BP Statistical Review of World Energy 2006
Quantifying Energy

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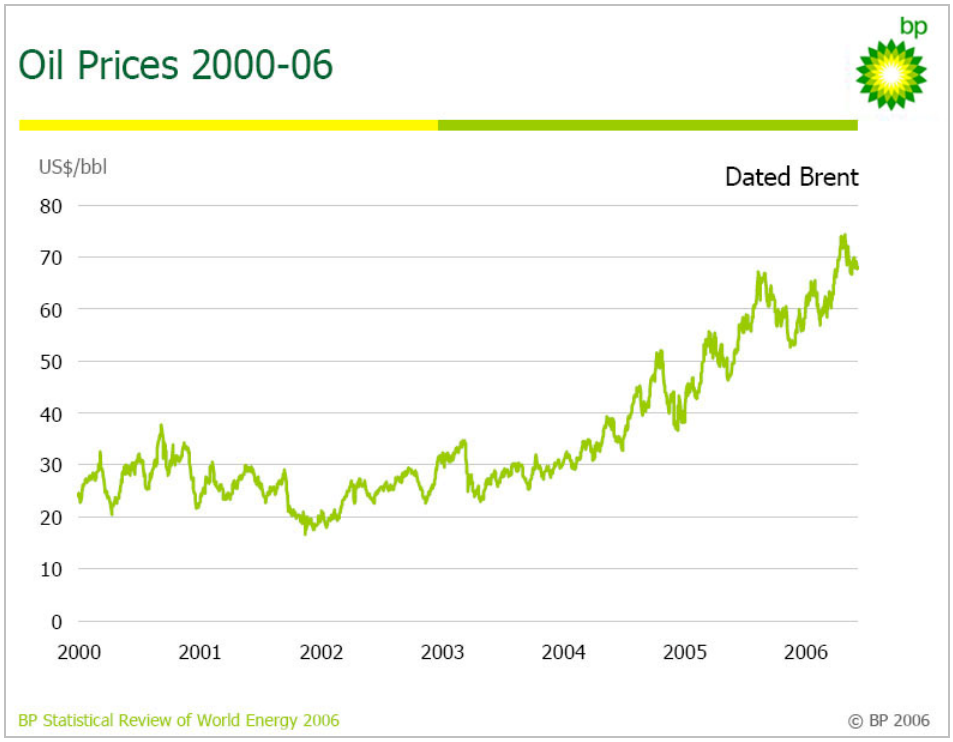
London 14th June 2006

1. Introduction

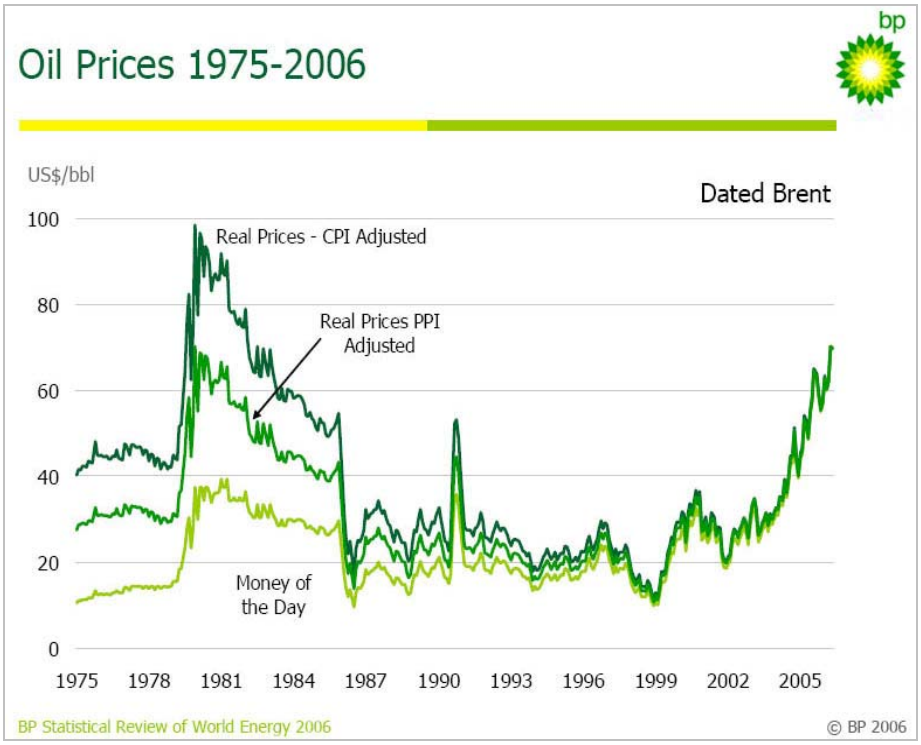
This presentation analyses world energy markets and trends in 2005 and into 2006. This has been a period characterised by high and rising prices and growing international concerns about energy security. The presentation is based upon the data in the 2006 BP Statistical Review of World Energy. The aim is to 'tell the global energy story' from the plethora of objective facts published in the Review. The intention is to make the story clear and simple.

The single most obvious energy development in both 2005 and so far in 2006 has been the further sharp rise in energy prices, and especially the price of oil. But this has not occurred in isolation. So, before describing the details about markets and fuels, I want to start by laying out the context and the drivers that have led to these exceptional prices. The first context is the prices themselves. The second is the starting point. 2005 followed 2004; and 2004 was itself an exceptional year in energy markets. The starting point was probably the single most critical determinant of the outcome. But behind all of this there are some key drivers which also need to be revealed. Some are obvious – for example the weather including the impact of last year's hurricanes. But there are also economic growth, financial markets, geopolitical developments and, importantly, fears and expectations.

2. Energy Prices

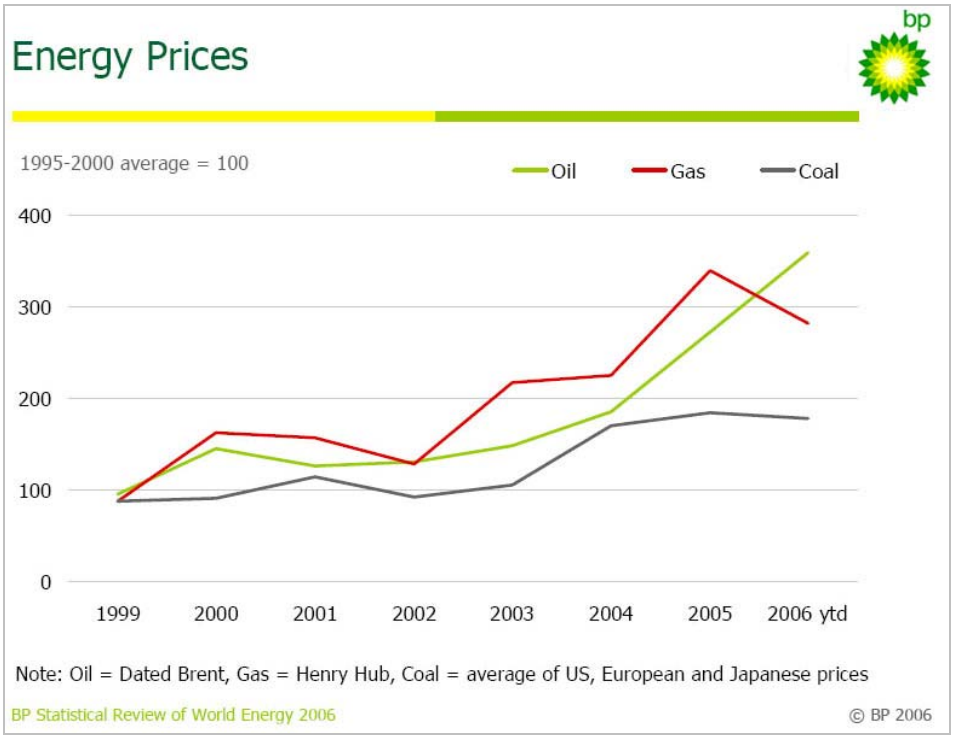


Brent oil prices averaged $54.52/bbl *[WTI: $56.59]* in 2005, a 42.5% *[36.4%]* increase from 2004 which had in turn seen prices increase by 32.7%. *[33.5%]* Oil prices have risen yet further in 2006, averaging $65 *[$66]* through the first 5 months of the year, having peaked at over $74 in early May. 2005 saw an all time high money-of-the-day year average price and the $74/bbl peak represents an all time high for daily prices.

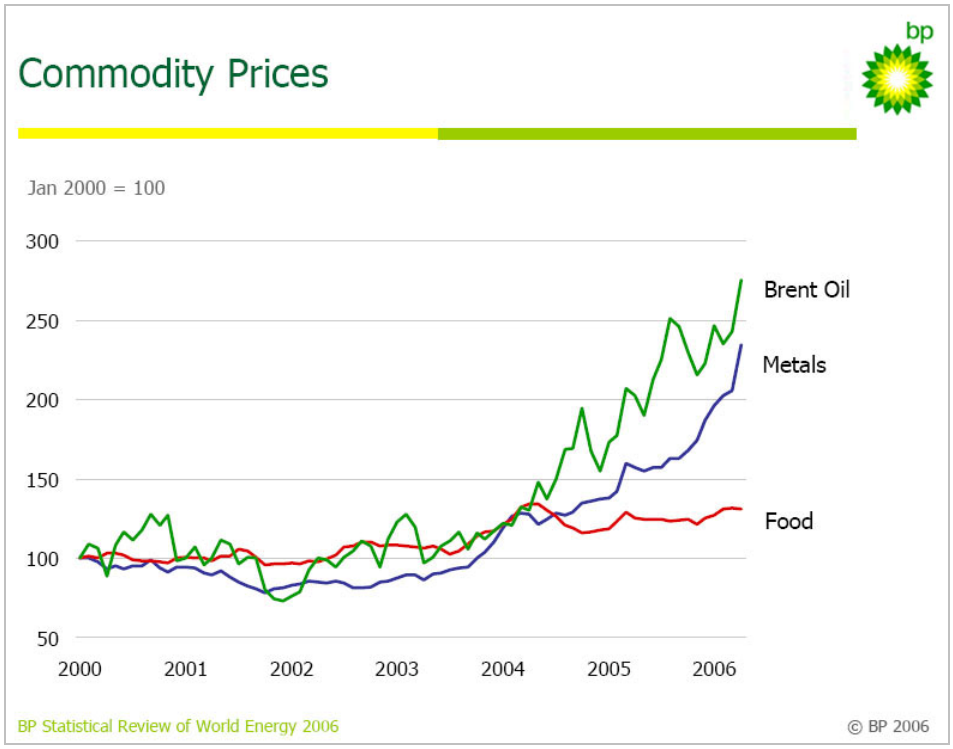


In real terms, inflation adjusted, the 2005 price was still below those prevailing between 1979 and 1982 if, as is conventional, the consumer price index is used to adjust for inflation. Alternative

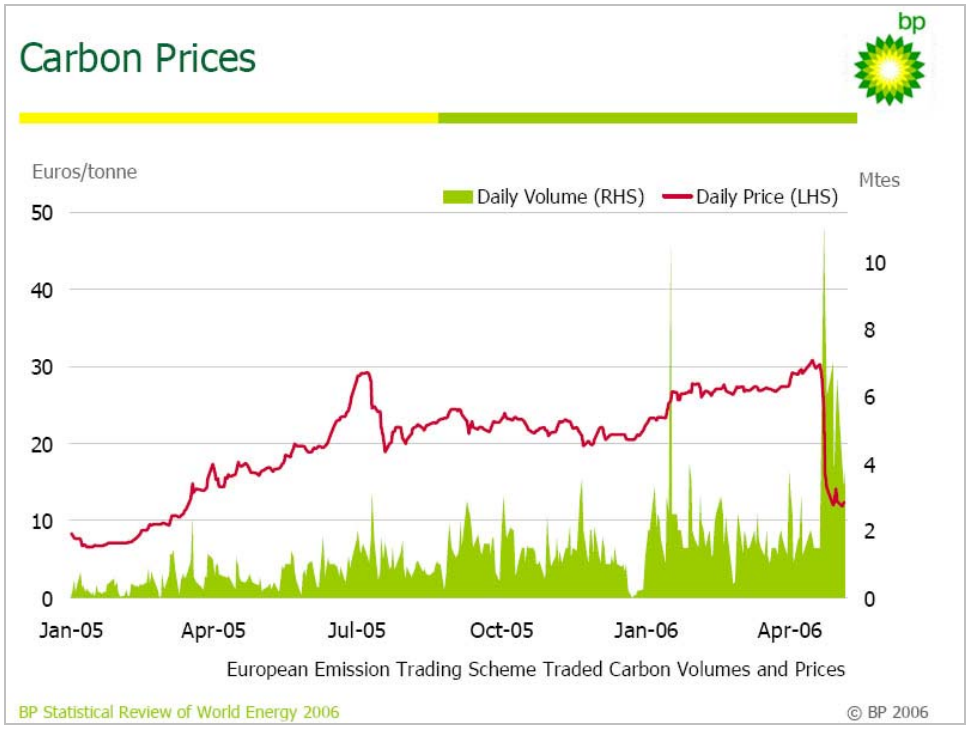
deflators such as the Producer Price Index reduce the previous peak to $70 during 1979. On this basis, the May 2006 recent peak is thus in line with previous historic highs.



