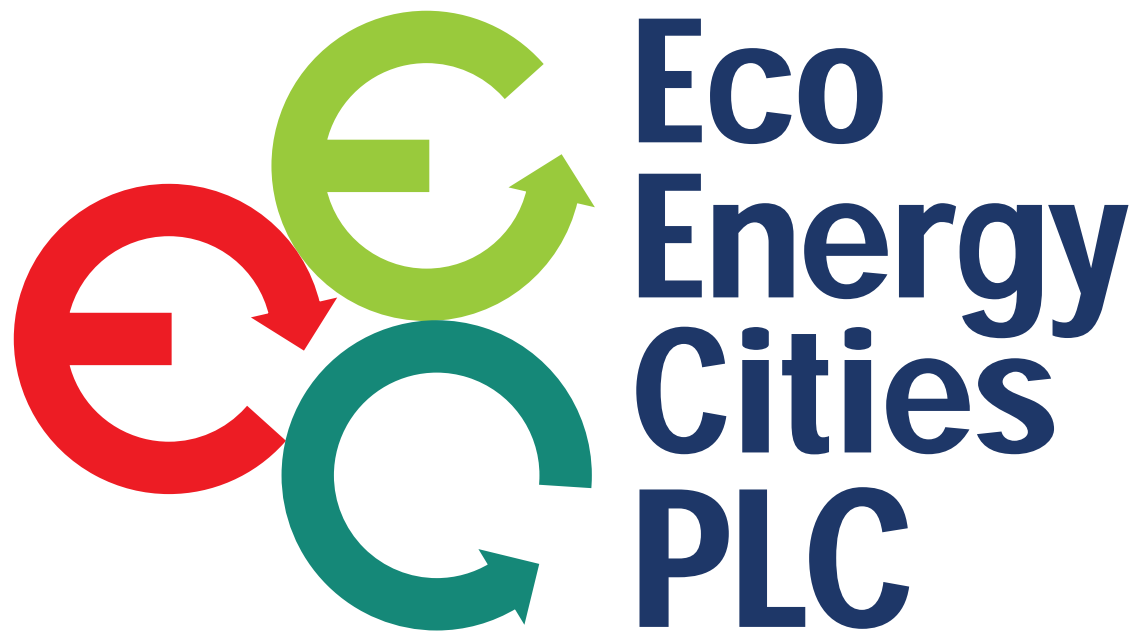


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# Lessons from the real world

One of the largest obstacles to sensibly confronting climate change is an assumption, widely speculated on by critics of the Kyoto Protocol, that reducing greenhouse gas (GHG) emissions is costly, anti-competitive, and disruptive of growth. Real world examples displayed in the charts presented in this report offer up a dramatically different story – that constraining carbon can lead to improved efficiency, profitability, and growth.

Let's review some of the raw numbers in the charts. BP reports savings of \$650 million from emissions reduction efforts. IBM reports savings of \$791 million. DuPont claims \$2 billion in efficiencies. Alcoa is looking at saving \$100 million by 2006. STMicroelectronics expects \$900 million in savings by 2010. Germany reports that its efforts will lead to the creation of 450,000 jobs, many of them within the renewable energy sector that sees €10 billion of annual turnover. In the United Kingdom, emissions dropped by 15% between 1990 and 2002 while, over the same period, the economy grew by 30%.

Report after report from real world reducers conclude that the cost of reducing emissions is more than offset by the benefits. We can only conclude that, on a fundamental level, it can be quite practical and profitable in the near term to reduce GHG emissions in a wide array of contexts using a number of strategies.

Furthermore, it appears that the long-term benefits, in many instances, are substantial. Both corporations and cities are able not only to document savings but also to generate revenues from energy-efficiency programs. This almost always motivates corporate thinking, but cities including Portland, Toronto, and Heidelberg have also realised millions of dollars in energy savings, freeing-up public funds for other purposes. At the national level, Germany anticipates becoming more competitive economically as a result of its ambitious GHG reduction programs. The UK and Australia can show that the costs of long-term strategies are not only negligible, but also likely to improve economic prospects significantly compared to business-as-usual.

All levels of industry and government can and should learn from one another. Thus, the exchange of information among leading greenhouse gas reducers is critical. This is the inspiration behind the formation of The Climate Group, a newly-founded, solutions-oriented leadership coalition based in the UK. As more good examples become widely known, the group reasons, these successes can give governments and companies around the world a greater sense of confidence about the feasibility of achieving significant GHG reductions cost effectively.

Results of negotiations on the international climate treaty are finally beginning to bear fruit. The treaty will go into force on 16 February 2005. It is clear that fears of its negative impacts on growth are overblown. The leading reducers displayed in these charts can offer scores of practical insights, based on real life experience, to government and industry leaders as to how to construct the most efficient pathways forward. These lessons can inform unilateral and multilateral action. Both will be essential if we are to succeed in tackling climate change.

*Michael Northrop directs the Sustainable Development Program at the Rockefeller Brothers Fund in New York City. He can be reached at [mnorthrop@rbf.org](mailto:mnorthrop@rbf.org)*

# Low-carbon leaders

## PROFITING FROM EMISSIONS REDUCTIONS

### Leading the way

In just two months – on 16 February – the Kyoto Protocol will finally enter into force. This will mark a new era in efforts to combat climate change as most industrialised countries will then have a legally binding obligation to curb their emissions of greenhouse gases (GHGs).

Within the European Union, this obligation has already been translated into precise emissions limits for some 12,000 industrial facilities in preparation for the launch of the EU Emissions Trading Scheme on 1 January.

In the lengthy debates surrounding both the Protocol and the EU trading regime, concerns have been raised about the cost of imposing such limits and the impact on industrial competitiveness. Across the globe, however, there is now a clear consensus that the costs of inaction are likely to be far higher than the costs of curbing emissions. This conclusion is based not just on scientific studies but on the concrete experience of hundreds of companies that have already taken action to reduce the carbon intensity of their operations.

Indeed, there is a growing body of evidence that, far from damaging competitiveness, efforts to reduce GHG emissions can bring substantial benefits to the bottom line. This *Environmental Finance* report, produced in association with The Climate Group, presents a selection of that evidence drawn from a wide range of industries, municipalities, states and regions.

The variety of organisations represented is persuasive testimony that efforts to improve energy efficiency, reduce waste, increase the use of renewable power, and other measures to adopt low-carbon operations, can be good for business as well as the environment.

As a result of the Kyoto Protocol coming into force, many more emitters – at company, city, state or national level – will find themselves obliged to adopt similar policies. They should be reassured by the experiences of the early movers outlined in this report. Indeed, it seems that this is one issue on which, for many organisations, there is a happy coincidence of self interest and the global good.

But those that remain unconvinced that reducing emissions can be beneficial, rather than a burden, face other pressures to take action. Growing consumer interest in climate change means those companies seen to be engaging with the issue and moving to reduce their impact on global warming are likely to be rewarded as a result of an enhanced reputation.

At the same time, there is mounting pressure from institutional investors for companies to disclose how climate change is likely to affect them and what they are doing to curb their emissions. Many pension funds and other powerful investors are convinced that some companies will suffer financially as a direct consequence of climate change. At the same time, however, they see plenty of opportunities in low-carbon technologies and services and are starting to adjust their investment portfolios accordingly.

Graham Cooper, Publisher

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www.environmental-finance.com

22-24 Corsham Street,  
London N1 6DR  
Tel: 44 (0) 20 7251 9151  
Fax: 44 (0) 20 7251 9161  
E-mail: info@environmental-finance.com

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# Reducers reap rewards

Reducing emissions of greenhouse gases, far from damaging industrial competitiveness and causing unemployment, can be highly profitable. **Mark Kenber** reviews the evidence

Since the adoption of the UN's Framework Convention on Climate Change in 1992, the advance of climate change – and the scientific research, technological innovation and policy development that accompany it – has accelerated dramatically. Reports by the Intergovernmental Panel on Climate Change (IPCC) and a range of other scientific bodies have become ever more forthright in their assertions that climate change is happening, is caused by an unprecedented build-up of greenhouse gases (GHGs) in the atmosphere and is principally the result of human burning of fossil fuels. The uncertainty that remains concerns the timing and extent of the impacts rather than their existence.

In response to this growing certainty and the recognition that the social costs associated with climate change could be enormous, national governments, local authorities, businesses, individuals and other institutions have begun to act to cut their GHG emissions. After a long wait, the Kyoto Protocol will now enter into force in early 2005, the EU Emissions Trading Scheme is due to kick off on 1 January 2005 and a host of regional and domestic incentives and regulations are being put into place. This, in turn, has spurred the creation of a range of businesses and schemes providing services related to carbon management.

As each new policy initiative is introduced, however, it is greeted with the now familiar doom-laden claims about the economic damage – loss of competitiveness, price increases, and unemployment – that will result. Many also argue that there is still insufficient certainty – about the science of climate change and/or the policy framework – for organisations to act to cut emissions. This response by those subject to regulation is not unexpected; after all organisations rarely call for constraints on their own activities unless they think their competitors will be worse hit. What is more surprising, and disap-

pointing, is that more has not been heard about the multiple options that exist for cutting GHG emissions at little or no cost and the non-GHG benefits that often accompany them. This is not due to a lack of evidence.

At the macro level, research by the IPCC and others has shown that the aggregate costs of implementing the Kyoto Protocol are likely to be small, provided that countries and companies act efficiently (ie, without delay and using the mechanisms available to them). The IPCC's Third Assessment Report, for example, suggests that total economic losses to industrialised countries are likely to be less than 1% of GDP by 2010 in the context of an expected business-as-usual increase of around 30% over the same period, probably within the margin of error of the growth projections themselves. Likewise, in the case of the UK, it is estimated that achieving the government's target to reduce CO<sub>2</sub> by 60% below current levels by 2050 will reduce GDP by only between 0.5 and 2%, alongside an expected tripling of the size of the economy.

Financial analysis and plant-level studies also suggest that decisive and early action to reduce emissions can be profitable or, at worst, significantly reduce business risk. Looking at the power sector, for example, the US company Innovest Strategic Value Advisors has shown that "all companies are likely to gain from preparing for carbon constraints....doing nothing is the worst option...By making astute changes to fuel mix and investments to refurbish existing assets, profits may also increase." In the same vein, investment bank Dresdner Kleinwort Wasserstein has stated that several utilities "should ... be winners regardless of the allocation basis chosen or

**'Proactive management responses to real or potential carbon constraints can lead to significant efficiency gains and improved financial performance'**

the cost of CO<sub>2</sub> ... overall, we consider the advent of emissions trading as a value-creation opportunity for the electricity companies".

Similar findings have emerged for a range of other sectors, where proactive management responses to real or potential carbon constraints can lead to significant efficiency gains and improved financial performance. Technology options already exist: Pacala and Socolow at Princeton University have shown that increases in atmospheric concentrations of GHGs can be limited to a doubling of pre-industrial levels using technologies that are "are already being implemented somewhere at full industrial scale."<sup>1</sup>

More generally, while the jury may still be out on whether corporate social responsibility and progressive environmental management always bring financial benefits and improved performance, it is clear that in many cases there are likely to be significant benefits from early action to cut GHG emissions. The logic behind this is intuitive, particularly in the case of energy efficiency, where reduced waste can only lead to cost savings, and is demonstrated by the increasingly positive experiences of those organisations that have implemented energy conservation and other GHG reduction measures.

The case studies and charts presented in the pages that follow provide examples of this. They are drawn from The Climate Group's research during 2004 and summarise the experiences of a wide range of corporations, cities, states and regions. The results are impressive. Despite the fact that many have not yet calculated the full benefits that have accrued from cutting emis-

**The Climate Group: building a coalition of leading reducers**



<sup>1</sup> Pacala, S and Socolow, R (2004) 'Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies', *Science* Vol 305, 13 August 2004

sions, massive GHG reductions have been achieved – up to 80% on 1990 levels – and major savings – up to \$2 billion.

Twenty-two companies from across the OECD are covered in the charts. Of these, five have achieved reductions of 60% or more – DuPont, Alcan, British Telecom (BT), IBM, and NorskeCanada – with combined savings of over \$5.5 billion. The case studies reveal that a variety of approaches have been taken, including improved energy efficiency (in processes, product design, and buildings), reduced waste and fuel switching.

NorskeCanada, a major pulp and paper manufacturer, has made substantial GHG reductions and set ambitious targets for the future. Since 1990, the company's CO<sub>2</sub> emissions have fallen by 61% and the firm has committed itself to a further 15% drop in GHG intensity over the next five years. These startling environmental improvements have brought net financial benefits: C\$2 million (\$1.7 million) back from the company's main energy provider BC Hydro from reduced energy consumption; and an estimated saving of C\$20 million–30 million from energy efficiency and related measures.

Likewise, Johnson & Johnson, one of the world's leading producers of healthcare products, has limited GHG emissions to a 26% increase since 2003, while over the same period company revenue has grown by 274%. The company now has a target of reducing its total emissions by 7% by 2010 despite expecting the firm to have quadrupled in size. In achieving this, the company has saved \$30 million annually through energy efficiency measures and now has the second largest installed base of solar photovoltaics (PV) for a non-utility in the US.

Equally impressive is the example of IBM which reduced global GHG emissions associated with energy consumption by 65.8% between 1990 and 2003. 35.4% of this came from energy conservation measures and annual energy efficiency improvements of nearly 6%. At the same time, perfluorocarbon (PFC) emissions from semiconductor manufacturing have been cut by 55%, against a goal of 10%. Despite these achievements, IBM has committed to reducing both energy-related and PFC emissions even further over the coming years. In part, at least, this is because the company has realized that reducing GHGs can be profitable. Indeed, since 1990 the company has saved nearly \$800 million in energy costs as a result of its GHG management efforts.

While pioneering companies have blazed the trail with deep emissions cuts, progressive cities and regions have



**BT's London tower – almost all the company's power will soon come from renewables**

not been far behind and, in many cases, have taken up the baton dropped by their national government counterparts with absolute CO<sub>2</sub> reduction targets ranging from 25% of 1990 levels by 2005 in Hanover (Germany) to 80% of 1990 levels by 2090 in Woking (UK). By introducing a municipal climate change plan, Portland, Oregon, has reduced per capita GHG emissions by 13% during a period when US national emissions grew by nearly 8%. In so doing, the city has reduced its own energy bill by \$11 million since 1991 and in just two years provided energy efficiency incentives to businesses and households that have generated annual bill savings of \$1.5 million. The savings of the 13 cities covered in the charts total over \$1.5 billion.

