A change of climate for big oil

As European environmentalists launch a boycott of US oil firms, other energy companies are winning praise for their efforts to tackle climate change. Mark Schrope examines the oil giants' divergent strategies.

It is rare indeed to find an oil executive who has the respect of environmentalists — but in May 1997, John Browne, group chief executive of the London-based oil company BP, became just that. Speaking at Stanford University in California, Browne was the first senior executive of an oil company to acknowledge that carbon dioxide and other greenhouse gases probably caused global warming, and to recommend that action be taken.

It was a brave statement. Both BP's manufacturing processes and its products generate CO_2, and by explicitly linking emissions of the gas to global warming, Browne was associating his company with perhaps the biggest environmental threat to our planet. "A lot of people viewed BP as a traitor to the industry," says Eileen Claussen, director of the Pew Center on Global Climate Change in Washington, a non-profit organization that promotes market-based approaches to tackling climate change.

Four years on, climate-change initiatives taken by BP and the Anglo–Dutch oil company Royal Dutch/Shell have split the industry and earned the two firms praise from environmental lobbyists. But US companies, most notably ExxonMobil (known as Esso outside the United States), face a summer of protests in Europe. Environmental groups accuse these companies of influencing President George W. Bush's decision to reject the Kyoto Protocol — the international treaty that aims to limit emissions of greenhouse gases — and hope to mobilize a consumer backlash against the firms.

Despite the differences in environmental policy, profits are the ultimate measure of success for all the companies. Each oil giant is facing a dilemma — should it gamble on investments that may prepare it for the future, when concerns about global warming have severely restricted the burning of fossil fuels, or reap maximum short-term rewards while the oil business lasts in its present form?

Alternative energy sources provide only a small fraction of the world's energy.

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AP BP SOLAR

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Future investment: in 1997, BP's chief executive John Browne (top) acknowledged the role of greenhouse gases in global warming. Since then, the company has invested in renewable energy such as this solar-powered lighting rig (top right) used at the Sydney Olympics.

All the big oil companies now accept that greenhouse-gas emissions pose a potential threat. All have invested in technologies to reduce such emissions, from techniques for capturing CO_2 before it is released into the atmosphere, to alternative methods for producing energy, such as solar power.

But behind the companies' environmental rhetoric, their approaches are very different. Only BP and Shell have made firm commitments to reducing their emissions of greenhouse gases and backed them up with targets and deadlines. They are also making the heaviest investments in alternative sources of energy.

Central to BP's efforts is a commitment to knock 10% off its 1990 level of greenhouse-gas emissions by 2010. Working with the New York-based organization Environmental Defense, the company has set rigid yearly emissions targets for each of its business units, from drilling operations to chemical plants.

Key to the scheme is the idea that the reductions do not have to be spread evenly around the business. Instead, cuts in emissions are treated as commodities that can be bought and sold. Under the plan, CO_2 emissions are priced at $8 per tonne. If a par-

ticular unit finds that the cost of cutting its emissions is less than this, it can aim to beat the 10% target and sell any excess 'carbon credits' on an internal market hosted on the company's intranet. Units that find the cost of cutting their CO_2 emissions is greater than $8 per tonne can choose to buy carbon credits, which count towards their 10% target. If it suits them, units can buy their way out of making any cuts. Credit is also given for lowering emissions of other greenhouse gases, based on their warming potential relative to CO_2.

Jeff Morgheim, BP's climate-change manager, handed out the reduction targets across all units uniformly, regardless of how hard reductions would be for a given group. The process did not endear him to the group leaders. "That's why I wear shades and a trench coat," he jokes.

But the group leaders have now come round, Morgheim argues. The company is already halfway towards meeting its targets, and estimates that it should reach its goal ahead of schedule, probably by 2003. Perhaps more importantly, the overall cost of the programme has been kept down by units finding reductions that stem from efficiency improvements. Morgheim points out that the second phase will be more expensive, as units made the easiest and cheapest savings first, but he is confident that the scheme will succeed.

Trading places

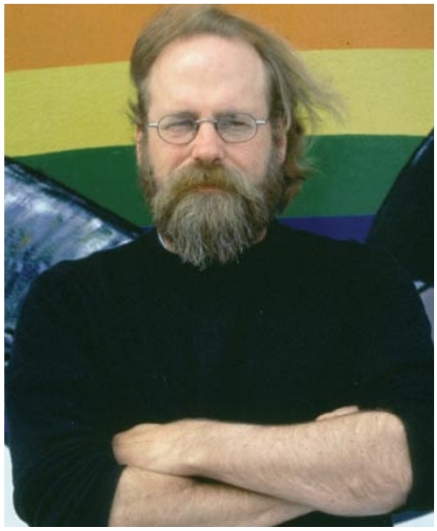
The element of profit in the system has also sparked some innovative ideas. Morgheim cites a recent call from a refinery manager who was considering using the heat generated by his refinery to heat water for a nearby community, and wanted to know if he would receive emission credits for the energy saved by the community. "When I hung up the phone I knew we had made the right decision," Morgheim says.

