



# The challenge of energy security

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Thank you and good evening. It's a pleasure and a great honour to be here today. I'd like to congratulate you, Sir Andrew, and the Faculty for the continuing success of the School and for the excellent research and teaching work you do. This school is a credit to London and enhances its position as a centre of global business.

Bankers and the financial sector may have displaced energy from the front pages of the newspapers right now, but Energy Security remains at the top of the global political and economic agenda. It was a key concern during the big swings in energy markets of the past two years and a little over a month ago it was at the heart of the debate in Copenhagen

The need to balance energy security, jobs and economic development while addressing the problem of climate change all contributed to the challenge politicians faced in Copenhagen. And that challenge means that energy security will dominate politics and policy for the next 12 months and considerably beyond.

So what delivers energy security? I believe the key factors are diversity, competition and efficiency:

- accessing the widest range of energy sources – through diversity;
- bringing out the best ways of finding, producing and distributing energy through competition;

and making the most of each unit of energy – through efficiency;

There is actually nothing new about these factors. But we mustn't underestimate their significance. Reliable and affordable supplies of hydrocarbon energy were taken for granted through much of the 20th century and laid the foundation for the world's extraordinary economic progress. When concerns arose, it tended to be at times of war or turbulence, notably in the Middle East, or, closer to home, with industrial action.

What's different now is that energy security has become a defining issue for the 21st century, as one element in a complex energy challenge with strategic, economic and environmental dimensions.

To meet this challenge, I believe we need to apply some basic business principles. We must be clear about where we are and where we want to go – the starting point and the destination. We need a clear regulatory framework to enable business to invest with confidence to build such a future. And we need to set out practical pathways towards the destination.

## 1. Creating a diverse energy mix

Let me look first at the journey that lies ahead. BP's projections suggest we'll need around 45% more energy in 2030 than we consume today - and double what we consume today by 2050. That's going to require investment of more than \$1 trillion a year – every year.



How do we meet that demand sustainably? Certainly there will need to be changes in the energy mix. We need more low-carbon energy. And we need to use energy more efficiently. But the main point is that there is no magic solution, and we will need a wide mix of energy types in 20 years time.

The share of renewable energy will certainly increase, but we have to be realistic about its contribution. As of today, all of the world's wind, solar, wave, tide and geothermal energy accounts for around 1% of total consumption. Given the practical challenges of scaling up such technologies, the International Energy Agency can't see them accounting for much more than 5% of consumption in 2030, even with aggressive policy support.

Undoubtedly nuclear energy and biofuels will play a part, and by 2030 carbon capture technology could be deployed at scale. But there will still be a major role for hydrocarbons. Indeed the IEA analysis indicates that even in a low carbon scenario predicated on keeping the atmospheric concentration of CO<sub>2</sub> to less than 450ppm, hydrocarbons will remain dominant.

The good news is that we have enough reserves of oil, and especially natural gas, to last for decades and reserve estimates are rising as we develop ways of unlocking both conventional and unconventional resources. Our analysis indicates that the world has sufficient proved reserves for over 40 years of oil and 60 years of gas at today's consumption rates.

So the foundation stone of energy security is creating a diverse supply of energy – diverse in the forms it takes and diverse in the places it comes from.

Today we say 'there are no silver bullets'. A century ago Churchill said the same thing in the language of his time when he declared that "Safety and certainty in oil lie in variety and variety alone."

The energy of the future will be more than oil. But oil will still be a major part of it. The critical point is that it will be a diverse mix.

In BP our own portfolio reflects this diversity. For example to date, in our low carbon energy business we have invested over \$4 billion and are continuing to invest more than \$1bn a year. In another we are planning to invest in Canadian heavy oil – a relatively carbon intensive activity, but one that has a major role in providing access to secure energy for North America. We believe both will be part of a broad and sustainable mix that embraces oil, gas, coal and renewables, producing and using them all with innovation and efficiency.

## 2. Government and the energy security architecture

Building such a future demands action both from businesses and policy-makers. Business can provide the building blocks and tools - but we need to work within the architecture provided by governments. There are two ways in which the current energy security architecture can be strengthened.

First, with continuing pressure on supply, it's important to develop energy resources as efficiently as possible – I believe that means opening them up to competition.

Restrictions on market forces are key when it comes to unlocking the resources we need. Right now much of the world's oil is held by countries in which access is restricted and so the application of technology held by the International Oil Companies is limited.

So competition has a big role to play. Opening access to a range of potential operators encourages the most efficient solutions, and often involves partnerships that provide new combinations of skills.



Iraq is a very good example. BP is teaming up there with CNPC of China and Iraq's South Oil Company to drive a major investment programme that will nearly triple production from the super-giant Rumaila field. With this and the other agreements concluded with national and international oil companies in the last six months, Iraq has the potential to contribute 10mmb/d to global supplies in the next 10-15 years. That's a big piece of the additional resource we need.

