



Blueprint for a shared future



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He was born in the UK in 1953 and joined Shell after graduating in Engineering from Cambridge University. He has worked for Shell companies in Brunei, the Netherlands, Oman and the UK. In 1998 he became Managing Director of Shell UK Exploration and Production – responsible for a fifth of the country’s offshore oil and gas business – and from 1999 until 2002 he was Shell Country Chairman in the United Kingdom. He became a Group Managing Director in 2002 and Executive Director of Exploration & Production in 2004.

He is a Fellow of the Institutions of Civil and Mechanical Engineers and a Council member of the Royal Academy of Engineering. He was appointed CBE in 2002 for services to the UK oil and gas industry.

He is a member of the Russian Foreign Investment Advisory Council, the Nigerian President’s Honorary International Investor Council and a Trustee of The Prince of Wales International Business Leaders Forum.

Energy industries must respond to three inter-related challenges – meeting expanding energy needs, getting more from increasingly difficult resources, and cutting carbon emissions. What will count will be our ability to work together, particularly national and international companies. As well as developing and deploying the new technologies required to meet these challenges, the industry must help promote the coherent framework that enables us to do so. This includes lobbying for a global carbon market that will enable carbon emissions – particularly from coal – to be mitigated more efficiently, and allow carbon space for the oil the world uses so effectively in transportation.

Energy industries will be transformed over coming decades as we respond to the challenges embodied in three hard truths.

First, we need to meet the expanding energy needs of an increasingly populated and rapidly developing world. Second, we need to get more from resources that are increasingly difficult to find, produce and deliver – expanding supplies and accelerating improvements in energy efficiency. Third, we must cut the carbon emissions from this essential energy in order to stabilise atmospheric CO₂ and limit global warming.

These challenges are closely inter-related. We have to tackle those emissions without jeopardising the secure energy supplies on which an increasingly urbanised, industrialised and integrated world depends. This inevitably means relying on oil, gas and coal while long-term alternatives are being developed.

The most pressing issue is the rapid expansion of coal-power without the use of available technology to capture and store CO₂. As well as making it more difficult to cut global greenhouse emissions, this will reduce the available space for the oil the world uses so effectively for transportation. I believe this industry must take the lead in explaining why the widespread use of carbon capture and sequestration technology is vital for the world

Responses and consequences

The latest Shell long-term energy scenarios to 2050 – *Scramble* and *Blueprints* – explore the consequences of different responses to those energy challenges.

In *Scramble*, consumer governments seek energy security through exclusive deals with producers, and by promoting

domestic production. Coal consumption grows more than two and half times by 2050, when oil and gas consumption is little different from today.

When action to reduce energy demand and curb carbon emissions is eventually taken, it is more expensive and less effective than if undertaken earlier.

In *Blueprints*, action is driven by emerging coalitions of interests – driven by business opportunities, and supply and environmental concerns. These pave the way for effective, market-driven measures to tackle demand and emissions.

The key enabler is the spread of carbon trading to the US, China and India. In this scenario, most OECD coal and gas-fired power stations – and half those elsewhere – employ carbon capture and storage by 2050.

Although overall energy consumption in *Blueprints* is significantly lower than in *Scramble*, more oil and gas is used. Consumption of oil and gas peaks after 2030 but is still higher in 2050 than at the beginning of the century, accounting for more than a third of energy.

Most importantly the chances of managing down CO₂ impacts cost-effectively are much greater in *Blueprints* than in *Scramble*.

There are two key points. First, the importance of maintaining flexible international energy markets, rather than being panicked into bilateral deals. Second, and crucially, the need for a coherent global framework to enable the necessary innovation and investment to respond to climate change.

In other words, to move as fast as possible to a global price for carbon which will help ensure the most cost-effective CO₂ mitigation solutions are deployed globally.

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As I will discuss later, I believe this will be good for the oil and gas industry.

Combining capabilities

Finding solutions to tackle the three hard truths will require us to develop new technologies, and deploy them quickly on a massive scale.

It is hard to overstate the challenges involved, although I fear many outside this industry do grossly underestimate them. Nevertheless, I remain optimistic about the power of our ingenuity.

What I think will count will be our ability to work together within the oil and gas industry. I believe that partnership between national and international oil companies is key.

NOCs today are knowledgeable, capable and confident. They don't depend on IOCs. However, I believe that IOCs – with their integrated, global capabilities – contribute valuable, additional strengths.