Shell, also in conjunction with Environmental Defense, has set itself an even more ambitious target of a 10% cut in 1990 emissions levels by 2002. Again, it is using a system of internal emissions trading, and looks set to meet its target. According to the Pew Center, BP's cut will take longer to achieve as more time is needed to incorporate some of its newly acquired subsidiaries into the programme.

Both schemes will be watched closely by negotiators seeking to salvage the Kyoto Protocol. If the accord is ever ratified, a similar system for 'emissions trading' will have to be implemented on an international scale. Arguments over the details of such a scheme contributed to the breakdown of the last set of international climate talks. "One of the reasons why we set up an internal emissions trading system ourselves was to see whether those systems can work in practice," says Robert Kleiburg, a climate-change analyst with Shell.

Shell has also developed an impressive roster of alternative energy projects through a US$500 million investment in its subsidiary Shell Renewables. Last year, together with a consortium of electricity generating and engineering companies, Shell Renewables opened a two-turbine wind farm off the coast of northeast England. The 4 megawatt (MW) farm is supplying electricity to 3,000 households. The company is now considering plans for a bigger project in the Irish Sea.

M. NICOLAOU/GREENPEACE



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Fuel for debate: Greenpeace's Steve Sawyer (right) welcomes the strategies employed by BP and Shell but backs the boycott on the anti-Kyoto US companies such as Exxon/Esso.

Working with Swedish energy company Sala-Heby Energi, Shell Renewables is also developing environmentally friendly combined heat and power (CHP) plants. Usually powered by gas, CHP plants are highly efficient and can provide both heat and electricity for anything up to a small town. Last August, Shell Renewables unveiled a CHP plant powered by wood chips left over from timber businesses which can provide 10 MW of electricity and 22 MW of heat. Hydrogen-powered fuel cells, batteries that many believe will run the electrical cars of the future, have also attracted investment from both BP and Shell. Other smaller oil companies are investigating carbon sequestration (see "The North Sea bubble", overleaf).

Despite these projects, alternative energy sources provide only a small fraction of the world's total energy needs. BP Solar, now the largest solar power company in the world, sold 40 MW of new capacity last year. This is a reasonable slice of the 250-MW global total, but with some individual fossil-fuel power stations generating thousands of megawatts, it is clear solar power still has some way to go.

Other oil companies seem to have turned their backs on renewables. ExxonMobil, for example, invested US$500 million in alternative energy before deciding that the practical and economic challenges of turning renewables into profitable energy sources were too great to warrant further funding.

Alternative sources may have a long way to go, but environmentalists are giving cautious praise to the efforts of BP and Shell. "I think they are way ahead of the rest," says Claussen. Steve Sawyer, an Amsterdam-based climate campaigner with Greenpeace International, wishes both companies would pursue alternative strategies more aggressively, but he backs their current efforts. "It's more than just greenwash," he says.

Such approval would have been out of the question in the early 1990s. As awareness of climate-change issues was starting to grow, many oil companies, including Shell and BP, funded lobbying groups such as the Global Climate Coalition (GCC). The GCC disputed the emerging scientific evidence for global warming and portrayed attempts to limit emissions as harmful to the world economy. BP and Shell have since withdrawn from the GCC, saying that they are now convinced that the science points to a warming world.

But ExxonMobil continues to speak out against the Kyoto Protocol and questions the degree to which the Intergovernmental Panel on Climate Change (IPCC), the group of scientists that advises governments on climate-change issues, represents a true consensus.

The North Sea bubble

Fossil fuels are likely to provide most of our power for the foreseeable future, but that does not mean that all the CO_2 produced has to go into the atmosphere. Norwegian company Statoil is pioneering attempts to store the gas elsewhere — deep below the seafloor. As Statoil's underground gas bubble grows, so do hopes that the technique could deal with more of the troublesome greenhouse gas.

The CO_2 is an impurity in the natural gas that Statoil extracts from the North Sea Sleipner gas fields. It is normally separated and released into the atmosphere, but since 1996 the company has been pumping the gas into a layer of sandstone around 1 kilometre below the seabed. Known as the Utsira formation, the layer traps the gas in a gigantic bubble which now contains some four million tonnes of CO_2.

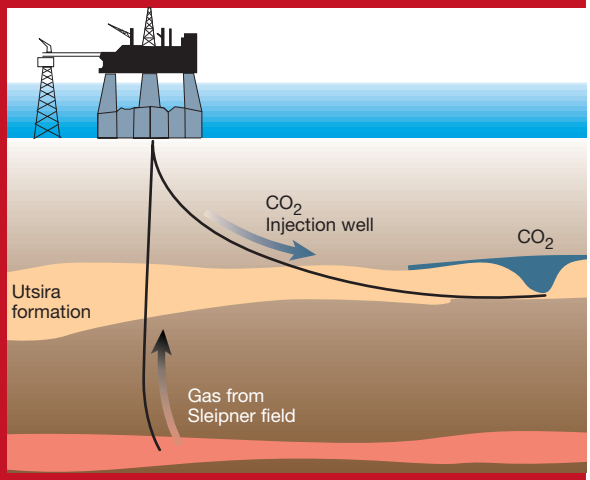
Once separated from the natural gas, the CO_2 is compressed before being pumped into the reservoir, where the high pressure keeps it in a dense 'supercritical' state — a hybrid of gas and liquid phases. This limits the diffusion of CO_2 through the sandstone. A layer of shale, which is impermeable to the CO_2, sits on top of the sandstone, effectively sealing the reservoir.

