Climate change and its effects on businesses

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Main source of information in this presentation: the Stern Report
Climate change presents a unique challenge for economics; it is the greatest and widest-ranging market failure ever seen!
Publicity

In the second of a three-part series, Kit Bingham looks at the financial opportunities offered by global warming.

Bankers cash in on climate change

The threat of climate change may be causing politicians and commentators beyond the globe to raise ever-decreasing voices of alarm. But bankers, investment managers and private equity firms are paying close attention to the scientific evidence.

The intergovernmental Panel on Climate Change reported recently that there was a consensus among scientists that human activity is warming the earth, prompting warnings that unmitigated climate change could become catastrophic.

It is the "interim" bit that interests the City's investors. Combating climate change, or developing new technologies to be developed and commercialised, will mean huge investment, ranging from wind farms to sea defenses, to biofuels. Climate change may be a challenge that banks will soon be able to exploit.

The market for clean technology and sustainable energy is growing at an incredible rate. New Energy Finance, a news and consultancy provider, and the global market for clean energy, reached some $15.9bn last year, nearly three times the level of two years ago. The group predicts a 45% rise this year to $26.5bn.

BlackRock's Ed Humes, who runs its clean energy fund, said: "What we've seen over the past couple of years is a growth in the number of companies, as well as in the demand, for green bonds and equity. This is driven by increasing public awareness about environmental issues, but it's also creating opportunities for companies to invest in sustainable growth industries."

When BlackRock's fund was launched in 2006, there were 451 new energy companies worldwide, of which 360 were in Europe. Now there are 900 companies, of which 580 are listed with a combined market capitalisation of about $500bn. One of the largest areas of green investment is London's Alternative Investment Market, which has emerged as the dominant global market for environmental companies. Half of the new companies quoted in the AIM are from outside the UK.

Peter Shott, managing partner of Carbon Trust Investment Partners, a commercial arm of the Carbon Trust, a government-sponsored advisory group, said: "The most significant recent trend in the environmental market is the growth of the private capital sector. Three years ago, there were one or two institutions in the clean energy sector with a combined market capitalisation of a few hundred million dollars. Now, we are seeing institutions like BlackRock that have $50bn in assets. These new players are investing in new technologies and companies that are developing new products and services, from renewable energy to energy efficiency."

"There has been a whole new set of companies on AIM that will be heavily involved in the low-risk infrastructure investments. These companies are attracting investments from across the globe, and they are creating new opportunities for investors.
Financial News, February 12, 2007

• …bankers, investment managers and private equity firms are paying close attention to the scientific facts behind climate change

• The Intergovernmental Panel on Climate Change recently reported there was a consensus among scientists that human activity is warming the earth, prompting stark warnings that humankind must adapt or face potentially catastrophic consequences

• It is the ‘adapt’ bit that interests capital markets

• Two years ago, clean technology was barely recognised in the United States. The speed of change has been phenomenal
US West seeks water, water everywhere

- Some USD 2.5 billion in water projects are planned in four states
  - Among them is a proposed 280-mile (450-kilometre) pipeline that would direct water to Las Vegas from northern Nevada.

- The Colorado River, a 1400-mile-long silver thread of snowmelt and a lifeline for more than 20 million people in seven states, is providing much less water than it used to.

- Everywhere in the West, as officials search for water to fill current and future needs, tempers are flaring among competing water users, old rivalries are hardening and some states are waging legal fights.
  - Montana filed a suit in February at the US Supreme Court, accusing Wyoming of taking more than its fair share of water from the Tongue and Powder Rivers.
The greenhouse effect

1. Solar radiation passes through the atmosphere and warms the surface of the Earth
2. Infrared radiation is given off by the Earth
3. Most infrared radiation escapes to outer space, cooling the Earth
4. Some infrared radiation is trapped by greenhouse gases, thus reducing the cooling
Greenhouse gas emissions in 2000 by source (Stern report)

Figure 1 Greenhouse-gas emissions in 2000, by source

ENERGY EMISSIONS
- Power (24%)
- Transport (14%)
- Buildings (8%)
- Industry (14%)
- Other energy related (5%)
- Waste (3%)
- Agriculture (14%)
- Land use (18%) (NON-ENERGY EMISSIONS)

Eight countries are responsible for 70% of emissions.

Total emissions in 2000: 42 GtCO2e.

Energy emissions are mostly CO₂ (some non-CO₂ in industry and other energy related). Non-energy emissions are CO₂ (land use) and non-CO₂ (agriculture and waste).

