



Changing Fortunes: Global Energy

Peter Voser
Chief Executive Officer
Royal Dutch Shell plc

Spruce Meadows Economic Round Table
Calgary, Alberta, Canada
11 September 2009



Peter Voser was born on August 29th, 1958. A Swiss national, he was appointed Chief Executive Officer of Royal Dutch Shell with effect from July 2009.

Prior to his appointment as CEO, he was Chief Financial Officer since October 2004 and up to July 2005 was Chief Financial Officer of the Royal Dutch/Shell Group of Companies. In 2002 he joined the Asea Brown Boveri (ABB) Group of Companies, based in Switzerland as Chief Financial Officer and Member of the ABB Group Executive Committee.

He first joined Shell in 1982 and held a variety of finance and business roles in Switzerland, the UK, Argentina and Chile, including Chief Financial Officer of Oil Products. He was a member of the Supervisory Board of Aegon N.V. from 2004 until April, 2006. He is a member of the Supervisory Board of UBS AG and a member of the Swiss Federal Auditor Oversight Authority.

We're at the beginning of a fundamental shift in our energy system, one that also requires a fundamental shift in our collective mindset. But the energy transition is not for the faint-hearted; it will take decades of reversing set-backs, involving generations of committed scientists, engineers and policy makers. Adding to the scale of the challenge, we will have to increase energy supplies to meet growing demand. In this speech, Royal Dutch Shell's CEO, Peter Voser, focuses on what government and industry can do to maintain energy security while building a new energy system. We need to diversify the global energy mix, without dismissing any energy option out of hand. To promote large-scale deployment of Carbon Capture and Storage and other low-carbon technologies, governments need to put the right policy frameworks and incentives in place. The UN climate conference in Copenhagen in December offers a good opportunity to make progress.

Intro

Two years ago, when we debated energy at this conference, the focus was on high demand, high prices and high cost.

Today the economic recession has suppressed demand and prices, and reduced the amount of available capital.

High cost is the only thing I still recognise.

Oil and gas majors face the unprecedented challenge of building a more sustainable energy system, while keeping up global oil and gas supplies, and responding to the worst economic downturn since the 1930s.

Clearly, fortunes in our sector have changed.

So it's a fitting reminder that this year marks the 200th anniversary of the birth of Charles Darwin.

Darwin explained that living organisms survive through evolution, constantly adapting to changes in their environment.

That's also a relevant insight for social organisms like companies.

But this isn't just a story of companies and their customers.

Governments will face pressure from voters who want affordable energy to *power* their lives and a clean environment to *sustain* their lives.

So, today, I'll focus on the energy transition, and what industry and government can do to balance energy security and managing climate risk.

Since oil sands and biofuels symbolise the importance of keeping that balance, I'd like to discuss these resources in some detail.

Energy transition: realism required

But, first, the wider picture. Some people say the time is ripe for a Green New Deal. They argue that governments should invest in new technology as a stimulus for low-carbon economic growth.

I agree that we're at the early dawn of a fundamental shift in our energy system, one that also requires a fundamental shift in our collective mindset.

At Shell, we've always embraced change. We like trying new things. We've played a pioneering role in many areas, be it in deep water technology, Liquefied Natural Gas, Gas-to-Liquids, oil sands, biofuels, or differentiated transport fuels.

So, as a company of firsts, we're happy to contribute to an energy transition, or green new deal, so long as we're all clear that this is a *long-term* venture, a contract between ourselves and future generations.

Indeed, Shell's scenario team believes that by the middle of this century 30% of the world's energy could come from wind, solar and other renewable sources. We'll see a greater variety of transportation fuels, including biofuels, electricity and hydrogen. And everything from cars to homes will be more energy efficient than what we know today.

If that vision of the future sounds attractive, make no mistake: it will take decades of reversing set-backs to get there.

And fossil fuels and nuclear will supply the remaining 70% even then.

“As a company of firsts, we're happy to contribute to an energy transition, or green new deal, so long as we're all clear that this is a long-term venture, a contract between ourselves and future generations.

History provides a parallel: Just as the growth of oil and gas did not stop the world from using coal, so the growth of wind and solar won't end the use of oil and gas.

These are realities voters and consumers should grasp, and policymakers and industry leaders should be clear about.

Technology Deployment Curves

The energy industry is very different from, say, the consumer electronics industry. A mobile phone company has 18 months to develop and market a new mobile phone, if it wants to beat the competition.

In the energy sector, the scale of investments and new projects is massive, and "18 months" feels more like "18 minutes".

So when Shell scientists achieve a breakthrough in the lab, we're happy, but we won't put the champagne on ice just yet.

It will take three more years to build a demonstration plant, one year to start it up, and two to five years to achieve a reliable operation. So, from the first demo to the first commercial plant easily takes a decade. And at that stage you don't build a dozen plants – you build one.