**T**he pattern continues at the state and regional level where authorities have set strong regional GHG reduction targets, developed carbon management systems and registries and designed emissions trading systems. These have been accompanied by a range of education and research programmes, the use of taxes, subsidies, state procurement and tariff structures to promote renewable energy and energy efficiency, and legislation to cap transport emissions.

At the national level, too, the synergy between emissions reductions and cost savings is becoming apparent. The UK, for example has reduced its emissions to 15% below 1990 levels – exceeding the requirements of the Kyoto Protocol – while the country's Action Energy programme stimulated savings of £650 million a year between 1989 and 2001. Likewise, Germany's promotion of renewable energy and improved efficiency has led to the creation of more than 450,000 jobs, undermining oft-repeated claims that a strong climate policy is bad for business.

There is no single recipe for these successes and the motivations and strategies of each organisation vary according to their geographical loca-

tion, sector and clients. However, all have shown that integrating carbon and energy management into their strategic visions can bring multiple benefits. The most common focus, and source of the main gains, is energy efficiency - in particular building and process design - but reducing waste and providing incentives for the use of renewables-based electricity have also brought substantial benefits.

It would be foolish to claim that the potential for win-win outcomes is limitless. Economic theory and empirical evidence suggest that the first reductions are always the easiest and cheapest and that, once these low hanging fruit have been exhausted, abatement costs can rise quite rapidly. At the same time, however, the first step is often the most difficult as it requires a shift in ways of thinking and problem solving that managers and staff are not used to. Once initial resistance has been overcome, harnessing the creativity and innovation of those involved can lead to far greater improvements. Sulphur dioxide emissions trading in the US is a good example of this: despite much hand wringing and furious lobbying by the companies being regulated, emission reductions have been greater than expected (and mandated) while allowance prices have – until very recently – remained far lower than anticipated. Similarly, in most countries, compliance with the Montreal Protocol's phase-out of ozone-depleting CFC gases has been far less costly and disruptive than initially expected.

The examples presented here are by no means comprehensive. However, they show a clear pattern of leadership responses to climate change going hand-in-hand with financial and economic gains. They also suggest that there is a growing convergence around both the need and potential to take early and decisive action to reduce GHG emissions: we hope that they will inspire others to join this trend. ■

Mark Kenber is Policy Director at The Climate Group.  
E-mail: [mkenber@theclimategroup.org](mailto:mkenber@theclimategroup.org)

**'Once initial resistance has been overcome, harnessing the creativity and innovation of those involved can lead to far greater improvements'**

# Understanding change or changing understanding?

**R**ecent scientific research suggests that Neanderthal man may have been killed off by climate change and his technological inability to survive increasingly harsh winters. The theory is that unlike the Gravettians – a branch of Homo Sapiens who arrived in eastern Europe around 30,000 years ago – Neanderthals did not develop the right tools, nor did they develop clothing to keep out the cold, as the Gravettians did with sewn furs and woven textiles. As a result, Homo Sapiens survived the harsh weather that dominated Europe between 18,000 and 25,000 years ago while the Neanderthals perished.

Moving forward 25,000 years, knowledge and technology are once again at the heart of the issue, as potential saviours in the current climate change debate. Indeed, it is clear that we must do three things to move on that debate: identify and better understand the issues; alter attitudes to climate change based on this understanding; and devise technologies to address the problem.

It is significant, then, that one of the

world's largest banks, HSBC, made a double announcement on the opening day of the 10th Conference of the Parties to the UN Framework Convention on Climate Change in December 2004. First, it became the first major bank anywhere to commit to carbon neutrality, by reducing energy use, buying green electricity and then offsetting the remaining carbon dioxide (CO<sub>2</sub>) emissions by investing in carbon credit or allowance projects. This is to compensate for the direct impact it has on the environment, with its buildings, air travel, and so on.

Second, HSBC has agreed a £650,000 three-year collaboration with Newcastle

University and the University of East Anglia (UEA), both acknowledged five-star universities for earth sciences and environmental sciences. Called the 'HSBC Partnership in Environmental Innovation', its remit is to research climate change and society's awareness of the issues, and to develop technologies to overcome some of the problems identified.

The common link between the two initiatives can be summed up in one word: 'action'. HSBC's group chief executive, Stephen Green, who will directly supervise the bank's carbon management plan, sums up the relevance of action in the carbon neutrality project: "In 2003, HSBC's CO<sub>2</sub> emissions from using electricity, natural gas, fuel oil and business travel were more than 550,000 tonnes. We need to act now to reduce our emissions."

But it may be less obvious how a partnership with two academic institutions will also make a direct impact. Or rather, it might be until you speak to Professor Paul Younger, who will be elected to the new HSBC Chair in Environmental Technologies and Geothermal Energy at Newcastle University in January 2005: "The partnership differs from many academic exercises in that it is about doing as well as learning and research. We aim to understand change in order to change understanding, promoting



100% of HSBC UK's electricity comes from non-fossil fuel sources like wind farms



Unpredictable weather, with the rains coming early or late, can lead to flooding, seen here in East Dongting Lake, Yuyang City, Hunan Province, China

effective means for renewable energy generation and conservation, actively engaging with the public on ways to help them think about how they use energy."

Not unlike the lesson we should learn from the Neanderthals' experience. They may have had spears, but these weren't up to the job. The Neanderthals' lack of technological know-how to develop anything that could be thrown any distance probably cost them their existence. They were simply unable to take the direct action that would have saved them.

It's an analogy that works with the HSBC Partnership, but it also holds good for the bank's carbon management plan. Francis Sullivan, HSBC's adviser on the environment, explains: "We have to keep pushing forward if we want to make a difference. Carbon neutrality is a worthy principle, but it has to be efficient and cost-effective." As a result, HSBC has established a carbon management task force to determine the best way forward, ensuring that the action it takes is of the highest quality. "At present, not all allowances and offsets that can be bought have the same environmental value and, as a matter of principle, we will ensure that ours are of the highest credibility, and are genuinely incremental," says Sullivan.

Credibility and good cost management are the keys to the success of all HSBC's environmental projects. HSBC is already in the top 50 companies globally in terms of climate leadership, according to the Carbon Disclosure Project's 2004 Climate Leadership Index, and the third highest-rated bank in the Dow Jones Sustainability Index, which tracks the financial performance of the leading sustainability-driven companies worldwide.

HSBC has also adopted the Equator



Speaking at the launch of the Climate Group in April 2004, when HSBC became a founder member of its Bank Working Group, Sir John Bond, HSBC group chairman, said: "HSBC has a deep and longstanding commitment to the environment, and it is our judgement that climate change represents the largest single environmental challenge this century. It will have an impact on all aspects of modern life. It is therefore a major issue for the bank's customers and its staff, as well as for every organisation on the planet, no matter how large or how small"

Principles, voluntary guidelines that direct the bank not to lend to projects where the borrower is unable or unwilling to comply with certain specified standards. And HSBC is also developing a range of socially responsible investment funds. This is a very public arena and one in which it is vital to perform at the highest level.

Being in a public arena, of course, has advantages, not least in raising awareness of climate change issues across all stakeholders, from institutional investors to the man or woman in the street. According to Dr

Keith Tovey, who will be elected professor at the new HSBC Low Carbon Innovation Centre within UEA's Carbon Reduction unit in January 2005, public awareness, ultimately, will be one of the most powerful elements in the challenges posed by the environment: "The keys to ameliorating the effects of climate change are to understand why it's happening, what people think of it, and then develop pragmatic solutions." Solutions, he is keen to point out, that have an impact across the globe, for the globe.

And one thing is for sure. While the demise of the Neanderthals was in effect a local, European issue, climate change is now a global concern. And although both partner universities are based in the UK, it is the aim of the partnership to have a worldwide impact, acknowledging that climate change is a global issue. Both universities have extensive worldwide networks and HSBC, with 10,000 offices in 76 countries and territories in Europe, the Asia-Pacific region, the Americas, the Middle East and Africa, will use its own reach across the planet to further enhance the project.

As Stephen Green remarks: "Our actions as a global bank affect the world. Our carbon management plan will make great strides towards ameliorating our direct impacts, while the 'HSBC Partnership in Environmental Innovation' will yield knowledge on climate change that will lead to improvements in environmental management globally, as befits the world's local bank. Together, I believe we can make a major contribution to increase our understanding, so that we can take early action to reduce the impacts we are having on our fragile planet."



Gas flaring by the Sakhalinneftegaz state company, Sakhalin Island, Far East Russian Federation

# Carbon cuts boost the bottom line

Evidence is mounting from a variety of companies around the world that taking action to curb carbon emissions can bring financial rewards. **David Biello** reports

**A**nnual global emissions of carbon dioxide (CO<sub>2</sub>), the most widespread greenhouse gas (GHG), amounted to more than 23 billion tonnes in 2002, from energy-related activities alone, according to new data from the International Energy Agency. Of this, around 41% came from burning oil. Power generation was responsible for more than 40% of total emissions, with transport accounting for around 21% (and rising). Oil companies, it would appear, have a lot to lose from any efforts to control GHG emissions by putting a price on carbon.

Yet the world's second largest oil company, BP, is in the vanguard of efforts to do precisely this. In 1998 it publicly announced a plan to reduce its GHG emissions to 10% below 1990 levels by 2010. By 2001, it had already achieved an 18% absolute reduction in GHG levels and, instead

**Alcoa: saving \$100 million from energy efficiency and reduced waste**

of resting on its laurels, set a new goal of holding net emissions flat at 10% below 1990 levels through 2012, despite anticipated growth.

Although such efforts might, at first sight, seem to be against its best interests, in fact, for an investment of \$20 million, the company estimates it saved \$650 million over three years. Plus, by implementing an internal emissions trading programme, BP gained valuable experience that should serve it well as regional, national and international carbon trading programmes spring up around the world.

"The fact that the target was delivered nine years early was simply because it was remarkably good business," said Chris Mottershead, BP's senior advisor on climate change. "Staff were getting up half an hour earlier to go and do things to reduce emissions because they really liked this issue. They started to work out what

the reductions might be and they started putting forward proposals, the majority of which were cash-flow positive."

Most of these projects involved either energy efficiency or capturing methane that would otherwise be flared into the atmosphere. By capturing that methane – a gas that is 21 times as powerful in terms of climate change as CO<sub>2</sub> – BP obtained another saleable commodity while simultaneously reducing its emissions profile. And the success continues, with BP reporting savings of another 1.8 million tonnes of CO<sub>2</sub> in 2002 which more than offset the 1.5 million tonne increase arising from company growth during the period.

It is not the only oil company to see the advantages of reducing its GHG emissions. Shell committed in 1998 to reduce its GHG emissions by 5% below 1990 levels by 2010 and, like BP, it has comfortably met its target. By 2003, Shell had reduced its emissions to 9% below 1990 levels, primarily by investing in technology to eliminate the flaring of methane and other GHGs as well as making improvements in energy efficiency.

Of course, oil giants merely produce the oil that later gets burned. Companies that are responsible for burning it also have a role to play. For example, several leading car manufacturers are striving to reduce the amount of GHGs emitted from tailpipes. Volkswagen, the German car giant with worldwide revenues of around €87 billion (\$113 billion), has committed to reducing the average CO<sub>2</sub> emissions from its new car fleet by 24% below 1995 levels by 2008. It has already achieved a reduction of 14%. And, through energy efficiency measures, such as simply switching off equipment when it is not in use, just one of Volkswagen's manufacturing plants in Germany saved €1.2 million in the first six months of 2004.

Volkswagen has also teamed up with Shell and fellow car producer DaimlerChrysler to develop new fuels that can be used in existing engines to help reduce emissions. They include synthetic fuels made from methane or natural gas – SynFuels – and biofuels derived from plants that, on combustion, emit the same amount of CO<sub>2</sub>



that they absorbed while growing – dubbed SunFuels.

Volkswagen is not alone in its efforts. Its Japanese rival Toyota has become the world leader in hybrid technology – cars that switch between electric and conventional motors to save fuel and thus GHGs – and has even licensed its technology to competitors such as Ford and Nissan. Toyota has also set targets for reducing its own emissions, including a reduction in its overall GHG output, measured in CO<sub>2</sub> equivalent (CO<sub>2</sub>e), to 1.55 million tonnes by the end of 2005 from 1.95 million in 1990. According to its latest social and environmental report, the company had already reduced its emissions to 1.57 million tonnes of CO<sub>2</sub>e by the end of 2003.

Car companies are not the only ones in the transport sector to recognise the business case for addressing climate change. For example, Deutsche Bahn, which is responsible for Germany's railway infrastructure, set a goal of reducing its CO<sub>2</sub> emissions and energy consumption by 25% below 1990 levels by 2005. It, too, has achieved its goal ahead of schedule thanks to the use of more efficient diesel engines, recovering energy used in braking (much like hybrid cars), and producing more energy from renewable sources. In fact, the company now obtains 13% of its power from renewables. All told, these measures have saved the company €700 million since 2002.

**H**heavy industry has also reported significant cost savings as a direct result of its efforts to reduce emissions. One of the most impressive achievements is that of US chemicals group DuPont. By minimising emissions of nitrous oxide (N<sub>2</sub>O) – a powerful GHG – arising from its production processes, and other measures, the company has been able to reduce its GHG emissions by 69% below 1990 levels. The company has also adopted a series of energy efficiency measures for its production facilities that helped it reduce its energy consumption by 9% below 1990 levels while increasing production by 35%. The resulting savings amounted to a whopping \$2 billion by 2000.

"The company's major stretch goal is to achieve zero injuries, illnesses, incidents, wastes and emissions," said Paul Tebo, DuPont's vice president for safety, health and environment. "Environmental stewardship was never a hard sell to DuPont's business and plant sites. It was a natural extension of the company's safety culture."



**Lafarge: benefitting from burning waste**

**'You do need to invest, but these projects can pay back quite quickly'**

*Chris Boyd,  
Lafarge Italy*

The company is also pursuing an aggressive strategy of meeting more of its energy needs from renewable sources, with a goal of getting 10% of its power from renewables by 2010, a substantial increase on the current figure of 3%. The company says it already saves up to \$15 million/year by using renewable energy.