Source: Prepared by Stern Review, from data drawn from World Resources Institute Climate Analysis Indicators Tool (CAIT) on-line database version 3.0.
CO₂ and temperature trends

Change in greenhouse gases from ice-core and modern data

Temperature projections of the 21st century
Rise in temperature

1°C
- Small glaciers disappear, threatening water supply for 50 million people
- At least 300,000 people die each year from climate-related diseases

2°C
- 15-40% of species face extinction

3°C
- Southern Europe will suffer serious droughts
- 1-4 billion more people suffer water shortages
- 150-550 additional millions at risk of hunger

4°C
- Agriculture yields decline by 15-35%
- Up to 300 million more people affected by coastal flooding every year

5°C
- Sea level rise threatens major cities such as New York, Buenos Aires, St. Petersburg, London, Shanghai, Mumbai and Tokyo
- Marine ecosystems seriously disrupted
Poorest countries

- The incremental impact of one ton of greenhouse gas is independent of where in the world it is emitted.
- Rich countries have a special responsibility for the causes of climate change, historically and today, whereas poor countries will be worse affected than the rich.
- Developing counties are at a geographic disadvantage
  - They are already warmer
  - They also suffer from high rainfall variability
- Further warming will bring them high costs and few benefits.
- The poorest countries are heavily dependent on agriculture, the most climate-sensitive of all economic sectors.
- These countries’ low incomes and vulnerabilities make adaptation to climate change particularly difficult.
- Climate change is likely to
  - further reduce already low incomes and
  - increase disease and death rates.
Oversea Development Aid will increase

Will the rich countries accept their responsibility and support the poor countries in an adequate way? The answer to this question could be a dramatic increase in Oversea Development Aid (ODA).
Developed countries

- Climate change may initially have small positive effects for a few developed countries, but is likely to be very damaging at much higher temperature increases.

- In higher-latitude regions (Canada, Russia, Nordic countries) climate change may lead to net benefits for temperature increases of 2 or 3 °C:
  - Higher agricultural yields
  - Lower winter mortality
  - Lower heating requirements
  - Possible boost for tourism

- Higher-altitude regions will also experience the most rapid rates of warming, damaging infrastructure, human health, local livelihoods and biodiversity.

- Developed countries at lower altitudes will be more vulnerable
  - With a 2 °C increase in global temperature, water availability and crop yields are expected to decline by 20%
  - Regions where water is already a scarcity will face serious difficulties and rising costs
Examples of risks with large-scale impacts

• Physical risks
  – In London alone, at least GBP 125 billion of assets lie in the floodplain

• Correlated risks
  – A collapse of the Atlantic Thermohaline Circulation would lead to a decrease in temperatures across much of the northern hemisphere, with a peak cooling of around 2 °C in the UK and Scandinavia. This would reduce rainfall, agriculture productivity and water supplies and would threaten ecosystems

• Capital constraints on insurance
  – Increasing costs of extreme weather will not only raise insurance premiums but also increase the amount of capital that insurance companies have to hold to cover extreme losses (e.g. hurricane losses)
  – Failure to raise sufficient capital could mean restrictions to insurance coverage.
Cost of damage from extreme weather

• Examples
  – A 5…10% increase in hurricane wind speed will double annual damage costs in the USA
  – Heat waves will be commonplace by the middle of the century. In 2003 in Europe, 35,000 people died and agricultural losses reached USD 15 billion

• Estimated losses
  – Without proper actions, the impact will be a permanent 5% reduction of world GDP, now and forever!
  – With proper actions, the impacts can be minimised to a permanent reduction of 1% of world GDP at stabilisation levels between 500 and 550 ppm CO$_2$e
Near past in Pöyry business

Pöyry’s products and services have been developed in response to climate change-related phenomena (e.g. shortages of water and energy, flooding) long before there was any public concern over climate change.
Opportunities in the energy area

Market for low-carbon energy products in 2050 worth at least USD 500 billion/year

• Emissions trading
• Nuclear power
• Waste-to-energy
• Wind and solar energy
• Bio-energy
• Need for reservoirs and big dams will increase with improved energy output/storage
• Carbon capture and storage
• Energy efficiency
• District cooling networks
• Retrofitting of power distribution
Opportunities in the forest industry area

Higher yields of biomass in northern countries and conflicting interests between paper industry and energy use