Subsequently – so this is *after* commercial introduction - it takes at least another 25 years for a new energy type to obtain a 1 percent share of the global market.

Liquefied Natural Gas, or LNG, is a good example. The first LNG exporting plant came on stream in 1964, in Algeria, using Shell technology. Since then, the growth of LNG has been spectacular, and has helped globalise the market for natural gas as the cleanest-burning fossil fuel. Today, more than forty years later, the share of LNG in the global energy mix is about 2%.

Biofuels are reaching their 1% share of the market around now. Wind could do so by the middle of the next decade, 25 years after the first large wind parks were built in Denmark and the United States.

Some people ask why we can't introduce low-carbon technology faster.

Shell's most recent energy scenarios already assume a faster ramp-up for renewables than history tells us to expect.

It's not that our industry desperately needs more game changing technologies or transformational research.

Strange as it may sound, we already possess much of the technology we need to build a more sustainable energy system.

The real challenge is large-scale deployment.

Take wind power in the United States. At present, wind accounts for just over 1% of total electricity generated in the US.

The growth of new wind power capacity in the U.S. has averaged a stunning 30% a year for the last five years. Shell has been an active participant in that growth. But this was from a small base. So this rate will have to slow down as the larger scale is reached.

Now, suppose the U.S. wanted to replace all its coal-fired power stations with wind parks. It would take 200,000 wind turbines to do so, covering more land than the State of Washington.

This assumes an average turbine size of 4 MW, which is more than double the present average.

It also assumes that the permitting of such large areas can be managed and that the grid can handle such a vast increase in on-and-off electricity.

Even if all this wind capacity got built, we'd still need to build new conventional power stations - to make sure there's power when we need it, not just when the wind blows.

In a telling example of the setbacks we'll encounter, T-Boone Pickens has postponed plans to build the world's largest wind farm – because of a lack of transmission lines and low natural gas prices.

Well, who said that evolution is painless.

Recession impact on supply security

Right now, the recession is causing us even more pain.

But energy demand will pick up on the back of an economic recovery.

"It takes at least 25 years for a new energy type to obtain a 1 per cent share of the global market."

China and India have weathered the global downturn better than most countries and will continue their rapid development.

Meanwhile, many of the world's producing oil fields are in decline.

So the critical question is whether supply will keep up with demand.

The International Energy Agency says the world will need to invest \$26.3 trillion in energy supplies up to 2030. On IMF calculations, that's more than 30 times the amount which governments globally have used so far to save banks and revive their economies.¹

Billions more will have to go into new power grids, CO₂ solutions and energy-efficiency.

But the opposite of what is needed is happening. Globally, energy investments are down— despite the efforts of Shell and other majors to maintain sizeable investment levels.

The IEA warns we could see a 20% drop in upstream oil and gas investment this year compared to last year – a reduction of almost \$100 billion. Investment in renewables could be 40% lower.

There may be plenty of energy around today. But a steep fall in investment could turn today's surpluses into tomorrow's shortages, especially in countries that combine inadequate domestic resources with ageing infrastructure. For, instance, in Britain, some analysts expect supply disruptions within the next 10 years.

Mark Twain once said: "What is man without energy? - nothing, nothing at all."

That's even more true today.

And if the lights really did go out, printing money wouldn't help.

That's why - on the supply side of the energy system - the energy transition will have to be a matter of evolution, not revolution.

Industry

This brings me to the role of industry and government.

For industry I see three priority areas: producing more oil and gas, CO₂ solutions, and diversifying the energy mix.

Our first responsibility is to make the most of the world's oil and gas resources. We need to increase the amounts of oil we presently recover from fields – usually not more than a third of what's in the ground.

And we need to open up new frontiers. Think about the ultra-deep water in the Gulf of Mexico and offshore Brazil, the sub-Arctic and Arctic region, the oil sands and unconventional gas.

The second industry priority is to reduce CO₂-emissions from fossil fuels. We can do that by increasing energy efficiency in our operations and helping our customers to do the same.

Another way is to capture CO₂ and store it underground.

According to the Intergovernmental Panel on Climate Change (IPCC), carbon capture and storage (CCS) could deliver around half of the total emissions reduction needed to stabilise atmospheric greenhouse gas levels by the end of the century.

There are some smaller CCS projects in operation or in preparation— in countries like Germany, the Netherlands, Norway, the US, Australia, and of course Weyburn and Quest here in Canada.

But the world is currently only storing around 3 million tonnes per year. By comparison: the coal-fired power plant in Nanticoke, Ontario, emits six times as much. So there's still a huge gap between where we are today and realising the full potential of CCS.

Implementing CCS at the necessary scale will be a costly affair.