DuPont's German competitor BASF has also set a tough GHG goal: to reduce its emissions by 48% below 1990 levels by 2012. By 2002, the company had already achieved a reduction of 38% – by addressing potent N<sub>2</sub>O emissions like DuPont – and it continues to battle for improved energy efficiency in its production processes with likely similar benefits to its bottom line.

The world's largest aluminium producers – Alcan and Alcoa – have also implemented major emissions management schemes. Alcan, headquartered in Canada, set itself the goal in 2000 of reducing its GHG emissions by 500,000 tonnes by the end of this year. Through smelter improvements at its worldwide plants, the company reduced its GHG emissions by 2.9 million tonnes in 2001 and 2002, well beyond its goal, and now plans to save a further 125,000 tonnes in 2005.

Its US rival Alcoa, meanwhile, aims

to reduce its GHG emissions by 25% below 1990 levels by 2010. Last year, it told the Carbon Disclosure Project, it had already reached that goal and it estimates it will save \$100 million in energy and environmental costs by 2006 as a result of its improved energy efficiency and reduced waste.

Even the cement industry, which accounts for 5% of global emissions, has joined the carbon reduction effort. The French group Lafarge has led the charge, by aiming to reduce its CO<sub>2</sub> emissions by 20% per unit of production from 1990 levels by 2010. In addition, the company has committed to a 10% absolute reduction of CO<sub>2</sub> emissions in all Annex 1 countries (industrialised countries) of the Kyoto Protocol. With annual emissions of roughly 81 million tonnes this is no small task.

**T**he company has already reduced its GHG emissions by 11% per unit of production, through energy efficiency and other measures. But, with energy efficiency improvements becoming less and less cost-effective, Lafarge has turned to technological improvements – including the use of waste products from steel production and coal-burning as well as burning used oil or biomass in its Lafarge Burner – to achieve its goals. New technology like the Lafarge Burner may even bring the company additional revenue through the sale of Clean Development Mechanism (CDM) carbon credits which could be generated when such equipment is installed in developing countries.

"You do need to educate people on burning waste, and you do need to invest, but these projects can pay back quite quickly," said Chris Boyd, CEO of Lafarge Italy. "Lafarge generally won't make investments unless the payback time is less than three years. In Italy, our fuel bill was 22% less in 2003 than it would have been without the use of waste fuels."

An expected building boom throughout the world threatens a tripling of emissions from the cement sector in the next 50 years. So, bringing new technology into the industry will continue to be key to the sector's emission reduction efforts going forward.

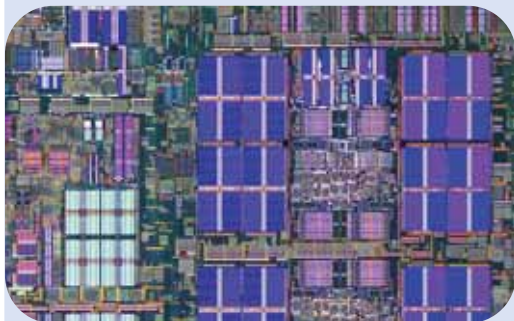
The same is true of many other industries, even those that are not major emitters, such as information technology. Computer chip maker Intel, for example, is relying on new technology to help it reduce its perfluorocarbon (PFC) emissions (a family of potent GHGs) and its energy consumption.

# Saving energy, pleasing shareholders

IBM is the world's largest information technology company with more than 319,000 employees and operations in 170 countries. It has a long-standing commitment to energy conservation through which it aims to reduce costs and increase shareholder value. Since 1990, through its aggressive actions to save energy, the company has avoided 8.45 million tonnes of carbon dioxide (CO<sub>2</sub>) emissions and achieved operating cost savings of \$791.4 million.

## Strategic energy plan

IBM's energy management programme dates back to 1974, when a formal policy was issued calling for the conservation of energy and materials in the company's operations and in the design and manufacture of its products. The company cites three aims for this commitment: cost savings; environmental benefit; and to help conserve the world's natural resources.



## More efficient microchips can contribute to a reduced energy requirement

IBM's energy management programme dates back to 1974, when a formal policy was issued calling for the conservation of energy and materials in the company's operations and in the design and manufacture of its products. The company cites three aims for this commitment: cost savings; environmental benefit; and to help conserve the world's natural resources.

To support the strategic energy plan, IBM shares knowledge and solutions related to energy efficiency both within the company, through global energy meetings and conference calls, and outside through various voluntary programmes.

## Efficient facilities

The company uses cutting-edge energy management strategies as well as conventional conservation measures to achieve its goals for improved efficiency. Ongoing efforts include: efficiency upgrades in computer and lighting equipment; installing energy-efficient motors and variable-speed drives on electric motor systems; improved design and operation of clean room manufacturing areas; using 'freecooling' in building climate control systems whenever outside air is cooler than the internal air; rebalancing exhaust systems to reduce wasted heat and cooling; improving management of plant air compressors; and varying temperature and humidity settings.

Some of these measures

are in evidence at the IBM facility in North Castle in New York state. This 420,000 square foot office building underwent a phased renovation over three years that upgraded its infrastructure and more than doubled its capacity. In spite of the 230% increase in the number of people and personal computers, the building's electricity consumption decreased by 11% between 1999 and 2000.

are in evidence at the IBM facility in North Castle in New York state. This 420,000 square foot office building underwent a phased renovation over three years that upgraded its infrastructure and more than doubled its capacity. In spite of the 230% increase in the number of people and personal computers, the building's electricity consumption decreased by 11% between 1999 and 2000.

For all new construction projects with combined capital and expense costs over \$500,000 (or more than 5% of the location's annual energy costs – whichever is greater) cost-effective efficiency measures are included in the engineering design.

## Efficient products

IBM has also been active in raising the energy efficiency of its products. It has set goals for energy efficiency improvements across its product lines, all of which have been met or exceeded. Part of this work has been achieved through participation in the US Environmental Protection Agency (EPA) Energy Star product labelling initiative.

IBM is also working to develop microchips which are both more powerful and more energy efficient. Though the main goal of this research is to prevent high-speed computers from overheating, more efficient microchips can contribute to a reduced energy requirement. "It has gone from an era where you didn't have to think about [energy] to an era where everyone thinks about it," says Russell Lange, chief technology officer of IBM's Technology Group. "In earlier times, companies would brag about the amount of electricity a mainframe required."

## Reduced PFC emissions

In addition to its gains through energy efficiency, IBM was the first semiconductor manufacturer to set specific emission reduction targets for perfluorocarbons (PFCs), a family of potent greenhouse gases. The original goal was to reduce PFC emissions from its worldwide semiconductor manufacturing processes by 40% (indexed to production) between 1995 and 2002. But, as part of its commitment under the US EPA's voluntary Climate Leaders initiative, IBM also committed to reduce PFC emissions by an absolute 10% by 2005, using 2000 as the base year.

To address these goals, the company's engineers invented a less emitting process to clean the equipment used in the most PFC-intense stage of semiconductor manufacturing. This process is currently being implemented in all new systems, and all other installed systems currently using PFCs have been equipped with emissions capture and treatment technology. Through the use of these new technologies, IBM has far surpassed both of its commitments (see table).

## Voluntary initiatives

As part of its overall strategy to address climate change, IBM participates in a wide range of voluntary programmes. These have allowed it to further institutionalise energy conservation as a cost-effective strategy within the company, to share best practice and technical knowledge among partners, and to increase external awareness of its energy programmes and results. In addition to the EPA's Energy Star and Climate Leaders programmes, current partnership programmes include: the World Wildlife Fund's Climate Savers, the World Resources Institute's Green Power Market Development Group, and the Chicago Climate Exchange.

### Targets

- Average annual CO<sub>2</sub> emission reductions from 2000 to 2005 equivalent to 4% of the emissions associated with IBM's electricity and fuel use
- Absolute 10% reduction in perfluorocarbon (PFC) emissions from semiconductor manufacturing by 2005 on a 2000 baseline

### Achievements

- Reduced global GHG emissions associated with energy consumption by 65.8% between 1990 and 2003 (35.4% due to energy conservation)
- 55% reduction in PFC emissions from semiconductor manufacturing by 2003 (against 2000 base year)
- Average annual efficiency improvement of 5.7% (1998 to 2003)
- Procured 2.5% of energy from renewables in 2003
- 100% of new personal computers, monitors and printer office models introduced from 2001 through 2003 met US EPA Energy Star criteria

### Benefits

- \$791 million saved through energy efficiency and renewables

Intel is the world's largest chip-maker and aims to reduce its PFC emissions by 10% below 1995 levels by 2010. It also aims to reduce its energy use by 4% a year through 2010 on a per-unit basis. Through the use of improved production processes, the company has already cut its PFC emissions by 35% between 2001 and 2003 and has also reduced its N<sub>2</sub>O emissions from one site in New Mexico by 32%. Although no figures are available for the cost savings arising from such reductions, the company's energy goals alone are saving it \$10 million a year.

When an idea makes such sound business sense, it is not unusual to see it adopted widely across the industry. Indeed, computer giant IBM has been striving to improve its energy efficiency even longer than Intel – since 1990 – and has saved even more. “Big Blue” has seen its CO<sub>2</sub> emissions fall by 65% from 1990 levels, thanks in part to PFC emission reductions, and saved \$791 million – equivalent to a full year's dividend payments – between 1990 and 2002 thanks to energy efficiency projects and emission reductions.

Another pioneer in GHG reductions from the information technology community is STMicroelectronics of Switzerland. This ambitious semiconductor manufacturer hopes to have zero net emissions by 2010. It plans to switch to fuel cells and co-generation to meet 65% of its energy needs and source 5% from renewables. Between 1994 and 1998, when global warming was still largely an issue for scientists rather than industrialists, the company saw its emissions drop by 20% and it expects its efforts to save it \$900 million by 2010.

**O**f course, any manufacturer that makes energy efficiency improvements can expect to save money (and carbon), but even financial firms have seen cost savings as a result of energy efficiency measures and new markets for their products. Insurance giant Swiss Re, for example, has committed to reduce its operational GHG emissions by 15% below 2002 levels in the next decade. It also hopes to become carbon neutral over the same period, by purchasing offsets through the World Bank Community Development Carbon Fund.

The company sees climate change as an issue that could affect its bottom line in a number of ways. For example, an increase in the frequency of natural disasters could have a serious impact on its property-casualty and



**M&S: seeking emissions savings in its supply chain**

**‘Of all the sustainability issue we deal with, none poses such an all-encompassing threat to the way in which we operate in the long term as climate change’**  
Mike Barry,  
Marks & Spencer

life insurance businesses. “For Swiss Re, climate change is more than a scientific issue,” said Chris Walker, managing director of greenhouse gas risk solutions for the company. “It is a financial issue.”

However, the company sees opportunities here as well as risks: from investing in energy efficiency, to insurance products for emissions trading, and insuring renewable energy projects. But it considers its major role to be questioning the companies it insures on their climate change policies. “It is the nature of our business to identify risks in the long-term,” Walker added. “If you start talking about an issue for a number of years it creates a groundswell of interest and awareness. If we can do this with climate change then it will be good for our clients and good for Swiss Re.”

The Zurich-based insurer is not alone in seeing the financial benefits of reducing GHG emissions and investing in efforts to reduce climate change. One of its main competitors, Munich Re, has also incorporated climate risk in its asset management plans as well as offering insurance and other financial services to the renewable energy industry.

Munich Re's German banking counterpart, HVB Group, has also entered the climate change fray. HVB has seen its CO<sub>2</sub> emissions from power decline by 29% between 1996

and 2002 and its emissions from heating fall by 38% in the same period. At the same time, the group has helped finance more than €1 billion in renewable energy projects.

With the financial services world increasingly engaged in the battle against climate change and its understanding of the potential risks and opportunities, it is clear that no major business sector can remain ignorant of the financial logic behind GHG reductions. Even Marks & Spencer, a leading retailer with a relatively low direct emissions profile, has decided to examine how the issue could affect its operations and how it should respond.

Like many of the companies in this article, the UK-based company has found that energy efficiency is the name of the game and it has set itself a goal, since 2001, of reducing energy use by 5% a year. As of April this year, it also plans to meet 8% of its energy needs from renewable sources.

**B**ut a much bigger chunk of the company's emissions derive from its supply chain (some 2.6 million tonnes of CO<sub>2</sub> from raw materials, manufacturing and importing compared with roughly 340,000 tonnes from its own operations). So the company has devised a plan for its suppliers that breaks down environmental management tasks into six steps, with the focus on energy efficiency.

In addition, the retailer has investigated the ‘lifecycle’ of its products and found that 80% of the carbon emissions associated with its clothing arise during washing and ironing. Simply by making clothes that can be washed at lower temperatures, the company could help the UK reduce household electricity consumption by 0.25%.

“None of these small strands appear particularly compelling at a time when the business can get a much better return from investing its limited sustainability budget in issues which help us to differentiate the brand and sell more today; issues such as avoiding [genetically modified] food,” said Mike Barry, sustainable development manager for Marks & Spencer.

“However, of all the sustainability issues we deal with, none poses such an all-encompassing threat to the way in which we operate in the long term as climate change. We cannot yet predict how Marks & Spencer might be affected. It may be reputational, it may be in cost-taxes, it may be loss of markets. The problem is complex, but the business case for action is simple: Start getting your house in order or risk being consumed by this issue.”

