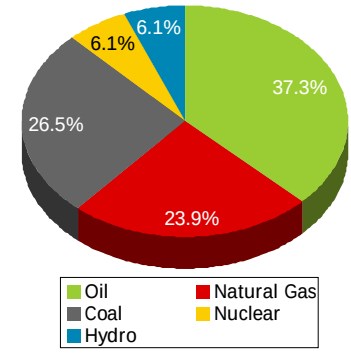
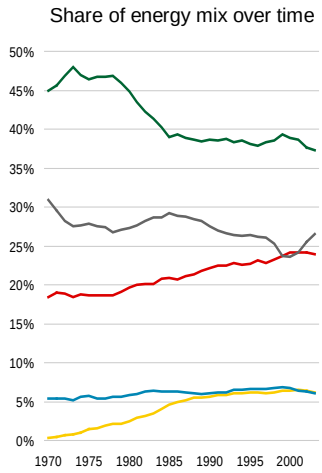
Paper given by Peter Mather (Head of Country, UK for BP) to The Foundation for Science and Technology at the Royal Society, March 8th 2006 as part of an evening of papers and discussion on UK Energy Policy

My Lords, Ladies and Gentleman, good evening. My intention over the next 15 to 20 minutes is to provide some context for our later discussion. In particular I will take a look at the global energy situation, then focus in on the UK and on natural gas in particular, finishing up with a look at some of the issues around the creation of energy policy that may need to be considered. What I won't be doing is giving you the answer, the 'silver bullet', as this is an extraordinarily complex issue and the subject of healthy internal debate at BP, as I'm sure it is in most organisations.

Current and historical global energy mix

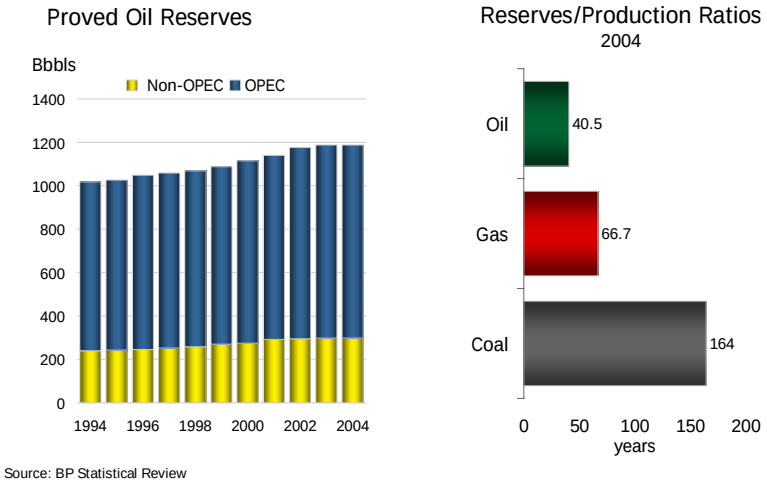




Source: BP Statistical Review

If you look over the whole world for the last 30 years you can see that as a fraction of the total energy mix, oil has been losing share, gas has been growing, coal has been coming down (although it has experienced something of a resurgence over the last few years, driven in particular by Chinese demand), whilst nuclear and hydro are both constant at about 6%. So roughly 85% of the world's energy is coming from fossil fuels, gas/coal/oil. Renewables still make a minor contribution, although their rate of growth exceeds traditional energy sources albeit from a very low base.