Andy Chadwick of the British Geological Survey is part of a team of European scientists responsible for monitoring the project. The team's 1999 seismic survey showed that the CO_2 is trapped within the reservoir and will probably stay there indefinitely. Chadwick is impressed with the project so far, but warns that the CO_2 may start to compress, rather than dissipate through the reservoir, making it progressively harder and more expensive to inject more gas.

But the Sleipner project's success does not necessarily imply that similar schemes could be applied to CO_2 from power plants. At Sleipner, the CO_2 would have been extracted from natural gas anyway, regardless of any storage scheme. Separating the CO_2 produced by power plants would require new investment, increasing the price of electricity. Additional infrastructure would also be needed to transport the gas to the reservoir. But the potential for storage is huge: just 1% of the reservoir Statoil is using, says Chadwick, could hold three years' emissions from all of Europe's power stations.

For Statoil, the Sleipner project has actually saved the company money. Norway taxes offshore carbon emissions to the tune of $38 per tonne. Before January 2000, the price was $50 per tonne. By storing one million tonnes of CO_2 undersea every year and avoiding this tax, Statoil recouped its $80 million investment within two years. The company plans to run the project for 20 years, storing around one million tonnes of CO_2 every year — equivalent to 3% of Norway's current total annual emissions.

David Adam



The latest IPCC report, issued earlier this year, stated that global temperatures were rising faster than previously thought and that there was strong evidence that greenhouse gases were the cause (see *Nature* **409,** 445; 2001). But Frank Sprow, vice-president of safety, health and the environment at ExxonMobil, says that most of the evidence linking greenhouse gases to global warming comes from climate models, rather than empirical data. "I think the layman and even some scientists don't understand that the question of attribution has to rely on models," Sprow says. He also claims that the report's executive summary played down substantial uncertainties within the document.

Joyce Penner, an atmospheric modeller at the University of Michigan in Ann Arbor, denies this. "The summary for policymakers does tell the story," she says. Penner was a lead author on the IPCC report chapter dealing with atmospheric aerosols, one of the largest sources of uncertainty in understanding climate change. "If you choose to ignore some of the things said there then you will get a skewed view," she says.

Pouring oil on troubled waters

Sprow does not deny that the build up of greenhouse gases poses long-term risks, but he argues that the Kyoto Protocol is not the way to deal with them. Instead, ExxonMobil advocates a three-tiered voluntary response to climate change. The initial focus is on energy conservation, followed by advances in technologies that reduce CO_2 emissions, and finally breakthroughs in areas such as carbon sequestration, which aims to lock emitted CO_2 away so that it cannot enhance the greenhouse effect.

Sawyer says such a strategy is unacceptable: "All it means is delay and taking actions which are of no conceivable cost to them at some undefined point in the future."

Steve Cochran, a spokesman for Environmental Defense, agrees. "Exxon has been extraordinarily difficult," he says. "It has funded efforts such as the GCC, which has worked very hard to undermine legitimate scientific understanding."

Greenpeace and other environmental groups have reacted by launching a European boycott of ExxonMobil and other American oil companies such as Texaco and Chevron. Sawyer says the goal is to provide encouragement for companies that do support Kyoto. In the long term, they hope to convince the United States to reconsider its decision.

If the boycott works, it may force ExxonMobil to factor consumer demand for environmentally friendly products into its long-term plans. Balancing environmental demands from the public and governments with the need to maintain profits will be a key challenge in the future for the oil industry.

Returning to Stanford earlier this year to give an update on BP's work on climate change, Browne described how the job of providing energy can feel like a trade-off between economic growth and a healthy environment. "I believe there is a huge commercial prize for those who can offer better choices which transcend the trade-off," he said.

The divergent climate-change policies of the oil giants are, in effect, speculations that reflect different views about that prize. Shell and BP are trying to position themselves as the main providers of the energy sources that may succeed fossil fuels. "They want to be there first," observes Claussen. ExxonMobil, on the other hand, appears to have decided that it can make more money by continuing under the present system for as long as possible — and catching up on alternative energy technologies at a later date.

Gordon Edge, an analyst with FT Energy in London, says ExxonMobil's decision will help profits in the short term, but will cause problems as renewables become more important. "Adjusting to renewables involves a major culture change. Exxon could take a decade to catch up," says Edge.

The long-term payoffs of all the companies' strategies are difficult to judge. But what is clear is that the outcome will affect us all: in gambling on their business futures, the oil giants are staking the Earth's climate. ■

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Pipe dreams: US companies seem reluctant to invest in renewable sources to replace fossil fuels.