



# **The energy supply allows evolution but not revolution**

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**Jeroen van der Veer** is Chief Executive of Royal Dutch Shell plc. He joined Shell in 1971 and worked in manufacturing and marketing in the Netherlands, Curaçao and the United Kingdom. In 1992, he became a Managing Director of Shell Nederland. Three years later he became President and Chief Executive of the Shell Chemical Company in the in the United States. He was appointed a Group Manager Director in 1997.

Jeroen was born in the Netherlands, and is married with three daughters. He has two degrees – one in mechanical engineering from Delft University and another in economics from Rotterdam University.

He is a Non-executive Director of Unilever.

**Over the next 25 years the world's population will grow by at least 1.3 billion. Together with more prosperity, that will lead to a growth in energy consumption of up to 50 per cent – within one generation.**

**At present some 80 per cent of the global energy consumption is fossil fuel and according to the IEA the share of fossil energy over the coming quarter of a century will remain at more or less the same level. So CO<sub>2</sub> emissions will continue to rise even under the Alternative Policy Scenario of the IEA. In the Hofstad Speech Jeroen van der Veer told the audience that for Shell the debate about CO<sub>2</sub> and the climate is over. "The only thing we consider important now is to discuss, consider and design solutions. For us, the question is what are we doing about it. And how will we beat our competitors, technologically and economically, in collecting and storing CO<sub>2</sub>."**

When you're invited to deliver the annual Hofstad Lecture, it's the tradition – as a kind of *bors d'oeuvre* – to pay a visit to the Editor's office of the *Algemeen Dagblad* newspaper to answer readers' questions. I did this a few weeks ago, and many of the questions were about climate and sustainable energy.

This is, of course, no surprise. Indeed, the transition from the age of hydrocarbons to the sustainable energy age is one of the biggest challenges the world is currently facing. Solutions must also be found for the environment and climate impacts of our present energy system. Doubts have sometimes been openly expressed about the willingness of oil companies to invest in alternative sources of energy and in CO<sub>2</sub> reduction. Some of the readers' questions reflected this distrust.

Please allow me to make one thing clear: The debate about CO<sub>2</sub> and the climate is over for Shell. That debate will undoubtedly continue elsewhere for some time to come, but we're no longer taking part. The only thing we consider important now is to discuss, consider and design solutions. For us, the question is what we are doing about it. And how will we beat our competitors, technologically and economically, in collecting and storing CO<sub>2</sub>.

Shell does not intend to take a defensive attitude to these challenges. Because if we find the most attractive solutions for sustainable energy sources and CO<sub>2</sub> emissions, we as a Group will be in a better position. There are fair opportunities for us here, CO<sub>2</sub> reduction is responsible behaviour, and let's be frank, it also offers opportunities to make money, nothing to be ashamed of.

That's why Shell has been investing for many years in research, development and demonstration in sustainable energy and CO<sub>2</sub> reduction. We're active in wind, solar cells and biofuels, and internally we've taken many measures, such as energy saving, to reduce our own CO<sub>2</sub> emissions. It is our

target that by 2010, the companies under our operational management will emit five per cent less CO<sub>2</sub> than in 1990, in spite of much higher production levels.

We have appointed our own 'Mr CO<sub>2</sub>', who's responsible for having solutions ready in the medium term, even as our oil and gas production will continue to grow. These will include improved energy efficiency, less flaring and large-scale demonstration projects for CO<sub>2</sub> collection and sequestration. But also the replacing of more fossil energy by sustainable resources.

The public debate will focus mainly on whether these actions are adequate, whether change shouldn't be faster, and whether the costs and benefits are acceptable. These are things we do want to discuss, because perception and reality should be close to one another. Only then can we prevent decisions being taken that are influenced by fear and hastiness, and which can eventually do more harm than good to our economy, our prosperity and the rate of energy transition.

