

Speech by Dev Sanyal, Executive Vice President and Group Chief of Staff, BP, at the Institute for Corporate Governance, International Summit, Copenhagen, 16 April, 2012

The Global Energy Challenge

1. Framing the issue

Good evening, ladies and gentlemen and thank you for inviting me to this conference. The institute fulfils a very important role in bringing together leaders from different sectors and backgrounds to discuss the key issues of our times.

The theme of this conference is ambitious, but nevertheless pertinent for the world today.

My subject is one aspect of the Global Challenge - the Energy Challenge.

Let me start with a piece of good news. One of the targets set back in 2000 for 2015 under the UN's Millennium Development Goals is currently on track to be achieved.

Indeed it is the first target. In three years' time, it is expected that the number people living on less than a dollar a day will have halved.

This is a major step and one that reflects the improving living standards in many emerging economies.

While access to energy is not solely responsible for this progress, I would suggest it is a factor. Energy brings heat, light and mobility – it brings refrigeration for medicines, infrastructure for schools and hospitals, the means to irrigate farmland or travel to work.

Providing that resource for the world is what we do.

But here is a more challenging point. By our estimates, the world could need as much as 40% more energy by 2030. And almost all that extra demand – 95% of it, we believe - is needed in emerging economies.

That, in a nutshell, is the biggest challenge – simply being able to find and produce energy on such a scale both affordably and sustainably.

2. Structure of speech

In my remarks today, I will provide a perspective on four questions:

- First, what are major trends in the world of energy?
- Second, what are the challenges we face in providing energy?
- Third, what are the drivers that can help us provide the energy we need in the way we need it?
- And finally what are the imperatives – what should policy makers and business leaders do to encourage these drivers?

3. Major trends

To begin with, the major trends in the world of energy. Where have we come from and where are we going?

3.1 Demand patterns

Looking at overall energy use, where we have come from is of course 250 years of industrialisation in the west – driven by the large-scale extraction and consumption of fossil fuels – first dominated by coal and then with oil coming into its own in the 20th century and latterly, gas.

This process has been followed by emerging economies – starting around 200 years later but evolving much faster.

Since 1990, OECD energy consumption has risen about 20% to 5.6 billion tonnes of oil equivalent but *non-OECD* consumption has increased over 80% and overtaken OECD demand to reach 6.4 billion tonnes.

The net effect is global growth in energy demand of around 2% a year. However that global average masks a huge disparity between established and emerging economies.

In the future we estimate growth of about 1.6% a year to 2030. This will mask an even sharper contrast as we expect OECD consumption to

stay essentially flat but non-OECD consumption to rise by 70%, driven by economic and demographic growth.

3.2 Energy efficiency / intensity

This is a lot of energy to produce and produce safely and sustainably.

One encouraging sign is that we expect global economic growth of 3.7% per year. So energy is not rising as fast as GDP.

This is because energy efficiency is improving and this pushes down the energy intensity of economies – the amount of energy they need to generate each unit of GDP.

In fact, since 1970, the amount of energy required to generate \$1,000 of GDP has reduced by about a third on average worldwide - from approximately 230 to 155 kilograms of oil equivalent.

Energy intensity is not only at its lowest level since 1850 but there is also less difference between the levels of key countries such as China and the US than at any time since the industrial revolution. The levels of energy intensity are both falling and converging, driven by trade in fuels, diffusion of technologies and standardisation.

3.3 Types of fuel

So what are the trends in terms of the *types* of energy we use?

Again there is a convergence occurring as economies seek out the most optimal forms of energy for each activity.

Sitting here in one of Copenhagen's cultural landmarks I hope you will allow me to refer to one of London's. If you have ever been to the Tate Modern art gallery you may have noted that it is in a former oil fired power station. It is not a power plant now because we rarely use oil to produce electricity in the UK. Gas is the more prevalent feedstock for power plants, taking over from coal and oil.

Meanwhile, oil remains the most prevalent and efficient transport fuel – though I should add that the efficiency of internal combustion engines has been increasing and is expected to double by 2030.

Oil's share of global energy demand has declined over the past few decades while that of gas has risen and that of coal has fluctuated - rising in recent years, largely due to heavy consumption in China.

We anticipate that oil, gas and coal will converge on a roughly equal share of total consumption at around 27% each in 2030.

It is a similar story in non-fossil fuels. We expect nuclear, hydro and non-hydro renewable forms of energy to have similar shares of total consumption by 2030 at around 6% each.

