

A golden age for gas?

The UK currently faces a number of energy challenges; the closure of coal and nuclear power stations, the decline in UK Continental Shelf (UKCS) oil and gas production, the intermittent nature of renewable generation such as wind and solar, and the UK Plc being able to fund the renewable technologies and insulation schemes needed to meet renewable energy targets

Gas demand in the UK has been primarily met by indigenous gas production from the UKCS but, in recent years, UKCS production has been declining and imports have been rising to meet demand. By 2025 the UK will be reliant on imports for around 75% of its gas. It is expected that despite the development of renewable heat sources such as air source heat pumps and biomass boilers, gas will remain the predominant source of domestic heating in the UK for the foreseeable future.

Electricity demand is set to rise over the next 30 years and, in the short term, that rise will be met by generation from natural gas and wind. The government's renewable energy strategy aims to reduce fossil fuel demand and encourage the use of renewable energy sources, in particular offshore wind. However, wind power is intermittent and for the majority of the time will not be sufficient to generate enough electricity to supply UK demand. Most nuclear and coal power stations are being shut down, and it may be that new nuclear power stations are not going to be economic. Therefore, electricity will be generated by a small amount of nuclear, perhaps some coal with carbon capture and storage (CCS) and wind energy, with gas as the predominant supply.

The Committee on Climate Change has argued that the government may be breaking its own climate change law by allowing gas-fired generation to be built. However, it is the energy suppliers which have to keep their customers' lights on and the only option for a windless day is gas; there is no alternative. There is also no material alternative to gas for heating. Biogas from anaerobic digestion is great but this is limited in supply to around 10% of domestic customer gas demand.

According to the 2011 Department of Energy and Climate Change (DECC) Carbon Plan, domestic transport accounts for 22% of UK greenhouse gas emissions. The majority of this comes from road transport, which accounts for 20% of UK greenhouse gas emissions. The government supports electric vehicles (EVs); however, the major carbon drawback of these is the production of the electricity used to charge the vehicle. In theory, the electricity used could be generated by



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renewable methods. However, the minimum electricity demand in summer night-time is approximately 25 GW, but nuclear and wind energy will only produce a maximum output of around 15 GW at any one time. This means that the electricity used to charge an EV will be generated by burning fossil fuels in coal or gas power stations.

There is little prospect before 2030 of having a material and consistent surplus of renewable electricity, which means that until that time at least it is likely that EVs will be adding to carbon dioxide emissions compared to petrol hybrid or low emission diesel cars.

DECC forecasts that, by 2025, the UK will be importing around 1mn barrels of oil per day, at a cost of around £40bn per year. It does not seem possible for UK Plc to fund this level of imports and, at the same time, finance renewable and alternative energy technology. Similarly, DECC forecasts an increased reliance on LNG imports by 2025, as a consequence of EU and UK policies creating an effective 'electricity from gas' strategy. The main supplier of LNG to the EU is Qatar which, aside from being expensive, results in very high carbon dioxide emissions from making LNG in desert conditions, made even worse by having 7% carbon dioxide vented to the atmosphere.

Given the reliance on LNG, it makes sense to have more domestic gas storage as a buffer to volatile LNG prices. However, the UK has had limited gas storage investment in the past 20 years, even as the UKCS has declined.

Clearly, there is a challenge to provide funding for expensive renewable technology and maintaining gas-powered back up to electricity generation, providing insulation for homes and to encourage new industry in the UK to pay for oil and gas imports. However, we may be lucky.

In 1973, Gulf (now part of Chevron)

drilled through the South Morecambe gas field, which was originally thought to be dry until John Bains of British Gas identified 180 m of gas-bearing rock and British Gas took over all the licences to develop this field. This was probably the most important event in the history of Centrica, BG Group and National Grid. South Morecambe has produced around 5 trillion cubic feet (tcf) of gas, which is worth around £50bn at today's gas prices.

Some 200mn years ago, the South Morecambe gas field was filled from gas below it in the Bowland Shale. Fortunately for UK Plc, this gas is still in place, and UK company Cuadrilla has the licence to develop it. Cuadrilla claims to have an estimated 200 tcf gas reserve in Lancashire which, if there is only 30% recovery, would be equal to 12 South Morecambe gas fields. This would equate to 1.5 tcf per year for 40 years, providing around a half of UK gas demand, and would be worth around £600bn that would otherwise be used to import gas from places such as Qatar.

The British Geological Survey (BGS) has identified numerous other good shale gas prospects across the UK and the total UK resource could be over 1,000 tcf. It is understood that DECC is working with BGS in relation to the total UK shale gas resource and such estimates will be published in Q1 2013.

The UK also has 6,000 km of high pressure gas grid known as the Local Transmission System (LTS). This operates at pressures of between 15 and 35 bar and is located within 2 km of 90% of UK's major logistics centres. With the availability of dual-fuel diesel-compressed natural gas (CNG) trucks, this provides the UK with the opportunity to shift transportation of trucks and buses onto CNG, saving in oil import costs and reducing carbon dioxide emissions by around 20%

In conclusion; renewables are great but intermittent and natural gas is needed to maintain supply for both electricity and heating demand. The UK has huge shale gas resources and we can start to replace LNG and oil imports with UK gas. We can also use this gas for a highly efficient version of CCS – 'coal can stay underground'! This strategy would provide work for UK people, reduce the cost of imports, ensure energy security of supply and result in lower overall carbon dioxide emissions. Shale gas production will also generate taxes, which could provide funding for renewables, insulation and a shift to natural gas vehicles.

We really are lucky to have such a resource and the planet earth will also be lucky if the shale gas can be used to underpin 'coal can stay underground' projects. ●

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