

Price, supply and demand go in wrong direction

Energy challenges multiply rapidly

From detailed energy data for 2007 published by BP and Cedigaz a number of worrying themes emerge. With energy demand rising inexorably and supply struggling to keep up, prices are likely to remain high and volatile. We are not running short of hydrocarbons yet – but bringing reserves to market is becoming increasingly difficult. And carbon emissions continue to rise rapidly.

| by Alex Forbes

Given that 2007 was a turning point in global awareness of anthropogenic climate change, it may come as a surprise to hear that the fastest-growing mainstream source of energy last year was coal. Consumption was 4.5% up on 2006. The slowest-growing of the fossil fuels was oil, which grew by 1.1%, but that did not stop crude prices approaching \$100/barrel towards the end of the year and breaking through that barrier early in 2008. The price rise has since accelerated. Meanwhile, despite 2007 being a record year for investment in so-called clean energy technologies – new investment reached almost \$150 billion – renewable energies such as wind, solar and geothermal power accounted for a tiny proportion of the world's electricity generation: less than 1.5%.

These were just some of the worrying messages that emerged in mid-June when BP's chief executive officer, Tony Hayward, and the group's new chief economist, Christof Rühl, launched the

latest Statistical Review of World Energy. Hayward described the review as 'one of the world's most reliable sources of energy data' and no one would argue with his assertion that 'at times like this we all – inside and outside the energy industry – need good data to make well-informed judgements'.

Just as useful as the 55,000 data points that the review provides is the detailed analysis that BP puts together to accompany the raw numbers. The analysis presented by Hayward and Rühl showed that – on every level – the world's energy economy has entered an era of unprecedented challenges. For the most part, Hayward and Rühl painted a gloomy picture but they also put forward suggestions for how the challenges might be tackled. That said, the solutions will not come cheap, with greater investment needed in all forms of energy production, and especially in energy efficiency, which some observers and analysts now see as potentially the

biggest contributor to solving the world's energy problems.

Hayward identified four major themes that Rühl and his team of economists had teased from data:

We live in an area of high, volatile prices for commodities of all kinds – and oil is no exception.

'Our view,' said Hayward, 'is that at least for the medium term the era of cheap energy is over. Dated Brent crude oil prices rose last year to [an average of] \$72.39, an 11% increase. Prices have increased for six consecutive years. That is a first in the history of the oil industry, and we have records going back to 1861, the year the American Civil War started. So we clearly live in an unusual era.

It is not just oil that has seen rapid price escalation. According to Rühl, since January



Tony Hayward, ceo of BP. Photo: Chip Somodevilla/Getty Images

2003, we have seen cumulative price growth of 300% for oil, 200% for traded coal, and 100% for US gas, 'all accelerating towards the end of the period'.

Hayward emphasised the divergence we have seen in the prices for oil and natural gas. While gas prices increased in most countries last year, 'the increase in global gas prices has not kept pace with crude oil, with US gas last year trading at a record discount to fuel oil'. Coal prices increased everywhere except in the US.

It is, however, the steep rise in the price of oil that has grabbed the headlines and Hayward was very definite about why oil prices have hit record peaks: 'There are some people that put the rises down to short-term factors – so-called speculators, or the weakness of the dollar – but the reality is that this is about fundamentals: a very tight balance between supply and demand.' The main driver of demand has been an unusually strong period of economic growth. Moreover, the

growing contribution to economic growth of the non-OECD economies has major implications for energy demand growth because energy intensity in these economies is three times that in the OECD economies. 'In 2007,' said Rühl 'developing

to show year-on-year declines for the first time this decade.' According to the 2008 Statistical Review of World Energy, world oil production fell 0.2% from 2006 to 81.53m barrels a day (b/d) in 2007, the first decline since 2002. OPEC production

It may come as a surprise that the fastest growing energy source was coal

countries used 4.4 barrels of oil equivalent (boe) to produce \$1,000 worth of GDP, but the OECD used only 1.4 boe.'