Energy, prosperity and the environment are all interlinked. Opting for any one source of energy has environmental impacts. Any environmental choice has economic consequences. And the policies that promote economic growth – three per cent here, ten per cent in China – have implications for energy demand. That's why none of these aspects can be assessed, or modified, in isolation – but require a prudent and balanced approach.

### **More people, more energy**

Over the next 25 years the world's population will grow by at least 1.3 billion. Together with more prosperity, that will lead to a growth in energy consumption of up to 50 per cent – within one generation. This is what the Reference Scenario of the International Energy Agency is telling us – and few people dispute that view. The same IEA has also calculated the impacts

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***How will we beat our competitors, technologically and economically, in collecting and storing CO<sub>2</sub>.***

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of a drastically different energy policy. This might comprise additional large-scale investments in, and in particular subsidies for, energy saving, CO<sub>2</sub> sequestration, the development of sustainable resources, improved building, heating and cooling techniques, and more efficient means of transport.

In this Alternative Policy Scenario, world energy consumption will not increase by 50 per cent over the coming 25 years, but still by almost 40 per cent. Equally significant is that according to the IEA the share of fossil energy over the coming quarter of a century will remain at more or less the same level – the current figure is around 80 per cent, and the figure for 2030 is also put at 80 per cent. Or at best, 77 per cent under the Alternative Policy Scenario. So CO<sub>2</sub> emissions will continue under both scenarios.

What is the reason for this? Why can't companies like Shell switch over faster from 'fossil' to 'sustainable'? Various Algemeen Dagblad readers asked me that. And so did the editors. To answer this, I'd like to present some facts. Do you know how much energy the world is consuming at present? All told, this comes to about 225 million barrels of oil equivalent per day. That's the grand total of quite a wide range of energy sources. In the first place we have oil, gas and coal. The fossil sources, in other words. There's also nuclear energy and hydroelectric – both with zero CO<sub>2</sub>. Then there's modern biomass, like biodiesel and ethanol. Plus renewables, particularly wind and solar. And in addition the world has 2.5 billion people for whom 'energy' only means firewood, harvest waste and dried manure.

### **Fossil fuels dominant**

I just said that fossil fuels account for 80 per cent of all energy, more than 180 million barrels of oil-equivalent per day. Renewables and biofuels currently account for about 1 million barrels of oil-equivalent. So that's the ratio at present: over 180 times more fossil energy is being consumed than sustainable energy. Why do fossil fuels have such a dominant position? Because they're still the most affordable and convenient source of energy on the planet.

Alternatives like wind, solar and second-generation biofuels have the advantage of low CO<sub>2</sub> emissions. But they can't compete in economic terms with fossil fuels – not yet. Everywhere – at universities, scientific institutes and also at Shell – the hunt is on for technological breakthroughs to make alternatives cheaper.

If that succeeds – and it will succeed – these resources could meet about one-third of world energy demand by about 2050. And they will continue to grow from then on.

Can't it be earlier, can't it be more, I hear you think. Consider the two factors I've just mentioned:

- renewables plus biofuels are still a lot more expensive than fossil energy;

- and both still only account for a mini-share of world energy demand, which is still growing as well.

A simple sum will bear this out: World energy demand is growing at an average rate of 1.6 per cent per year. This year alone, that comes to an average additional consumption of 4 million barrels of oil-equivalent every day. Even if renewables and biofuels together were to grow at the rate of 25 per cent per year – which would be an enormous achievement, more than twice the average so far – they would then account for 250,000 barrels of extra energy per day. But the additional demand comes to 4 million barrels. So the remainder, 3.75 million barrels per day, will primarily have to come from fossil sources, because there's little extra scope in nuclear and hydro.

### **Technological breakthroughs**

If renewables and modern biofuels really are to get anywhere – and this must and will be achieved – then revolutionary technological breakthroughs will be needed. This is being worked on – very hard, in fact. However the energy supply allows evolution but not revolution. You can't simply upscale something that's still very small, and also more expensive, into something very big. Moreover, if we open up new oil and gas fields, set up refineries or LNG plants or build gas or coal fired power stations in 2007, these facilities will be there for a good 30 years.