# Leading reducers: corporations

COMPANY	MEASURES	TARGET/REDUCTION	COST SAVINGS
3M	<ul style="list-style-type: none"> <li>● Energy efficiency</li> <li>● Process and product improvements</li> </ul>	<ul style="list-style-type: none"> <li>● 50% reduction in worldwide GHG emissions between 1990 and 2005</li> <li>● 35% reduction from 1995 levels</li> </ul>	● \$200m since 1973
Alcan	<ul style="list-style-type: none"> <li>● Energy efficiency (smelter improvements)</li> </ul>	<ul style="list-style-type: none"> <li>● Reduce GHG emissions by 500,000 tonnes over 2001–04</li> <li>● Objective for 2005 is estimated at 125,000 tonnes</li> <li>● Alcan UK achieved 65% reduction in GHG emissions between 1990 and 2000</li> <li>● Globally Alcan reduced total GHG emissions by 2.9m tonnes over 2001 and 2002</li> </ul>	● Not available
Alcoa	<ul style="list-style-type: none"> <li>● Energy efficiency</li> <li>● Reduced waste</li> </ul>	<ul style="list-style-type: none"> <li>● Reduce GHG emissions by 25% between 1990 and 2010</li> <li>● Assuming success with inert anode technology, 50% reduction by 2010</li> <li>● 25% reduction in GHG emissions between 1990 and 2003</li> </ul>	● \$100m environmental and energy cost savings by 2006
Austin Energy (city-owned utility)	<ul style="list-style-type: none"> <li>● Energy efficiency – demand-side management (DSM) for customers</li> <li>● Renewable energy (sales)</li> </ul>	<ul style="list-style-type: none"> <li>● Generating 20% of the electricity it sells from renewable sources and increasing energy efficiency by 15% by 2020</li> <li>● Saved 500MW since 1982, removing need for a coal-fired power plant</li> </ul>	● Not available
BP	<ul style="list-style-type: none"> <li>● Methane capture</li> <li>● Energy efficiency</li> </ul>	<ul style="list-style-type: none"> <li>● 10% reduction on 1990 GHG emissions between 1998 and 2010</li> <li>● Revised in 2001 – hold net emissions at 10% below 1990 levels until 2012</li> <li>● 18% reduction in GHG emissions between 1998 and 2001</li> </ul>	● \$650m (1998–2001)
British Telecom	<ul style="list-style-type: none"> <li>● Reduced fleet size</li> <li>● Energy efficiency</li> </ul>	<ul style="list-style-type: none"> <li>● 62% reduction in CO<sub>2</sub> emissions between 1991 and 2004 because of improved energy efficiency</li> <li>● 38% reduction in CO<sub>2</sub> emissions between 1992 and 2004 because of improvements to transport</li> <li>● Canadian forest industry reports reducing GHG emissions by 28% below 1990 levels industry-wide</li> </ul>	● £600m between 1991 and 2000
Canadian forest products industry	<ul style="list-style-type: none"> <li>● Energy efficiency</li> <li>● Biomass fuels</li> </ul>	<ul style="list-style-type: none"> <li>● Reduced CO<sub>2</sub> emissions by 52% between 1995 and 2002</li> </ul>	● Industry reports greater competitiveness; cost savings not reported
Deutsche Telekom	<ul style="list-style-type: none"> <li>● Energy efficiency</li> </ul>	<ul style="list-style-type: none"> <li>● Reduced CO<sub>2</sub> emissions by 52% between 1995 and 2002</li> </ul>	● €10m
DuPont	<ul style="list-style-type: none"> <li>● Reduced N<sub>2</sub>O emissions from nylon production (80%)</li> <li>● Energy efficiency (20%)</li> <li>● Use of renewables (&lt;1%); 10% goal for 2010</li> </ul>	<ul style="list-style-type: none"> <li>● 65% GHG reduction on 1990 levels by 2010</li> <li>● 69% reduction in GHG emissions from 1990 levels</li> </ul>	● \$2bn (efficiency) ● \$10m–15m (renewables)
Enbridge Gas Distribution	<ul style="list-style-type: none"> <li>● Customer energy efficiency (DSM)</li> </ul>	<ul style="list-style-type: none"> <li>● Reduce GHG emissions resulting from company operations by 25% compared to 1990 levels</li> <li>● Avoided 2.5m tonnes of CO<sub>2</sub> between 1995 and 2003</li> </ul>	● C\$700m (customers)
IBM	<ul style="list-style-type: none"> <li>● Energy efficiency</li> <li>● Reduced PFC emissions from semi-conductor manufacture</li> </ul>	<ul style="list-style-type: none"> <li>● 4% energy efficiency goal per year</li> <li>● Absolute 10% reduction in PFC emissions between 2000 and 2005</li> <li>● 65% reduction in CO<sub>2</sub> emissions from 1990 levels</li> <li>● Over past five years has achieved annual average efficiencies of 6%</li> </ul>	● \$791m (1990–2002)
Intel	<ul style="list-style-type: none"> <li>● Use of new technologies</li> <li>● Energy efficiency</li> </ul>	<ul style="list-style-type: none"> <li>● 10% absolute reduction in PFC emissions from 1995 levels by 2010</li> <li>● Reduce worldwide energy use 4%/year through 2010 on a production-normalised basis</li> <li>● 35% reduction in PFC emissions between 2001 and 2003</li> <li>● 32% reduction in N<sub>2</sub>O emissions from New Mexico site</li> <li>● 10% additional reduction committed for 2002–07</li> <li>● 17% reduction in CO<sub>2</sub> emissions between 1997 and 2003</li> </ul>	<ul style="list-style-type: none"> <li>● Annual savings of \$10m through energy conservation projects</li> <li>● Cost savings for PFC reductions not available</li> <li>● Senior energy manager reports this has been economically beneficial to firm; numbers not reported</li> </ul>
Kodak	<ul style="list-style-type: none"> <li>● Energy efficiency</li> </ul>	<ul style="list-style-type: none"> <li>● 20% reduction in CO<sub>2</sub> (per unit of production) by 2010</li> <li>● Absolute reduction of 10% in Kyoto Protocol Annex 1 countries</li> <li>● 11.8% reduction in CO<sub>2</sub> emissions (per unit of production) on 1990</li> </ul>	● Environment manager reports this has led to savings, making Lafarge more competitive; other cement firms following
Lafarge	<ul style="list-style-type: none"> <li>● Energy efficiency (40%)</li> <li>● Use of cementitious materials (56%)</li> <li>● Use of biomass fuels (4%)</li> </ul>	<ul style="list-style-type: none"> <li>● Reduce GHG emissions by 59% between 2001 and 2005 through reduced steam usage</li> <li>● 59% reduction in GHG emissions from 1990 levels</li> </ul>	● C\$5m/year
Norske Canada	<ul style="list-style-type: none"> <li>● Energy efficiency (25%)</li> <li>● Fuel switching (bunker oil to natural gas) (35%)</li> <li>● Use of biomass fuels</li> </ul>	<ul style="list-style-type: none"> <li>● 5% reduction by 2010 on 1990 levels</li> <li>● 9% reduction in GHG emissions from 1990 levels</li> </ul>	● Not available
Shell	<ul style="list-style-type: none"> <li>● Energy efficiency</li> <li>● Investments to end continuous gas flaring</li> </ul>	<ul style="list-style-type: none"> <li>● Zero net emissions by 2010</li> <li>● 20% reduction in CO<sub>2</sub> emissions between 1994 and 1998</li> </ul>	● \$900m (1994–2010)
STMicro-electronics	<ul style="list-style-type: none"> <li>● Energy efficiency</li> <li>● Switch to fuel cells and co-generation (65% of energy)</li> <li>● Renewables (5%)</li> </ul>	<ul style="list-style-type: none"> <li>● Reduce operational GHG emissions by 15% against 2002 by 2013</li> <li>● Zero net emissions by 2010</li> <li>● 10% reduction in GHG emissions between 1999 and 2001</li> </ul>	● Not available
Swiss Re	<ul style="list-style-type: none"> <li>● Energy efficiency</li> </ul>	<ul style="list-style-type: none"> <li>● Halve remaining emissions by 2008</li> <li>● Eliminate all fossil fuel use in its plants by 2010</li> <li>● 30% reduction in greenhouse gas emissions from 1990</li> </ul>	● Senior energy manager reports this has been economically beneficial; numbers not reported
Tembec	<ul style="list-style-type: none"> <li>● Energy efficiency</li> <li>● Biomass fuels</li> </ul>	<ul style="list-style-type: none"> <li>● Goal for 2003 to reduce CO<sub>2</sub> emissions to 1.61m tonnes or less</li> <li>● 19% reduction in CO<sub>2</sub> emissions from 1990 levels</li> </ul>	● Not available
Toyota	<ul style="list-style-type: none"> <li>● Energy efficiency</li> <li>● Thermal emissions recovery</li> <li>● Purchasing wind power</li> </ul>	<ul style="list-style-type: none"> <li>● Reduction in GHG emissions of 40% by 2006</li> <li>● 37% reduction in GHG emissions from 1997 levels</li> </ul>	● Not available
United Technologies Corporation	<ul style="list-style-type: none"> <li>● Energy efficiency</li> </ul>	<ul style="list-style-type: none"> <li>● Annual 5% reductions in GHG emissions</li> <li>● 26% reduction in CO<sub>2</sub> emissions between 1996 and 2002</li> </ul>	● Not available
Westpac	<ul style="list-style-type: none"> <li>● Energy efficiency</li> <li>● Reduced paper consumption</li> </ul>		

Sources: [www.theclimategroup.org/assets/TCG\\_Emissions%20Charts%2004.pdf](http://www.theclimategroup.org/assets/TCG_Emissions%20Charts%2004.pdf)

# Taking carbon out of paper

NorskeCanada is a major North American manufacturer of printing paper. It has approximately 4,000 employees and the capacity to produce 1.8 million tonnes/year of paper for magazines, catalogues, telephone directories and newspapers at its mills in British Columbia. Most of the company's products are sold to customers in North America, Asia and Western Europe.

The company's greenhouse gas (GHG) emissions are largely determined by the amount and type of energy it uses to make its products. Approximately 98% of its direct emissions are derived from the combustion of natural gas and oil. Indirect emissions arise from the electricity purchased from BC Hydro.

NorskeCanada is the single largest customer of BC Hydro, one of Canada's largest electrical utilities. With an annual energy bill of approximately C\$200 million (\$170 million), reducing expenditure through energy efficiency was one of the main motivations for the company's efforts to reduce its GHG emissions. However, Stu Clugston, NorskeCanada's vice-president of corporate social responsibility, emphasises that there is also a strong desire within the company to 'do the right thing'. "We are a huge consumer of natural resources in British Columbia," Clugston says, "and we have taken the position that our footprint is way too big ... we can certainly reduce our impact".

## Mill modernisation

The past decade has seen a reduction in GHG emissions across the pulp and paper industry due to improvements in technology and efficiency. There have also been substantial gains made through fuel switching – first from oil to natural gas, and then greater reliance on biomass fuel derived from salt-laden logs.

The C\$400 million modernisation of NorskeCanada's Crofton Mill in 1992 resulted in major emissions reductions, and all the company's mills now have ISO 14001 certified environmental management systems in place. These regularly undergo internal and external compliance audits, which are communicated to management and the board so that deficiencies can be addressed. Other projects at the mills are focussed on increasing the amount of energy from biomass, while reducing the use of fossil fuels, the demand for steam, and energy consumption.

Strategic changes in production have also helped to reduce emissions. For example, sawdust and other waste wood (which would otherwise be burned or sent to landfill) is used for paper and pulp production, and recycling de-inked pulp reduces the need for virgin fibre content.

## Management tools

Reducing GHG emissions involves key staff at both the mill and corporate level, from the senior vice-president of operations to the environmental managers at each site. 'Scorecards' are given to each mill on a monthly basis and are examined by the 'Corporate Energy Council'. Quarterly reviews with the executive provide guidance on the GHG implications of energy decisions.

Russ Horner, who was appointed as NorskeCanada's CEO in 2000, has introduced some new values to the compa-

ny, and his personal commitment to the GHG reduction effort has allowed it to build on its existing initiatives. The rationale behind the company's decisions are communicated through work-group meetings, newsletters and its intranet. Neighbours are kept informed of NorskeCanada's environmental performance and initiatives through community advisory forums and local news announcements.

## Cogeneration and BC Hydro

To help reduce the emissions associated with its energy purchases, NorskeCanada has been working with BC Hydro on its Power Smart programme to identify internal power saving opportunities. BC Hydro has a strong incentive for improving the energy efficiency of its customers, as it saves the energy company from having to build additional capacity. "Power Smart is a very innovative programme," says Clugston, "It rewards large consumers and even small residential consumers for making the right steps around energy efficiency." In the year ending June 2004, NorskeCanada benefited to the tune of C\$2 million as a result of its energy conservation measures under the Power Smart programme.


NorskeCanada is also looking at ways to self-generate power using cogeneration technology so that, at peak times, the company can remove itself from the main grid. This reduces the need for new generation capacity, and is more cost-efficient. The company currently cogenerates about 80MW which is enough to power about 50,000 homes.

## Transportation and supply chain management

In addition to energy conservation measures, NorskeCanada is currently examining how further emission reductions can be achieved in the transport of its materials and products. The emission impacts of moving goods by train, barge, freighter, and truck are being studied and, wherever possible, arrangements are made so that containers do not return empty.

The company is also a leader in lighter weight paper, and has been continually lowering the weight of its paper across product lines. In addition to using less fibre, lighter paper also means more paper per roll and fewer rolls to ship, resulting in GHG savings throughout the supply chain.

## Future priorities

Looking forward, NorskeCanada is investigating the possibility of producing a carbon-neutral paper. This would be a first for the paper industry and could be marketed as a unique, premium product. "We're attempting to bundle ethical, environmental and social attributes together to create a different kind of pedigree for our products," says Clugston. "If we can make innovative ideas like this happen, as well as building on the programmes we already have in place, then we will continue to reduce our greenhouse gas emissions, and see significant business benefits." 



**Biomass fuel brings "substantial gains"**

### Targets

- To reduce GHG emissions intensity by 15% in the next five years
- To move into the top quartile of Canadian pulp and paper companies, with respect to energy efficiency

### Achievements

- CO<sub>2</sub> emissions have been cut by 61% since 1990
- GHG emissions from three of NorskeCanada's mills dropped by 30% between 1990 and 1999, while production in these mills rose by 12%
- The energy intensity of the company dropped from 37GJ/tonne of product in 1990 to 33GJ/tonne in 1999

### Benefits

- C\$2m in benefits from energy provider BC Hydro as a result of reduced energy consumption
- An estimated saving over the past 10 years of C\$20m–30m due to energy efficiency and related measures



# Carbon and renewables – the role of the financial industry

The long-awaited market for greenhouse gas (GHG) emissions has become a reality. In 2005, the European Union will launch its emissions trading scheme and with the Russian Government's recent ratification of the Kyoto Protocol, this far-reaching agreement will finally come into effect.

