

**MacroPlus
Comment**

Old king coal

- Oil and gas are the focus of much public discussion of energy and climate change
- However the real issue is coal, which is making an important comeback
- Moreover, this stands to continue: coal reserves are practically limitless
- Any serious climate policy would need to tackle coal head on

Igniting the energy debate

Oil and gas are central in public energy discussion ...

The media focus has for some time been on oil and gas. Oil because enhanced recovery techniques are causing output in the US – once again the ‘lucky country’ – to rise back towards self-sufficiency. Gas because the shale price tumble is boosting US industrial competitiveness: gas prices in the US are now only half as high as in the EU, and lower still relative to those in Japan and much of the rest of Asia.

In Germany, where the matter is compounded by the cost of Energiewende – Germany’s renewable energy transition – the corporate sector has become vocal on the issue. In the UK, it is consumers who are pushing the matter up the political agenda.

... especially in some advanced economies

At a global level however, it is not oil and gas that are the real issue: rather it is coal. For coal, that dirty fuel which dominated energy supply in the latter part of the 19th and early 20th Centuries, and which fuelled the Industrial Revolution, no less, is making a comeback. And this may well have profound consequences.¹

The fall and subsequent rise of coal

Oil and gas drove the energy sector in the 20th Century

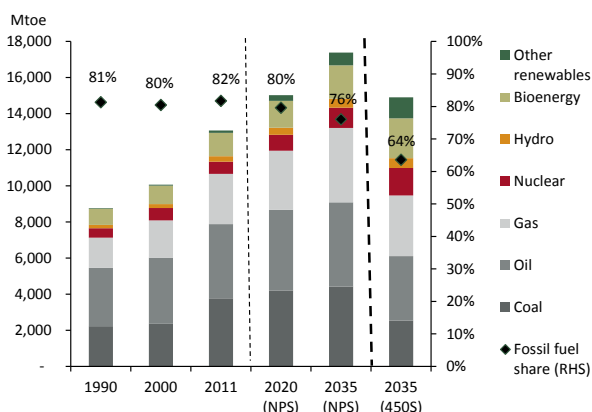
Coal’s decline, from the early decades of the 20thC, was due in important part to major technological advances, especially cars and aeroplanes, that required high-energy-density fuels – in short, oil. Demand for oil-based fuels grew rapidly, and continued throughout the century. Meanwhile, gas demand too developed strongly as natural gas became more widely available. By 2000, oil accounted for over a third of global primary energy demand (36%); coal for 23%; and gas for 21%.

But coal is making a comeback

But now coal is coming back, and with a vengeance. Between 2000 and 2011 coal demand soared by 60%, far outstripping the growth of demand for oil (12%) and gas (34%). Coal now accounts for 29% of world primary energy demand, not far behind oil’s 31%.

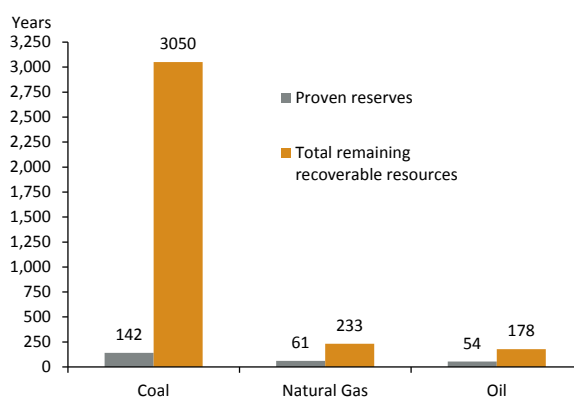
Coal demand is growing particularly strongly in developing Asia: just this past month China approved the construction of 100 million tonnes of coal production capacity, equivalent to 10 percent of US annual usage, and a six-fold increase on 2013. Even in Germany, (brown) coal electricity production rose last year, to its highest level since 1990, the result of new plants being built to meet base-load demand following the shelving of nuclear power plant construction plans.

