-prescription drugs.
Medical Devices and Diagnostics: surgical implants, instruments, needles and sutures; different kind of monitoring systems and instruments of different kinds
Pharmaceutical; develop products for family planning; psychiatry, mental illness and diseases of the nervous system; gastroenterology; oncology; immunotherapy; cardiovascular disease; dermatology; pain management; allergy; antifungals; antihistamines; anti-infectives; and antiparasitic drugs; and biotechnology-derived products.

Johnson & Johnson about climate change and sustainability
Johnson & Johnson recognizes the critical interdependence between human health and the health of the planet. Johnson and Johnson feels a special responsibility to protect the environment and to live the values stated in the document "Our Credo".

Johnson & Johnson has had environmental goals for more than 15 years. The environmental footprint has been reduced significantly under program Next Generation Goals (2000-2005). In the new set of five year goals called the Healthy Planet 2010 (2005-2010) goals, Johnson and Johnson states that the goals continue to go beyond what is required by any government.

The Energy Usage CO_2 emissions goals are:

- Absolute reduction in CO_2 emissions of 4% 1990 - 2005 and 7% 1990-2010
  Actual: 11.5% decrease from 1990-2005
- 100% implementation of Energy Best Practices by year-end 2005.
  Actual: 97% implementation by year-end 2005.

Johnson and Johnson and its role in the debate on climate change:
Johnson & Johnson has partnered with a number of organizations as part of their commitment to high environmental values and sustainable growth. Johnson & Johnson's involvement with major conservation organizations includes board membership by some of their senior management.

The ones that in some aspect are connected to the climate change issue are:

- Harvard Medical School, Center for Health and the Global Environment –An academic institution working to expand environmental education at medical schools and to further investigate and promote awareness of the human health consequences of global environmental change.
- Global Environmental Management Initiative – A group of leading corporations dedicated to fostering excellence in global environmental, health and safety management.
- The Nature Conservancy – The world's largest private, international conservation group.
- The Wilderness Society – Dedicated to the protection of public lands in the United States. Johnson & Johnson is supporting the society in its efforts to demonstrate the link between wild land conservation and community economic stability.
- U.S. EPA National Environmental Performance Track (NEPT) – Johnson & Johnson has more than 30 facilities in this voluntary partnership program and is an NEPT Corporate Leader. Progress on our performance commitments can be found on this website.
- World Business Council for Sustainable Development – An international organization working to promote cooperation among business, government and other stakeholders.
- World Environment Center – A non-profit, non-advocacy organization promoting information exchange among industry, government, academia and the public.
- World Resources Institute – An international research organization focusing on issues of the environment and sustainability.
- World Wildlife Fund – An international organization dedicated to preserving nature and biological diversity.

SWISS RE

About Swiss Re and its business
Swiss Re is one of the world's leading and most diversified reinsurers, it provides reinsurance products and financial services that enable risk taking essential to enterprise and progress. It was founded in Zurich, Switzerland, in 1863. Today, Swiss Re operates in more than 30 countries and provides its expertise and services to clients throughout the world. Swiss Re's traditional reinsurance products and related services for property and casualty as well as for life and health business are complemented by insurance-based corporate finance solutions and supplementary services for comprehensive risk management.

A company's sustainability practice and its reputational value are increasingly perceived as important drivers of business success. Swiss Re has firmly integrated sustainability practice into its corporate framework, thus creating economic value by improving its environmental and social performance beyond mere compliance with laws and regulations.

The core values are

- Engagement -through understanding and responding to the stakeholders' needs.
- Excellence - through expertise, efficiency and sound decision-making in all they do.
- Sustainability -through balance in economic, societal and environmental development.
- Integrity - through uncompromising commitment to transparency and ethical principles.

Swiss Re about climate change and sustainability
Swiss Re acknowledges that climate change is happening. In their view, a precautionary approach is the only appropriate way to deal with it - since it is not possible to quantify the total impact of climate change before taking action. Swiss Re states that climate change entails more than just risk and believes that efforts to abate it and to provide cover against its adverse effects also create new business opportunities.

Swiss Re also works to foster broad awareness of climate risks. It supports effective measures to reduce greenhouse gas emissions and provides new (re)insurance and financing solutions in this field. The company shares its know-how through its publications and engages in discussion on emerging issues with various stakeholders at the Swiss Re Centre for Global Dialogue in Rüschlikon. The global TV documentary The Great Warming" is part of their "Sharing Solutions" philosophy, aimed at raising awareness on issues that are key to a company dedicated to a sustainable future.

The Swiss Re risk assessment, includes closely monitor weather pattern changes as well as ongoing socio-economic trends responsible for increasing the concentration of population and values in exposed areas.