As a leading reinsurer of natural perils, Swiss Re strongly supports these regulations to govern GHG emissions which, despite their flaws, offer the best mitigation alternative for the climate change risks faced by the insurance and financial industry.

As a knowledge-based company, we continue to build upon our expertise and knowledge regarding climate change and the potential to mitigate its impact. An important component is our educational and awareness building campaign on reducing GHG emissions. In November, Swiss Re organised its fifth Greenhouse Gas conference\*. Highlighting the company's ongoing commitment to action on climate change, this one-day event, held at the Swiss Re Centre for Global Dialogue, in Rüslikon, examined the potential role of the financial industry in facilitating markets for GHG emissions reductions and renewable energy.

One of the most pertinent issues identified was how to unleash the power of the financial sector, and particularly institutional investors, to provide the financing and risk mitigation necessary to develop environmental market mechanisms. A few observations from the conference follow.

## Role of the financial industry: facilitating the market

From a financial industry perspective, there are several issues that are specific to the renewables and carbon markets. While there is growing capacity and experience among banks in financing sustainable energy projects, there are several problems that still need to be addressed. These include: a structuring process for GHG transactions that is often perceived as too cumbersome and expensive for smaller projects; a lack of innovative financing instruments; initial investment costs that are viewed as too

high; and risks associated with potential regulatory change that will dilute the value and duration of the environmental credits.

With regard to regulations, it was clear that governments need to create policy frameworks that will provide the clarity and stability vital to both the project developers and their financiers. Stop-start markets caused by regulations such as the Production Tax Credit in the United States, which has only a two-year lifespan, are not conducive to long-term, secure financing.

While banks have a direct role to play in financing emissions reductions and renewable energy projects, it is crucial that the important role of institutional investors be recognised. With their interest in corporations' long-term profitability, they can play a key role in influencing the climate change debate: through pricing (ie valuing more highly those companies that are effective in their climate change risk management) and as owners (by influencing corporate policy through voting their proxies and via direct engagement). Clearly, while institutional investors can exert pressure on companies, they are not as effective in eliciting an immediate reaction as policy makers.

That said, once new environmental policies are set in motion, astute institutional investors will do all they can to urge affected companies to respond positively rather than lobby against them. History has shown that, in the long term, these policies will generally be beneficial to all 'universal owners'.

Besides these more general issues, the conference hosted workshops which drilled down to examine: risk management for emissions markets; investment funds with a green return component; and the bankability of green premiums. In addition, a panel discussion run by the International Emissions Trading Association highlighted the lessons learned from implementation of the Clean Development Mechanism (CDM).

A key point emphasised at the conference was that there have been many success stories around the world, where companies have reduced their emissions levels by up to 75% and still turned a profit. Yet one of the most

important and persistent barriers to corporate action on climate change is the belief that eco-friendly policies are inherently unprofitable. Greater communication of these success stories should encourage companies to act and should ensure that the lessons learned by the early pioneers can be put into practice in the future.

## Objective – providing concrete business solutions

The financial services industry has a real opportunity (and an obligation) to contribute to the climate change debate and to provide solutions through its own investments and business expertise. After all, climate change and emissions reductions are ultimately as much of a financial issue as an environmental or social one. Our industry needs to overcome the barriers to action and lead by developing financial solutions and risk mitigation techniques that assist our clients in adopting sustainable and sound business practices. To do its part, the financial services industry must be ready to transform corporate responsibility statements and commitments into concrete business activity and opportunity.

As a leading provider of innovative risk solutions, Swiss Re has been developing solutions to facilitate the use of market mechanisms to reduce emissions. The company's Greenhouse Gas Risk Solutions unit is driving forward business opportunities that are in line with Swiss Re's sustainability commitments. However, its main task is not only to develop new products but also to get Swiss Re's insurance, finance and investment professionals to apply their expertise to environmental finance, thereby moving climate change to centre stage of the financial services sector.

**Christopher Walker,**  
Head Greenhouse Gas Risk Solutions

\* *Carbon and Renewables: Financing the Market* conference material is partially available. If you are interested in receiving presentations or a summary of the conference, please contact:  
Group Media Relations, Tel: +41 285 7171,  
E-mail: media\_relations@swissre.com



Gorner Glacier, Valais, Switzerland

**Ivo Menzinger, Sustainability Expert, Swiss Re**

“Today, climate change is a fact. And change presents us with both risks and opportunities.” Ivo Menzinger and his team identify environmental risks and help develop sustainable strategies to cope with them. Swiss Re was among the first to recognise the potential impact of climate change on the financial services industry and to study effective ways of managing associated risks. Combining expertise and financial strength, Swiss Re is ideally positioned to provide your company with tailored solutions to mitigate your exposure and protect your balance sheet – ensuring, in a climate of uncertainty, that you feel secure. [www.swissre.com](http://www.swissre.com)

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# Cities reach for the skies

**Roz Bulleid** reviews efforts to combat climate change being made by town and city councils

The phrase “think global, act local” may be something of a cliché, but it is an adage that a number of cities have taken to heart, often taking on targets for tackling climate change far exceeding those of their national governments.

San Diego in California, for instance, is aiming to reduce carbon dioxide (CO<sub>2</sub>) emissions across the city to 15% below 1990 levels by 2010, and Cape Town in South Africa plans to reduce CO<sub>2</sub> emissions from the residential sector by 10% over a similar period. Melbourne, the second largest city in Australia, has set itself the target of zero net emissions of greenhouse gases (GHGs) by 2020.

A number of these targets have been set as part of the Cities for Climate Protection (CCP) programme established in 1993 by the International Council for Local Environmental Initiatives, a membership organisation for local government authorities. The CCP provides a framework and support for emissions reductions and has grown rapidly since its inception.

Abby Young, programme director for the CCP's activities in the US and a number of developing countries, says that 150 US cities are now members, meaning that the scheme covers around 20% of the country's population.

She says there are several reasons why cities are getting involved. First, citing this year's severe US hurricane season, she says that “communities are going to be, and already are being, very badly hit by the impact of climate

change”. Then there is their substantial energy consumption, and the fact that “local governments have a huge opportunity to decrease GHG emissions”. In the case of the US, “the leadership vacuum” on climate change has been another factor, she adds.

Capitalising on the position of cities as major energy consumers, and as bodies that can build international links, even when states cannot agree, the British Council – an organisation which promotes the UK abroad – is creating a programme called ZeroCarbonCity. Intended to support the UK government's much-heralded emphasis on climate change during its presidencies of the G8 and EU in 2005, the scheme will involve a survey of 100 cities, examining their responses to climate change, and a series of events around the world.

Civic authorities may not be under the same pressure to comply with their climate change targets as federal governments, or face the same international regulations, but they also lack the legislative power that national governments hold, making it harder to bring about change.

Not all have achieved, or will achieve, their targets. But, as *Carbon down, profits up*, a study by The Climate Group shows, their efforts have not only often been effective, but have had the added benefit of saving them money.

This is clearly the case with improving the energy efficiency of civic buildings, a common starting point for city councils wishing to reduce GHG emissions. The twin cities of

Minneapolis and Saint Paul in Minnesota have fitted the buildings they own with more energy-efficient electrical equipment and thereby slashed their annual energy bills. According to a report from the US Environmental Protection Agency (EPA), the efficiency improvements were funded by local electricity utility, Northern States Power, now part of Xcel Energy, which provided interest-free loans of up to \$1 million/year for five years, which the cities are repaying through their power bills. The improvements are expected to pay for themselves within about ten years, says the EPA. Similar work in Chicago has reduced CO<sub>2</sub> emissions by 7,602 tons a year, saving the city almost \$1 million annually.

Energy demand can also be reduced outside municipal buildings in some fairly simple ways. A number of cities, including Saint Paul, Denver and Portland in Oregon, are replacing traditional traffic lights with ones that use LEDs, which are 80–90% more efficient and last 10 times longer than conventional lights. The city of Denver's Environmental Protection division predicts that this will save \$357,000 annually in energy, labour, and materials costs, and reduce CO<sub>2</sub> emissions by 8,894 tons per year.

Extending improvements in energy efficiency beyond the council to city households and businesses is more challenging, and often brings less financial reward. One possibility is to install

**‘Communities are going to be, and already are being, very badly hit by the impact of climate change’**  
Abby Young, CCP

district heating systems, which are more efficient than localised heating sources. These are relatively common in continental Europe but less so elsewhere. Even where they already exist, further emission reductions can often be achieved by improving their efficiency, or converting them to use renewable sources of energy.

For Mexico City – which has undertaken a campaign called ‘Proaire’ aimed at integrating climate protection with air quality objectives over the 2002–10 period – the city’s low-income housing offers an opportunity to improve both water and energy efficiency standards. Measures such as energy-efficient light bulbs and low-flow shower heads will be installed in 30,000 new homes and retrofitted to 45,000 existing units, and are expected to reduce emissions by 31,000 tonnes of CO<sub>2</sub> per year, according to *Less is more*, another report from The Climate Group. Over the longer term, the city hopes to save a further 24,900 tonnes of CO<sub>2</sub> through the installation of solar-powered heating systems in 50,000 social housing units.

Another option for councils is to provide advice to householders on energy efficiency and any tax incentives or rebates that exist to help them carry out improvements. For example, Portland has introduced a suite of measures, including education about rebates and other incentives offered by the state, private–public energy conservation partnerships, green building standards and renewable energy demonstration projects, which is claimed to have saved local households and businesses \$300 million since 1990.

Pressure can also be put on local people to reduce the emissions generated by transportation. The most obvious way of doing this is through improving public transport, but there are also other options. London, for example, claims the introduction in February 2003 of a congestion charging zone, which drivers have to pay to enter, has led to a 19% reduction in traffic-related CO<sub>2</sub> emissions within the zone.

Besides adapting council buildings, services and vehicles to be more efficient, and encouraging their populations to do the same, many cities can also reduce GHG emissions efficiently through the capture of landfill gas. The methane that escapes from municipal rubbish dumps has a global warming potential 21 times that of CO<sub>2</sub> and, if captured, can be used in heating systems, power generation or transport.

San Diego, for example, has fitted 100 refuse trucks to run on methane converted to liquefied natural gas and in Toronto, where around 72% of

**‘Waste minimisation and recycling strategies can also help cities play their part in curbing GHG emissions’**

GHG emissions came from landfill in 1990, methane now provides 44MW of electrical capacity. Royalties on the gas generate revenues of C\$2.4 million (\$2.0 million) annually, according to a 2003 report from consultants Torrie Smith Associates and RIS International.

Methane capture in developing countries is a promising technology for generating GHG emission reduction credits under the Kyoto Protocol’s Clean Development Mechanism. Such credits can then be sold to developed countries that face legally binding GHG targets under the Protocol. The local authority in Cape Town is hoping to raise money in this way to help fund the capture of 90,000 tonnes of methane that would otherwise escape from just one waste disposal site between 2005 and 2014.

Waste minimisation and recycling strategies can also help cities play their part in curbing GHG emissions as they reduce the amount of waste going to landfill, as well as bringing a host of other environmental benefits.

Another effective, although sometimes costly, way of reducing GHG emissions is the use of renewable power. Heidelberg in Germany, for example, has opted to buy 25% of its power from clean energy projects that include solar, biomass and geothermal schemes, while Santa Monica in California, already buys all the power consumed in its civic facilities from renewable sources. A number of other cities, including some in countries with relatively cloudy climates, have installed solar panels at municipal sites, or provided funding for solar installations. The initial outlay from this kind of project can be relatively high but it may produce savings over the long term, and be used to

encourage the local population and businesses to do the same.

Most cities are using more than one approach to reduce their GHG emissions, which makes it hard to analyse the impact of particular tactics. Nonetheless, there have been some significant successes.

Woking Borough Council in the UK claims to have reduced its energy consumption by more than 40% from the 1990 level by 2002, and the CO<sub>2</sub> emissions from council-owned vehicles and facilities by nearly 100,000 tonnes, a 72% decrease. This meant that it had effectively met its energy efficiency aims for 2001, which it set in 1991, and it is now working towards its aim of reducing community and municipal GHG emissions to 80% below 1990 levels by 2090.

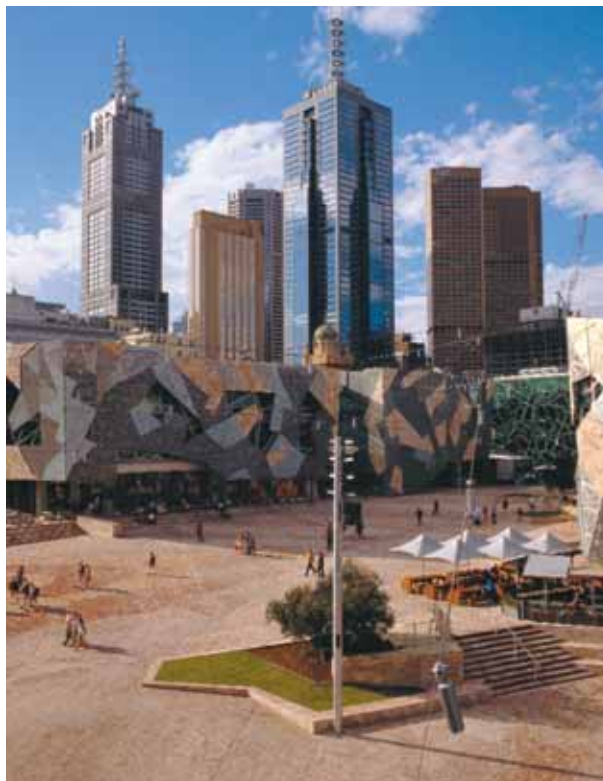
Heidelberg, meanwhile, has managed a 30% reduction in CO<sub>2</sub>-equivalent emissions from its municipal buildings compared to 1987 levels, and Toronto achieved a 42% reduction from city facilities between 1990 and 1998, thanks largely to landfill gas capture.

In general, reducing municipal emissions is easier than addressing emissions for the community as a whole. But Växjö in Sweden had, by 2002, managed a 18% reduction in emissions per capita, based on 1993 levels, through a programme of improving energy efficiency, providing free energy advice and switching from fossil fuels to biofuels for transport and heating services. Its aim of halving CO<sub>2</sub> emissions from fossil fuels by 2010, however, remains some way off.