Proved energy reserves

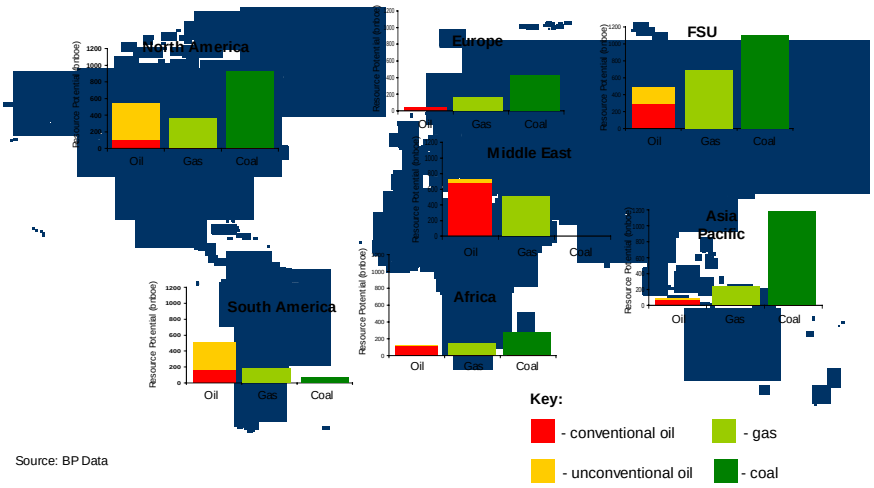


Source: BP Statistical Review

One of the key questions we're always asked is 'how long will hydrocarbons last'? Of course, we don't know, and predictions have always proved wrong as new technology and man's ingenuity have enabled hydrocarbons to be accessed in ever more challenging circumstances. If you look at proved reserves (i.e. recoverable with reasonable certainty) then we can maintain current production levels of oil for over 40 years, gas for over 66 years and coal for over 160 years. Obviously as production levels go up, then reserves are depleted more quickly. But equally, more hydrocarbons are either discovered or become recoverable, either because of price or technology, in fact probably both. You can also see from the left hand chart that, just looking at oil reserves, these have risen every year over the last 10 for which we have current data.

Location of resources

Oil, Gas and Coal Resources by Region (bnboe)



Source: BP Data

But there is a dislocation between where these reserves are and where the major consumer markets are to be found.

This chart shows the distribution of hydrocarbon resources across the world. Plotted on the same scale for all the different regions, is the amount of conventional and unconventional oil (tar sands, shale oil etc.), the amount of gas, and the amount of coal. There are a number of interesting things to note.

Let's look first at the Middle East, where everybody assumes all the oil is. Yes, reserve levels are high there, with a comparable amount of gas as well, but there is virtually no coal at all in the Middle East. On the other hand, if you look at North America, there is a fair bit of oil (not quite as much as the Middle East) but most of it is unconventional therefore higher cost, a fair bit of gas, and a good deal of coal. Similarly, if we look at Asia/Pacific, you see relatively few fluid hydrocarbons reserves, but again a tremendous amount of coal.

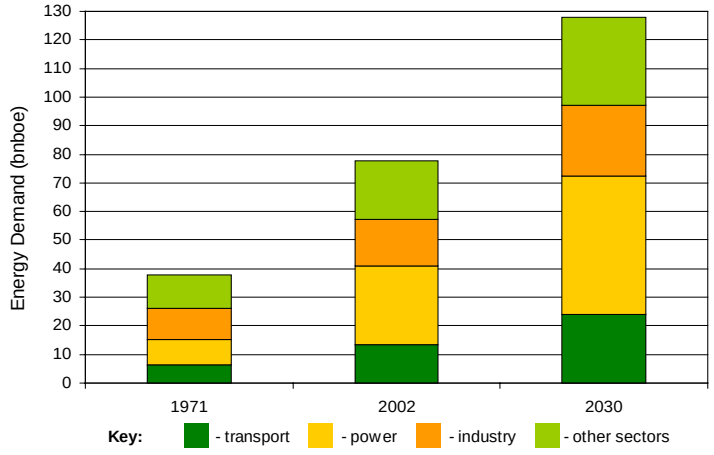
So the message here is that there is a dislocation between where the conventional hydrocarbon resources are and where the demand centres are.

One striking statistic tells much of the story - around 70% of global oil and gas consumption is in North America, Europe and East Asia – but these

regions account for only around 12% of conventional future reserves. Internationally available oil and gas supplies could in future come from just a couple of regions – mainly the Middle East and Russia, but also West Africa unless, as I'm sure we all hope, domestic demand increases in line with economic activity. The dependence of the OECD economies on imported oil and gas will continue to increase – and with this comes a sharply increased concern about security of supply in all its forms.