High and rising energy prices are not just an oil phenomenon, but oil prices have risen by more and for longer than either gas or coal prices. Oil stands out in that its prices have continued to increase through 2005 into 2006, while gas and coal have slipped back. US natural gas prices (Henry Hub) increased by 50.2% on average in 2005 (to $8.79/mmbtu), but have receded during 2006 to date, declining by 17.9% to average $7.21/mmbtu. US gas prices peaked in December 2005 at $15.4/mmbtu. Coal prices in Europe and the US peaked during the second half of 2004, although the US (CAPP) price still increased by 10% on a year average basis in 2005. 2006 price developments show that oil prices have now risen more than either gas or coal. Coal prices have not increased as much as gas prices.



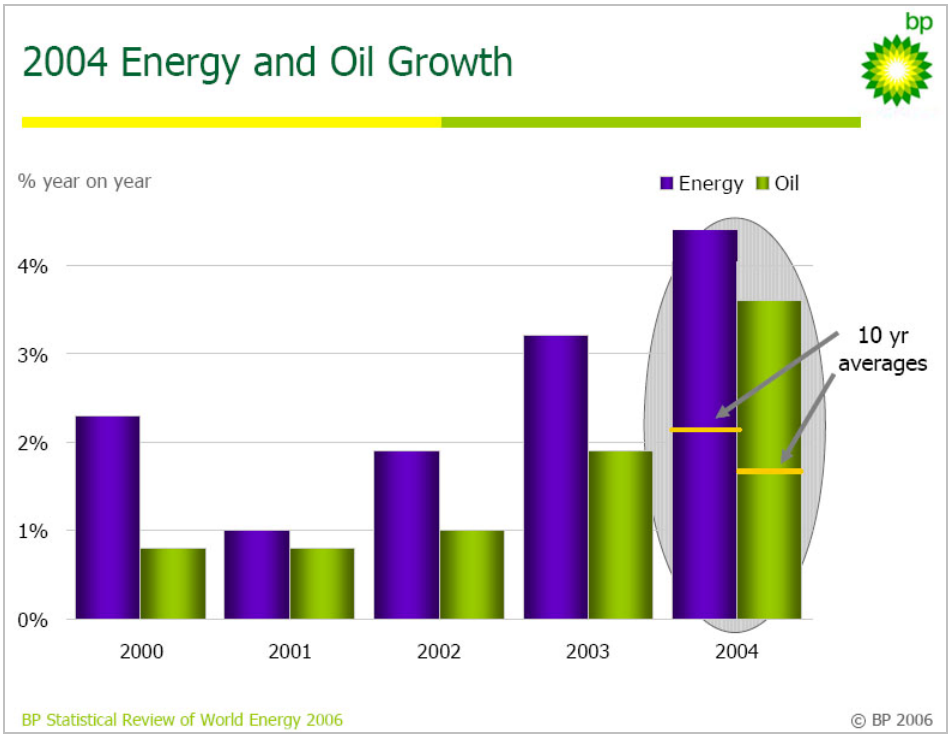
Some other commodity prices have moved in the same direction as oil prices in recent years. For example, the IMF Metals commodity price index has increased by 135% since Jan 2000; oil increased by 175% over the same period. Soft commodities have not risen by equivalent amounts. The IMF food index only increased by 31% over the period.



At the same time, the price of carbon was quoted for the first time in the European Emission Trading Scheme – the ETS. The price of carbon averaged €18.24/tonne (US$22.67) in 2005. It rose progressively through 2005 until late April 2006, partly reflecting the rising price of gas relative to coal in Europe. The price then fell sharply as evidence was released that emissions were lower than expected in several participating countries.

3. The Context

3.1 2004: The Exceptional Starting Point



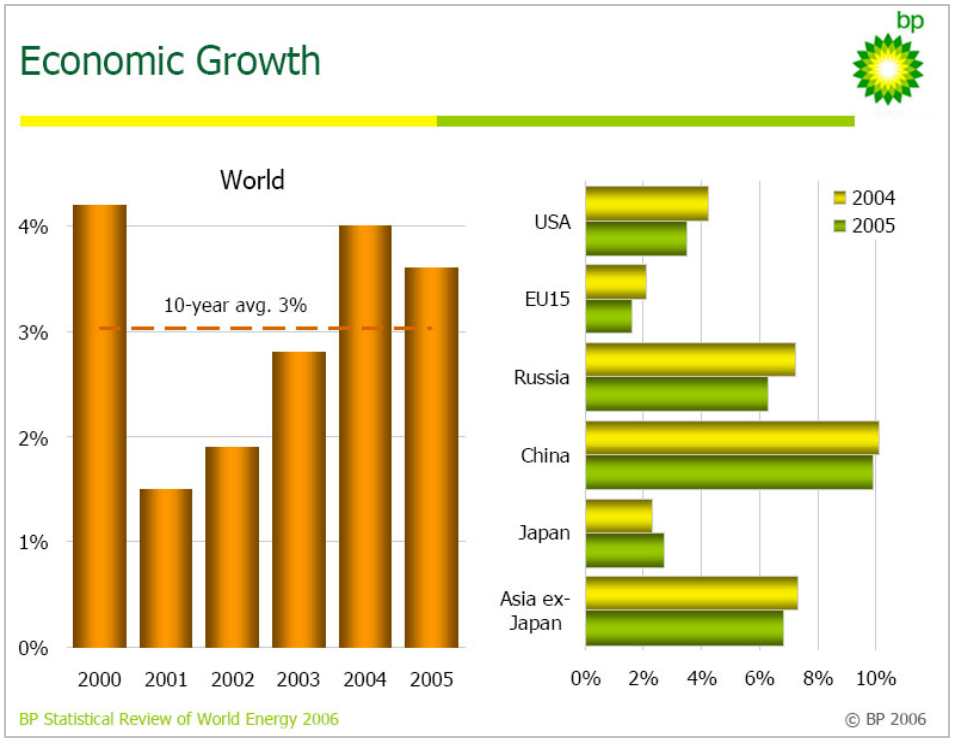
Energy market developments in 2005 cannot be assessed in isolation. The starting point matters. 2004 was a year of particular strength in world energy markets. Strong world economic growth drove energy consumption across all fuels. Spare capacity became limited in many parts of the energy value chain. In particular world spare oil production capacity fell to low levels; spare refining capacity fell with upgrading capacity to treat sour or heavy crudes operating flat out; and constraints in the contracting sector raised rig rates and drove up cost inflation. Energy prices in 2004 rose to then new highs for all fuels.

Developments in 2005 need to be reviewed taking account of this constrained starting point that had already begun to deliver price signals for both consumers and producers.

3.2 The Exogenous Drivers

There were then a series of other factors that continued to drive energy markets in 2005.

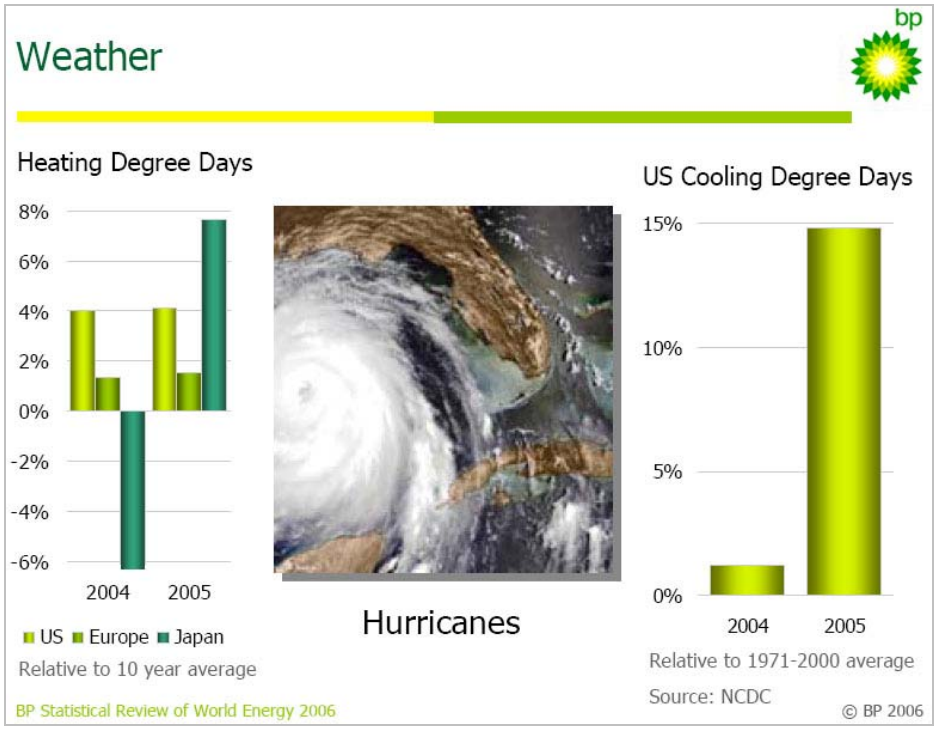
3.2.1 Economic Growth



First, the world economy was again strong; growth averaged 3.6% in 2005. This was above the 10 year average but slower than the 4% achieved in 2004. Every region grew at above trend – except Europe – but, at the same time, most regions also slowed from 2004.

Above trend economic growth underpinned energy consumption growth in aggregate. However, the negative impact of rising prices upon oil consuming economies has been less than in the early 1980s. This recent oil price increase has been demand driven, in contrast to the price spikes of the late 1970s. In addition the burden has been less this time. Since 1980 world GDP has doubled while oil consumption has only increased by a third – in other words oil intensity has fallen by 38%. Similarly, in 1979 oil prices rose 125%; between 2003-5 oil prices rose by 89%. The negative drag on economic growth from higher oil prices has thus so far been limited and less than that experienced in 1979.