That's why the world can never switch over all at once to a new energy system; we'll be growing towards it at an evolutionary rate. The brand-new car you're buying now will only go to the breaker's yard in about 15 years' time. Only then will it be replaced by the newest technology. To illustrate the wide gap we now have between renewables and fossil energy, let me draw a comparison with regard to the Netherlands. If solar panels measuring four square metres were to be installed on each of the 4 million roofs in this country that are suitable for this purpose, this would supply about 2 billion kilowatt-hours or 2 terawatt-hours of electricity per year. But the

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Netherlands consumes 120 TWh per year. So such a 'four million roofs plan' would meet 1.67 per cent of the electricity consumption of the Netherlands. If we had all changed over to solar-generated electricity on New Year's Eve, we would have exhausted the full year's supply by 1.45 a.m. on 7<sup>th</sup> January.

With biofuels the story's not much different. They are still far more expensive than fossil energy, their market share is small, and we shouldn't really include what are termed first-generation biofuels. With this first generation, food crops are converted into fuels: colaseed, corn, wheat and all kinds of other oil-containing seeds. Last year the American magazine Fortune worked out that to fill up an SUV with 25 gallons, or about 95 litres, of ethanol, would take enough maize to feed a human being for a year.

And the processes for making first-generation biofuels are not very CO<sub>2</sub> efficient either. In some cases the whole cycle from field to wheel produces even more CO<sub>2</sub> than fossil fuels. In Shell's view, biofuels should preferably be produced by what are termed second generation technologies. Then vegetal residues can be used, such as wood, straw, corn stalks, leaves or algae. Even recycled paper and sewage sludge are possible, in theory. This would bring CO<sub>2</sub> reduction up to 90 per cent and the biofuels would not affect the price of margarine, beer or corn tortillas, for instance.

At present, wind, solar and biofuels still rely on subsidies. That support is a key element in the research, development and demonstration that are needed to make new sources of energy cost-competitive in the longer term. We always ask the subsidising agencies to provide a level playing field, a limited duration of subsidy and a declining level of grant.

We also ask for tradable emission certificates to be issued for the production of low-carbon energy sources and for CO<sub>2</sub> storage. This can best be done by embedding these activities in the European Emission Trading Scheme (ETS) and the Clean Development Mechanism ensuing from the Kyoto agreements. The ETS isn't working efficiently yet and is having teething troubles, and you'll have heard that CO<sub>2</sub> rights are currently being traded at rock-bottom prices. But at least it's a working system that's capable of improvement – and that makes it better than nothing. This trading scheme shouldn't be forced by an abrupt limitation of issued emission rights. That would drive manufacturing businesses

out of Europe without making the world cleaner.

### **Unprecedented challenge**

As I've already said, the world is facing the unprecedented challenge of structurally changing the energy supply.

-In the longer term, easily producible fossil sources will be exhausted.

-In the shorter term, energy-importing countries will be seeking a lower level of dependence on energy-exporting countries.

-And then there are the climate concerns. For some this is a short-term threat, for others the necessary transition towards more sustainable energy sources is an evolutionary process that will unfold over the rest of this 21<sup>st</sup> century. I personally am in the latter group.

In the transitional phase to the new energy balance, every source possible will have to be tapped.

-For the time being, the world won't be able to manage without fossil sources – as I've already pointed out, we'll first be consuming even more oil, gas and coal. This requires major investments in new production capacity.

-Because easy oil and gas resources are becoming exhausted, unconventional reserves will have to be opened up.

For instance: oil sands, or oil and gas in difficult regions or from complex geological structures and reservoirs.

-To respond to climate concerns, solutions will have to be devised for the increasing CO<sub>2</sub> emissions.

For some countries this may also be nuclear energy: nuclear fission now and perhaps nuclear fusion at some later stage.