Demand growth across all sectors

Global energy demand is set to grow by over 60% over the next 30 years – 74% of the growth is anticipated to be from non-OECD countries



Notes: 1. Power includes heat generated at power plants
2. Other sectors includes residential, agricultural and service

Source: IEA WEO 2004

It is interesting to look at the projected growth of demand also as a function of sector. Here the energy demand is broken up according to transport (mostly cars, although also trucks, ships, and planes), power (i.e., electrical generation), industrial uses, and then other sectors which include residential, agricultural, and service sectors.

Several things are evident here, apart from the overall growth. One is that transport consumes a relatively small fraction of the energy. Many people, when you say "energy", immediately think "cars and oil." But, in fact, only 20 – 25% of the energy used is for transport, more in developed countries like the UK, less in developing countries.

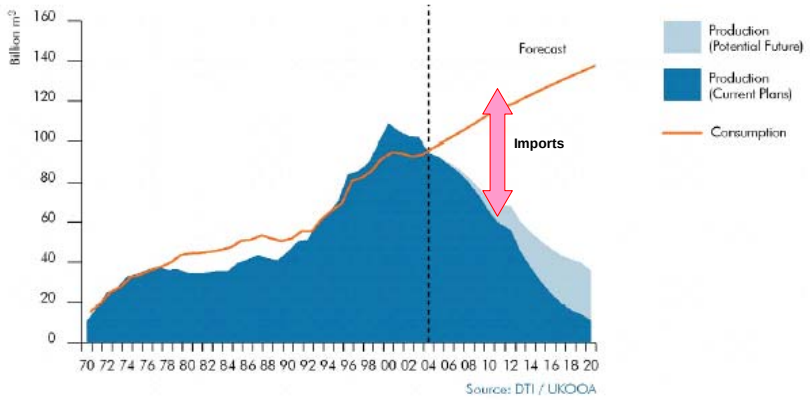
Second, electricity generation consumes a growing fraction of the world's energy supply as the world becomes richer. Electricity is a high quality

form of energy that developed countries prefer. Finally, you can see that industrial and residential uses account for about as much as the power sector.

World population is set to grow by another 1 billion or so, taking us to around 7.4 billion by 2020. With much of this population growth foreseen in non-OECD countries, of the 60% increase in energy demand forecasted over the next 30 years, over 70% is expected outside the current OECD.

UK Gas Supply/Demand 1970 - 2020

Figure 14: UK Gas Production vs. Consumption 1970 – 2020



- UK self-sufficient in gas for 10 years – now 42% of UK energy supply
- Demand growth driven by transition from coal to gas fired power
- Became net gas importer again in 2004
- Oil self-sufficent until ca. 2010

So with that global context let's turn our attentions now to the UK, the main focus of tonight's discussions.

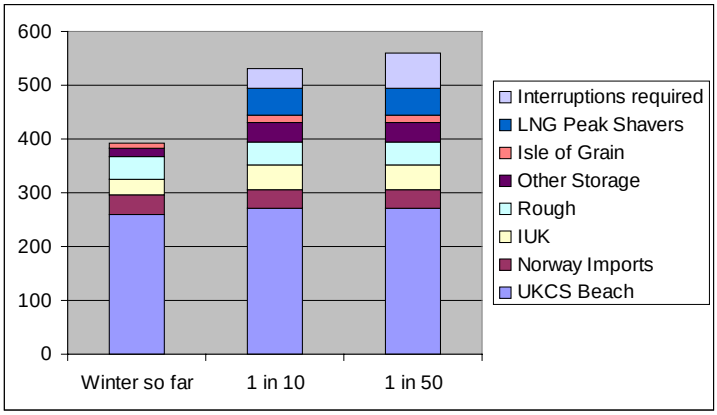
DTI figures for 2004 show that the percentage shares of the different energy sources over all sectors in the UK had gas out in front at 42%, with oil at 32, coal at 17, nuclear at 7 and renewables at 2. So let's look at the situation with gas in particular.