3.2.2 Weather

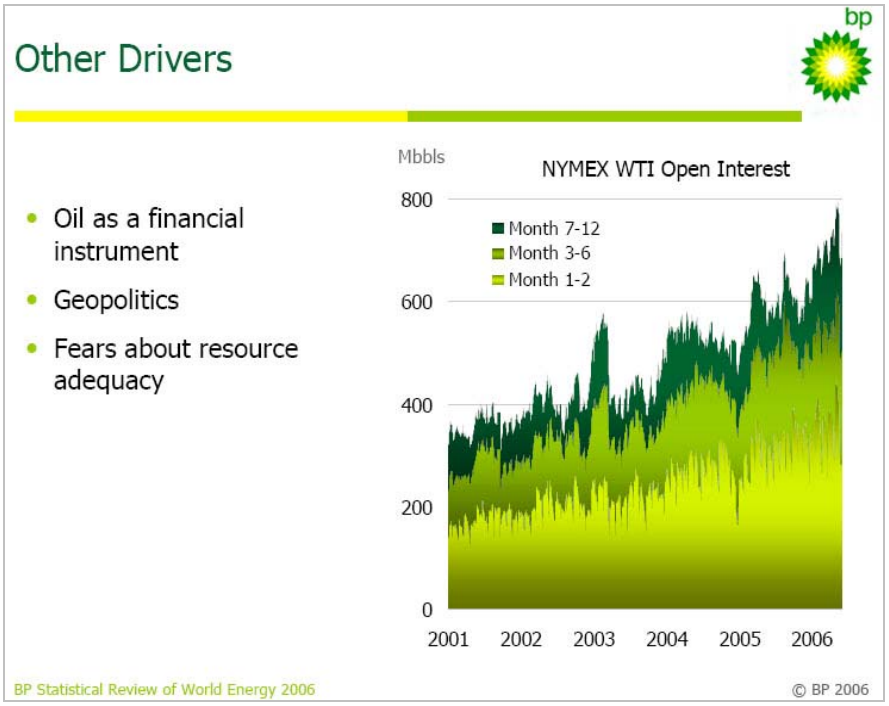


Weather is always a key determinant of year-by-year changes in energy consumption and production, but 2005 was particularly affected. The weather strengthened energy consumption and weakened production. This was a combination of two factors:

1. In the major energy consuming areas, the winter was colder than usual and the summer was hotter than normal.

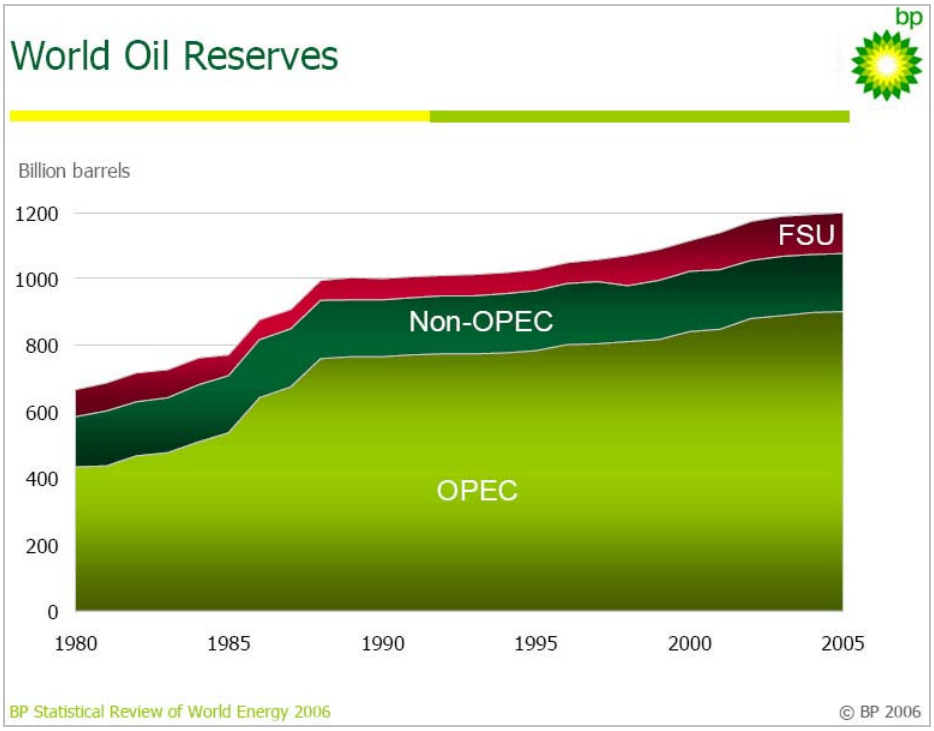
2. The US hurricane season was hugely damaging. A cumulative 116 million bbl of US offshore oil production was lost and 595 bcf of gas production. Some of these losses have continued into 2006.

3.2.3 Other Drivers



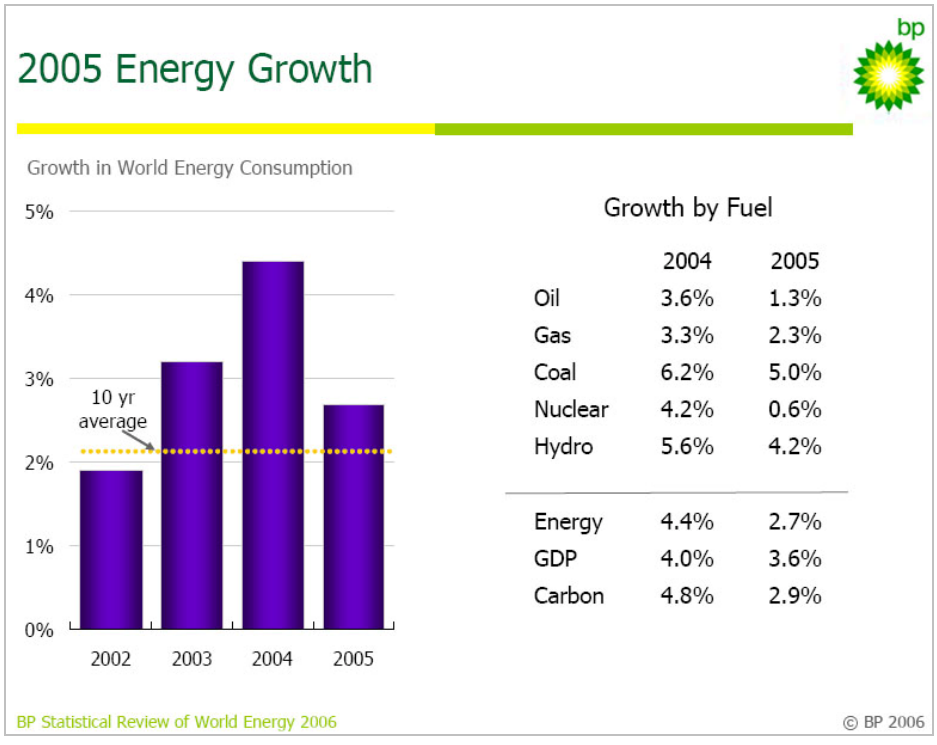
There are also indications that energy markets and prices have been driven by a number of forces over and above physical supply and demand. Energy and other commodities have increasingly become financial assets. A growing number of investors have chosen to trade in energy using various financial instruments. Energy markets have deepened at both the short and long end. Liquidity has been enhanced and a multiplicity of risk management tools are now available. Current events, as well as changes in asset preferences and market expectations, have the power to move market prices rapidly and substantially. Periodically such preferences and expectations may be independent of or exaggerate energy market fundamentals. Nevertheless, as energy products are ultimately physically deliverable, fundamental forces will always assert themselves in time.

Also the geopolitical situation, especially in oil producing countries, has been perceived to have deteriorated. Oil production has been physically disrupted, expansion plans have been delayed and fears about future political stability have increased. This can to some extent be observed in the rise in long dated forward oil prices that have increased by at least as much, and often more than, prices for more immediate delivery. Put another way, the oil market in 2005 signalled a need for higher ‘precautionary inventories’, enabling OPEC to produce in excess of consumption without weakening prices. The associated shift to a contango market structure – where forward oil prices are above spot prices – gave financial incentives to traders and other market participants to accommodate the excess supply and increase their stock holdings.



These perceptions have also at times been reinforced by fears about future resource adequacy. Some analysts are predicting an imminent physical resource constraint. The oil and gas reserve data published in this Review provides a reassuring picture about oil and gas reserves. The aggregate levels are high and year by year a combination of exploration, investment and the application of technology is ensuring that every unit of oil and gas that is produced is replaced by new proved reserves. There is no resource constraint, although it is valid to question whether adequate investment will take place on a timely basis and if such reserves are accessible to investors. Meanwhile perceptions over future scarcity can affect long run market prices.

4. 2005: The Energy Challenges



Let's now move on and consider what actually happened in 2005 in world energy markets and why. First, the world economy and thus energy demand had momentum. Secondly, high energy prices had begun to create incentives to contain energy consumption and to switch fuels. And thirdly, the energy markets had to cope with the physical disruptions of hurricanes, the uncertainties of geopolitics and the impact of a surge in financial players at the same time as risk perceptions were growing.

4.1 The Global Outcome

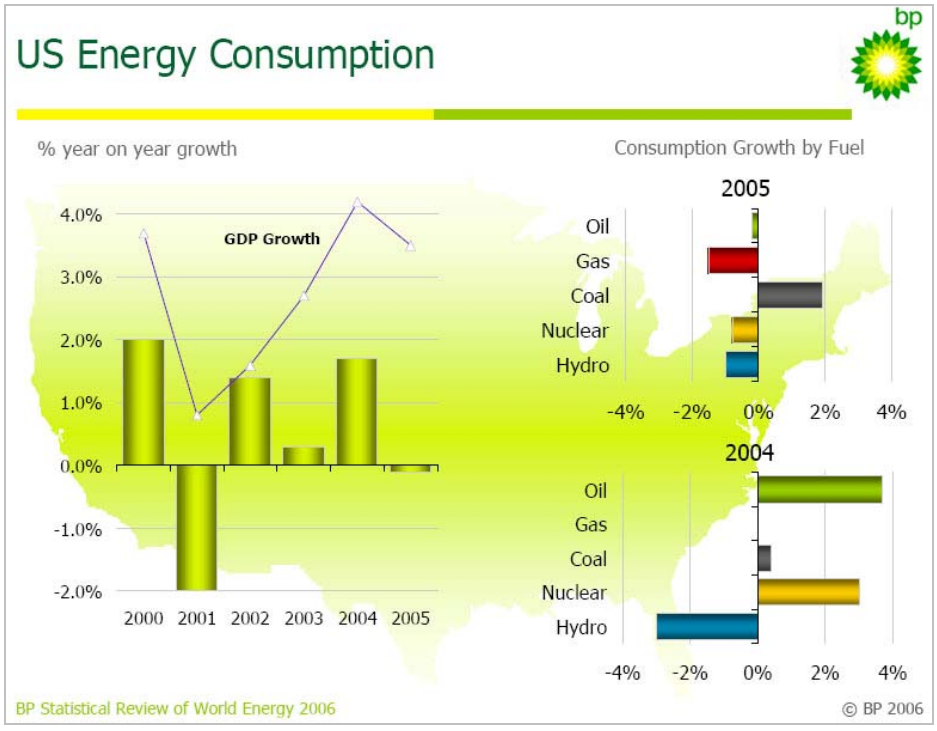
The net result was a different outcome from 2004, with selective but important examples of where market adjustments developed. Markets continued to work efficiently with no shortages of physical supplies. In this sense 2005 saw continued energy security – energy supplies remained available and reliable.

There was a slowing of world energy growth from 4.4% in 2004 to 2.7% in 2005. This was still above the 10 year average, but more of a slowing than the slight weakening of economic growth would tend to imply in aggregate. The largest consumption slowdown was in oil – to 1.3% – somewhat below the 10 year trend rate. The least slowdown was in coal. And so at a global and aggregated basis, energy consumption slowed and the slowdowns were greatest where price rises were bigger and more sustained. There appears to have been some form of both price and income effect.

World carbon emissions grew by a further 2.9% in 2005. The strength of coal consumption meant that the world's carbon intensity of energy edged up again – for the third year in a row.

Inevitably global aggregates contain numerous exceptions and deviations; and last year was no exception. These can best be seen at national levels:

4.2 The United States



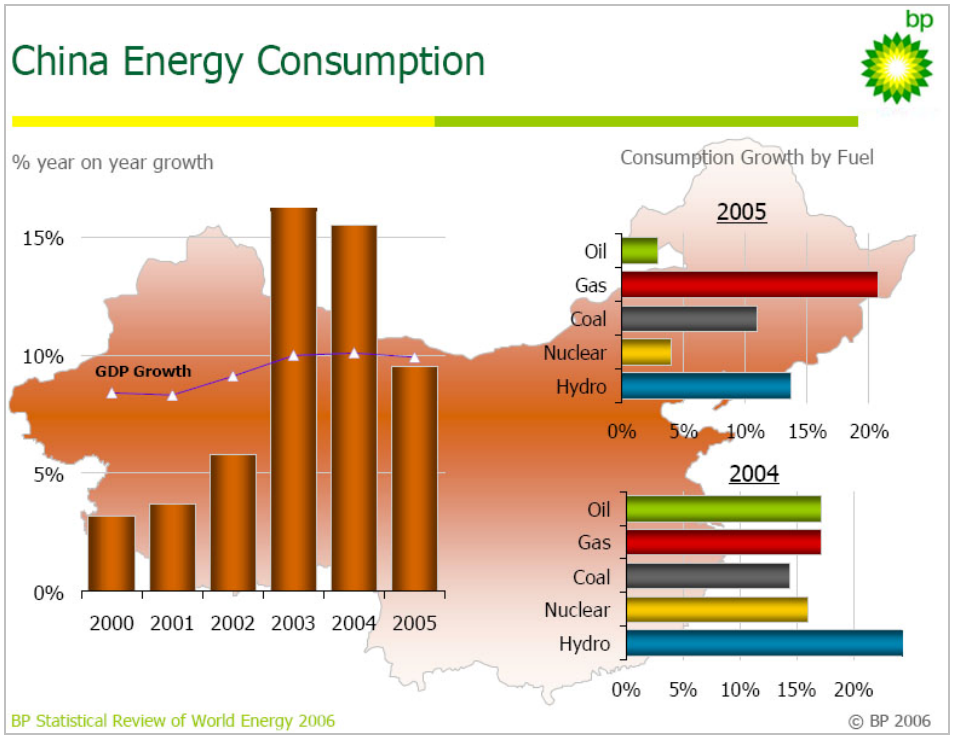
First, the United States, the world's largest energy consumer and producer. Energy consumption actually fell in the US (by 0.1%), despite continued, although slower, economic growth of 3.5%. This is the first time since 1985 that the US has experienced above trend economic growth and a

decline in energy consumption. This US outcome is a function of the impact of the hurricanes and the effect of both high prices and changing relative energy prices in competitive markets.