But *without* CCS we would only increase the cost of climate mitigation and shift the burden to future generations.

The third area that the oil and gas industry can play a role in, is to help the world diversify

“There may be plenty of energy around today. But a steep fall in investment could turn today's surpluses into tomorrow's shortages.”

¹ Amount used by end of July 2009 = \$778 billion world-wide. Much of this money is likely to be recouped when the economy recovers. Source: IMF, The State of Public Finances: A Cross-Country Fiscal Monitor, July 30, 2009, p. 29, Appendix Table 4.

the energy mix – meaning more unconventional oil and gas, more renewables and more nuclear.

In the area of renewable energy, Shell has been active in wind, solar, hydrogen and biofuels. Today, the largest of our activities is in wind.

For the next few years, we will concentrate on biofuels, an area that holds great promise and has a close fit with our core competencies.

Oil sands

Let's now zero in on biofuels and oil sands, two of the world's most hotly debated new energy sources.

Canada's oil sands reserves of up to 175 billion barrels are a welcome addition to North America's energy supply.

Today, oil sands bitumen production stands at 1.3 million barrels a day.

The US Energy Information Agency believes that, by 2030, oil sands could account for around 6% of global non-OPEC oil supply.

As we all know, bitumen production from the oil sands poses environmental and social challenges.

Let me assure you that at Shell we work hard to reduce those impacts.

But oil sands are not off the scale environmentally.

Recent independent studies show that – after many technology innovations and operational improvements - petrol from oil sands today only produces 5% to 15% more CO₂ than conventional petrol - when measured from “well-to-wheel.”²

CO₂ Capture and Storage could further reduce emissions. Our Scotford Quest project would capture up to 1.1 million tonnes of CO₂ each year. That's like taking 175,000 North American vehicles off the road.

The Federal and Provincial Government of Alberta have shown great leadership with respect to their support for CCS. Shell is very pleased that our Quest project has been selected for potential funding. There are still many challenges to resolve before a final investment decision can be taken. But it's a milestone - and an important step towards placing Alberta and Canada among the global leaders in CCS.

We're not saying that the environmental challenges around oil sands are too small to worry about. But they should be seen in the right context.

Biofuels

The same is true for biofuels, of which the world now produces well over a million barrels a day.

Let's remind ourselves why we're interested in biofuels.

First of all, they are a welcome addition to the world's liquid fuels in an oil-constrained world. Secondly, they have great potential to reduce greenhouse gas emissions.

As a result, more than 50 countries are developing or have renewable fuel mandates. The European Union, for example, insists that 10% of road vehicle fuel come from renewable sources by 2020.

But the environmental and social challenges associated with biofuels production are real and require proper management.

The benefits of biofuels vary according to the feedstock and production processes used. For example, North American ethanol produced from corn typically reduces greenhouse gas emissions by 10%-30%, whereas an efficient variety of Brazilian ethanol derived from sugar cane can reduce emissions by as much as 90%.

Biofuel supply chains are long and involve thousands of individual farmers.

“Canada’s oil sands reserves of up to 175 billion barrels are a welcome addition to North America’s energy supply.”

“More than 50 countries are developing or have renewable fuel mandates.”

² Council on Foreign Relations, Center for Goeconomic studies, Michael A. Levi, [The Canadian Oil Sands, Energy Security vs. Climate Change](#), Council Special Report, No. 47, May 2009; TIAX LLC and MathPro Inc. for Alberta Energy Research Institute, [Comparison of North American and Imported Crude Oil Lifecycle GHG emissions](#), July 6, 2009; Jacobs Consultancy for Alberta Energy Research Institute, [Life Cycle Assessment Comparison of North American and Imported Crudes](#), July 2009.

Shell has taken many measures to ensure our supply chains are environmentally sustainable. For instance, we include sustainability clauses in our contracts – and, to date, three quarters of our suppliers have signed up to them.

We are working together with the Roundtable on Sustainable Biofuels and many other international actors to develop an international certification scheme that would provide assurances on Greenhouse Gas footprint and other environmental and social aspects.

In the meantime, at Shell we're working hard to develop advanced biofuels that can also use non-food feedstocks like straw, or even algae.

But it will take huge effort to overcome all the technical hurdles and produce them at competitive prices.

Here in Canada, our partner Iogen Corporation specialises in converting straw into ethanol, using enzymes. Iogen provides a good example of how we diligently work through the research and demonstration phases. We've been producing bio-ethanol at a demo plant for the past four years. Production now averages 40,000 litres per month. But before we would be ready to build a bigger plant – say one that produces around 70 million litres a year – we'd need to do more work on commercial feasibility, plant design and operational excellence.

Governments

Renewable fuel mandates and Alberta's support for the Quest project show what governments can do to manage the energy transition.

Let me highlight a few more priority areas for government involvement.