Turning to the supply side, Hayward said: 'Supply has failed to rise adequately to respond to the increase in demand. The data shows that Opec production fell last year. Production of oil and gas is falling in many of the mature market economies. Another big impact on supply is Russia where production has recently begun

fell by 300,000 b/d because of production cuts implemented in November 2006 and February 2007. Oil production outside Opec remained weak.

Production of natural gas rose by 2.4%, with the US accounting for the largest increment. China and Qatar also saw strong growth in output. EU production fell by 6.4%, with UK output down by 9.5%, the world's largest volumetric decline for the second consecutive year. LNG supply

grew by 7.3%, with much of the growth coming from Qatar and Nigeria.

Stressing that bringing new supplies of energy to market would require big investments, Hayward identified three obstacles: the overheated project construction environment, resource nationalism and high taxes. 'Although industry spending has increased significantly,' he said, 'the supply chain is red hot – and bottlenecks, equipment shortages and lack of skilled personnel have resulted in growing delays and significant cost inflation.'

Where markets are allowed to operate freely, they work.

'Consumers are responding to high prices by moderating demand,' said Hayward. 'For instance, global consumption of oil, the fuel with the largest price increase, was the weakest of the fossil fuels. It was below average for a second year in a row. In fact, all of the growth in world oil consumption was concentrated in countries that subsidise prices. In the market economies of the OECD, consumption declined again in 2007, including in the United States.' Countries that subsidise fuel prices include China, India, and the oil-producing nations themselves. Subsidies shield consumers from the full impact of rising prices, and can therefore lead to profligate energy use.

'The world has ample resources of oil, gas and coal'

However, with oil prices at their current levels, many governments are struggling to pay the enormous bills that subsidies require.

World primary energy consumption in 2007 was 11,100 million tonnes of oil equivalent (Mtoe), up 2.4% on 2006. European Union (EU) consumption was down by 2.2%, OECD saw a rise of 0.3%, and the former Soviet Union (FSU) a rise of

0.8%. Other emerging market economies ('other-EMEs' – a grouping made up of the Middle East, non-OECD Asia, non OECD-Europe, Africa, and South and Central America) saw demand rise by an average of 5.5%.

World oil consumption rose by 1.1%, or 1 million b/d, to 85.22 million b/d and again there were big differences across regions. EU consumption was down 2.6% and OECD by 0.9%, while 'other EMEs' saw a rise of 4.4%. Consumption in the oil-exporting regions of the Middle East, South and Central America, and Africa accounted for two-thirds of the world's growth.

Consumption of natural gas rose by an above-average 3.1% to 2,922 billion cubic metres (bcm). However, only North America, Asia-Pacific and Africa recorded above-average regional growth, with the 'other EMEs' grouping rising by 4.1%. In the EU, consumption fell by 1.6%, mainly because of warmer-than-average winter weather.

We are not running out of hydrocarbons.

Hayward was adamant that reserves of oil and gas are sufficient to meet demand for the foreseeable future. 'I'm certainly not a subscriber to 'Peak Oil', he insisted. But he acknowledged that geopolitics, in particular resource nationalism, were

creating supply constraints. 'The data in this review have consistently shown that the world has ample reserves of oil gas and coal. Global proved oil reserves are sufficient to meet current production for more than 41 years – and reserves are tending to increase over time. However, bringing those reserves into production is a different matter. Declining OECD production highlights the fact that while resources are not a constraint globally,

the resources within reach of private investment by the oil majors or the independents are limited by political factors, trade barriers and high taxes.

'In other words, when it comes to producing more oil, the problems are above ground not below it, and they are human not geological.'

The BP statistics show that proved world oil reserves at the end of 2007 were 1,238 billion barrels, down very slightly from 1,240 billion barrels in 2006, giving a reserves/production (R/P) ratio of 41.6 years. Natural gas reserves were 177.4 trillion cubic metres (tcm), up slightly from 176.2 tcm in 2006, giving an R/P ratio of 60.3 years. Coal reserves were 847,500 million tonnes, giving an R/P ratio of 133 years.