Swiss Re sees that prevention and mitigation of climate change is leading to international, long-term regulatory frameworks to reduce greenhouse gas emissions. They contribute to emission reductions by offering financial solutions in this area, which also create new business opportunities.

In addressing sustainability challenges, Swiss Re makes direct use of its expertise in risk assessment and transfer. In addition to nurturing relevant internal knowledge, it also cooperates with external experts on specific issues. This knowledge is either fed into its underwriting and investment processes or, when feasible, used in the development of new products such as environmental impairment liability (EIL) insurance. In addition, the Swiss Re's Greenhouse Gas Risk Solutions unit explores new business opportunities in the area of carbon markets and renewable energy.

Swiss Re's measures to minimise its internal environmental impact include a ten year program to become fully greenhouse neutral by the year 2013.

Swiss Re and its role in the debate on climate change:

Swiss Re conducts an ongoing dialogue with our stakeholders since they acknowledge that the vision for a climate-friendly, sustainable economy and society can become a reality only through mutual effort. Swiss Re is continuously engaged in the international climate change debate, in promoting awareness and in developing approaches for emission reductions and adapting to the effects of climate change

Swiss Re has been investigating questions relating to natural catastrophes for many years with an aim to better assess and manage the risks from natural disasters in the insurance industry. Findings from its catastrophe research are published for the insurance industry and all interested sectors of the general public.

Efforts are also made to present various stakeholders with insights into sustainability-related risks, e.g. through the publication series, events at its own Centre for Global Dialogue at Rüschlikon and its Sharing Solutions sponsorship initiatives. The two Top Topics of climate change and water play a special role in these activities.

UNILEVER

About Unilever and its business
Unilever was founded in the 1890s in England by William Hesketh Lever who was a social pioneer of his time, and built a picturesque village for his workers, which is still a strong community today.

With 400 brands spanning 14 categories of home, personal care and foods products, Unilever claims no other company touches so many people's lives in so many different ways. 150 million times a day, someone somewhere chooses a Unilever product.

Today Unilever employs 223.000 people in 100 countries worldwide, and supports the jobs of many thousands of distributors, contractors and suppliers

Consumer research plays a vital role in Unilever brands' development. Unilever has strong roots in local markets which also mean that they can respond to consumers at a local level.

Unilever also believes that the very business of conducting business in a responsible way has a positive social impact.

Unilever about climate change and sustainability
Every day, people in 150 countries around the world choose Unilever's products to feed their families and clean themselves and their homes. This illustrates the main way in which Unilever believes it makes a positive contribution to society: by meeting people's basic needs for nutrition, hygiene and personal care with the brands they sell.

Unilever recognizes the need to align economic growth, environmental protection and social progress for a sustainable future. Its commitment is to manage its social and environmental impacts responsibly, to work in partnership with its stakeholders and to contribute to sustainable development.

Unilever is guided by a set of values and standards that govern the way it does business. These are set out in the Corporate Purpose and the Code of Business Principles.

The company has stated that it in the future intends to integrate their environmental and social activities into their business plans and also to become a part of their business model and day-to-day management.

Unilever uses the Brundtland definition of Sustainability: "Meeting the needs of the present without compromising the ability of future generations to meet their needs."

When Unilever first started thinking about sustainability in the mid-1990s, they chose areas where they had a direct interest and a clear contribution to make. They also understood that many of the crucial issues were outside their immediate control. Therefore partnership working became central to their approach. Today, Unilever focuses on three initiatives: in agriculture, fish and water.

Unilever states that global warming could potentially affect agriculture, availability of clean water and sea temperatures, and this in return could have direct effects on its business.

Unilever and its role in the debate on climate change:
Unilever is working together with McDonald's, Coca-Cola, Greenpeace and the UN Environmental Programme, Unilever formed the Refrigerants Naturally initiative that promotes HFC-free refrigeration in retail equipment. Unilever also participate in the Carbon Disclosure Project.

Unilever also aims to help customers to reduce their impact through informing them of ways to cut energy, for example, through lowering the temperature of water for laundry and other similar pieces of advice.

VATTENFALL

About Vattenfall and its business
Vattenfall generates, distributes, sells and trades electricity and heat. Vattenfall's vision is to become a leading European energy company.