- Access to resources and secure supply lines;
- Climate policy frameworks;
- Energy efficiency and conservation.

When it comes to access to resources, here in North America I'm thinking in particular about offshore Alaska, the most promising hydrocarbons basin in the U.S. But before we can bring more oil to the North American

market and investment into the local economy, we need access. There's no way around that.

Energy security also depends on reliable international supply lines.

Over the coming decades many pipelines, LNG terminals and electricity grids will be added. Shipping will intensify. In itself, a more intricate supply network increases flexibility and stability in the system.

The downside is that long supply lines are vulnerable to sabotage and piracy. The Horn of Africa illustrates the point.

Our industry looks to governments to manage these security issues, and we're grateful for what NATO and others have done so far.

We need the same cooperative spirit to make the UN climate conference in Copenhagen a success. Society needs real progress on climate policy frameworks that put a price on emissions and promote CCS and other clean energy technologies.

I mention CCS because pioneering companies should be able to earn allowances for the CO₂ they store underground. The principle must be that a tonne of CO₂ stored underground is as good as a tonne of CO₂ avoided through a wind park.

Governments should also properly address energy use. If the energy transition is to take on the character of a Revolution, it'll be on the *demand*-side of the energy system.

New technologies can make a big impact in helping consumers to use less energy for the same level of comfort.

Installing smart grids and energy meters, better insulation of homes and offices, lighter and smaller vehicles with more efficient engines, more efficient fuels and lubricants – these types of measures take the bull by the horns.

On the supply-side, the energy system is less flexible, as we saw when discussing wind power's potential to replace coal-fired capacity.

That's why, for me, the energy transition entails an *Evolution* in energy *supply* and a *Revolution* in energy *use*.

“Society needs real progress on climate policy frameworks that put a price on emissions and promote CCS and other clean energy technologies.”

Comparing government and industry agendas

If governments and industry are to work together on a new energy system, we'd better start coordinating our agendas now.

So what do we get if we compare these agendas?

First, as we have seen, one common challenge is to keep up investments in energy supplies through different economic cycles.

Governments are understandably focused on the financial sector and getting their economies going again. They have shown what can be done if the political will is there. But national budget deficits and debts have risen. Replenishing the government coffers by slapping new taxes on the energy industry may seem like a good idea to some. But it isn't. It would increase the risk of a severe supply crunch further down the road. What we need is governments promoting, rather than discouraging, investments in energy projects.

Secondly, in some countries, the political sustainability agenda doesn't match the technology agenda. Making new energy technologies available at a large scale has historically taken decades. Speeding up the deployment of low-carbon technology is possible, but only if governments put the right policy frameworks and incentives in place. Copenhagen is a key opportunity to make progress on CO₂ pricing and carbon capture and storage. Let's not waste it.

Third, we need to give appropriate attention to energy use. A revolution in energy use is technically feasible and, with proper political management, could achieve tangible results.

Finally, the world needs diverse energy supplies, including oil sands bitumen and biofuels. With energy demand set to grow, we should keep open all supply options.

Governments possess the key to providing access to resources, securing supply routes, and diversifying the energy mix, . . . and all of that with future generations in mind.

Having invoked Charles Darwin at the outset, it seems only right to give him the final say: "It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change."

Thank you

***"The energy transition entails an Evolution in energy supply
and a Revolution in energy use."***

Recent speeches by Executive Directors

Challenges and developments in the NOC-IOC relationship

Malcolm Brinded



The development, demonstration and deployment of low carbon technology – the case for CCS

Malcolm Brinded



Balancing Global Resources

Malcolm Brinded



Value-driven partnerships for a diverse energy future

Jeroen van der Veer



Energy volatility – the place of oil

Malcolm Brinded



Investing through the cycle: challenges and opportunities

Jeroen van der Veer



Industry evolution—where are we heading next?

Malcolm Brinded



This publication is one of a range published by
Shell International BV, Carel van Bylandtlaan 30, 2596 HR The Hague, The Netherlands.

For further copies, and for details of other titles available in English or as translations,
please write to the above address, or contact the Communications department of your local Shell company.

Information about Royal Dutch Shell plc, including
downloadable versions of various publications, can be accessed at:

www.shell.com/speeches

© Shell International Limited BV, 2009 Permission should be sought from SI before any part of this publication is reproduced, stored in a retrieval system, or transmitted by any other means. Agreement will normally be given, provided that the source is acknowledged.

The companies in which Royal Dutch Shell plc directly and indirectly owns investments are separate entities. In this publication the expressions “Shell”, “Group” and “Shell Group” are sometimes used for convenience where references are made to Group companies in general. Likewise, the words “we”, “us” and “our” are also used to refer to Group companies in general or those who work for them. These expressions are also used where there is no purpose in identifying specific companies.