This chart shows the historical and potential future supply and demand balance for natural gas in the UK. You can see that the country has actually been self-sufficient in gas for around 10 years, a situation which is partly responsible for the enormous growth in gas fired power generation where relatively cheap, plentiful gas, with its considerable environmental benefits,

has been the obvious fuel of choice and now accounts for over a third of UK power generation.

It's worth noting that the UK is forecast to remain oil self-sufficient until around 2010.

Today's UK gas supply – mcm/day



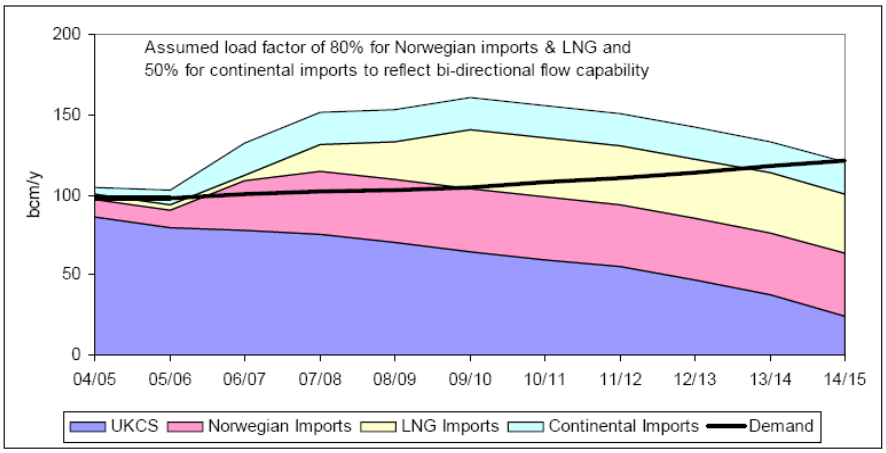
Based on industry data

Staying on gas, we do currently have sufficient sources of supply. This chart shows the sources of gas this winter, showing their provenance first of all for this winter so far, then if we were to have a cold spell, the sort you only expect once every 10 years, and then on the right, the sort of cold spell you might only expect every 50 years. The key point here is that the North Sea today is still the major source of reliable supply for natural gas, but that other sources are there in ever increasing amounts, in particular Norwegian imports, imports from the Continent via the Interconnector (IUK), Storage (including Rough) and to a lesser extent LNG.

So the industry has already embarked on diversifying its sources of supply for UK gas.

It is also worth noting that during periods of high prices this winter there is evidence that demand management has kicked in, with voluntary interruptions and fuel switching smoothing some of the peaks of demand. This is the sign of a market functioning properly.

Looking ahead



Source: National Grid Transco

Despite new sources of supply coming onstream in the North Sea, such as the Rhum field we inaugurated a few weeks ago, it is undoubtedly true that this country will source decreasing amounts of our natural gas from the UK side of the North Sea, although predictions of the imminent demise of the North Sea have usually proved premature in the past.

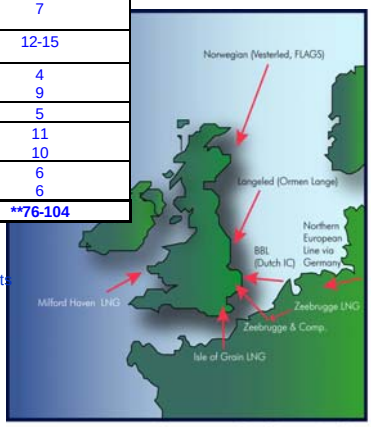
But as this slide shows with our modest demand growth there is no reason to panic, and if you add to this slide the increasing provision of storage then you could draw some comfort, at least for the next 10 years or so.