First US oil consumption fell – by 0.2%. Natural gas consumption fell by 1.5%. There was a direct and indirect hurricane impact on oil and gas consumption, especially in and close to the Gulf Coast. But these declines occurred despite more heating and cooling degree days than in 2004. The gas consumption decline deepened a fall especially in industrial gas consumption that stretches back to 2000, largely as a result of high prices. There was a switching back into coal, which saw growth of 1.9%.

Thus while the hurricanes in particular distorted the US outcome, the US reflected the global trend of weaker energy consumption despite strong economic growth and a switch away from higher cost energy into lower cost sources.

4.3 China



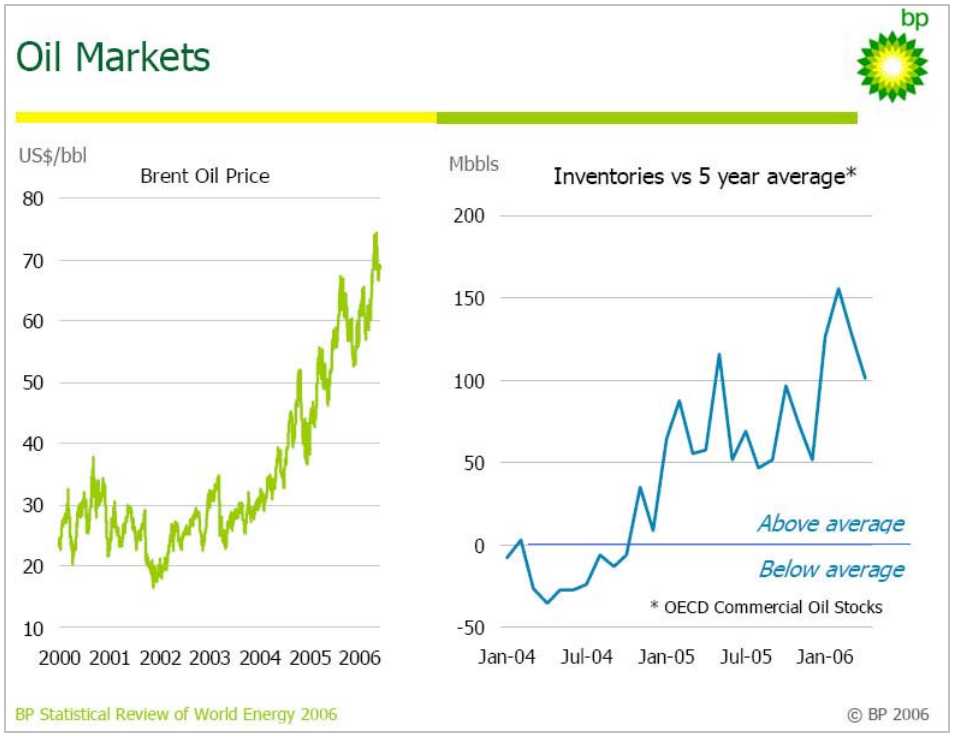
Secondly there is China. China's energy outcome in 2005 also fits the global picture. Economic growth in China was essentially unchanged at 9.9% but energy consumption growth slowed from 15.5% in 2004 to 9.5% in 2005. 2004 had seen coal shortages, especially in power generation. Oil was accordingly used increasingly for electricity. Oil use had surged by 17.1%, buoyed additionally by a sharp rise in car sales the previous year.

But 2005 was different. The shortage of coal for power generation was essentially resolved. The most energy intensive industrial sectors grew less rapidly. Increased availability of domestically produced natural gas and hydroelectricity helped at the margin. And oil consumption was effectively rationed in some areas as price controls caused localised shortages. Oil consumption growth fell back to just 2.9%. Thus China was a slower source of energy growth, despite continued economic growth.

China generated 49% of world energy consumption growth in 2005. It is now the world's largest producer and consumer of coal, the largest producer of hydroelectricity and the second biggest consumer of oil. It generated the largest single increment in natural gas production and consumption in 2005. China is now the world's second largest energy consumer (with 14.7% of

world energy consumption) and its recent energy growth has had an important impact upon both global energy aggregates and as a source of high growth, especially of oil consumption and imports.

5. Fuel Market Developments



Let's now move on and review the various fuel markets and attempt to understand developments in 2005 and into 2006.

5.1 Oil

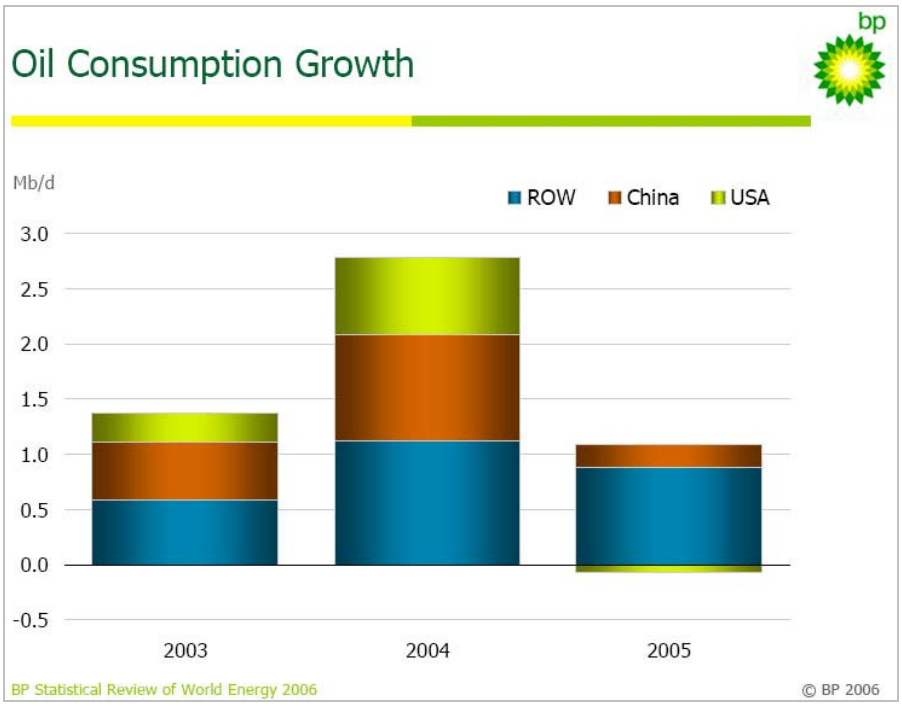
5.1.1 Introduction

Let's start with oil. Oil markets entered 2005 after an exceptional year. Growth in 2004 had left global spare production capacity at low levels – about 1.5 million b/d and almost all in Saudi Arabia, according to the EIA. Nevertheless, by the end of 2004, oil production growth had more than supplied the increase in oil consumption, and inventories were increasing and were at above historic average levels. But this stockbuild failed to weaken prices. The risk premium had risen: the market was concerned that spare capacity was low relative to potential supply disruptions.

So, what has happened in 2005/6? Prices rose further, as we have already seen. Brent *[WTI]* crude broke through $60/bbl in August 2005 and averaged $55 *[$57]* for the year as a whole. Prices remained on an upward path and broke $70 in April 2006. The question is whether this further price rise has been triggered by fundamentals or by other factors.

2005 was a weaker year in the oil market, in terms of both oil consumption and production growth. Slower production growth did not remove the excess supply and inventories have continued on an upward rising trend. Spare production capacity has only increased at best slightly. In other words the oil price rise cannot be attributed to 'fundamentals' but rather predominantly to a further increase in the risk premium.

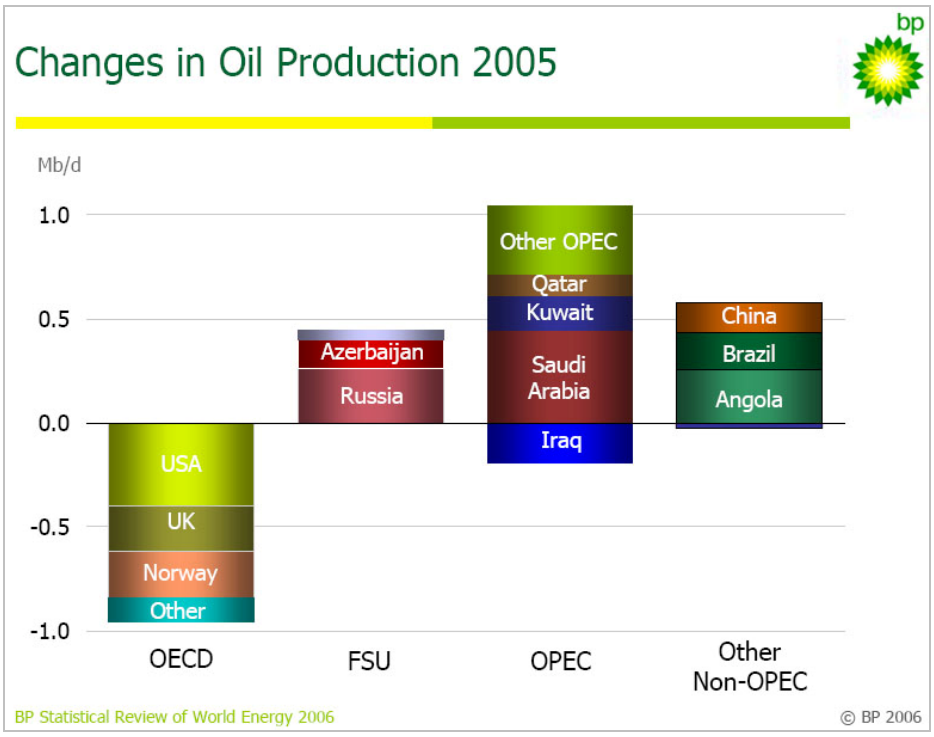
5.1.2 Oil Consumption



World oil consumption growth fell back sharply in 2005 – to 1 million b/d, 1.3%, which is below the 10 year trend and only 35% of the rate in 2004. Oil consumption growth thus fell by 1.8 million b/d and over 80% of this slowdown occurred in just 2 countries – the US and China – and in roughly equal proportions. US consumption fell by 77,000 b/d (-0.2%) due to a combination of the hurricane impacts and price effects. Gasoline consumption had weakened after the hurricanes but recovered before year end. The Chinese slowdown was to a significant degree a reversal of the temporary factors that had stimulated demand in 2004, especially in the power sector. China's 216,000 b/d (2.9%) oil demand growth represented only 21% of world oil consumption growth, down from the 35% in 2004.

The other notable weakness of oil consumption growth was in the rest of developing Asia Pacific. In many countries, including Malaysia, Thailand, Indonesia and India, consumption weakened after fuel subsidies were reduced, while India substituted imported oil with imported gas and coal.

5.1.3 Oil Production



2004 had utilised most of the world's cushion of spare oil production capacity. Oil production growth in 2005 was accordingly more constrained. But there were also other forces that limited output increases:

- The US hurricanes seriously disrupted oil production and delayed new field A number of accidents and disruptions to production occurred for example at India's Bombay High

- And finally there has been rising cost inflation which reflected constraints in the contracting and engineering sectors and which exacerbated delays

Total world oil production increased by 889,000 b/d – 1%. In net terms OPEC supplied almost all of this, 96% of the growth (851,000 b/d), with total non-OPEC (including the FSU) growing by a mere 38,000 b/d.

Non-OPEC production in 2005 can be broken into several parts:

1. Russian production grew by a slower 264,000 b/d, down from 743,000 b/d in 2004

2. The rest of the FSU grew by 171,000 b/d led by Azerbaijan which commissioned the Azeri field for export through the Baku-Ceyhan pipeline. The first cargo of crude was exported from Ceyhan at the beginning of June 2006.

