



[Effective emissions control requires:]

- companies to look beyond their own green agenda
- governments to provide legislation
- all industry stakeholders to work together.

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While the verdict is in on the contribution of carbon dioxide to climate change, the jury is still out on the capture and storage of the gas. Jan van de Eijk, Shell, tells Jim Banks why industry collaboration is crucial if major environmental challenges are to be overcome.



Capture the essence

Various CO₂ capture technologies exist and, particularly in the US, the gas is being injected underground to enhance recovery from declining fields. The Intergovernmental Panel of Climate Change estimates that underground storage runs to 2,000 gigatonnes. However, there are still concerns over what will happen to injected CO₂. In addition, the energy and cost needed to process CO₂ are still being established.

Jan van de Eijk, Shell's chief technology officer, explains that his company is looking at the bigger environmental picture. According to Shell, there are two scenarios for the development of greenhouse gas reduction technologies such as carbon capture and sequestration (CCS): the scramble and the blueprint. The scramble, according to van de Eijk, is where individual companies or groups continue to pursue individual agendas.

'And only after a number of years do they realise that it doesn't work and are therefore shocked into moving toward closer cooperation,' he says. 'The blueprint, however, is where governments and stakeholders start to work collectively worldwide to address climate change issues.'

Joint effort

Though he in no way discounts other concerns – areas such as water quality and biodiversity protection – for van de Eijk, the key issue that everyone should be resolving together is CCS and, in doing so, putting cooperation before profit.

'There will always be differences in the details but, fundamentally, this is our stance on CCS,' he says. 'We believe this is an area where working with other entities is the way forward: through the sharing of information and data so you have joint accelerated learning. That is what we should all do now rather than try to carve out a proprietary, unique capability for ourselves. It is happening this way. There are many joint industry projects in this space.'

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Shell is part of a broad-based coalition, the European Technology Platform for Zero Emission Fossil Fuel Power Plants (ZEP), which aims to speed up the roll-out of demonstration projects so that CCS will be in commercial use by 2020. In its 2007 sustainability report *Responsible Energy*, Shell asserts: 'ZEP brings together the European Commission, European industry, NGOs, scientists and environmentalists. Thanks partly to ZEP's efforts, the European Union has recently launched a flagship programme to build 10 to 12 demonstration power plants with CCS by 2015. There is no time to lose. Every year's delay in the large-scale roll-out of CCS adds more than one part per million to long-term global levels of CO₂ in the atmosphere.'

Van de Eijk agrees that there has been enough talk. 'I think these are all areas where we will not gain anything

[Brent Spar: the green lesson]

Brent Spar was a redundant North Sea crude storage and tanker-loading buoy. In 1995, Shell obtained the UK Government's permission to sink it 155 miles off the Scottish coast in water 1.5 miles deep. The resultant uproar by environmental groups led by Greenpeace prompted driver boycotts of Shell's filling stations and inflicted substantial reputational damage to a company that, with such products as its nature guides, had always cultivated an environmentally responsible image.

Shell tried to answer its critics but in the end, after Greenpeace activists had actually boarded the structure as it was being towed for disposal, it abandoned the plan.

'I can only speak for what it did to me as a Shell employee at the time,' says Jan van de Eijk. 'I learnt that when you are having discussions with external stakeholders, there is more to having a good dialogue than possessing a sound engineering type of analysis of a mission and alternatives. There are many more things that need to be addressed in such discussions than the scientific and engineering areas. We learnt that the hard way with Brent Spar. It has helped us very much to understand that we are talking about the planet and that engagement with our external stakeholders needs to start early and needs to be more than just an exchange of scientific and engineering considerations.'

[Acid rain: the green model]

While counselling against complacency, Jan van de Eijk points to the successful way in which other greenhouse gas emissions have already been tackled.

'SO₂ is an example where you can see that, as a world community, we have made significant progress in reducing emissions,' he says. 'Subjects like acid rain that were dominant in the 1980s have gone away because they are an example where, by collective action, the industry has made a difference. This is a model for us to look at for other greenhouse gas emissions, and we should not be discouraged about what can be done collectively.'

He believes that as the world develops over the next 25 to 30 years, CCS and storage will be a very important measure to limit the rise of CO₂ levels.

'At that point, we will have made so much progress on the reduction of energy use and the supply of more renewable sources of energies, that CCS will be used less,' says van de Eijk.

Collective action has also seen a reduction in the emissions of ozone-damaging CFCs, an area that Shell continues to track and address.

by further intellectual discussions,' he says. 'It is about getting some real action going and starting to learn from the feedback from these demonstration projects. This is something where Shell, and other companies, are putting in significant effort.'