These are in three main areas:

- developing and deploying technology,
- helping to build local skills and capabilities, and
- helping to secure added-value customers.

Technology development is at the heart of Shell strategy. Last year we invested \$1.2 billion in R&D.

We spend over half of our capex with our NOC partners. So, they are deeply involved in – and benefit from – this proprietary R&D.

Developing new technologies is only part of it. These need to be applied effectively – in an integrated way – in increasingly demanding projects.

Harnessing experience of global operations is vital, investing in training, development and sharing knowledge globally – to benefit our partners as well as ourselves.

IOCs must also help to develop wider skills in host countries.

I have seen many striking examples – from Oman, to Russia, to Aberdeen – of small local companies becoming major international contractors, leveraging the opportunities and capabilities developed in working with Shell.

Delivering energy security

Let me turn to the challenges we face together in delivering the oil and gas to meet expanding needs.

According to the IEA, demand for oil and gas could grow by 50% more in the 25 years to 2030 than in the previous quarter century. Meeting this from a resource base that is already so heavily developed will tax all our capabilities.

We need above all to:

- maximise production from existing fields,
- develop more difficult resources, and
- deliver much more gas to many more customers.

The first imperative is to get the most out of existing fields. This requires doing many things better. Let me give two illustrative examples of Shell technology development in this area.

First, the use of underbalanced drilling to reduce drill times, improve recovery and enable better reservoir characterisation. UBD is not, of course, Shell technology. Where we have gained is from the experience of deploying it much more quickly and widely than others.

Second, employing Smart technology to enable real-time reservoir management. This is also clearly not confined to Shell, with, for example, Saudi Aramco being a leader in Smart technology implementation. But, again, we can bring real benefits from our experience of leading in global deployment, as well as from specific proprietary technologies.

Just one example of those benefits. In the Iron Duke field in Brunei, Smart wells provide 15% more production and a two-year delay in water breakthrough.

The second imperative is to develop more difficult resources – in harsher environments like ultra-deepwater or the Arctic, or have more complex geology, that are contaminated with H₂S or CO₂, need treatment before they will flow, or require 'unconventional' production methods. Over the coming decades, they will play an increasing part in all our businesses.

Being able to transfer experience around the world will be crucial. Let me

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give a couple of Shell examples.

In China, together with our partner PetroChina we are developing the Changbei field, that will deliver gas to help a cleaner Beijing for the Olympics this year. We brought our global experience of tight gas developments – particularly in the US – to drill long multilateral horizontal wells in the unstable reservoir.

Enhanced Oil Recovery is also an area where our efforts continued in the US throughout the 1980s and 90s as many lost interest elsewhere. In Shell, we gained long experience, with steam in California and miscible gas floods – using CO₂ – in Texas.

This experience is proving invaluable today, for example in Oman where we are involved in a wide range of thermal, miscible gas and chemical EOR projects. We have also established a dedicated Shell EOR research centre there, to support these new projects as well as advance these complex technologies globally.

The third imperative is to deliver much more gas to many more customers. Putting together the supply chains to do this remains very challenging.

For example, the Sakhalin II scheme, now nearing completion, has been one of the most complex projects ever undertaken. Huge challenges have been successfully overcome – including creating a major new LNG hub in a highly hostile environment – yet overall unit development costs including the LBG plant remain well below our global average of \$7/boe.

Qatar is, of course, at the centre of today's global LNG expansion. However, its vision also includes leadership in another key future part of the global gas business, Gas to Liquids. We're proud to partner Qatar Petroleum in both LNG and GTL.

Building the Qatar Petroleum-Shell Pearl GTL plant – which will produce around 260,000 barrels a day of GTL products and natural gas liquids – is a massive project. The overall project is now about 35% complete.

As well as the challenges of taking

new technology into such large-scale production, we are also developing new global premium markets for the ultra-clean products, which can significantly improve city air quality.

A coherent framework

On that note, let me return to the global climate, and the importance of establishing a framework that enables us to meet all the energy challenges.

New mechanisms are needed for mitigating CO₂ emissions. These must provide choice, flexibility, and encouragement for innovation and investment, and enable essential energy supplies. Many different technologies may play a part. We have to continue testing and developing them.

But, with the world's developing economies in full spate of the essential development that is transforming the lives of billions of people, energy demand and carbon emissions are growing very rapidly. So we have to concentrate on the most effective and practical ways of reducing those emissions.