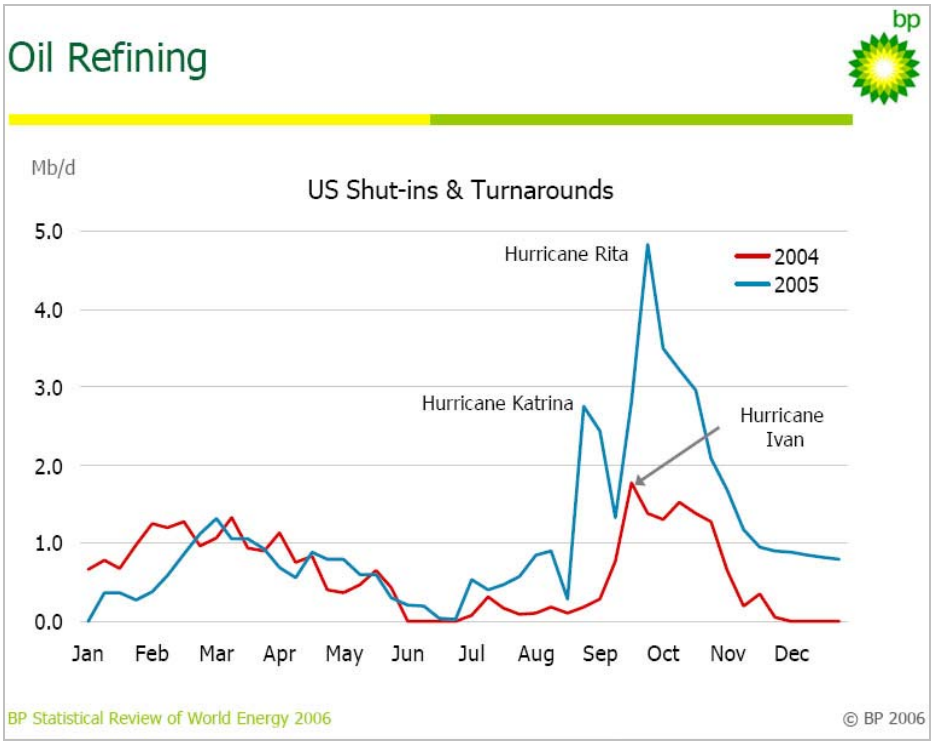
3. The hurricanes directly reduced US oil production by 310,000 b/d for the year out of a total US decline of 398,000 b/d. There were also declines in Alaska and California.

4. Production in the rest of the OECD fell by a further 555,000 b/d. This was mainly the UK and Norway, where production fell by 220,000 b/d and 219,000 b/d, respectively, but also this year Canada and Mexico. The total OECD production decline of 953,000 b/d was the largest ever.

5. There were a number of 'sweet spots' where new production has come on stream, for example Angola (256,000 b/d), Brazil (176,000 b/d), China (146,000 b/d)

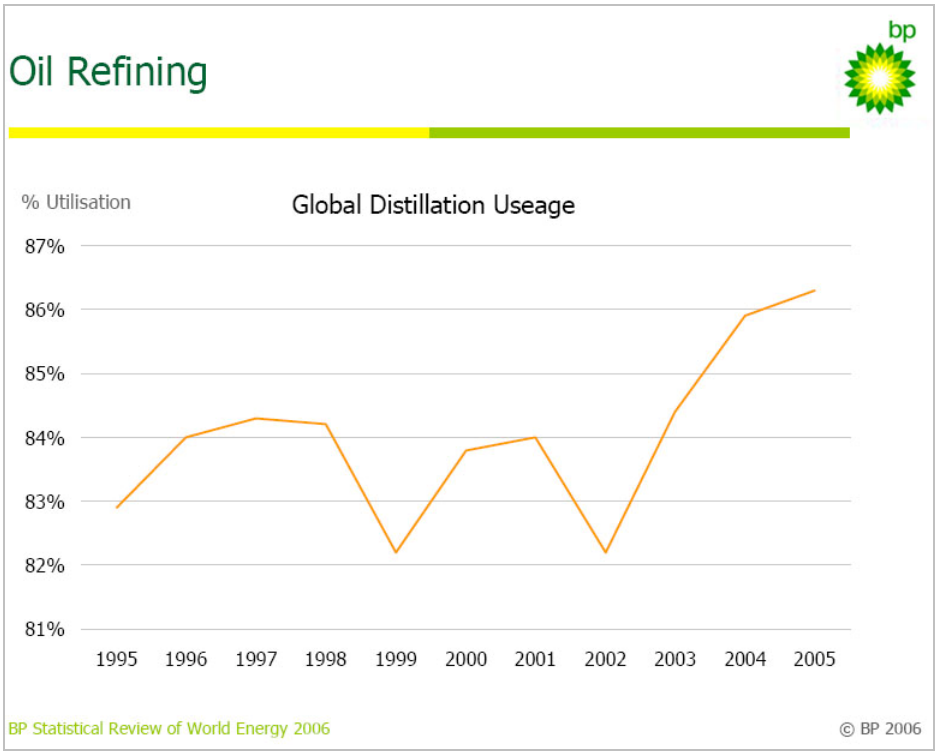
OPEC's production growth of 851,000 b/d was widely spread – across Saudi Arabia (with the largest increment of 447,000 b/d), Kuwait, the UAE and Qatar. 180,000 b/d of the growth came from NGLs, of which Qatar was the largest source as LNG output ramped up. Iraqi output fell by 190,000 b/d. The only significant remaining excess capacity is still in Saudi Arabia.

5.1.4 Oil Refining



This leaves us with refining. Two developments have brought refining issues to the fore during 2005.

First, the US hurricanes seriously disrupted refining activity on the US Gulf Coast. After Rita, up to a total of 5 million b/d of complex US refining capacity was out of action. The 5 million b/d represented 29% of US refining capacity and a similar proportion of US gasoline production. The initial reaction was a 'super-spike' in refining margins. In face of this there were both policy actions and market responses. The US EPA decided to permit an early switch to winter gasoline quality and diesel sulphur specifications were temporarily relaxed. In addition, the IEA authorised the release of emergency stocks. Straight run margins became strongly positive. This encouraged incremental crude runs at less sophisticated sites around the world. Overall product imports to the US increased sharply to around 4 million b/d in 4Q. As markets rebalanced and in the absence of a cold start to winter, global average refining margins drifted down. US product inventories actually rose during October and November. Markets had worked. Product supplies were maintained at the cost of temporarily higher prices and margins.

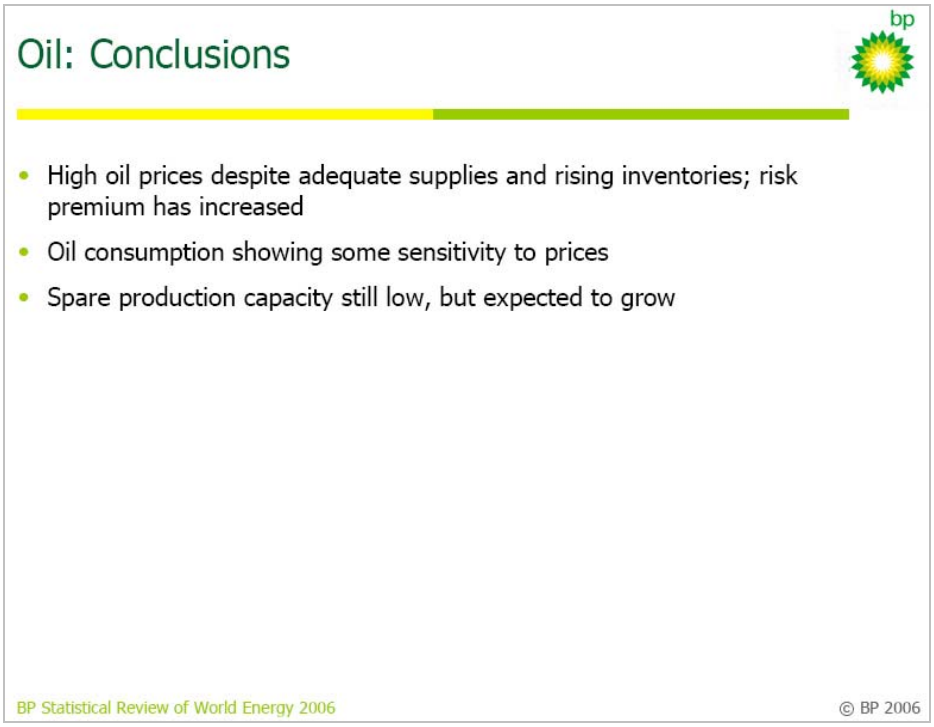


Second, capacity utilisation in refining continues to rise. The global utilisation rate has reached 86.3% for distillation capacity, while all upgrading units operate effectively at full capacity Global refinery capacity additions in 2005 were 679,000 barrels per day in face of oil consumption growth of 1 million b/d. But there was still almost 12 million b/d of unused primary distillation capacity in 2005. Refinery crude runs are well below oil consumption after NGLs, volume gain, direct crude burn and other non-refinery sourced streams such as ethanol and MTBE are accounted for.

The main constraint in the refining system currently is limited upgrading capacity, exacerbated by the need for now to process large volumes of incremental heavy sour crude. From time to time, this has caused a substantial widening of the spread between light and heavy crudes. Refinery constraints have influenced relative crude values but not the absolute price.

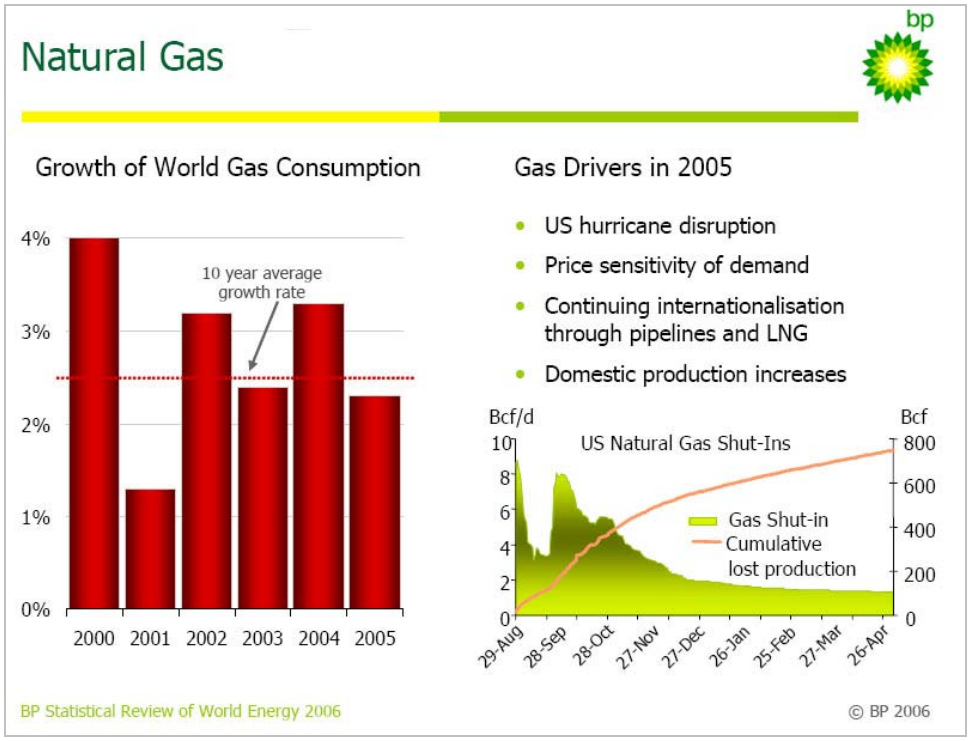
Meanwhile the experience of the hurricanes proved that much of that spare capacity can be utilised as and when market conditions provide an incentive. It has served to confirm the efficiency and flexibility of the world refining system.

5.1.5 Oil Conclusions



Overall, these developments have left the world oil market adequately supplied despite supply disruptions. Oil prices are close to $70/bbl and are held up at this high level by low surplus capacity, risk perceptions and fears. Oil consumption has been shown to have some price sensitivity, but the extent of demand reductions has so far been insufficient to weaken prices. Meanwhile oil consumption continues to grow, driven by economic growth around the world. New upstream and refining investments are underway but lead times are long. Global spare production capacity should in time grow further and get back to historic norms of around 3 million b/d, probably towards the end of this decade. At that stage the risk premium could decline and OPEC may seek to take a more active role in maintaining market balance.