However, behind a chart like this lies much furious activity by the industry – with the aim of maintaining the highest level of production possible in the North Sea, developing resource and infrastructure for pipeline imports, accessing LNG supplies and investing in regasification facilities, and building more storage, bringing the UK more in line with the Continent in terms of storage capability where the European average is 60 days of supply, versus only 18 days here in the UK.

New import projects

Name of Project	Target Date(s)	Capacity (bcm/year)
Langeled Pipeline (Ormen Lange)	2006 & 2007	23
Bacton Interconnector* Upgrading	Phase 1 2005-6 Phase 2 2006-7	8 7
BBL Pipeline	2006-7	12-15
Isle of Grain LNG	Phase 1 2005 Phase 2 2008	4 9
Statfjord– FLAGS Pipeline	2007	5
South Hook LNG (Milford Haven)	Phase 1 2007-8 Phase 2 2009-10	11 10
Dragon LNG (Milford Haven)	Phase 1 2007 Phase 2 2010-12	6 6
TOTALS		**76-104

Notes: * Existing import capacity of Interconnector = 8.5
** Figure of 76 applies without Phases 2 of LNG projects
Vesterled existing import capacity = 10 bcm/yr
Current demand in the UK = 100
Predicted 2010 import requirement = 60bcm bcm/yr



Source: National Grid Transco / UKOOA

Many of these projects are listed here on this slide. If you look at the map you will see the new projects and their locations (point). I won't go into each one in detail, but I would make the point that if we are able to bring all these projects onstream, and I have no reason to doubt the capability of the industry to do so, then we may be in the comfortable position of having surplus capacity over and above our future import requirements. The predictions are that we may need an extra 60 bcm/year of imports by 2010 and these projects will deliver at least 76, and more if Phase 2 of some of these projects is included.

So having looked at the global energy situation, the story in the UK, focussing in particular on natural gas, let me conclude with a few comments on some of the issues we see around the formulation of energy policy.

Local drivers of energy policy

- Demand
- Supply
- Energy security
- Policy on greenhouse gas emissions
- Competitiveness
- Market efficiency
- Technology

The first point to make is that energy policy is both a global and local issue. The climate and the world's resources are things that we share. However, each piece of geography, whether that's a country or a trading bloc, such as the EU, has specific conditions.

So whilst the drivers on this slide, albeit not an exhaustive list by any means, are relevant for the UK, they are also relevant for many other geographies too.

Demand and demand management must be a key consideration. The debate around demand growth in China is very different to the conversation here in the UK, where growth will be more modest. Supply and energy security are linked – what are the potential sources of energy supply, what infrastructure is required to bring these supplies to the market, are the market mechanisms in place, what are the economics – and what are the security implications lying behind these supply options, security in the sense of physical interruptions but also in the sense of geopolitical risk or, for example, terrorist threat.

Climate and energy cannot be delinked, whatever you may think about the science around climate change, and so energy policy and a country's policy on reducing CO2 emissions in particular, have to be taken as a package. But countries need competitive industries that create wealth and employment and they need efficient markets that enable investment and capital to flow to the right places and allow prices to reflect the true state of supply and demand.

And underlying all this is technology which must react to all the signals in order to help find solutions for demand, supply and reductions in harmful emissions.

Some principles to consider

- Sustainable investment, technology and skills
- Sharing of risk and reward
- Inclusive, but materiality is key
- Market mechanisms to price carbon - level playing field
- Governments should avoid 'picking winners'
- Transitional period may be required
- Liberalised supply and infrastructure markets
- Appropriate foreign relations
- Simple, stable and predictable

As I said at the outset, there is no silver bullet, at least we haven't found one. But there are principles that we believe any energy policy should consider.

Any investment, financial, technical or in human resource, must be on a sustainable basis. We shouldn't chase 'one hit wonders', that's not fair on future generations. And for these investments to be sustainable an appropriate sharing of risk and reward between different parties is likely to be essential.