The external net sales 2005 was 129 158 MSEK (EURO 13, 7 billion) and the number of employees was 32.200

Vattenfall operates in three different markets; Germany, Poland and the Nordic countries. It is Europe's fourth largest generator of electricity and the largest generator of heat. Electricity generation is primarily comprised of nuclear power and hydro power

Vattenfall manages many different technologies and has a diversity of energy sources. Our major sources are hydropower, coal, nuclear power, biofuels, peat, wind power and waste. To a lesser extent, we also use gas, oil, geothermal and solar energy. Vattenfall handles many different environmental issues and we regard the management of greenhouse gas emissions, air quality, soil protection, land use, water protection, waste management, hydro dam safety, nuclear safety and energy efficiency to be our main focus areas. Vattenfall is now one of the biggest Nordic wind power players

Vattenfall also has a considerable heat and electricity generation based on fossil fuels, biofuel and waste. Its coal-fired power plants are among the most modern in the world.

Vattenfall about climate change and sustainability
Vattenfall's ambition is to be number one for the environment and to be recognized for this.

Vattenfall states that today, we make choices that will impact mankind. Not just tomorrow, but 100 years from now. Vattenfall has a vision and a plan for how to move forward, which could result in almost 80 per cent decrease of carbon dioxide CO_2 emissions that it believes would stabilize the atmosphere.

Vattenfall concludes that all of today's energy sources that are used globally will continue to be needed in the foreseeable future. Energy, especially in the form of electricity is the basis for the modern society and contributes to quality of life. Every energy source and each operation is to be managed in an efficient and responsible way.

Vattenfall main focus areas are:

- Climate change (Greenhouse gas emissions)
- Air quality
- Soil protection
- Land use
- Water protection
- Waste management
- Hydro dam safety and nuclear safety
- Energy efficiency
- Electric and magnetic fields

Vattenfall understands the urgent need to cut greenhouse gas emissions and is involved in developing and implementing three main carbon dioxide-reducing measures:

- Optimization of existing technology
- Increased use of non-carbon dioxide energy sources
- Capturing and permanent storage of carbon dioxide from fossil-fueled power plants

In 2001, Vattenfall initiated the CO_2 free power plant, a long-term research and development project.

Vattenfall and its role in the debate on climate change:
To address the challenge of climate change on a global level, Vattenfall has outlined a proposal for a global adaptive burden-sharing model. The model builds on the principles that all countries shall participate in relation to their share of global GDP, that no country shall be denied its right to economic development, and that no country shall have to go through disruptive change. The model stretches over a 100 years. It is meant to present a "third way", in relation to the Kyoto road and the American way. It combines cap and trade mechanisms with initiatives on accelerating technological development. To set a correct price on emissions, the pricing must be as global as possible. Hence, a global system for emissions trading must be developed.

The European Union emission trading system – aimed at reducing the emissions of carbon dioxide and other greenhouse gases – was launched on 1 January 2005. Vattenfall has a special task force to prepare for advanced participation in the trading system. Its CEO Lars G Josefsson is strongly committed to handling climate change issues responsibly, and promotes a global emission trading system.

Vattenfall gives advice and supplies products and services that help households and industry save energy. Two examples are the "Tips for households" and the "Industrial energy-saving".

AB VOLVO

About Volvo and its business
Volvo is one of the world's leading manufacturers of trucks, buses and construction equipment, drive systems for marine and industrial applications, aerospace components and services.

Founded in 1927, Volvo today has approx 82,000 employees, production in 25 countries and operates on more than 185 markets. The net sales 2005 amounted to approx EURO bn 23.

The business areas are: Volvo Trucks, Mack, Renault Trucks, Volvo Buses, Volvo Construction Equipment, Volvo Penta, Volvo Aero and Volvo Financial Services.

Several business units provide additional manufacturing development or logistical support. The largest business units are: Volvo Powertrain, Volvo 3P, Volvo IT, Volvo Logistics, Volvo Parts and Volvo Technology.

Volvo about climate change and sustainability
As one of the world's largest producer of heavy vehicles, Volvo feels responsibility do limit the environmental impact caused by its products and operations. Volvo focuses on energy efficiency, reducing emissions and alterative fuels. Volvo also acknowledges that we all depend on transports and therefore smoothly functioning transportation is one of the cornerstones of modern society.

Volvo also points out that the AutoOil II predictions show that the emissions from road transports will decrease substantially during the coming 20 years.

The main focus in development lies on diesel engines. Volvo states that improving fuel efficiency is an effective way to reducing CO_2 emissions as well as reducing costs for its customers.

One of the most important elements for the management of environmental issues in the Volvo Group is the decision to have a single environmental policy, common to all parts of the company. The environmental policy includes a commitment to extend Volvo's scope of environmental programmes to their working partners, e.g. suppliers and dealers. Environmental requirements for suppliers were introduced in 1996, and are used as an integral part of the supplier evaluation and follow-up at the different purchasing organisations.

Volvo is looking into alternative fuels such as DME and is conducting research on the hybrid area, which it considers as a competitive and promising solution for its products.