5.2 Natural Gas



Natural gas developments have not mirrored oil, even though there are some common forces. Gas markets have become increasingly linked internationally, but outcomes, forces and trends still differ around the world. As with oil, world gas consumption growth in 2005 fell back – but less so, to 2.3% from 3.3% in 2004. Slower global economic growth was a factor. But a number of other drivers were key:

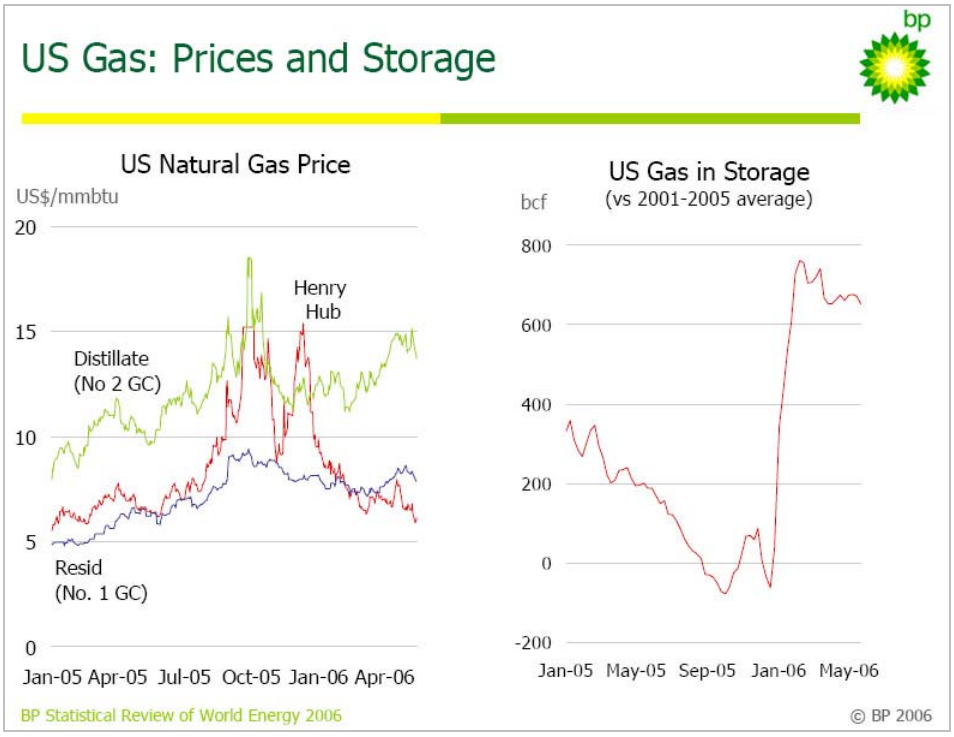
1. First the US hurricanes were more disruptive to US gas markets than oil markets

2. Gas consumption is proving to be price sensitive in liberalised energy markets

3. The internationalisation of gas is continuing via both pipelines and LNG

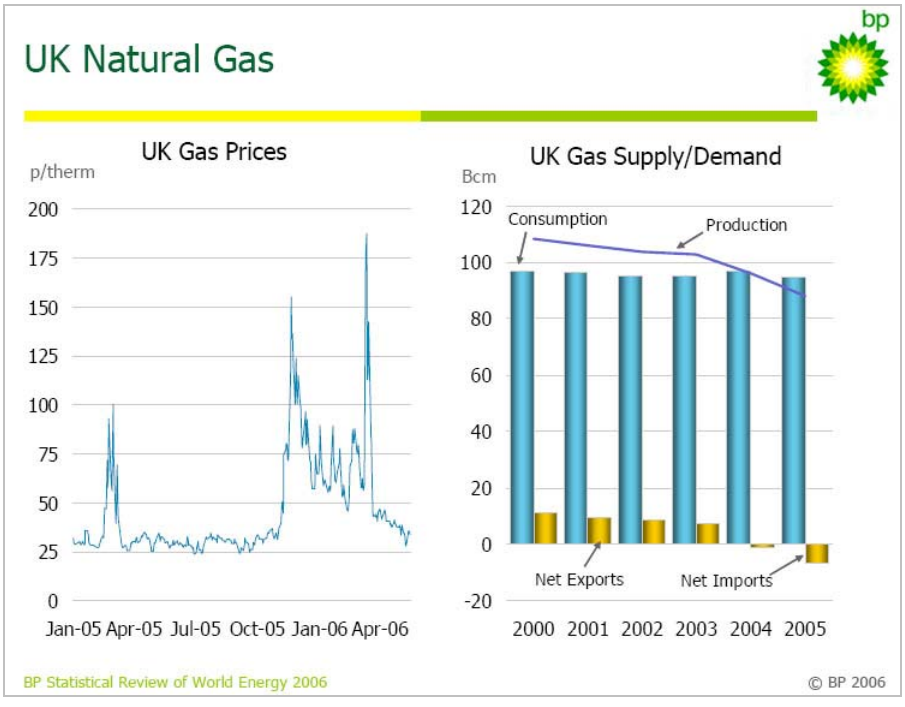
4. Domestic supply availability is increasing in some specific markets

Hurricanes Katrina and Rita were especially damaging to US gas facilities. The production loss represented 15% of annual offshore Gulf of Mexico production in 2005. This was the major contributory factor behind the 2.3% decline in US natural gas production, despite a drilling driven onshore production increase. US production has now been flat for a decade; but this decline took it to the lowest level since 1993. Spot prices surged to over $15/mmbtu in October after the hurricanes – and again in face of a December cold snap.



However, since January this year US gas markets have shifted dramatically from a period when supply fears prevailed to one of excess supply and high levels of gas in storage. Prices have halved from above distillate parity to below resid parity in a matter of months. High prices, both before the hurricanes and after, have weakened demand. This was then reinforced by a mild 2005/6 winter. Most of this demand response occurred in the industrial sector where gas use fell by 8.4% in 2005; gas use in power actually increased. Aggregate consumption fell by 1.5% in 2005, back down to 1995 levels.

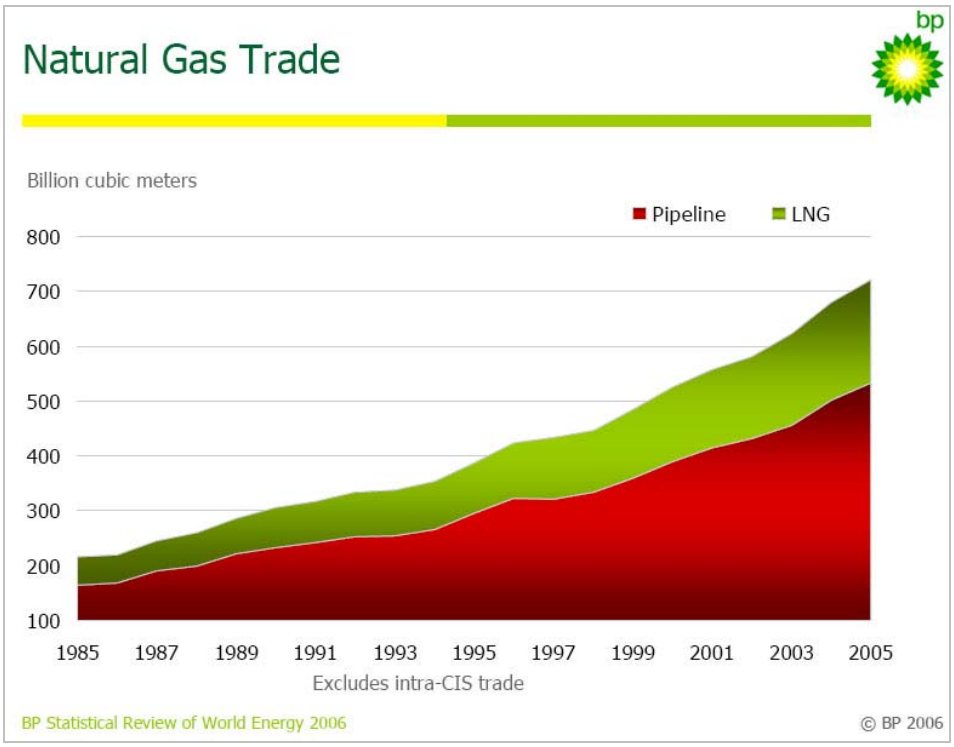
The US is a clear example of energy markets working. Markets responded efficiently to both the supply disruption and high prices. The response was almost totally from within North America. LNG imports rose immediately after the hurricanes but have since fallen back. The cost was temporary high prices.



The second example of gas market adjustment has been the UK. Declining UK North Sea gas production resulted in the UK becoming a net gas importer for the first time ever in 2004 and with a further 8.1% production decline in 2005, imports rose further. Existing import infrastructure is being expanded and new infrastructure is coming on stream. However, following cold weather in November 2005, fears about winter deliverability developed and prices surged to spike at 155p/therm ($23.5/mmbtu). Then in February 2006 there was an accident that disabled the Rough storage facility that contains 80% of the UK's gas in storage. Cold weather in March created a further new spike at 187.5p/therm ($32.78/mmbtu).

As in the US, markets have worked and supply deliverability was maintained. UK gas consumption fell by 2.2% in 2005. Coal consumption increased by 2.8% as the power sector switched fuels. In March 2006 some CCGTs burned distillate on a temporary basis.

UK gas prices have now returned to below 40p/therm, which is in line with Henry Hub prices. UK futures prices for the winter are however above Henry Hub, implying a risk premium that reflects further concerns over winter availability.

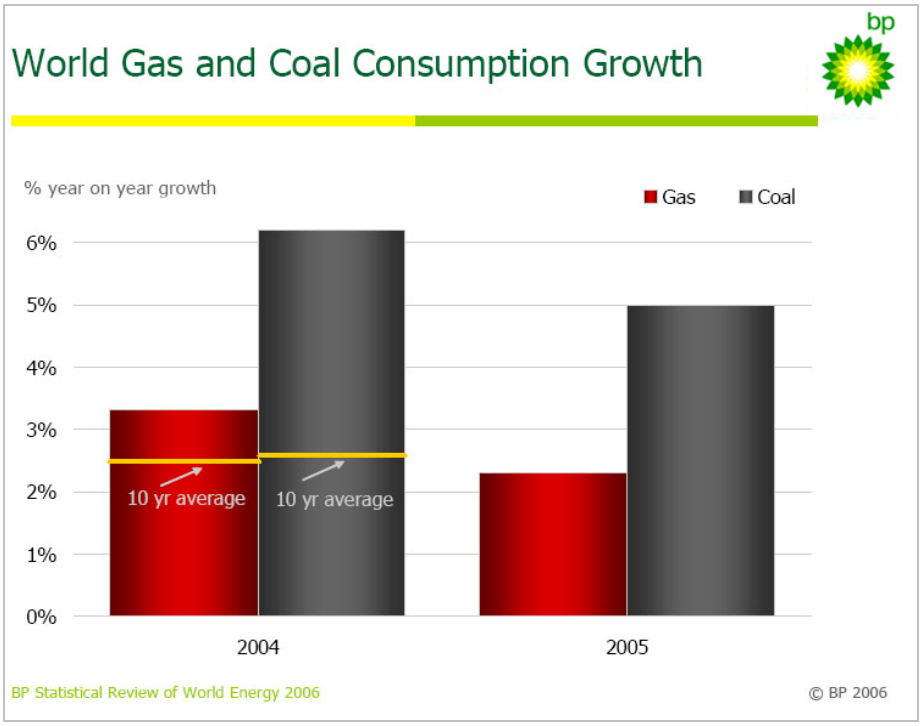


Meanwhile, international trade in natural gas continues to grow faster than consumption as a result of continual expansions in both international pipelines and LNG shipments. 2005 saw a further 6.4% expansion in both pipeline and LNG trade. In 2005, the amount of natural gas traded across an international border increased to 26.1% of global natural gas consumption. In pipeline trade the major new growth was from Libya and Algeria to Italy and from Myanmar to Thailand. Meanwhile exports grew from Norway and Russia to various European markets, including Turkey. Kazakhstan and Turkmenistan raised exports to and through Russia. Flows increased from Bolivia to Brazil, and from Canada to the US. UK imports through the Interconnector expanded.

There were new LNG start ups in Egypt and ramp ups in Qatar and Australia. LNG deliveries to Spain surged following low rainfall that reduced hydro output by one third.