Going forward, we expect the non-fossil fuels as a group to contribute more to energy growth over the next twenty years than any single fossil fuel, mainly driven by renewables. However, they start from such a low base that even by 2030, fossil fuels are still expected to account for as much as 80% of energy consumption.

Coal drove the industrial revolution. Oil drove the transport boom of the 20th century. Gas is now expected to provide the largest single contribution to energy growth, accounting for over 30% of the growth in energy demand to 2030.

3.4 Physical resources

Finally in terms of trends – do we believe the energy resources are there to meet demand? Our answer is unhesitatingly 'yes'. Geologists have located decades' worth of fossil fuel resources and technology has constantly proved equal to the task of discovering more as the years go by.

However, existing oil fields are declining and we anticipate the world will need to add around a Saudi Arabia's worth of production every five years. This is one of the reasons why we are now looking to new frontiers such as the deepwater, heavy oil and alternatives to oil such as sustainable biofuels.

4. Challenges

These are the big trends in energy. And from them you can see the nature of some of the challenges.

There are three main challenges - safe and reliable operations; security of supply; and sustainable growth.

4.1 Safe and reliable operations

The first challenge is that of safe and reliable operations. We work in a high-hazard industry. We explore and produce energy in some hostile environments around the world, on land and at sea. We transport, process and distribute hydrocarbons at scale.

In BP we experienced a tragic accident in the Gulf of Mexico in 2010. Our industry has also seen other significant incidents.

We have continued to apply the learnings from the Deepwater Horizon accident and have further enhanced our safety and risk management processes, which also include the capability of our people and deployment of technology in order to reduce risk.

We have a safety and operational risk organisation working alongside our businesses to advise, guide and, if necessary, intervene.

We have intensified our training and brought in expertise from other industries, for example nuclear, the navy and chemical industries.

We have introduced new voluntary standards in BP that in many cases exceed current regulatory requirements.

And we are also working with a number of industry groups worldwide to ensure breadth of understanding as well as learning.

4.2 Security of Supply

The second challenge is the security of supply. This has three dimensions.

The first is operational security. Modern industry which controls much of society's infrastructure requires both failsafe and quality supply of energy. In most countries the market operates to ensure energy reaches its users. But we can never take this for granted.

The second dimension is about the relationships needed between governments and companies to ensure the robustness of supply chains that bring energy from the oil or gas field, from the windy sierra or the biofuel plantation, through the conversion and distribution process, to the consumer.

The third dimension is strategic security. Over half the world's oil reserves lie under four countries and half the world's gas in three.

In short: Europe, India and China are importers, while Africa, the Middle East and Russia are exporters; and this pattern will probably become more pronounced in time. If you bear in mind that much of the world's energy, as it is moved from continent to continent, passes through well-known maritime choke points, you can see just one reason why governments are worried. This increasingly requires the development of mechanisms to avoid conflict in sea-lanes, and to develop cooperation – for example in tackling piracy.

4.3 Sustainable growth

The third challenge is sustainable growth. And again it has three dimensions.

First, environmental sustainability in the production and consumption of energy. The challenge here is to avoid lasting damage to terrestrial and marine ecosystems and to limit greenhouse gas emissions.

Second, societal sustainability – ensuring trust with host governments, societies and local communities that provide a licence to operate – both formal and informal.

Finally, economic sustainability or the production of energy in ways that are affordable for users and viable for producers.

5. Drivers of the energy future

So what are the factors – the drivers – that can help us overcome the challenges?

Let me give you an example of problem solving.

Ten years ago BP and others were transporting large volumes of liquefied natural gas to the United States to make up America's gas deficit. Our gas production hubs in Trinidad were, for example, shipping their gas to the US.

Today the tankers from Trinidad sail east not west. US gas production has been revolutionised in a few years by the opening up of reserves of shale gas and tight gas. New technologies are able to drill multiple wells, horizontally and vertically, with root and branch systems, as well as fracturing the rocks in new ways to release vast new quantities of natural gas.

In the past ten years, it is estimated that one in five new jobs created in the US has come from energy. And the gas revolution could provide as many as 600,000 jobs by the end of the decade.

With this example in mind, I would like to discuss four specific drivers of change.

5.1 Technology

The first is technology.

Without the new ways of drilling, America's gas revolution would not have taken off as it has.