Advanced technology is essential to producing these resources efficiently. The revolution in shale gas in the United States in the past three years, unlocked by new application of drilling and fracturing technology, is a great example that has transformed the US's energy future. So too is the series of discoveries we and others have made with the help of advanced seismic imaging techniques in the deep waters of the Gulf of Mexico. One of our recent finds, the Tiber field, involved drilling a well 10 kilometres deep.

The second area where policy is critical is the question of climate change. It is, of course, central to sustainable energy security that we find a clear way forward on this issue. BP has been calling for action for at least 12 years – preferably via creating a price for carbon through market mechanisms. Again this is because we believe competition will encourage the most efficient ways of cutting emissions.

Those aren't just words. At BP we factor a carbon cost into both our investment choices and the engineering design of new projects. This is our way of ensuring that our investments are competitive not only in today's world but in a future where carbon has a more robust price.

Which brings me on to December's Copenhagen conference. Many people suggest it was a failure. I don't agree. Of course it didn't meet some of the more extravagant expectations. But for the first time since the climate debate began in earnest 20 years ago, the vast majority of the world's countries are lined up and heading in the same direction – most importantly China and the US are on board. This is a huge step forward. Only two years ago, climate change just didn't feature on the Washington agenda, and while China's leaders were beginning to take domestic actions, they were unwilling to commit to them on the world stage. Now they are both politically committed to a negotiating process with a timetable and an agreed goal – and more importantly they are taking real and significant action on the ground. Hundreds of billions of dollars are beginning to flow into renewable energy and efforts to dramatically improve energy efficiency.

My third reason for not joining the post-Copenhagen detractors is this: I have a feeling it may mark the emergence of greater realism in the climate debate. There is a dawning realisation that we can't afford to be paralysed by the absence of agreed targets for 2030 or 2050. Individual governments need to act regardless of whether there is a global treaty. In fact, the key to action is alignment, rather than agreement – moving in the same direction, not necessarily in lock-step.

In that sense, to paraphrase Churchill again, I see it not as the end of the effort to curb carbon emissions. Not even the beginning of the end. But it is, perhaps, the end of the beginning.

The crux of the matter is this. If policy makers encourage investment – whether in low-carbon energy or fossil fuels – then investment will flow – but if it doesn't then the risk is that spare capacity will dwindle and we will return to the price volatility we saw in 2008.

### 3. Pathways to energy security and efficiency

This can't be a one-size-fits-all approach. Each country or economic bloc will have to assess its natural advantages and deficiencies in energy, so that it can set a workable framework within which the market can deliver energy security.



At BP we find it helpful to think about this in terms of a range of 'energy pathways' for different countries and industries – for example the pathway for US transport, or for European power generation. This highlights the most effective and efficient way of reducing carbon emissions while meeting demand.

The first conclusion is that, in all circumstances, energy efficiency is the No.1 priority. That means more efficient vehicles, buildings and electronic appliances – more investment in technology and infrastructure such as smart grids.

In the IEA's latest low-carbon scenario, efficiency is projected to be capable of driving more reductions of energy-related emissions by 2030 than renewable power, nuclear, carbon capture and biofuels put together.

Let me reflect on how the pathways may look in Europe and in the UK.

In transport, by far the most effective pathway to a lower-carbon transport industry is through making car engines more efficient.

Hybrid vehicles will be increasingly important. So, in the medium term, will advanced biofuels. Electric vehicles and hydrogen fuel cells will have a part to play in the long term. But they need massive new infrastructure and their electricity or hydrogen needs to be produced more sustainably. Electric vehicles are only as low-carbon as the power that fuels them.

Looking at the power pathway, we believe it will increasingly make sense to use more natural gas. Gas is the fuel that offers the greatest potential to achieve the largest greenhouse gas reductions – at the lowest cost – in the shortest time – and by using technology that's available today.

Gas is easily the cleanest burning fossil fuel. It's very efficient and combined-cycle turbines, fuelled by natural gas, are quick and relatively cheap to build.

Europe is already a big user of natural gas, which is one reason why its industrial and power sectors emit less carbon than the US. The trouble is that European politicians sometimes speak as if dependence on imported gas is a problem.

To them I say three things. First, Europe has long been structurally dependent on imported energy and – unlike the US – will become more so in the next few decades. The most effective way to reduce such dependence is to curb energy consumption – and costs - by significantly investing in energy efficiency.

Second, even though the concern often focuses on Russian dominance, the supply picture is actually more diverse. Ample pipeline volumes from Norway, North Africa and soon the Caucasus are being augmented by a growing volume of liquefied natural gas at competitive prices. Russia's share of EU gas imports has halved since 1980, and Russian gas represents only 6.5% of EU primary energy supply.

In fact abundant new supplies from places like Qatar mean LNG is coming into its own as a globally traded commodity like oil. This is not a market Europe needs to fear.