Whether they achieve their targets or not, the investments made by many of the CCP members will, in the end, save them significant amounts of money. The UK-based environmental project, Taking Stock, claims that, if the achievements of Woking Borough Council – which it says is the most energy-efficient council in the UK – were extrapolated across the 3 million households in the southeast of the country, the savings would amount to more than £414 million (\$745 million) and 8 million tonnes of CO<sub>2</sub> over an 11-year period.

As a study by the EPA points out, the world’s rapidly increasing urban population may be particularly vulnerable to climate change. The ‘urban heat island effect’ could magnify heat waves and the increased run-off from roofs and pavements is likely to exacerbate rainfall problems. At least, with more than 600 local governments, responsible for an estimated 10% of global GHG emissions, participating in the Cities for Climate Protection programme, the world’s cities are beginning to face up to the challenge. **31**

**Melbourne: aiming for zero net emissions by 2020**



# Leading reducers: cities

CITY	MEASURES	TARGET/REDUCTION	COST SAVINGS
Berlin, Germany	<ul style="list-style-type: none"> <li>● Information and advisory programmes on energy efficiency</li> <li>● Use of combined heat and power (CHP) generation + minimising losses in gas and heat distribution systems</li> <li>● Use of energy contracting</li> <li>● Increased use of solar energy</li> </ul>	<ul style="list-style-type: none"> <li>● 15% reduction in CO<sub>2</sub> emissions between 1990 and 2000</li> <li>● 17% reduction in CO<sub>2</sub> emissions between 1990 and 1997</li> </ul>	<ul style="list-style-type: none"> <li>● Municipal budget relief of €2m/year</li> </ul>
Hannover, Germany	<ul style="list-style-type: none"> <li>● Construction of low energy houses</li> <li>● Installation of photovoltaics (PV) on public buildings</li> <li>● Use of CHP</li> <li>● 'GSE' (energy saving in schools)</li> <li>● 'Tatort Büro' (energy saving in municipal buildings)</li> <li>● 'Kliik' (climate protection in kindergartens)</li> </ul>	<ul style="list-style-type: none"> <li>● 25% reduction in CO<sub>2</sub> emissions on 1990 levels by 2005 (set in 1992)</li> <li>● 6% reduction of CO<sub>2</sub> emissions across the city between 1990 and 1997, with heating systems achieving 19% reduction in emissions</li> <li>● Hannover is planning final audit covering 1990–2005</li> </ul>	<ul style="list-style-type: none"> <li>● Projects including Kliik, Tatort, Büro and GSE have saved over €400,000</li> </ul>
Heidelberg, Germany	<ul style="list-style-type: none"> <li>● Retrofit of public buildings</li> <li>● Purchase of renewable energy (solar and biogas CHP)</li> <li>● KLIBA (non-profit energy consulting company) founded in conjunction with local municipalities and local savings bank – provides free energy efficiency advice</li> </ul>	<ul style="list-style-type: none"> <li>● 20% reduction in CO<sub>2</sub> emission on 1987 levels by 2005</li> <li>● 30% reduction in CO<sub>2</sub> emissions from municipal buildings</li> </ul>	<ul style="list-style-type: none"> <li>● €1.5m/year on municipal fuel bill</li> </ul>
Leicester, UK	<ul style="list-style-type: none"> <li>● Use of CHP in community heating</li> </ul>	<ul style="list-style-type: none"> <li>● 50% reduction in energy consumption on 1990 levels by 2025</li> <li>● Supply 20% of city's energy needs from renewable sources by 2020</li> <li>● Reduced emissions by 47,500 tonnes of CO<sub>2</sub> between 1993 and 2001</li> </ul>	<ul style="list-style-type: none"> <li>● Saved £3.9m in energy costs since 1993</li> </ul>
Melbourne, Australia	<ul style="list-style-type: none"> <li>● Energy audits and retrofits for buildings</li> <li>● Purchase and production of renewable energy</li> </ul>	<ul style="list-style-type: none"> <li>● 30% reduction of municipal emissions on 1996 levels by 2010</li> <li>● 20% reduction of community emissions on 1996 levels by 2010</li> <li>● By 2003 had reduced municipal greenhouse gas emissions by 10.5% on 1996 levels</li> </ul>	<ul style="list-style-type: none"> <li>● Not available</li> </ul>
Portland, US	<ul style="list-style-type: none"> <li>● Public-private energy conservation partnerships</li> <li>● Education on rebates, tax credits and other incentives</li> <li>● Requirement that 50% of solid waste from businesses be recycled</li> <li>● Commitment to public transport and cycling within city</li> <li>● Renewable demonstration projects</li> <li>● Use of LED traffic lights</li> </ul>	<ul style="list-style-type: none"> <li>● 20% reduction in CO<sub>2</sub> emissions on 1988 levels by 2010</li> <li>● 7% CO<sub>2</sub> reduction in emissions from council-owned vehicles and facilities compared to 1990 levels</li> </ul>	<ul style="list-style-type: none"> <li>● \$300m in savings for households and businesses since 1990</li> </ul>
Port Phillip, Australia	<ul style="list-style-type: none"> <li>● Lighting retrofits</li> <li>● Solar panel installation</li> </ul>	<ul style="list-style-type: none"> <li>● 20% reduction of GHG emissions on 1996 levels by 2011</li> <li>● 11% reduction of GHG emissions from council-owned vehicles and facilities and saving of 28,000 tonnes of CO<sub>2</sub> from community and council sources</li> </ul>	<ul style="list-style-type: none"> <li>● More than A\$120,000</li> </ul>
Regina, Canada	<ul style="list-style-type: none"> <li>● Converting street lighting to high-pressure sodium</li> <li>● Converting vehicle fleet from gasoline to compressed natural gas</li> <li>● Improving efficiency of water supply system and sewage treatment</li> <li>● Improving building lighting, heating and ventilation</li> </ul>	<ul style="list-style-type: none"> <li>● 20% reduction of GHG emissions on 1988 levels by 2005</li> <li>● Additional 1% reduction each year until 2012</li> <li>● Includes emissions from municipal operations and all activities within geographical jurisdiction of city</li> <li>● 9% reduction of greenhouse gas emissions from council-owned vehicles and facilities on 1988 levels (equivalent to 10,000 tonnes annually)</li> </ul>	<ul style="list-style-type: none"> <li>● C\$500,000/year on energy costs</li> <li>● Expenditures up to 1997 matched cumulative savings from energy retrofits</li> </ul>
Minneapolis–St Paul, US	<ul style="list-style-type: none"> <li>● Energy retrofits in municipal buildings</li> <li>● Recycling and waste reduction</li> <li>● Equipment and lighting conversion</li> <li>● District heating/cooling and transport improvements</li> </ul>	<ul style="list-style-type: none"> <li>● 20% reduction in CO<sub>2</sub> emissions by 2005 on 1988 levels (set in 1992)</li> <li>● 12% reduction in CO<sub>2</sub> emissions between 1988 and 1998</li> </ul>	<ul style="list-style-type: none"> <li>● Municipal building retrofits saving \$113m/year in energy costs</li> </ul>
San Diego, US	<ul style="list-style-type: none"> <li>● Using landfill gas to generate power</li> <li>● Award-winning composting programme and diversion of waste through recycling and greenwaste collection</li> <li>● Methane gas from landfill converted to liquefied natural gas to fuel over 100 refuse collection trucks</li> <li>● Photovoltaics on city facilities</li> </ul>	<ul style="list-style-type: none"> <li>● 15% reduction in GHG emissions from 1990 levels by 2010</li> <li>● Source 50MW of energy by 2013 using PV generation</li> <li>● 15% annual reduction in fuel consumption by city vehicles</li> <li>● Efficiency improvements to city operations over 1994–2001 reduced energy use by 144 million KWh, and CO<sub>2</sub> emissions by 89,000 tonnes</li> </ul>	<ul style="list-style-type: none"> <li>● Cumulative energy cost savings of \$15m from city utility bills</li> </ul>
Toronto, Canada	<ul style="list-style-type: none"> <li>● Methane capture from landfills</li> <li>● Building retrofits</li> <li>● Efficient street lighting</li> <li>● Improved public transport</li> </ul>	<ul style="list-style-type: none"> <li>● 20% GHG emission reductions by 2005 on 1990 levels</li> <li>● 42% reduction in GHG emissions in municipal facilities between 1990 and 1998 (majority of reductions achieved through methane capture)</li> </ul>	<ul style="list-style-type: none"> <li>● C\$20m–30m in cumulative revenue estimated from landfill methane capture</li> <li>● C\$17.5m saved in energy and maintenance costs</li> </ul>
Växjö, Sweden	<ul style="list-style-type: none"> <li>● Conversion of electric heating to biomass district heating</li> <li>● Use of CHP fuelled with biomass</li> <li>● Improvement in energy efficiency in companies</li> <li>● Free energy advice</li> </ul>	<ul style="list-style-type: none"> <li>● 50% reduction in CO<sub>2</sub> emissions from fossil fuels per capita by 2010 on 1993 levels (set in 1996)</li> <li>● Reduce use of electricity per capita by 20% from 1993 to 2010</li> <li>● Stop using fossil fuels in city activities</li> <li>● 18% reduction in emissions between 1993 and 2002</li> </ul>	<ul style="list-style-type: none"> <li>● Not available</li> </ul>
Woking, UK	<ul style="list-style-type: none"> <li>● Efficient lighting</li> <li>● Construction of efficient facilities and buildings</li> <li>● Use of CHP, fuel cells and solar power</li> <li>● Promoting the use of low-carbon vehicles</li> </ul>	<ul style="list-style-type: none"> <li>● 40% reduction in energy consumption from municipal buildings by 2001 on 1991 levels (set in 1990)</li> <li>● 80% reduction of GHG emissions (municipality and community) by 2090 on 1990 levels (set in 2002)</li> <li>● In 2002 had reduced energy consumption 43.8% on 1990 levels, and reduced CO<sub>2</sub> emissions 71.5% (96,588 tonnes) from council-owned vehicles and facilities</li> </ul>	<ul style="list-style-type: none"> <li>● £4.9m saved in municipal energy and water bills since 1990</li> </ul>

Sources: [www.theclimategroup.org/assets/TCG\\_Emissions%20Charts%2004.pdf](http://www.theclimategroup.org/assets/TCG_Emissions%20Charts%2004.pdf)

# Berlin gets boost from energy efficiency

**B**erlin, the largest city in Germany with a population of almost 3.5 million, has made significant progress in reducing its greenhouse gas (GHG) emissions. Having set a reduction goal of 25% below 1990 levels by 2010, the city had already made a 15% reduction by 2000.

The cuts come from three main sources: the decline in industrial activity after the fall of the Berlin Wall; fuel switching; and modernisation of the city's building stock. In addition, the city has made significant progress in increasing the production of renewable energy.

After the division of Berlin in 1949, and the building of the Wall in 1961, West Berlin became disconnected from the national electricity grid, and was forced to become self-sufficient in energy. To conserve resources, it developed incentives for the use of combined heat and power (CHP) and district heating, leading to the development of the largest district heating system in Europe, and creating a legacy of energy efficiency.

When the Wall fell in 1989, it was decided to make an Energy Plan for the reunified city. At the same time, the non-profit Climate Allianz was founded in Berlin with the goal of reducing carbon dioxide (CO<sub>2</sub>) emissions in a number of European cities by 50% over the next 20 years. For Berlin, however, even with its strong emphasis on energy efficiency, this ambitious goal would have required a complete switch from oil and coal to natural gas within 20 years. The decision was therefore made to set a more realistic goal of a 25% reduction by 2010, and the Energy Plan was set up in 1994 to guide the city's emission reduction measures.

However, "there was a conservative government in Germany in the early 1990s and ... little federal policy to force the climate issue," says Klaus Müschen, head of the city's Climate Protection Unit. "This changed in 1998 with the election of the Red/Green government who established a number of measures to encourage increased energy efficiency and the uptake of renewables. These federal programmes have greatly influenced Berlin's local actions, and the framework conditions have been improved even further by the climate change policies of the European Union, and the new emissions trading scheme," Müschen adds.

## Fuel switching

Fuel switching began in earnest in the early 1990s when the city established large subsidies for apartment buildings to make the switch from coal to natural gas, or to district heating. In addition, when Berlin decided to privatise the local heating and electrical utilities, it agreed with the buyers that they would support energy efficiency and renewables projects. Around €50 million (\$65 million) has been put into these programmes in the last few years, and a number of new gas-fired CHP plants have been built. They include a 380MW gas steam turbine plant that went online in 1996, effectively saving 1 million tonnes of CO<sub>2</sub> per year.

In parallel with the fuel switching initiatives, the city implemented a wide-scale modernisation programme for public and privately owned apartments involving improved insulation, district heating, efficient design and construction, and the installation of photovoltaic cells. "In total, 600,000

apartments have been modernised in the last 15 years," explains Müschen. "That is around one-third of the apartment buildings in Berlin, and represents more than a 50% reduction in energy use." Berlin also established a programme to disseminate knowledge on energy saving technologies, and practical measures to improve energy efficiency.

## Energy service companies

In the late 1990s, in the face of a very tight financial position, Berlin needed to find an alternative to subsidies in order to keep the city on target towards its goals for reduced energy use in public buildings. As a solution, it developed partnerships with energy service companies (ESCOs) who take responsibility for financing energy efficiency improvements in a number of buildings over a period of



Three quarters of new buildings should have solar panels


10–15 years. The ESCOs guarantee a certain amount of cost savings for the city and the rest of the savings are used to refinance the ESCO's investments.

The average savings achieved through these initiatives have been 25% of energy costs, and they have provided a net relief for the city budget of almost €2 million per year.

## Encouraging renewable energy

In addition to its emission reduction and energy efficiency goals, Berlin set a target of doubling the use of renewables within the city between 1999 and 2002. This meant doubling the share of solar energy, because there was no space to build wind turbines within the city boundaries.

In 1997 the city developed an agreement with local energy companies which called for the installation of solar collectors on 75% of all new buildings. In addition, since 2000 there has also been a renewables law at the federal level which guarantees a rate of about €0.5 per kWh for photovoltaic electricity that is fed into the grid. This fixed price has meant that investors feel safe buying solar plants, and has resulted in the annual production of more than 5MW of solar power in Berlin.