LNG has increasingly connected regional gas markets with some degree of flexibility. Contract cargoes still dominate the trade. Spot cargoes are estimated to be less than 15% of total LNG volumes. Hence LNG market liquidity is low. Cargoes are often simply unavailable for a given time slot. Availability was limited in 2005 and particularly following the US hurricanes, strong

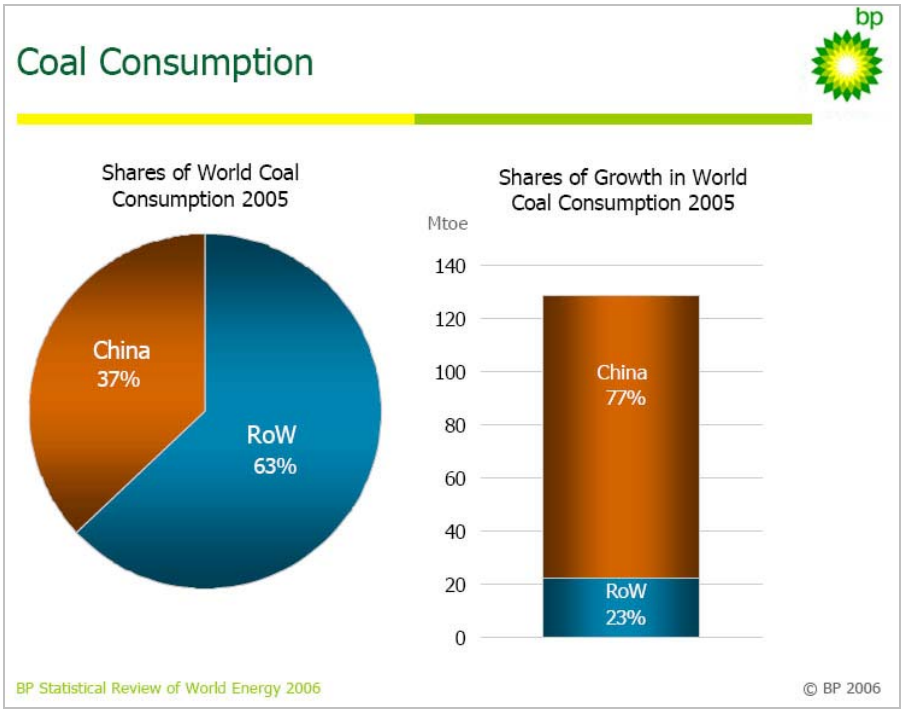
Spanish demand, downtime in Nigeria and the opening of UK facilities. Nevertheless, the trend is for continuing rapid growth in supplies and for increasingly deep and flexible markets.



The gas story has become complex. Gas prices have been pulled upwards by rising oil prices and there were spikes in the US and UK. Competition from cheaper coal has increased, especially in liberalised markets. Consumption accordingly fell in the US and UK - the world's largest and third largest gas markets. Most recently, gas prices in the US (and UK) have receded despite rising oil prices. Increasing supply availability, especially through contracted trade and in domestic markets, underpins gas consumption growth in many other markets. Gas is no longer the fastest growing fuel.

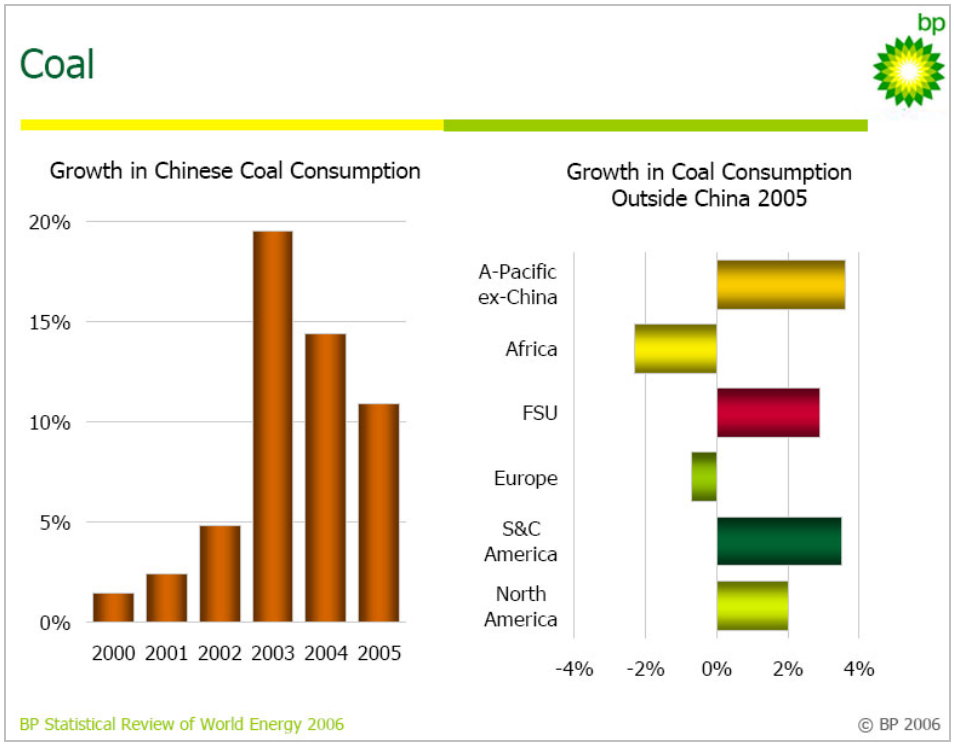
5.3 Coal

Coal is now the world's fastest growing fuel. This was the case in 2005, in 2004, for the period since 2000 and for the last decade, from 1995.



This, however, is only true as a result of China. China consumes 36.9% of the world's coal, almost all of which is domestically produced. In 2005 China alone represented 76.8% of the growth in world coal consumption. Chinese coal growth represented 38.8% of the growth in total energy consumption worldwide in 2005. Nevertheless, over each of the time periods I have just quoted, gas grew faster than coal in the world excluding

China. As a result it is appropriate to analyse coal in China separately from trends in the rest of the world.



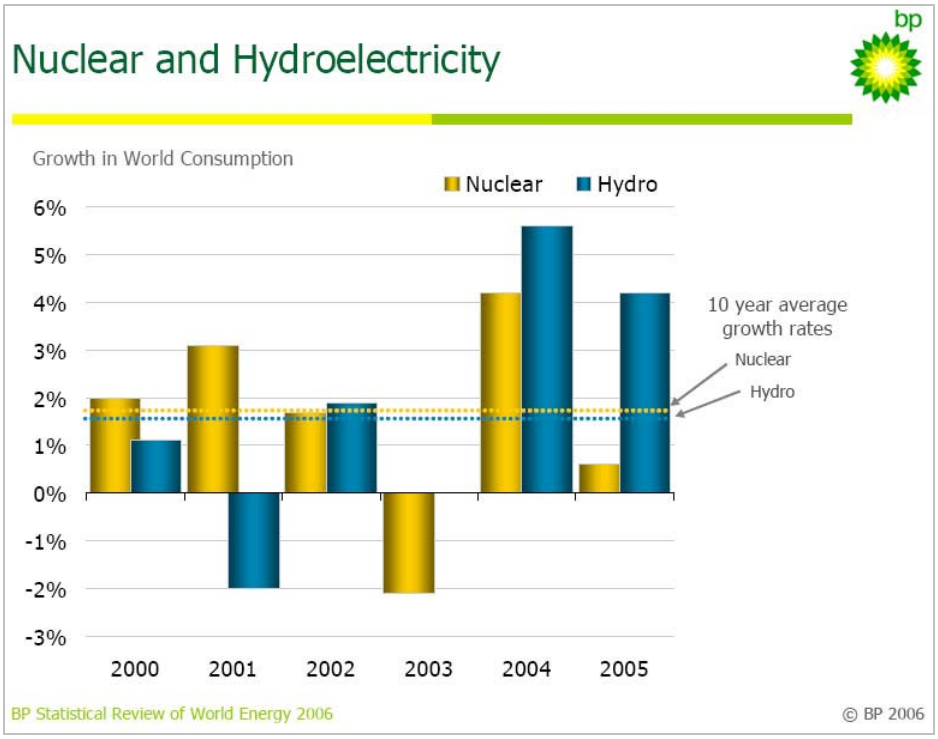
Chinese coal consumption increased by 10.9% in 2005, a slowdown from the 14.4% in 2004. In 2004 coal and coal fired power generation capacity had been in short supply. There had been brownouts, power rationing and growing use of oil in power. These constraints eased in 2005. In

2005 about 76GW of power generation capacity was added, of which 83% was coal-fired. The efficiency of coal use in power generation increased. Rail constraints were eased. Coal and power prices were raised. Meanwhile the power and coal intensity of industrial production fell. China's 2004 coal and power constraints have now been essentially resolved.

Coal growth outside China has been modest. It grew by 1.8% in 2005, just slightly faster than the 10 year average of 1.5%. The US and India share the role of the biggest volume increases. In the US the growth was fuel switching at the margin in face of high gas prices. In India it was GDP driven, partly imported and despite increased gas availability. Coal consumption is rising widely throughout Asia alongside imported gas. Russian consumption continues to rise and helps release gas for export. European Union coal consumption fell, but this was concentrated in Germany where subsidies continue to fall. Elsewhere in Europe – the UK, France and Spain – consumption grew, incentivised by lower coal prices.

International coal is now relatively cheap with prices having risen less and having turned down before gas. The cost of carbon has yet to critically impact fuel choice. Fuel choice for future power generation investment is a critical issue, but the economic answer is not yet clear.

5.4 Nuclear



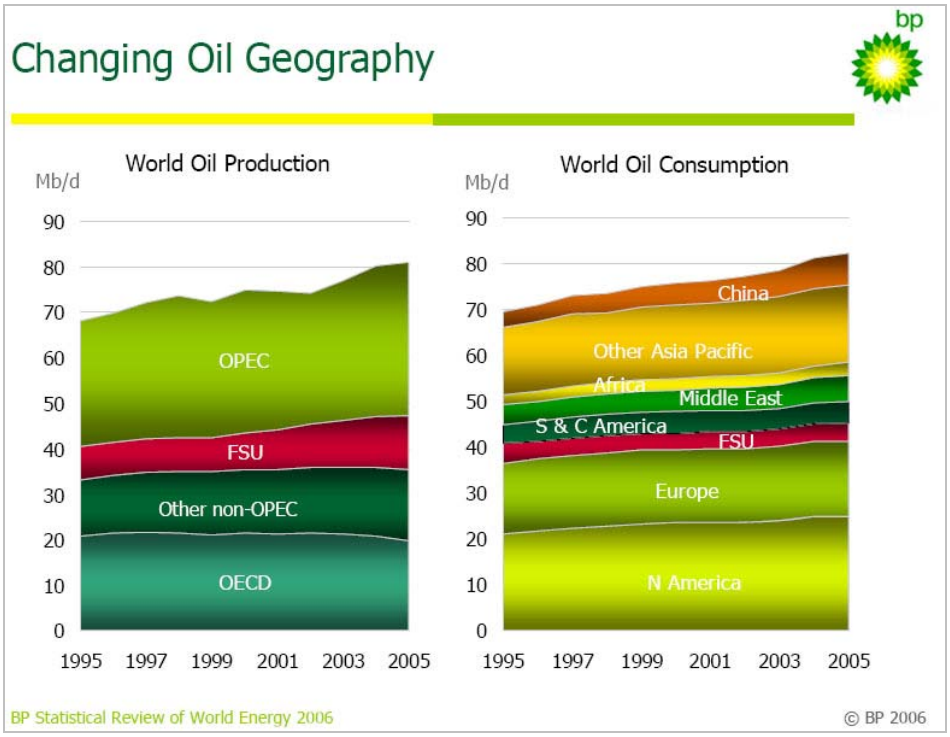
Nuclear power tended to sit on the sidelines in 2005 although the debate about future investment in new nuclear capacity has become more intense. Nuclear output edged up a mere 0.6%. Nuclear experienced above average growth in Asia-Pacific – 5.4% – but small declines in the US and Europe. 4 new reactors were connected to the grid, all in Asia-Pacific – 2 in Japan, and one each in India and South Korea. Nuclear output continues to edge up in Russia and the Ukraine. Meanwhile, Germany and Sweden permanently shut down one reactor each as part of a phase down policy. US nuclear output dipped as a result of increased planned maintenance downtime. Scheduled closures are set to impact nuclear output increasingly in coming years. New reactors are under consideration in a number of countries but lead times will inevitably be long.