Figure 1: World primary energy demand, 1990-2035



Source: IEA World Energy Outlook (2013)
Notes: NPS: New Policies Scenario; 450S: 450 Scenario

Figure 2: Fossil energy resources by type



Source: IEA World Energy Outlook (2013)
Notes: Number of years of production based on estimated production in 2013

Plus ça change, plus c'est la même chose

Fossil fuels still dominate energy demand ...

Thus, due in significant part to coal, and notwithstanding climate change and environmental concerns and policies over the past twenty-odd years, hydrocarbons today are as dominant an energy source as they were in the 1990s. In 1990 the fossil-fuel share of primary energy demand was 81% (Figure 1), by 2011, nearly 20 years on from the Rio Earth Summit, the share had actually nudged up, to 82%, notwithstanding a more than three-fold increase in demand for 'other renewables' such as wind and solar.

... and are expected to do so for some time

Nor does the situation seem likely to change, at least any time soon. For example, the IEA's *New Policies [central] Scenario* projects a fossil fuel share of 80% in 2020 – the same as in 2000. Even over the long term, hydrocarbons' share is expected to drop only modestly – to 76% by 2035.

Technology drives all fuel types

Technology drives both renewables and fossil fuels

One reason for fossil fuels having retained their importance owes to the considerable competition within the energy sector: although renewables have benefitted from technological advance, so too have fossil fuels. Consistently-high oil and gas prices have had, and continue to have, a profound impact on oil and gas supply, driving game-changing technology advances. Enhanced recovery techniques, hydraulic fracturing, and horizontal drilling are but three examples.

In parallel, oil is being progressively outcompeted in sectors other than transport, particularly given that natural gas is a cheaper substitute. And lower gas and oil prices make renewables less cost-effective.

Endless coal

Coal reserves are near endless

On present evidence it would seem that, notwithstanding the often-commented-upon developments in oil and gas, coal will – on present policies at least – play a major role for decades, if not centuries, to come. One, major, reason is that coal resources are immense. On latest estimates, proven reserves of coal would last for around 150 years at current production levels. More remarkably still, total recoverable resources could last for a staggering 3,000-odd years (Figure 2). These resources way exceed those for natural gas and oil, even after recent exploration and discoveries.

Climate policy would need to tackle this head-on

One implication of the near-limitless reserves of coal is that any serious global climate policy would have to become a coal-centric story. IEA projections illustrate the scale of the challenge. Coal demand in the *450 Scenario* – which shows the energy and emissions pathway judged necessary if the world were to be kept on the 2°C track² – would need, by 2035, to be 43% below the level expected in the central *New Policies Scenario*. This would represent the biggest relative reduction required of any fossil fuel (Figure 1).

Stranding abundant coal assets would prove difficult

It is therefore impossible, on the arithmetic, for policymakers to get serious about climate change unless they tackle coal head on. And this seems unlikely. A material carbon price, ideally globally, would discourage its use: but it could well prove politically difficult to 'strand' assets on anything like the requisite scale. Carbon capture and storage, by preventing CO₂ release from fossil fuel use, may offer a solution. But with present technologies, at least, it adds substantially to the cost of power plants, putting them on a par with low-carbon technologies.

The canary in the coal mine

Against this background there are two basic developments which, although unlikely, would be of immense significance were they to start to happen:

- **First, policymakers getting serious about tackling coal.** Given that abundant cheap shale gas has led the price of coal lower, the explicit or implicit tax that would be needed to keep coal demand in check would probably have to be high. Thereafter, climate policy – and a low-carbon shift – might move quite quickly, given coal's disproportionate importance;
- **Second, a breakthrough with carbon capture and storage.** That could unlock the current policy deadlock: while it is possible to imagine users paying more to use coal, it is difficult to imagine countries allowing plentiful coal assets in the ground to be stranded.■

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¹ We express our thanks to Nick Butler for a helpful discussion on this issue.

² Defined by the IEA as a 50% chance of keeping the long-term increase in average global temperature to 2°C.