-At the same time affordable alternatives will have to be developed.

In the transitional phase this will also be 'clean fossil', with the CO<sub>2</sub> emissions of gas or coal fired power generation being directly stored underground.

-And we'll have to devote more efforts to energy saving: the cleanest and cheapest energy is and will always remain the energy we don't use.

The essence of all developments is to supply the world with energy that meets the three C's: *Cheap*, *Clean* and *Convenient*. Amidst all these challenges and developments, Shell has drawn up its strategic plan. We've opted to grow the production of oil and gas – more and more of this will come from unconventional sources. In addition, we are and shall remain active in the treatment, refining, retailing

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and marketing of oil and gas, and we're specialists in bulk chemicals.

Apart from that, we're aiming to get at least one major renewables activity off the ground. As soon as there are prospects of a sustainable energy source that is viable without subsidies, we shall invest in it on the same scale as we now do in fossil energy – which means we're talking billions of dollars.

At the same time, we're already investing in reducing the environmental impact of fossil energy production and consumption. By our specialised gasification technology, for instance. This enables natural gas, coal and biomass to be turned into extremely clean liquid fuels, or into base chemicals and fertilisers. The CO<sub>2</sub> from these processes can be centrally captured and stored.

We're also constantly investing in energy saving in our plants and processes; each year we achieve an efficiency improvement of some two per cent in this way. In addition, we're selling our specialised know-how for achieving energy savings in petrochemicals and the processing industry to third parties.

### **Excellent in CO<sub>2</sub> solutions**

In these choices, we aim to do a top-quality job. We even aspire to be excellent in them. Excellent, for instance, in the oil sands in Canada. The Canadian government considers it acceptable for these reserves to be developed. We aim to do this better than our competitors in terms of efficiency, cost, environmental impact and technology. In the same way, we intend to resume production at the super-heavy oil field Schoonebeek in the Netherlands in the coming years. Just as for oil sands, a lot of new technology will be needed for Schoonebeek too – such as high-pressure steam injection and long horizontal producing wells. In this way we can responsibly produce the very heavy oil from what is one of Europe's largest onshore oilfields.

We're aiming to be just as excellent in devising CO<sub>2</sub> solutions. Some of our current activities:

- By 2009 we shall have halted gas flaring in Nigeria.
- We're investing in energy saving programmes for our chemical plants and refineries, but also in efficiency improvement by delivering residual heat to district heating systems.
- Projects are under way for injecting CO<sub>2</sub> into depleting oilfields to enhance oil recovery at the same time, and we're also looking into CO<sub>2</sub> sequestration projects

in depleted gas fields.

- We're active in CO<sub>2</sub> trading, and we're supplying this gas to glasshouse produce growers in South Holland and to paper industry suppliers. Our CO<sub>2</sub> is also to be found in soft drinks and beer.
- And as I've already said, we're looking out for a renewable or biofuel that can commercially stand on its own two feet and grow into something big. This search is now in the demonstration phase.

In all these instances we aspire to excel in technology. To underpin this, a Chief Technology Officer has been appointed. Together with our Chief Scientists, he is responsible for developing and disseminating technology throughout the Shell Group.

### **Rekindled motivation**

The new energy world is moving further and further away from 'simple oil and gas projects'. The future lies with high-cost, organisationally complex and technologically sophisticated projects – and this is where Shell sees its unique selling point, whereby we can distinguish ourselves from others. Last year we recruited 6,000 extra people to design and execute all these new technologies and projects. And we haven't stopped there: our recruitment targets for this year come to about 4,000 people. About 600 of them will be recruited in the Netherlands.

Shell has undergone a drastic change over the past few years. We responded very energetically to the 'reserves issue' of early 2004 by structurally putting our house into order. And we've succeeded in doing so: we've proved this by our financial and operating results for 2006.