Despite booming investment in clean energy technology, the world's carbon emissions continue to rise.

'The fastest-growing fuel is coal,' said Hayward, 'because it's cheaper, easier to access, and usually located where it is consumed. What is more, reserves of coal are the largest of all the fossil fuels.' So although clean technologies are growing very rapidly – wind power by 28.5%/year and solar power by 37%/year – Hayward said that 'all reasonable forecasts suggest we will continue to be dependent on fossil fuels for the bulk of our energy, well into the future'.

'The world urgently needs more energy investment', concluded Hayward. 'And I'm talking about energy investment of all kinds: oil, natural gas, coal, nuclear energy and alternative energy. In short, we need all forms of energy, from all sources. And we need to focus on using the energy we consume more efficiently.'

'My expectation is that policy changes will occur over the medium term to allow oil production to be increased sustainably. (...) I am optimistic that the world will figure out what needs to happen to allow production to continue to rise to meet the demand.' Right now, not everyone will find it easy to share his optimism. ■

A year of divergence for world gas markets

Overall, Cedigaz reports world natural gas supply rising by 2.5% on 2006 to reach 2,951 billion cubic metres (bcm), numbers very similar if not identical to those reported by BP in its statistical review (see main article). There were, however, very different growth rates between and even within regions:

- In North America, marketed production of 779 bcm was boosted by a 3.2% rise in US production, while production in Canada edged up by only 0.8%.
- In the Former Soviet Union (FSU), soaring output in Azerbaijan, Kazakhstan and Turkmenistan largely offset a slight decline in Russian output, leading to production of 794 bcm, a 1.3% increase.
- In Europe, production fell by 3.8% to 294 bcm as mild weather curbed demand. Only Norway increased its production. The UK, in structural decline, recorded a fall of 9.4%.
- Production in the rest of the world grew strongly to meet both local demand and exports. The fastest absolute growth was in the Middle East – notably in Qatar – Asia and Africa.

International gas trade rose by 2% in 2007 to reach 905 bcm, and it accounted for 30.7% of world marketed production. Almost all the growth came from a 7.7% increase in LNG trade, while pipeline trade was again more or less flat, recording growth of just 0.4%, reaching 679 bcm. The share of LNG in global gas trade rose from 23.7% to 25%, a volume of 226 bcm.

LNG imports in North America rose strongly to 25.1 bcm after two years of decline, making the region the fastest-growing LNG market. Asian LNG demand grew by 9.5% to 148 bcm, driven by high growth in both traditional markets such as Japan and emerging markets such as India and China. European LNG imports fell by 7.1% to 53 bcm, reversing the trends of the two previous years when Europe recorded the fastest LNG demand growth rates.

| | Marketed Production | Exports | Imports | Consumption |
|---------------------|---------------------|--------------|--------------|---------------|
| North America | 779.1 | 132 | 156 | 803 |
| Latin America | 147.4 | 32.6 | 14.4 | 129.2 |
| Europe* | 279.8 | 171.3 | 416 | 524.7 |
| Central Europe | 13.7 | - | 11.3 | 25 |
| Former Soviet Union | 794.1 | 280.5 | 120.3 | 633.8 |
| Africa | 196.6 | 109.1 | 2.7 | 90.2 |
| Middle East | 355.4 | 75.8 | 19.9 | 299.5 |
| Asia/Oceania | 385.2 | 103.6 | 164.3 | 445.9 |
| World Total | 2951.3 | 904.9 | 904.9 | 2951.3 |

* intra FSU trade is included

World natural gas balance in 2007 - in billion cubic meters

Source: Cedigaz, 2007 Natural Gas Year in Review



Cedigaz is an international association dedicated to natural gas information. It currently has 195 members from 40 countries. The members represented in the Board of Administration play the most active role in the gathering and spreading of information.