The Berlin Senate has also subsidised the installation of solar equipment in blocks of flats built before the end of 1990. Solar thermal equipment receives a 30% subsidy under this programme, and thus far 42,000 square metres of solar thermal plants have been installed in the city. 

### Targets

- Reduce greenhouse gas emissions 25% below 1990 levels by 2010
- Reduce energy use in public buildings by 30%

### Achievements

- 15% reduction in greenhouse gas emissions by 2000
- Doubled the collector area of solar thermal plants and the amount of energy produced from photovoltaics between 1999 and 2002
- 10% of the city's electricity came from renewables in 2002/3
- Developed a new 20MW wood-fired biomass CHP plant

### Benefits

- Energy efficiency programmes have resulted in relief for the municipal budget of almost €2 million/year

# Backing renewables

**B**T Group is one of Europe's leading providers of telecommunications services, with almost 100,000 employees and operations in 24 countries. The company began to address its greenhouse gas (GHG) emissions as part of an overall strategy of energy efficiency prompted by a UK government push in the mid-1980s to reduce energy consumption. At that time, the company invested in a database to monitor energy use at a detailed level and established a set of baselines to track its achievements.

"From the moment we invested in these systems, we began to realise fantastic energy and cost savings," says Chris Wade, BT's environment manager. "Bearing in mind the size of BT's energy bill, it made a lot of sense to implement these projects." By the early 1990s the company had begun to apply the same thinking to its use of transport and in 1992 it published its first environmental report.

It was not until the UK government produced its *Guidelines for Company Reporting on Greenhouse Gas Emissions* in June 1999 that BT began to monitor its climate change-related emissions directly. "In the first year we reported on the contributions we were aware of, based on the data we were already collecting on energy and transport" says Wade. "However, our [carbon dioxide] CO<sub>2</sub> reduction target starts from 1996 because that was when we were able to establish a firm baseline that included air and rail travel, hire cars and refrigerants." Currently, the company reports only on its emissions from the UK, which represents 90% of its business. It is in the process of setting up data collection systems for its global operations as part of an extended environmental management system.

## Setting and implementing targets

In recognition that climate change is a major issue, BT decided in 1996 to set a public target to reduce its GHG emissions by 25% from 1996 levels by 2010.

"All new targets are set and incorporated in the business-wide budgeting cycle in order to ensure that the necessary funds are available for the goals to be achieved," says Wade. "Once you have set a target you need to: a) make sure you've got the money to achieve it; b) make sure that you have programmes that are going to deliver it; and c) monitor it regularly."

As another way to get buy-in for its emissions targets and related initiatives, BT has established a web-based awareness system, an education programme for employees and the communication of achievements through a daily news service and monthly paper.

## Improved energy/cooling efficiency

As mentioned above, monitoring is one of the most important components of any emissions reduction strategy. To this end, BT uses one of the UK's largest computer-based energy management systems to collect data at half-hour intervals from over 6,000 sites. This means that 95% of the company's electrical energy is remotely metered, allowing for the effective identification and elimination of waste energy.

BT has a great incentive to minimise energy costs as it is one of the UK's largest consumers of electricity, accounting for 1.8% of the commercial and industrial energy market. To achieve maximum energy savings, the company takes into account the whole life costs of its plant when assessing purchases, which creates an incentive for it to buy more efficient equipment.

It is also striving to reduce GHG emissions associated with

cooling at its facilities by eliminating the need for refrigerants. The company has been working with two of its suppliers to develop a standard cooling unit that uses primarily fresh air cooling, thereby saving a great deal of money and energy.

## Transport solutions

Though BT has been focused on improving transport efficiency for several years, it has recently adopted a number of innovative measures to help reduce the size of its commercial fleet. They include: productivity targets to increase the efficiency of vehicle routing; vehicle pools which provide services for employees who drive infrequently; and 'walking engineers' who use public transport and walk to jobs that require little equipment.



Through the implementation of these measures, the company's commercial fleet was reduced by 4% in 2004, with a corresponding reduction in fuel consumption. For 2005, BT aims to reduce its commercial fleet by a further 2,000 vehicles (approximately 9%).

The company also sees that the goal of reducing emissions provides it with a business opportunity as flexible working solutions, and the use of audio and video conferencing, are increasingly being used to reduce daily commutes and travel for meetings.

## Purchasing and producing renewable energy

In addition to its work on improving transport and energy efficiency, BT is a pioneer in the large-scale purchase of renewable energy. In October 2004, the company negotiated a three-year contract with npower and British Gas, which will see almost all of the company's electricity needs supplied from wind, solar, wave, hydropower, and combined heat and power (CHP) sources. As renewable energy is exempt from the UK government's Climate Change Levy, these purchases are broadly cost neutral to the company.

## Future priorities

BT not only buys energy, but also generates power on-site to provide extra electricity at peak times and during supply failures. In the financial year 2004, the company generated 21GWh of electricity. It is now investigating the suitability of using its own properties to house wind turbines. It is also investigating the feasibility of new systems, including those that combine solar energy and wind, and the use of bio-fuels to replace diesel in emergency generators.

As a long-term goal, BT is investigating if it could become a carbon-neutral company. "Ideally I would hope that we would be able to achieve this without purchasing [emission] offsets", says Wade. "I believe that doing the right thing actually increases the market value of the company. Thus far, all the projects we have implemented have allowed for business growth while CO<sub>2</sub> emissions have fallen."

### Targets

- Reduce CO<sub>2</sub> emissions to 25% below 1996 levels by 2010
- Purchase 10% of electricity from renewable energy sources by 2010

### Achievements

- Reduced overall CO<sub>2</sub> emissions to 42% below 1996 levels by 2004
- 60% reduction in CO<sub>2</sub> emissions on 1991 levels due to energy programmes
- 35% reduction in CO<sub>2</sub> emissions on 1992 levels due to transport programmes

### Benefits

- Energy savings equivalent to over £119m (\$214m) since 1991

# States of the nation



Climate change opportunities – Texas aims to grow a wind energy industry

Where national governments have been slow to act, state and regional bodies are developing climate change policies that could – eventually – drive action at the centre. **Mark Nicholls** reports

In the evolution of the struggle to bring down emissions of greenhouse gases (GHGs), two types of organisation have received the lion's share of attention – national governments and companies. It was, of course, industrialised world nation states that adopted GHG targets in Kyoto in 1997, and it is the industrial sectors of these countries that have been the target of most early GHG reduction policies.

But other levels of government have also stepped forward in an attempt to tackle global warming. As is discussed on pages 14–16, municipalities around the world are putting in place policies to lower their GHG emissions – and their efforts are being matched at the regional and state level.

The most aggressive regional or state-level climate change policies are under development in the two countries where many would argue that action at the national level is weakest – the US and Australia. Both have turned their backs on the Kyoto Protocol: President George Bush formally repudiated the treaty in 2001, at the start of his first term. Australian Prime Minister John Howard followed in 2002.

However, both countries have a federal structure that confers significant legislative and regulatory powers on their constituent states. In Australia, while Howard's Liberal party has recently won its fourth national election victory, all state governments are in the hands of the opposition Labour Party, which sees its approach to climate change as a key policy stance differentiating it from the federal government in Canberra.

In the US, there is less of a partisan split between action at the state and federal levels. Certainly, the Republican federal administration has

done little to address concerns about climate change at the national level since 2000 – and few expect Bush's re-election in November to change that. But, while Democrat-inclined states have perhaps gone farthest in developing climate change strategies, more conservative parts of the country have also introduced policies designed to tackle the problem. And, in many of the states where climate policies have been developed, they have faced little opposition and won broad bipartisan support.

States and regions outside these two countries are, of course, developing their own responses to climate change (see box). However, the most aggressive and far-reaching sub-national strategies have evolved where a federal government has shown an unwillingness to act on the issue, leaving a political vacuum in which other political actors feel able – or compelled – to take action.

Indeed, both before and after Bush's re-election, many – domestically and abroad – have pointed to state-level initiatives as evidence that all is not lost in terms of climate change in the US. The Pew Center on Global Climate Change – a non-partisan think-tank – has produced a

<sup>1</sup> *Greenhouse and Statehouse: the Evolving State Government Role in Climate Change*, Barry Rabe, Pew Center, 2002, and *Climate Change Activities in the US*, Pew Center, 2004. See [www.pewclimate.org](http://www.pewclimate.org)

number of reports<sup>1</sup> examining state-level climate change policies in detail.

In the introduction to one of these, *Greenhouse and Statehouse*, Pew Center president Eileen Claussen writes "there are multiple drivers that influence states to reduce their greenhouse gas emissions, and states derive multiple benefits from doing so". She points out, for example, that New Jersey "views climate change explicitly and comprehensively, and has integrated all sectors of the economy into programs to reduce greenhouse gas emissions".

Texas, in contrast, passed an ambitious 'renewable portfolio standard' (RPS), requiring electricity utilities to develop new renewable energy generation, to help guarantee long-term energy security for its residents, and to position the state to exploit opportunities as renewable energy is further developed.

This policy – which, incidentally, was signed into law by then-governor George W Bush – shows that many regional initiatives focus on the opportunity side of the ledger.

Elsewhere, numerous policies are in place to encourage renewable power generation, improvements in energy efficiency, and more sustainable transport. To cite just three examples: California's energy crisis of 2000–01 encouraged legislators to adopt an energy conservation package in 2001 that is designed to reduce peak summer demand by 2,000MW; in May 2004, Connecticut updated its energy efficiency standards on a range of products, including commercial air-conditioners and refrigerators; and New York State has established a programme to provide funding for the extra costs of cleaner buses.

On renewables, a number of states have established public funds – financed through taxation, levies on sales of electricity, or contributions from utilities – mandated to promote clean energy projects and companies. Their activities range from providing research and development funding to consumer education and, in some cases, the funds even provide venture capital and project finance. In 2002, 17 of these funds, from 12 states, banded together to support a non-profit organisation, the Clean Energy States Alliance, to work on multi-state efforts to promote renewable energy.

Other state governments have identified potential opportunities elsewhere. A number of mid-Western and southern states – far away from



**New York's Governor George Pataki – taking a lead on climate change**

the coastal states where climate change has greater resonance as a political issue – have introduced policies to help their farmers benefit from climate change concerns.

The US agricultural sector has long recognised that it would stand to benefit from any emissions programme which gave credit for carbon stored in soil or growing vegetation – under so-called 'carbon sequestration'. Georgia has set up a 'No Tillage Assistance Program', which leases farmers equipment to reduce tillage, which cuts down on fuel use and increases the amount of carbon sequestered in the soil. Nebraska, Wyoming, North Dakota and Oklahoma are all investigating the issue.

Forestry, too, provides states in both Australia and the US with carbon sequestration opportunities. Oregon, for example, runs its Forest Resource Trust, which provides up to 100% of the costs incurred in reforestation of under-producing forest lands. In exchange, the trust claims title to any carbon credits the planta-

tions may generate, and shares in the profits that may accrue from any timber sales.

But, as well as the opportunities that some see in future controls on GHGs, many states also acknowledge the necessity of reducing emissions now – or at least putting the infrastructure in place to facilitate future reductions.

According to the Pew Center, 28 US states have developed, or are developing, strategies or action plans to reduce their GHG emissions. New Jersey, for example, has committed to reduce its emissions to 3.5% below 1990 levels by 2005.

Other states have focused on the power sector – typically the easiest place to mandate reductions, given the generally small numbers of heavily emitting plants. Oregon was one of the first states to move in this area, passing landmark legislation in 1997 that requires new power plants to offset around 17% of their carbon dioxide (CO<sub>2</sub>) emissions, by paying a fee to the non-profit Climate Trust, which invests in projects that reduce or sequester GHGs.

In 2001, Massachusetts capped emissions of CO<sub>2</sub> – alongside those of sulphur dioxide and nitrogen oxides – from its six largest power stations. In 2002, New Hampshire mandated similar multi-pollutant legislation, requiring power plants to reduce CO<sub>2</sub> emissions to 1990 levels by 2006.

Meanwhile, no fewer than 39 states have completed inventories of their GHG emissions. A number – including New Jersey and Maine – have introduced mandatory reporting of GHG emissions, and California, New Hampshire, and Wisconsin have introduced voluntary registries.

Such reporting initiatives form the basis of emissions trading schemes and states in both Australia and the US are moving forward with plans to introduce such systems. The most ambitious is that led by Governor George Pataki of New York. In April next year, the outlines of a scheme that will bring together nine north-eastern US states are due to be announced. There is some speculation that California could subsequently join such a scheme – potentially capturing one-third of US greenhouse gas emissions.

Meanwhile, discussions are continuing in Australia on developing a multi-state GHG cap-and-trade scheme. At present, only New South

## Europe's regional leaders

In the European Union, national governments – and the institutions of the European Union itself, particularly its executive branch, the Commission – have taken the lead on the bloc's efforts to meet its Kyoto Protocol target. The 1998 Burden Sharing Agreement explicitly devolved to the then 15 member states their contribution to meeting the EU's overall objective of reducing its greenhouse gas (GHG) emissions to an average of 8% below 1990 levels over 2008–12.

Since then, the EU's members have all developed climate change plans – of varying detail and ambition. Some, with federal structures, have in turn devolved responsibility for meeting targets to their regions. For example, Belgium's three regions – Flanders, Wallonia and the City of Brussels – have been charged with coming up with their own plans to comply with the EU-wide Emissions Trading Scheme.

But that is not to say that – in common with many municipalities – regional governments have not sought to make their own contribution to tackling climate change. The Climate Group's *Carbon Down, Profits Up* report\* singles out two initiatives for mention.

The first, that of Bavaria in Germany, sets a target of reducing carbon dioxide emissions to 80 million tonnes (Mt) each year by 2010, compared to 90 Mt in 1999. A key part of the regional government's effort is directed towards research and development funding for innovative energy and environmental technologies.

The second is a novel initiative led by the government of Tuscany, in Italy, to broaden the EU Emissions Trading Scheme. The regional government is proposing to support the voluntary "opting in" of industry sectors not covered by the scheme, and encourage the participation of small and medium-sized enterprises by helping them form groupings under the scheme's provision for the 'pooling' of companies.