Thirdly, Europe could significantly improve its position by overcoming the obstacles to a proper functioning single energy market. That means breaking down the barriers between national grids and building more cross-border connections. That needs to be the first priority of the newly-installed European Commission.



And what about the UK? Energy security has become a hotly debated topic here too, as oil and gas production from the North Sea has declined and the Government has adopted ambitious targets for emissions reduction. In the recent cold snap, it has become a household concern.

In fact, and despite the media hype, the truth is that the market worked rather well in January in keeping UK households and industry supplied in a period of record gas demand. Prices at the National Balancing Point spiked less than during the warmer weather a year ago. While some interruptible industry contracts were disrupted, there was no impact on residential supplies.

The issue for Britain is not a potential shortage of gas but a limitation on our ability to balance supply and demand across the country. In other words, it's about the need for investment in infrastructure such as pipelines and storage capacity, not about the structure of supply.

Only one third of our supplies in the coldest period last month came from the North Sea, nearly half was made up with imports either by pipeline from Norway and the Continent or in the form of LNG from Qatar, Trinidad, Algeria, Egypt and even further afield – that's hardly an over-reliance on one supplier.

And incidentally, the freeze was accompanied by very little wind – an object lesson in how we need to manage the intermittency of wind with the role gas plays in providing the swing capacity.

As a general election looms, there are a number of wider issues that deserve consideration.

First is the North Sea. The bounty of oil and gas from our own coastal waters remains a huge positive for Britain's balance of payments, energy supply, jobs and general economic well-being. And while this has now passed its peak, don't assume it's all over. In fact it's estimated that there are 20-25 billion barrels of oil and gas still to be extracted from the UK Continental Shelf.

BP's experience is that with continuing investment and by using the latest technology, the productive capacity of North Sea reserves can be stretched way beyond what was once assumed. And this has big implications for the fiscal regime.

Incentives for continued investment – including extending the life of existing fields - will more than pay for themselves; while a more punitive regime curtails production and therefore tax revenues sooner than necessary. This issue hangs much in the balance. While Government has shown signs of listening to the industry's concerns, investment in the North Sea is still declining and more radical action is required to turn it around.

My second point concerns the role of Government in energy. Both main parties acknowledge that Government needs to act to promote a diverse and secure supply, including gas, nuclear power and renewables.

The question now is what form of Government intervention is appropriate when the capital stock of Britain's power generation industry is ageing. The proposed nuclear programme, for example, seems to be very ambitious – in timing at least. And even if it is delivered it will do little more than replace the existing, ageing nuclear capacity. Equally ambitious is the massive scale of the recently announced plan to build up Britain's offshore wind power.

With these uncertainties in mind it would be foolish to underplay the role that natural gas and energy conservation can play in reducing carbon emissions.



Whoever wins the election will need to be thinking quite carefully about what else needs to be done to secure power supplies in the coming decade. No prime minister will relish the prospect of the lights going out on his watch.

Equally, for those inclined to propose more radical action to wean Britain off imported hydrocarbons, there is an important distinction between energy security and energy independence. The former is a legitimate and desirable goal; the latter is costly and probably unattainable.

This leads me to my third and final point, concerning cost. In my view it's vital, as we gear up to confront the problem of climate change, that we choose the lowest-cost energy pathways.

Energy efficiency, gas fired power, lighter cars and advanced biofuels all offer relatively low-cost routes, while more headline-grabbing options are not the most cost-effective in terms of cost per tonne of mitigated CO<sub>2</sub>. With today's technology, carbon capture and storage to make clean coal, for example, is very expensive. Offshore wind is also costly - for example in comparison to onshore wind, which is now a big business for BP in the United States, and indeed to nuclear.

## Conclusion

Let me draw some conclusions.

The current debate about Copenhagen and sustainability add new urgency and importance to the broader discussion of energy security.

The challenge of creating a low-carbon economy is far from easy, requiring the wholesale re-engineering of the global economy over time. It will demand very significant investment by industry which in turn requires a clear and stable regulatory regime.

The complexity and scale of the task make it especially important that those involved try wherever possible to respect three principles:

First, efficiency – the best way to more secure energy is saving energy. Governments should seek the most efficient approaches that impose the lowest overall costs on society.

Second, diversity – there is no one, silver-bullet solution or technology that will deliver a secure energy future. A diverse mix of resources and technologies will be needed.

Third, competition – efficient markets and market mechanisms will provide the most effective way to produce and distribute energy and to induce change.

The consequences of failure would be serious. Without a credible and enduring framework, it will be impossible for industry to invest at the scale necessary to maintain and enhance our energy supply.

As well as ensuring that we don't leave future generations with the prospect of rising sea levels, we need to ensure that we keep the lights on in the next decade. If we can meet both these challenges, as I believe we can, then we will truly have delivered energy security.