There's much focus on transport – from the growth of basic personal transport, to where people holiday, to how far their food has travelled. Emissions from transport are growing rapidly, and need to be mitigated.

However, according to the latest IEA reference case, global carbon emissions from the growth in transportation to 2030 will be only half those from the growth in new coal-fired power generation, which will alone account for some 40% of the total increase in global CO₂ emissions in this period.

It is not just the size of that potential target for CO₂ mitigation that matters. There are four more good reasons why focusing first on coal-fired power offers the greatest potential for managing emissions.

First, the bulk of this expansion will be in just three countries – China, India and the United States – accounting for a third of the total increase in global CO₂. So getting their focus on the issue is crucial.

Second, it will come from relatively

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few installations – perhaps 1,200 in those three countries – which can be much more effectively regulated and influenced than the three billion planes, ships, buses, cars and mopeds likely to be manufactured in the period.

Third, power stations last for 50 years. So, if we don't tackle their emissions as they are built now it will be much more difficult and expensive to retrofit them.

Fourth, the combination of Integrated Gas Combined Cycle technology and carbon sequestration offers an effective and practical way of dealing with emissions from coal-fired power.

Carbon capture and sequestration costs for large-scale schemes could be as low as \$30-50/tonne, and should fall through the learning curve.

The Intergovernmental Panel on Climate Change estimates that CCS could provide 55% of the emission reduction the world needs to avoid the worst effects of climate change.

But why should countries like China and India invest scarce capital in sequestering carbon while their per capita emissions and standard of living are still so much lower than in the west?

I believe they will only do so within the framework of a global carbon market – based on binding cap and trade agreements – that puts a value on sequestered carbon and enables effective trading between regions. We need this as soon as possible to ensure that CO₂ reduction dollars focus on the most cost-effective and implementable solutions globally, rather than just what appeals politically and locally.

As an immediate step, CCS should be included within the Clean Development Mechanism.

I believe that our industry has a common interest – shared by oil and gas companies and producing nations alike – in pressing for such a market to be established as quickly as possible.

It might at first seem counterintuitive that global carbon trading could be something that oil and gas producers should support. But society will only think it safe to permit a limited 'carbon space'. Natural gas should naturally gain

pole position in that space, given its convenience and environmental benefits, especially in replacing coal in power generation. Oil and coal will need to compete for the remaining space.

Tackling carbon from new coal power stations will leave much more space for oil to fulfil its key role as the most convenient and cost-effective transport fuel for much of this century, before long-term alternatives can be widely implemented.

Developing renewable resources will still be key, and in Shell we're actively doing so – with second generation biofuels, wind and thin film solar. Our scenario studies show how renewables will play an increasing role in energy supplies.

But we understand the current cost barriers and the immense scale-up challenges, reflected for example in the emerging problems from the expansion of first generation biofuels.

For example, replacing just today's global coal-fired power would require covering some two million square kilometres with wind turbines. That's more than three times the size of France.

I think people outside our industry often have difficulty in comprehending the sheer scale of what is required to meet the energy needs of billions of people.

That is why it is so hard to replace the efficiency of fossil fuels, and why a coherent global approach such as I have outlined is essential.

So, another key area of partnership between IOCs and NOCs should be in working together much more to advocate such an approach, based on our shared understanding of what is required.

Competing for partnership

Our ability to work effectively together is one of this industry's key strengths. And conversely, so is the fierce competition that drives constant innovation and improvement.

Shell and our competitors all work hard to demonstrate why we should each be the partner of choice for NOCs. I know that being chosen depends on the competitiveness of our technologies and

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capabilities, as well as our commitment to meeting partners' needs.

As IOCs, we seek to employ our strengths, and capital, for long-term mutual advantage, building a relationship, not selling a package. That's why I believe that long term upstream partners are better chosen through negotiating true, sustainable win-wins rather than through short-term price-focused tenders, which often end in mutual dissatisfaction.

Let me conclude with my two main

points.

First, over the coming decades this industry faces unprecedented challenges, and partnership offers us a blueprint for shared success.

Second, we should as an industry be lobbying much more effectively for global carbon trading to enable carbon emissions – particularly from coal – to be mitigated more effectively and efficiently, and to allow carbon space for the oil the world uses so effectively in transportation.

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