\* See [www.theclimategroup.org/assets/TCG\\_Emissions%20Charts%2004.pdf](http://www.theclimategroup.org/assets/TCG_Emissions%20Charts%2004.pdf)


Wales – the most populous state – has a trading scheme in place, which places reduction targets on electricity retailers. This initiative, which came into force at the start of 2003, aims to reduce per capita emissions to 7.27 tonnes by 2007 – 5% below 1989–90 levels.

In late 2003, Bob Carr, the state's Labour Premier, began discussions with his peers in Australia's other states and territories to set up a national carbon trading scheme

– despite opposition from the federal government.

But, for all the progress at the state and regional level, Claussen at the Pew Centre notes that several factors limit the scope of states and regions to address climate change, including “the reluctance of some states to deal with the issue, constitutional limits to their engagement in international relations, limited funding, and potential inefficiencies if states address climate change in

different, incompatible ways”.

It is these very inefficiencies, however, that could – eventually – galvanise federal governments in the US and Australia into action. The nightmare regulatory scenario for companies in the US, for example, is that they face a patchwork of 50 slightly different emission reduction regimes. Before that happens, corporate pressure for a unified federal approach will likely become unstoppable, many analysts believe. 

## Leading reducers: states/regions

STATE/REGION	MEASURES	TARGET
Bavaria, Germany	<ul style="list-style-type: none"> <li>● R&amp;D into renewable energies (€300 million invested in past five years)</li> <li>● Supporting a high alpine climate research centre</li> </ul>	<ul style="list-style-type: none"> <li>● Reduce CO<sub>2</sub> emissions by 10% on 1999 levels by 2010</li> </ul>
California, US	<ul style="list-style-type: none"> <li>● Law to regulate GHG emissions from cars starting with 2009 model-year</li> <li>● Public goods charge on electricity that provides funding for renewable power generation and energy efficiency</li> <li>● Rebates for customer owned solar and wind systems</li> <li>● GHG emissions registry for private and public sector organisations</li> <li>● Energy-efficient building code policies</li> </ul>	<ul style="list-style-type: none"> <li>● 20% of retail electricity to be generated from renewable sources by 2017</li> <li>● Reduce electricity consumption in businesses and households by 20% (rewarded by 20% payment)</li> <li>● Governor Schwarzenegger has requested a state-wide emissions reduction target</li> </ul>
Connecticut, US	<ul style="list-style-type: none"> <li>● Connecticut Innovations Clean Energy Fund to promote the production and use of clean energy</li> <li>● Legislation requiring updated energy efficiency standards for eight different products</li> <li>● Legislation requiring the state to adopt California's stringent emission standards for light duty motor vehicles</li> </ul>	<ul style="list-style-type: none"> <li>● Short term – reduce GHG emissions to 1990 levels by 2010</li> <li>● Medium term – reduce GHG emissions 10% below 1990 levels by 2020</li> <li>● Long term – reduce GHG emissions sufficiently to eliminate any dangerous threat to the climate; current science suggests this will require reductions as much as 75–85% below current levels</li> <li>● Executive order requiring the state to purchase 20% of energy used for state buildings from non-polluting sources by 2010</li> <li>● Percentage rises to 50% by 2020 and 100% by 2050</li> </ul>
Massachusetts, US	<ul style="list-style-type: none"> <li>● Regulations requiring power plants to reduce emissions of CO<sub>2</sub> through increased efficiency or the purchase of CO<sub>2</sub> credits</li> <li>● Mass Renewable Energy Trust established through a charge on electricity bills to fund renewables research, development and demonstration</li> <li>● Requiring transport projects to report on expected CO<sub>2</sub> emissions</li> <li>● ‘Greening’ state vehicle fleet</li> </ul>	<ul style="list-style-type: none"> <li>● Short term – reduce GHG emissions to 1990 levels by 2010</li> <li>● Medium term – reduce GHG emissions 10% below 1990 levels by 2020</li> <li>● Long term – reduce GHG emissions sufficiently to eliminate any dangerous threat to the climate; current science suggests this will require reductions as much as 75–85% below current levels</li> <li>● Massachusetts Renewable Portfolio Standard requires generators to provide 1% of their electricity from renewables by 2003, rising to 4% by 2009</li> </ul>
Manitoba, Canada	<ul style="list-style-type: none"> <li>● Legislation to promote use of ethanol in cars and research into bio-diesel</li> <li>● Demonstration of fuel cells and hydrogen generation</li> <li>● Efficiency Manitoba established in 2003 to integrate demand side management programmes</li> </ul>	<ul style="list-style-type: none"> <li>● 23% reduction in GHG emissions on 1990 levels by 2012</li> <li>● Increased production of hydro and wind power for sale to Ontario</li> </ul>
New Jersey, US	<ul style="list-style-type: none"> <li>● Mandated reporting of both CO<sub>2</sub> and methane from large sources</li> <li>● Organisations (including state's largest utility, schools, colleges, universities, and more than 6,000 congregations) have signed a pledge to reduce their greenhouse gas emissions in accordance with the state goal</li> <li>● Social benefit charge on utility bills for energy efficiency and renewable energy</li> <li>● Environmental disclosure requirements for utilities to provide customers with information about CO<sub>2</sub> emissions of the electricity they are using</li> <li>● Development of a multi-tier system for permitting that incorporates GHGs</li> <li>● Formal agreements with Netherlands and Canada allowing for development of joint trading projects and environmental technology reciprocity</li> </ul>	<ul style="list-style-type: none"> <li>● 3.5% reduction in GHG emissions below 1990 levels by 2005</li> <li>● Renewable portfolio standard that gradually increases towards a mandatory level of 4% of overall state supply by 2012</li> </ul>
New York, US	<ul style="list-style-type: none"> <li>● Governor Pataki invited governors of the other north-east states to participate in development of a regional cap-and-trade program (RGGI) to be launched in April 2005</li> <li>● Clean-fuelled bus programme provides funding for incremental cost of a clean-fuelled bus over a diesel bus</li> <li>● System benefits charge to fund energy efficiency, R&amp;D in renewable resources and CHP</li> </ul>	<ul style="list-style-type: none"> <li>● Reduce primary energy use per unit of gross state product 25% below the 1990 level by 2010</li> <li>● Increase renewable energy from 10% of primary energy use currently to 15% by 2020</li> <li>● Reduce GHG emissions 5% below 1990 levels by 2010</li> <li>● Establish a private sector bio-fuels industry in the state within five to 10 years</li> </ul>
New South Wales, Australia	<ul style="list-style-type: none"> <li>● NSW Greenhouse Gas Abatement Scheme, an initiative to reduce GHG emissions per capita in NSW to 7.27 tonnes by 2007 and maintain this level until 2012. Each year a target will be set by NSW electricity retailers, which they must meet or pay penalties</li> </ul>	<ul style="list-style-type: none"> <li>● Reduce GHG emissions by 5% below 1989/90 levels by 2010</li> </ul>
Tuscany, Italy	<ul style="list-style-type: none"> <li>● Draft proposal for the inclusion of regional governments in the EU emissions trading scheme</li> </ul>	<ul style="list-style-type: none"> <li>● Reduce greenhouse gases according to the Kyoto Protocol, by 6.5% below 1990 levels for the 2008–12 commitment period</li> <li>● Increase percentage of energy produced from renewable sources</li> <li>● Stabilise and reduce energy consumption</li> </ul>
Victoria, Australia	<ul style="list-style-type: none"> <li>● Renewable Energy Support Fund to assist in the development of small-scale renewable energy generation projects</li> <li>● Green power accreditation to provide confidence to consumers</li> <li>● Support for research and analysis of market needs and opportunities and to promote green power products</li> <li>● Solar hot water rebates</li> <li>● Consideration of GHG emissions as part of the state's environmental impact assessment process</li> </ul>	<ul style="list-style-type: none"> <li>● Reduce energy consumption in government buildings by 15%</li> <li>● Reduce GHG emissions from government vehicle fleet by 10%</li> <li>● Commitment from state government to purchase 10% of its electricity needs in the form of green power</li> </ul>

Sources: [www.theclimategroup.org/assets/TCG\\_Emissions%20Charts%2004.pdf](http://www.theclimategroup.org/assets/TCG_Emissions%20Charts%2004.pdf)

# Savings from products and processes

German chemicals and pharmaceuticals holding company, the Bayer Group, is one of Europe's 100 biggest companies, with some 115,000 employees in 350 distinct companies spread across every continent. It makes more than 10,000 products, many of them highly specialised and requiring substantial consumption of energy.

## Setting and implementing targets

In 2000 Bayer set an ambitious target to reduce its greenhouse gas (GHG) emissions by 50% below 1990 levels by 2010. By means of several large initiatives planned and followed at the highest levels of the corporation, it has already managed to reduce its emissions by 60%, even though overall production has increased by 16%.

"Bayer has been committed to keeping the air clean and thus to climate protection for many years", said Udo Oels, member of the Bayer management board, responsible for innovation, technology and the environment. "Since the signing of the Kyoto Protocol, we have invested around €1 billion (\$1.3 billion) and have already more than achieved our ambitious targets: emissions of greenhouse gases have been cut by over 60% worldwide."

As a chemicals company, environmental management has been a primary concern of Bayer's corporate culture. When climate change began to gain attention at the end of the last century, the company responded by entering into voluntary agreements with the German government and other German chemicals companies to set GHG reduction targets. Rather than wait for regulatory regimes to be imposed, Bayer took action so that large-scale strategic solutions could be planned and implemented within the context of routine investment cycles.

Drawing on its experience in setting targets for the treatment and release of wastewater, the company was able to set a 50% GHG reduction target, and surpass it. This was achieved largely through the development of new technologies and equipment, and the retiring of old plant on a well-planned schedule of capital investment and expenditure. Three specific initiatives, discussed below, are credited with making the most significant contribution to GHG reductions.

## Two-stage incineration

Many Bayer products employ plastics. Adipic acid is used in the early stages of plastic production, and one by-product is large amounts of nitrous oxide ( $N_2O$ ) – a potent GHG. Bayer engineers examined the manufacturing process, and developed a two-stage  $N_2O$  incineration process. They designed a

system that used the  $N_2O$  as a fuel source, so its combustion not only eliminated these direct emissions but also replaced some of the fossil fuels previously used. The company estimates that releases equivalent to 4 million tonnes of carbon dioxide ( $CO_2$ ) have been avoided since the process was adopted in 1993 at its plant in Uerdingen, Germany.

## New chlorine production technology

Another technological breakthrough has led to further GHG reductions, through improvements in energy efficiency. To produce chlorine, Bayer traditionally used electrolysis based on mercury cell technology. In 1997, it developed a new membrane technology that reduces energy consumption by 30% at its plants in Leverkusen, Uerdingen and Dormagen. It estimates that these efficiencies avoided the release of 400,000 tonnes of  $CO_2$  between 1997 and 2002.

## Fuel switching

Perhaps the most ambitious effort the company has mounted to address its GHG emissions has been the replacement of two coal-fired power plants it operated in Dormagen. Bayer solicited bids to install and run a new gas-powered facility and estimates it has achieved annual savings of 600,000 tonnes of  $CO_2$  equivalent as a result of this fuel switch.

## Management infrastructure

Embedded within the management infrastructure of Bayer's many companies are mechanisms for considering both economic and environmental costs and benefits. In addition, an active and varied group of stakeholders closely watch the company. "We have both a horizontal and vertical structure for sharing information internally, and for monitoring external developments that have an impact on our businesses, so that we remain responsive," says Wolfgang Grosse Entrup, head of governmental and product affairs.

The head of innovation, technology and environment has one of four seats on the company's group management board. He also chairs the corporate sustainability board which, in turn, is supported by a sustainable development working group, an interdisciplinary team of managers from across the organisation. These internal structures draw appropriate managers into planning processes from the company's business units, production sites, and the government and product affairs department.

## Product development

They also allow Bayer to develop products that contribute to climate protection. For example, it has developed more efficient insulating materials and boards that will help its customers save energy. It has also developed a form of rubber for tyres that cuts down on fuel consumption, lighter-weight plastic for cars and plastic frames for solar power-generating units, which makes them less expensive to produce. The company has also conducted life-cycle assessments on roughly 20% of its products, and has instituted a programme to measure products for their resource efficiency, safety and environmental compatibility.



Chemicals giant targets low-carbon technology

### Targets

- Reduce  $CO_2$  emissions to 53% below 1990 levels by 2010 in Germany
- Reduce  $CO_2$  emissions to 50% below 1990 levels by 2010 worldwide
- Emissions of acid gases are to be further reduced through technical measures and by outsourcing and relocating production to modern plants

### Achievements

- Reduced overall  $CO_2$  emissions by 60% below 1990 levels by 2004, while overall production rose 16%
- Consumption of electrical energy in chlorine production cut by 30%
- Avoided the release of 4 million tonnes of  $CO_2$  equivalent by incinerating  $N_2O$  (a potent GHG)

### Benefits

- Significant GHG reductions achieved while the company's overall production increased 16% between 1990 and 2004



# Eco Energy Cities PLC

## 生态能源城市有限公司

A Joint Venture between Davis Langdon Seah International - University of East Anglia - China Developments PLC



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Tel: + 86 21 5465 4299 Web: [www.eco-energy-cities.com](http://www.eco-energy-cities.com)

[uea@eco-energy-cities.com](mailto:uea@eco-energy-cities.com)

[info@eco-energy-cities.com](mailto:info@eco-energy-cities.com)

[dls@eco-energy-cities.com](mailto:dls@eco-energy-cities.com)

**Eco Energy Cities Att: Professor Trevor Davies, University of East Anglia, Norwich NR4 7TJ United Kingdom**

生态能源城市有限公司 联系人: 泰弗 达维斯 东安格利亚大学 诺维奇, 英国 邮编: NR4 7TJ

**Eco Energy Cities Att: David de Montaigne, 16th Floor Huaihai Plaza, 1045 Huaihai Road, Shanghai China 200031**

生态能源城市有限公司 联系人: 大卫 德 蒙特 淮海中路1045号淮海国际广场1601室, 上海, 中国 邮编: 200031

**Eco Energy Cities Att: Simon Barnard, Davis Langdon Seah, 63 Thorpe Road, Norwich NR1 1UD United Kingdom**

生态能源城市有限公司 联系人: 塞蒙 博纳 威宁谢工程技术有限公司 托普路63号, 诺维奇, 英国 邮编: NR1 1UD