Outside of Europe, Shell, with partners Chevron and Western Oil Sands, is completing studies in Canada on the Quest installation, a large-scale CCS project that would involve more than a million tonnes of CO₂ each year from the Shell Scotford Upgrader at the Scotford Refinery near Fort Saskatchewan, Alberta. This, the Athabasca Oil Sands project, in which Shell has a 60% stake, is its first oil sands venture and poses a range of environmental challenges, from the release of nitrogen oxide to using water and energy to produce steam for the production process. Shell has committed to minimising its environmental footprint in Canada, in particular, pitching a voluntary target to cut its CO₂ emissions by 50% in the next two years. However, van de Eijk says that the issue of cuts in greenhouse gas

emissions needs to be reinforced by government legislation. 'We don't believe [at Shell] that relying on voluntary caps by individual companies is the best way to tackle climate change,' he points out. 'Instead, to get all companies and all sectors to act, we are encouraging government regulations that reward lower CO₂ sources of energy and greater energy efficiency. We are also moving to targets for individual facilities to help our operations improve their energy efficiency and manage CO₂. The ambition for most assets will be to have CO₂ emission levels that are in the top 25% of similar facilities. Achieving this will involve a combination of greater energy efficiency and further progress on CCS.'

Change begins at home

Shell has placed itself in a strong position in the last decade by disposing of a portfolio of smaller, older refineries. Van de Eijk explains that the firm looked at its total asset portfolio in terms of environmental challenges and came to the conclusion that, while it could upgrade the smaller facilities, it 'preferred to focus efforts on a number of leading plants which by their size and integration allow the greatest reduction in the environmental footprint'.

Shell is also looking at ways of reducing the amount of energy the company uses.

'Group operational practices are aligned with a lower environmental footprint and energy use is clearly one of them,' says van der Eijk. 'With the rapidly rising energy prices, companies including Shell are reviewing their portfolio of options, because so many energy savings options become more attractive with higher energy prices. This is very much part of operational excellence that we are keen to drive and we measure ourselves against our opposition in this space.'

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Regarding CCS, Shell has demonstrated the fundamentals of the process. 'We can capture CO₂ from diluted gas streams but it takes energy and money,' says van der Eijk. 'One of our aims is to work hard with other partners in the industry to bring that number down. It can be done. And then there is the issue of storage. We have injected CO₂ in the past, but it is also clear that we need to increase the confidence of society that the gas will stay subsurface.'

Responsibilities and opportunities

According to van der Eijk, there is still much to be learned more about how to make the process more cost effective and how the gas moves subsurface.

'What you see now in the industry is a tremendous effort to get a number of demonstration projects going – where we can gain practical experience of large-scale CO₂ capture and drive the costs down,' he says. 'In addition, we need to look at ways to inject CO₂ most effectively and monitor

[Shell: the green agenda]

Shell's environmental policies are driven, says Jan van de Eijk, by the principles of 'planet, people and profit (PPP)'. 'Within PPP, the planet is very much an important element in what we choose to do and how we choose to do it,' he explains.

Shell's environmental policies are long standing, but over the last 10 years, the need for a totally integrated approach has increased dramatically. The company does not see the monetary and management costs of environmentally responsible behaviour as something separate: good operational practice has to be fully aligned with protecting the environment.

'Efforts to reduce the use of energy or water in your operations – the production of by-products – all these operational focus areas have been linked to protecting the environment,' says van der Eijk. 'In the last five years it has become clear that there are specific expectations from society and that your licence to operate – your right to actually produce energy products – very much depends on your performance.'

In addition, the licence to start and develop new operations is also very much dependent on whether companies can show that they have a leading performance in terms of environmental footprint.

'It is an enormous source of competitive advantage if they can demonstrate that they are doing this job, preferably better than their competitors,' says van der Eijk.

Therefore, because Shell does not make a distinction between the production of energy and the additional environmental investments, there is no figure for the extra costs.

'We have taken to heart the fact that a good project needs to integrate these aspects of PPP and we don't single out environmental expenditures as a kind of add-on that we look at differently,' he continues. 'When we have a new investment in the expectation that we are going to produce a certain stream of energy or chemical products, it has to fully meet all the conditions posed to us around environmental footprint and stakeholder buy-in. It is not at all helpful to say that this is an extremely profitable project, but now that I need to invest in all kinds of protection it actually becomes less profitable. There is only one project and that is one that meets the expectations from all our external stakeholders.'

its fate subsurface then strengthen the verification of the fact that the stuff doesn't leak.'

In this monitoring space, van de Eijk posits that some firms will gain from proprietorial technology.

'If you are a company that has a particular CO₂-monitoring device or sensor, then you may see it as a business opportunity where you want to protect the improvements that you have made to your sensor and so you want to sell it to as many projects as possible. Some of the companies that provide equipment or special services may well want to specialise and in that sense create a business for themselves. But, in terms of the capability to capture and store CO₂ in a responsible manner, I believe that a joint industry effort is the only way to make a significant and long-lasting effect.' ●

[Jan van der Eijk]

Jan van der Eijk became group chief technology officer of Shell in May 2006. His role is to ensure the company's technology development and implementation supports and enables the realisation of its business aspirations. Van der Eijk also leads the team of Shell's chief scientists promoting scientific skills within the company and ensuring the capture of emerging energy technologies.