- Forests as a carbon sink
- Wood as a low-energy building material
- Forest management as part of flood control
- Ethanol plants
- Bio-diesel plants

Value-added in utilisation of forest resources

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Opportunities in infrastructure and environment

Cost of extreme weather-related damage 0.5-1.0 % of world GDP

- Flood control and management
- Disaster management
- Urban hydrology
- Water resources management
- Irrigation
- Spatial and urban planning
- Rail-bound traffic
- Mission-critical networks
- Low-energy building materials
- Energy efficiency
- Emissions trading
- RAUinfo, CC-SWOT,…
Pöyry services

Figure 1 Greenhouse-gas emissions in 2000, by source

Energy and water efficiency of industrial processes and operations

Biomass power plants, solar and wind, CHP, hydro-power, nuclear power

Mass transit, trains and metro, bio fuel, urban planning

Energy emissions are mostly CO₂ (some non-CO₂ in industry and other energy related)
Non-energy emissions are CO₂ (land use) and non-CO₂ (agriculture and waste)

Source: Prepared by Stern Review, from data drawn from World Resources Institute's Analysis Indicators Tool (CAIT) on-line database version 3.0.
Something to remember

Sheikh Yamani, Saudi Arabia’s former oil minister and a founding architect of OPEC, once said, “The stone age came to an end not for a lack of stones, and the oil age will end, but not for a lack of oil.”

People will feel the impact of climate change most strongly through changes in the distribution of water around the world and its seasonal and annual variability (Stern Report).
Flood protection and management

Engineering services based on more than 50 years’ experience and over 100 projects in flood protection and flood management
Flood protection and management

Basic planning of flood protection for regions and cities

Flood protection in the City of Cologne, Germany

Regional Study, Germany
Major flooding in Prague in 2002
Prague: Modern solutions in old city centres

Visible structure in normal conditions

Flood protection dams installed
Vantaa: Outskirts of Helsinki Airport – a stormwater run-off study

- The study area is characterised by extensive paved surfaces including Helsinki International Airport, logistic centres, Ring Road III and major motorways, and new housing areas
- Network modelling to identify bottlenecks of the current drainage network
- Model calibration with real event data
- Ranking areas sensitive to urban flooding
- Recommendations for further investments and actions
Case: Erosion in a watershed management area in India

- Erosion is calculated using standard equations, which are based on topography, satellite image-based vegetation and other parameters.
- Red areas in thematic map indicate high erosion risk, which means that only certain forest harvesting operations can take place in those areas.
Case: Timber availability in Russia

- Pöyry has experience of and is continuously carrying out assignments related to forest resource mapping by combining satellite images and field observations
- Timber availability analysis based on Landsat images:
  - Total timber volume
  - Tree species distribution
  - Existing infrastructure
  - Overall land use data
Case: Inventory of forest fire areas in Portugal
Case: Clean Development Mechanism (CDM) - project in Uruguay

Site:
Botnia, Fray Bentos Pulp Mill, Uruguay

Project:
Biomass power generation project - 32 MW black liquor-based surplus electricity generation will be used outside the mill site

Pöyry’s role in the CDM project:
- Project Design Document (PDD)
- Sustainability Assessment Tool for host country approval
- Stakeholder consultation in Latin America
- Arrangements related to validation and registration of the project

• The project replaces fossil fuel-based electricity with biomass-based electricity in the grid
• Emissions reductions: average 40 000 tCO₂/a
Greenfield industrial park in India

The main challenges in the park:
- Insecure power supply from the grid
- Deficit of water
- Climate causes significant need for cooling energy
- Companies in the industrial park have high requirements for the quality of the energy supply

Energy purchase alternatives:
- Electricity purchase from the grid
- Captive power plant (CPP)
  - Power production
  - Combined heat/cold and power production

Pöyry’s key findings:
A substantial part of the electric power consumed in cooling and evaporation can be replaced by using CPP’s excess heat.

Combined Heat and Power (CHP) improves the efficiency of energy production.

Emissions reductions: 50 000 tCO₂/a
Energy analysis of Imatra mill

Site:
Total production approximately one million tonnes a year.

Project:
Power Plant Energy Efficiency Analysis as part of Finnish Energy Conservation Scheme.

Pöyry’s key findings:

Initially, more than 100 ideas for energy efficiency improvement; 18 ideas selected for final savings calculations

Savings: Identified savings potential of annual energy cost > EUR 1.0 million

Emissions reductions: 53 000 tCO₂/a