Technology has also opened up the offshore industry. Indeed, the modern BP cut its teeth developing new technologies for the North Sea. Twenty years on in the Gulf of Mexico we developed new forms of seismic technology, using sonar waves to provide images of what lies below the earth. The difference was that we took the soundings from many different angles and that enabled us to see below the salt canopies that had been obscuring the oil. That seismic technology has kept evolving and we now use some of the most powerful supercomputing facilities in the world to analyse the data.

Our efforts to develop cellulosic biofuels depend on advanced enzyme technology to convert grasses into sugar.

And as I mentioned earlier, technology is also a vital tool in service of safety and risk management.

5.2 Capability

The second driver is capability. Ultimately, technology cannot be deployed without people.

The transformation of the US gas industry has also been driven by increasing expertise among the workforce. And in BP we have transferred that expertise to other very different settings like Oman, where we are releasing gas from tight formations using techniques pioneered in places like Wyoming and Colorado.

Providing the energy of the future will require the highest levels of skills in geology, engineering, biochemistry, construction, logistics and project management, not to mention finance, legal and other support functions.

Last year, for example, we hired around 2,000 new technical specialists and increased our UK graduate recruitment this year by 50%. We need great people to take on this challenge.

5.3 Relationships

The third driver is relationships.

Our business starts with the relationship with governments who give us access to their resources and it ends with customers who give us their custom. In between we deal with suppliers, contractors, business partners, investors, communities, NGOs, universities and many other groups.

5.4 Efficiency

Fourthly, efficiency. This is a driver of safe, secure, sustainable energy. And it results from a combination of know-how and technological innovation.

6. Imperatives

Finally, what drives the drivers? What are the imperatives that will enable policy makers and business leaders to make the most of technology, capability, relationships and efficiency?

In particular, what drives the capacity to innovate?

There are no easy answers.

6.1 Policy

Many policy-makers in Europe and beyond are grappling with these issues with good intentions while facing many constraints, not least the uncertain global economic climate.

It is therefore useful to focus on the facts – what has worked and why? And if I look again at the example of natural gas in the US – or perhaps the gas market in Europe to a degree – I see a correlation between an open market, encouragement for competition and the emergence of new technology, deep capability and ongoing efficiency.

Innovation tends to happen and capability tends to deepen where competition exists. Of course, there is also an argument that public funding is needed in certain areas, such as fundamental R&D and transitional support for emerging technologies.

Looking to sustainability, I mentioned earlier that energy consumption is now growing more slowly than GDP. It now takes less energy to create each unit of wealth. However, greenhouse gas emissions are proving harder to separate from *energy* growth. In other words the carbon emitted per unit of energy consumed is only slowly coming down.

In searching for solutions, one way of looking at this is that the same drivers which reduced energy intensity can also reduce carbon intensity – in other words competition driving innovation, capability and efficiency. It requires directing the competition to the right target.

Put simply, if you want the market to find a lower carbon solution then you have to adjust the market conditions. For example, by putting a price on carbon or raising the returns from low-carbon energy until it becomes competitive without support. This is generally more efficient than command and control regulation.

6.2 Companies

Turning to the role of companies, like many of you in this room, we have thought hard about how to deliver real value for investors.

We firmly believe that the way to approach that task is by making choices and playing to one's strengths. A super-major cannot be super at everything.

In BP's case those strengths are exploration, deepwater production, giant fields, gas supply chains, and a world-class downstream business, all underpinned by technology and relationships.

And by making choices, we deepen our capability in those areas, we find new partners and we strengthen our capacity to innovate.

7. Conclusion

Energy is a complex issue and sitting in this magnificent auditorium I cannot resist drawing a parallel with the process of creating and performing an orchestral piece.

There are many different elements and each needs to be positioned as part of an effective mix. Getting that mix right is important. Each instrument has to have the right tone. And the blend has to be carefully weighted. And before anything can happen, the capacity to innovate has had to be invoked and applied.

So to summarise.

We at BP believe that the world is going to need more energy, but the mix of energy is shifting. Efficiency is increasing. Energy intensity is improving. The challenges are those of safe and reliable operations; security of supply; and sustainable growth. The major drivers that can help us overcome the challenges are technology; capability, relationships and efficiency. For companies, the imperative is to make choices that play to one's strengths. And if there is one thought to put before policy-makers, it is to encourage the *capacity to innovate* through open markets, competition and well targeted policy frameworks.

We live in a world which is multi-faceted but as Churchill once said: "A pessimist sees the difficulty in every opportunity; an optimist sees the opportunity in every difficulty."

Ladies and Gentlemen, I am an optimist.

Thank you.