5.5 Hydroelectricity

Both nuclear and hydroelectricity contribute 6% to total energy consumption. For the last decade hydro output has not kept pace with total energy consumption and its share has slipped slightly. All the growth over the last decade has come from outside the OECD, and virtually half of this has come from China. 2005 was a relatively good year for hydro, growing by 4.2%. China had become the world's largest hydro producer in 2004 overtaking Canada and Brazil as the giant Three Gorges Dam phased in. Further growth at the Three Gorges in 2005 stimulated a 13.7% growth in Chinese hydro output.

Elsewhere hydro output was driven by rainfall changes: better precipitation in Scandinavia, India, Canada and much of South America but low rainfall in the Alps, Iberia, Siberia and the US Pacific North West.

6. Energy Security



A number of factors have contributed to moving energy security up the agenda globally in 2005. High prices, fast changing patterns of production and consumption, weather related incidents and geopolitical tensions all provide the backdrop. Energy security is multidimensional, and often means different things to different people. This Review focuses on the presentation of objective data in order to illustrate and assess international energy trends. It is impossible to reveal 'energy security' in a single graphic or data point. We can however illustrate a few dimensions.

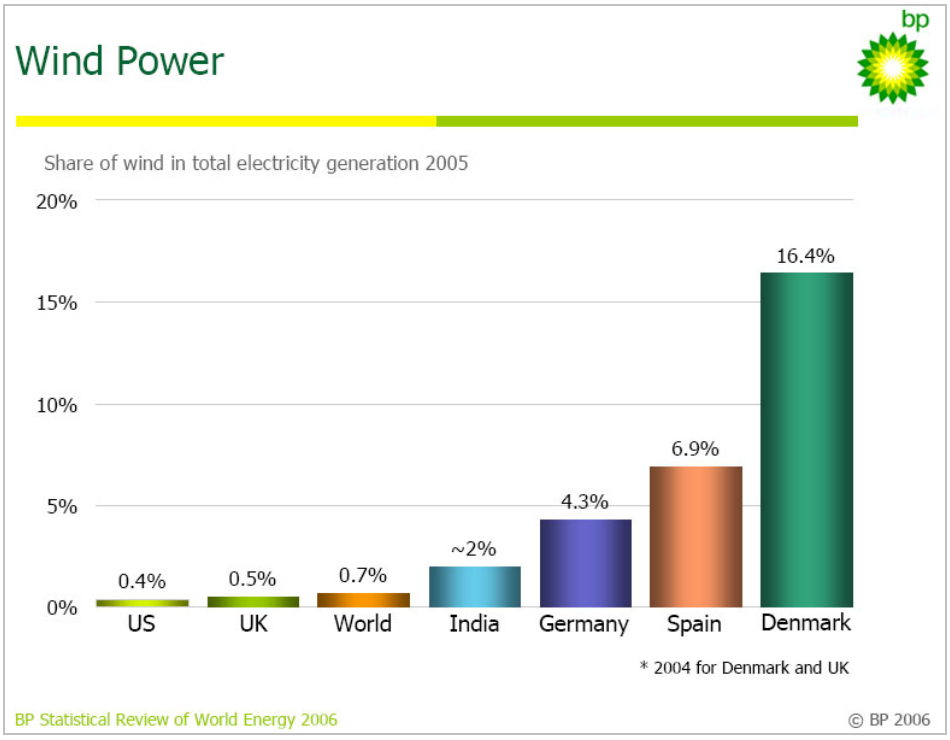
First we can observe the changing geography and flows of energy production and consumption. We have already discussed the rising trade in natural gas. The geography of oil has also been changing – and has raised concerns among some oil consumers and even producers.
Since 1995 world oil consumption has increased by 13 million b/d, that is 19% or 1.7% p.a. There has been growth in every region, except the former Soviet Union, but China has dominated the growth story. Chinese oil consumption has more than doubled to 7 million b/d. Most of this growth was imported. China alone represented 27% of the world growth. OECD oil consumption also continued to rise, but relatively slowly – at 1% p.a., by 4.8 million b/d in total. As a result, the OECD's share in world consumption slipped from 63.2% to 59.2%.

The changes in oil production are a contrast. Almost half the growth in world oil production since 1995 – that is 6.2 million b/d – has come from OPEC. OPEC production has reached its highest level ever, but its market share has hardly changed since 1995: it edged up from 40.8% to 41.7%. In comparison, OPEC's market share was 53.5% in 1973. In this sense the world's dependence on OPEC oil has hardly changed recently and remains below historic highs.

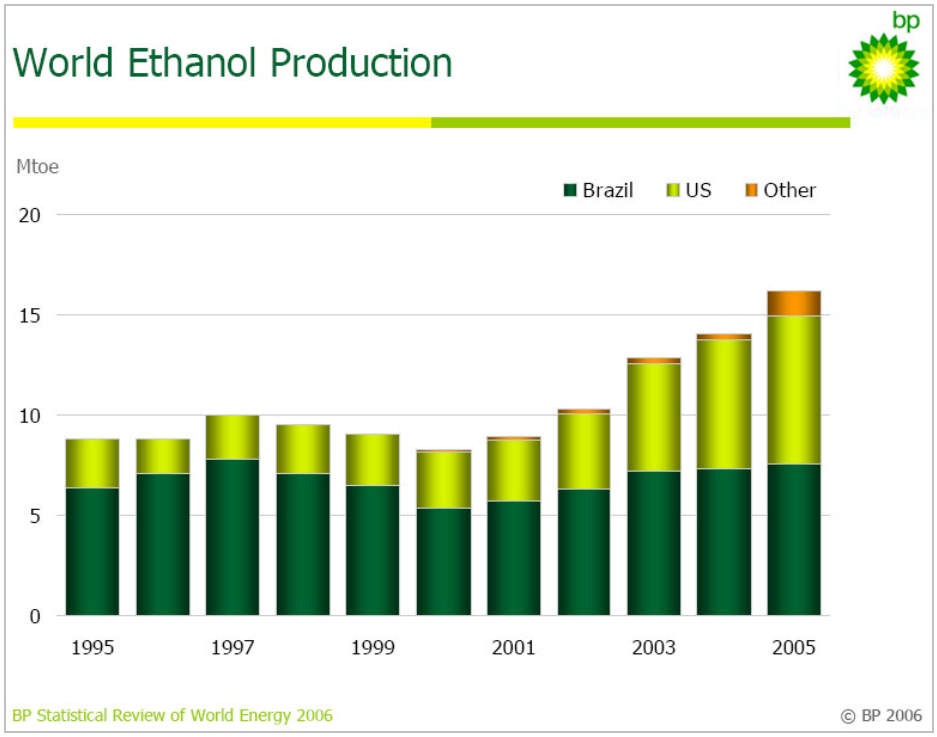
There have, however, been some big changes in the geography of oil production. OECD production fell by 971,000 b/d over the last decade, despite having grown in the late 1990s. Meanwhile oil production shifted to the Former Soviet Union, and Russia in particular, and to other non-OECD non-OPEC producers, whose aggregate shares went up from 29.5% to 34.4%. OECD's net oil imports rose from 24.3 million b/d to 29.5 million b/d: that is 59.1% of OECD oil was imported in 2005, up from 52.6% in 1995 and the highest share since 1979.

These broad demand trends look well established: that is rising OECD and Chinese oil imports. In the immediately foreseeable future there will be increased oil supplies available from the Former Soviet Union, from other non-OECD, non-OPEC producers and from OPEC. Longer term oil supply geography is less predictable and depends upon a variety of uncertain factors. The rising import dependencies worry some consumers. However, the growing levels of trade – whether of oil or gas – and the resulting interdependencies should also be grounds for some confidence.

Meanwhile, energy consumers around the world are increasingly expressing their desire to consume energy that is both local and green. The internet version of the Statistical Review contains selective data on renewable energies. I want to focus upon two of these to reveal the growth and the role of renewable energy in meeting this objective.

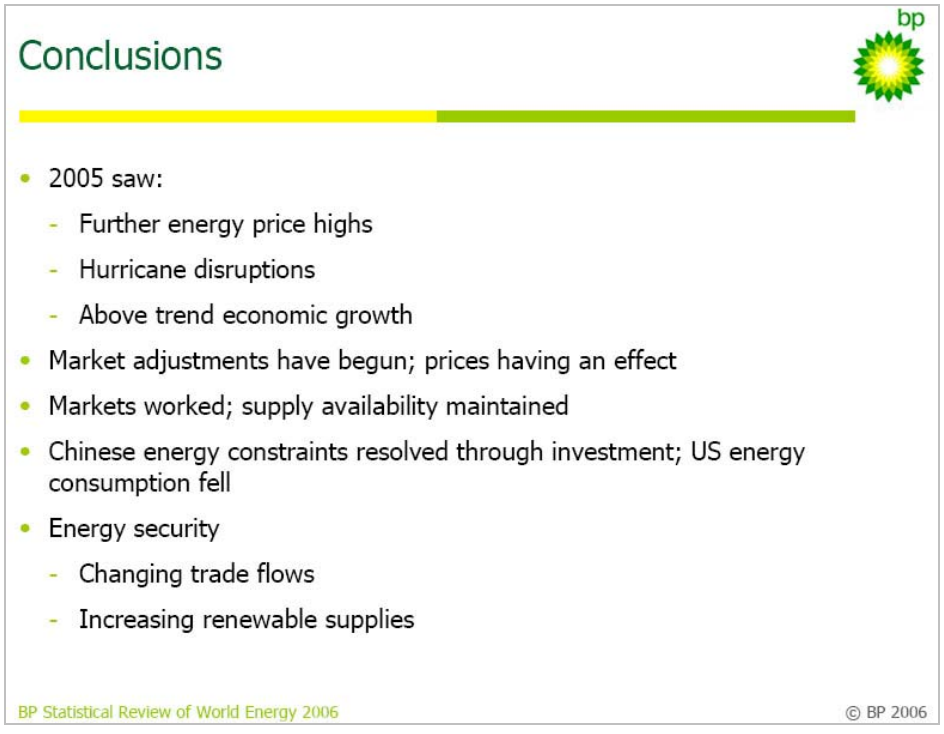


First there is wind power which is the most physically visible renewable energy to most people. Installed wind power capacity has increased at a rate of 28.6% a year since 1995. Wind's penetration has been selective, depending upon climatic conditions and the degree of public support. The growth of newly installed wind capacity has now exceeded that of new nuclear power worldwide for 8 years in a row. However, wind power still only generates an estimated 0.7% of worldwide electricity. Its role will rise further, but inevitably remain small for the foreseeable future.



Second, there is ethanol. Ethanol, together with bio-diesel, is the leading renewable liquid motor fuel. It used to be essentially a Brazilian phenomenon, distilled from sugar cane. US ethanol use has surged in the last several years, supported by tax credits and most recently by the 2Q 2006 phasing out of MTBE. 20% of the US corn crop is already utilised to produce ethanol. There are also active programmes in Canada and China. Global ethanol production increased by 10% in 2005 and reached 16 mtoe – equivalent to over 300,000 b/d of oil production – about 0.4% of world oil consumption. Government programmes indicate that further rapid growth is probable. Technological advances particularly into cellulosic ethanol offer a substantial potential for growth into the medium and long term.

7. Conclusions



2005 has been another dramatic year in energy markets. Energy prices rose to new highs and in 2006 oil prices have risen yet further. 2005 was a year of further above trend economic growth and one when the weather was disruptive, especially the US hurricanes.

Global energy consumption growth was also above trend, but not as strong as economic growth alone would predict.

Market adjustments are beginning and will continue. Coal and gas prices have already fallen. There have been price effects on demand. Oil consumption growth slowed sharply and inventories have risen. However, the perceptions of rising risk have pushed oil prices up yet further. There has been interfuel competition in some markets. Coal has become the fastest growing fuel.

Markets have continued to work despite physical disruptions. Natural gas and oil product price spikes have proved to be temporary and served to maintain supplies. Supply availability has continued, but at the cost of high prices.

The constraints in China's coal and power markets were essentially resolved during 2005 through new investment, mainly in coal. Chinese oil, coal and total energy growth all slowed despite steady high economic growth. US energy consumption fell – as did US consumption of all fuels except coal – despite above trend economic growth.

Energy security has risen up the agenda in almost every country. Energy importers are importing more energy from energy exporting nations. Both groups are increasingly concerned. Such concerns should be balanced against the mutual benefits from growing trade and interdependence. Renewable energies are fast growing, but still small in aggregate; growth prospects are strong.