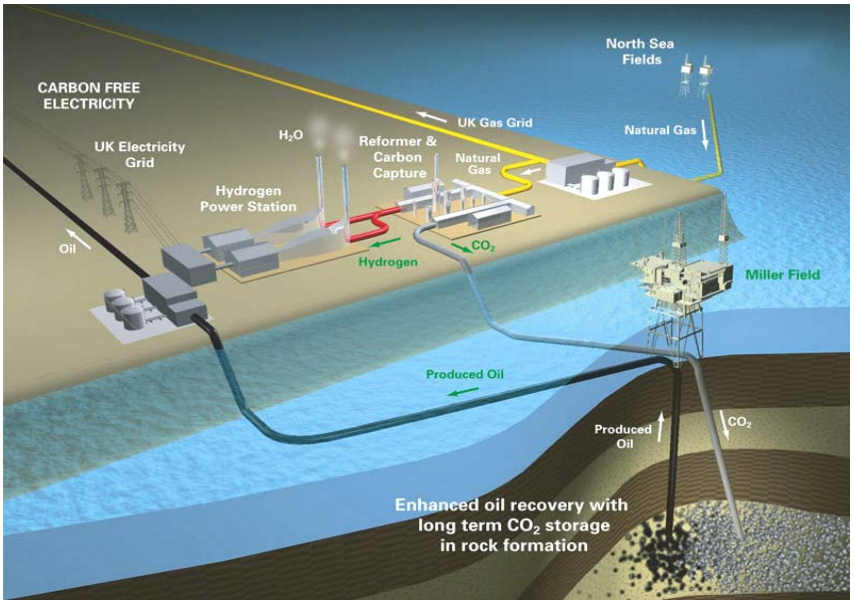
Whilst all energy options must be considered, due priority should be given to material options, options that can really make a difference. In the longer term carbon should be priced on a level playing field, with appropriate market mechanisms allowing investments in carbon reduction to be made in the most efficient places. The ETS is a good start, but this might need to be deepened and broadened in order to play a bigger role – and ideally extended beyond Europe so as not to penalise European industry in the global marketplace.

We don't believe governments should be in the business of picking winners, although there may need to be a transitional period where new technologies require an appropriate legislative and fiscal framework in order to be able to compete longer term on a level playing field. Thereafter the market should determine who the winners and losers are, as in any other sphere.

Constant pressure to complete the liberalisation of European energy markets has to be important for this country – liberalised markets will ensure that supplies get to where they are most valued, that demand management occurs where it can be done most efficiently, and that supply shocks can be buffered where possible. Look at the US in 2005 – the market reacted very efficiently to the supply disruption caused by the autumn hurricanes.

Finally, it's good to talk, and the right relationships with countries that have a role to play in energy, whether as suppliers, transit countries, or as fellow consumers, are important. And above all, wherever we go on energy policy, it must be simple, stable and predictable.

One option for near carbon free electricity



In the remaining few minutes, let me close with a brief description of one such material option we are looking at with our partners, Scottish and Southern Energy, Shell and ConocoPhillips.

This is a carbon sequestration project which takes gas in from the North Sea, passes it through a reforming process that effectively separates the CH4 into Hydrogen and CO2, passes the Hydrogen through to the neighbouring power station for near carbon free power generation, whilst sending the CO2 back out to the Miller field where it is reinjected underground, at the same time extending the life of the field owing to enhanced oil recovery.

The project, as currently scoped, will generate 350MW of clean electricity from existing fossil fuels, providing enough electricity to power a quarter of a million homes whilst removing 90% of the CO2 (1.3MT/annum). This is an exciting project, a first for the UK, technically achievable, delivering real materiality, but the economics are challenging and finding the right policy mechanism to allow this and other such projects to get off the ground is a priority.

My Lords, Ladies and Gentleman, energy policy is a complex subject. I hope I have provided some context, global and local, raised some issues and given you one example of where some options lie. Forgive me, however, for not having given you the ‘silver bullet’ solution !

Thank you.