Volvo and its role in the debate on climate change:

The three dimensions of sustainable development, economic development, social development and environmental care are all equally important for Volvo's ability to meet the current and future needs.

Volvo's history in addressing sustainable development is based on a long tradition of responsible business conduct and long-term and consistent efforts to improve quality, safety and the environment. Volvo signed the UN initiative Global Compact in November 2001. By signing the Global Compact, Volvo says it clarifies its ambition to be a responsible and credible member of the society.

The Volvo Environment Prize supports environmental research and it has been awarded to leading researchers for sixteen years.

Volvo believes that the fastest and most cost-effective method of reducing the environmental impact of transport is to make it more efficient. If a certain quantity of goods or a given number of people can be transported using fewer vehicles than at present, the total quantity of emissions will be reduced while the transport operators will also benefit from greater efficiencies.

The environmental impact of this source will be reduced even further if conditions enabling traffic to flow more smoothly can be created. In this context, Volvo is confident that bigger vehicle combinations offer one effective solution, intelligent transport systems another

OVERVIEW OF COMPANIES INTERVIEWED

Company	Segment	Sales	# Empl	Products	Market & Sales
Vattenfall	Energy	13,7 B €	32 000	Electricity and network	Electricity customers: Germany 3 mill. Poland 1.1 mill, Nordic region 0,9 mill Network customers: 5,9 millions
AB Volvo	Automotive	25 B €	82 000	Comm. vehicles marine eng aero eng and serv	World's largest or second largest > 100 countries
IKEA	Retail	14,8 B€	90 000	Furniture	220 stores in 33 countries Eu 81%, A+A 3%, NA 16% 410 million visitors 1300 suppliers in 53 countries
ERICSSON	Telecom	16,3 B €	56 000	Network, telecom	1000 networks in 140 countries 40% of all mobile calls
BP	Energy	$262 B	96 000	Gas and power Refining and marketing Exploration and production Renewables and alternatives	6 continents, >100 countries Solar cells in >160 countries
J&J	Health care	$50,5 B	116 000	Thousands of health care products in hundreds categories 230 companies	6 continents 32nd on the Fortune 500
Unilever	Food & cleaning	39,7 B€	223 000	400 brands spanning 14 categories of home, personal care and foods products	>100 countries Every day 150 million people choose Unilever's brands. The company has many thousands of distributors, contractors and suppliers.
ABN AMRO	Finance	986 B €	110 000		Ranks 8th in Europe and 13th in the world (total assets) more than 4,500 branches in 53 countries
Swiss Re	Finance	17,242 B CH (premiums earned)	9 000	reinsurance and financing	World-wide

ANNEX 3. QUESTIONNAIRE ON CLIMATE CHANGE AND CORPORATE STRATEGY

This questionnaire will be completed during a telephone interview or face-to-face interview at your convenience.

The "Climate Change and Corporate Strategy" project is designed to identify gaps in corporate knowledge that MISTRA and the Generation Foundation can seek to fill through their funding of long term research programmes. It is also a strategic tool to help companies deliberate internally on how to address the challenges associated with global climate change.

INTERNAL FOCUS

Q1) Please indicate how you are including the following in your business strategy:

a) the impact of climate change on the vitality/viability of your business in 10-20 years
b) the impact of your business activities on the climate (discuss current and future business models)

Q2) In a potential roadmap for addressing climate change, indicate the key areas for focus within your business and mention framework plans for areas you consider key. e.g., energy use, product mix, innovation strategy, supply chain, consumer communications, internal know-how and leadership competence

Q3) In drawing up your map, in which of the areas mentioned above do you require more knowledge or understanding?

EXTERNAL FOCUS

Q4) Do you view the following external processes as facilitating or hampering your company's ability to address climate change? Please give details.

The below are examples to stimulate thinking, but please add or ignore in accordance with your experience.

NATIONAL LEGISLATION
TRADE LEGISLATION
GLOBAL AGREEMENTS/PROTOCOLS
LOCAL INITIATIVES TO ADDRESS CLIMATE CHANGE
COMPETITOR AGREEMENTS (E.G., TRADE ASSOCIATIONS, CODES OF CONDUCT)
FINANCIAL MARKETS AND INVESTOR PRIORITIES
DIRECT CORPORATE INTERACTION WITH POLICY MAKERS
INTERACTION WITH IPCC AND OTHER ACADEMIC RESEARCH
OTHERS (PLEASE LIST)

Q5) Would the role played by business in any of the above benefit from more research? If yes, please specify.

Q6) In conclusion, what new knowledge creation, research and/or educational programmes would you like to see research foundations support?