The unification in 2005, turning Royal Dutch Shell into a single company after a cohabitation agreement lasting 97 years, was a key step in this process. With one Board, one share and one Headquarters, in The Hague, we have quickly rekindled motivation and speed – and thereby new growth. What belonged together by nature has now grown together organically. It's working, things are going well. Shell is less complex, more transparent and more professional. And more agile.

Our strategy is also easier to communicate: 'More Upstream and Profitable Downstream' is what we've called it. So more oil and gas production. And refining, marketing and chemicals must be profitable everywhere. No long texts about mission and vision, that's not our style.

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### **Top quartile in everything**

The question we ask ourselves is: where are we going and what must we do to get there? During this journey we'll be benchmarking ourselves on all aspects, comparing ourselves with our competitors. Because we definitely want to be in the top quartile in everything, up with the best 25 per cent of corporate performers. We aim to be at the top in terms of profits, safety, operations, efficiency, production, reserves, dividend and reputation.

Out of a wide offering of potential investment opportunities, we're now opting for those projects that will ensure us long-term production and income. In doing so, we rate value higher than volume. We'll also be growing primarily on the basis of our own projects. In the longer term, organic growth adds more value than expensive takeovers. At present, we have almost 200 major projects at various stages in the pipeline – and for us a project is 'major' if we have to invest more than \$100 million.

Apart from any acquisitions – which we always keep an eye on as a way to rebalance our portfolio – we think we'll be investing \$ 22 to 23 billion this year. Of this, some 80 per cent will go to the upstream sector: oil and gas production, and the conversion of natural gas into LNG and oil products.

This is our response to the two big short-term challenges facing the entire energy industry. Firstly, supplying the extra energy that the world demands. Secondly, coping with the rapidly changing social and political environments in which we have to operate.

Over the past year, our company has again experienced at several locations – I need only mention Nigeria and Russia – that the energy world is not a tropical holiday paradise. But we don't walk away, not even when there's a storm brewing. In Russia and Nigeria we're doing business very responsibly. They're not easy places to operate, as you know. Such countries impose extreme demands in all respects on all those who work there. But for more than 100 years we have been used to maintaining our own corporate values, even under extreme conditions. We shall continue to do so.

### **Active government policies**

Nowadays we all speak of globalisation as if it means that the same fixed game rules apply everywhere. Of course that isn't so. You can read in your newspaper how the goalposts are unilaterally moved during the

match, and the referee isn't always neutral either. The World is Flat, says the prophet of globalisation, the American journalist Thomas Friedman. At any rate that's literally true of the world in the Netherlands. But outside this country you encounter enormous mountains to cross and valleys to pass through.

To complete this journey we always need governments. To a large extent, they determine how the energy sector can respond to the major challenges. Governments and business companies indissolubly need one another – and they should both realise that better. Because energy supply and environmental care are matters of global importance, the best responses to these challenges will materialise if as many governments as possible think and act alike.

On the worldwide scale this will, perhaps, always remain an illusion. But then this thinking alike should in any case happen on the EU level. Sadly there are no harmonious sounds coming from Brussels. President Barosso will be left with an empty toolbox if the 27 member states put their own interests higher than the common interest.

Precisely because energy policy is steadily moving towards the enormously expensive, hypercomplex projects I've just mentioned, it's vital that businesses can count on the consistent long-term policies of government authorities. So I warmly approve of government authorities setting energy efficiency standards. The best thing would be for such standards to have a long-term timeframe, for instance up to 2020, because this would stimulate technology and innovation.

Yes, you did hear correctly: as a private industry executive I'm calling for active – and preferably international – government policy measures. This isn't a paradox but the creating of a win-win situation for society and the business community. As and when this active international government policy is in place, private companies like Shell will deliver the energy supply and emission control solutions we need.

Today you're hearing a note of optimism. Indeed, I believe that government authorities and Shell can do much to keep energy 'clean', 'convenient' and relatively 'cheap' for consumers. At any rate, we're devoting our energy to this.

Thank you for your kind attention.

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