SHAUN FITZGERALD

Managing demand

*When minding the energy gap, it is crucial to manage demand says Shaun Fitzgerald**

The UK domestic energy gap is widening, with national demand set to outstrip indigenous supply. Growth in demand has been around 0.7% per year. It is envisaged that by 2010, based on current estimates, the UK will have to import 50% of its gas demand. This estimate rises to 80% for 2020. The overall strategy for devising a solution to this potentially awkward situation must involve initiatives to increase energy supply. If growth in demand continues at the current rate then a further 80-90 million tonnes oil equivalent (mtoe) will be required by 2050. Crucially, there are also major opportunities to close the gap by reducing the UK energy demand. A cut in demand also means a welcome cut in carbon emissions from use of fossil fuels.

The UK government recognises the importance of energy saving. The 2003 Energy White Paper stated explicitly that energy efficiency measures are needed in order for the UK to meet its commitment to reducing carbon emissions by 60% by 2050. The opportunity for energy savings can be gleaned from a brief review of UK energy consumption. The chart shown in Figure 1 shows that the UK's primary energy demand in 2003 was 245 mtoe. Of this, only 70% reached end consumers. These losses in the supply chain represent a significant opportunity for savings. Fifty mtoe are lost simply as heat energy in the generation of electricity. This waste heat is mainly discarded to the environment.

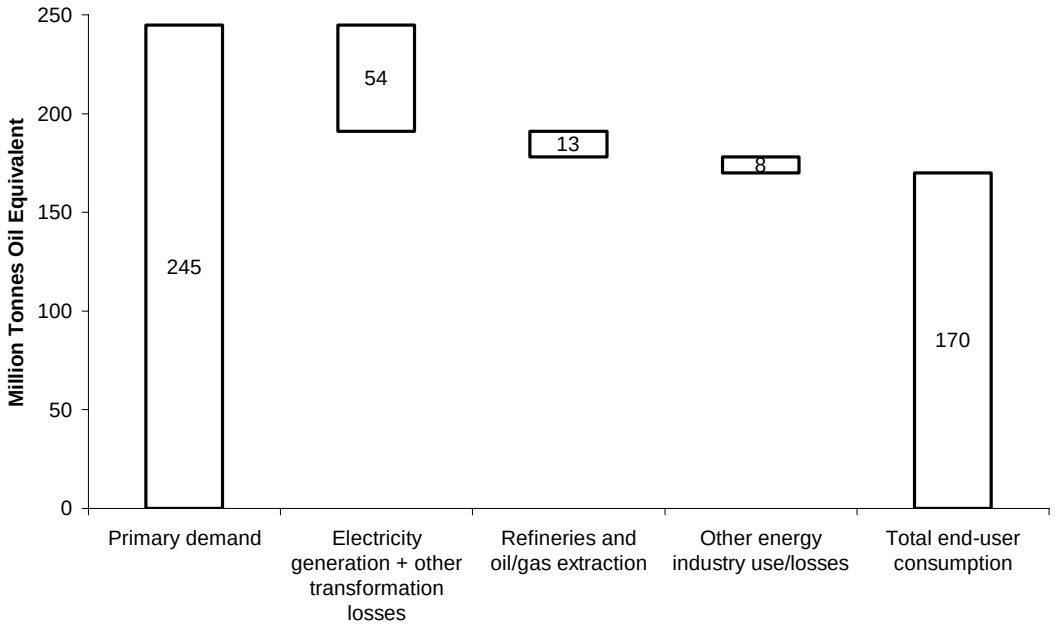

Figure 1. 2003 primary energy demand in UK from DTI Digest of United Kingdom Energy Statistics.

In continental Europe district heating schemes, in which dwellings and other buildings make use of this otherwise waste heat from power generation, are more widespread than in the UK. For example, district heating supplies 28TWh of heating in Denmark, accounting for 50% of the Danish heating market. Sixty-two percent of the district heating is from cogeneration plants, where the waste heat from electricity production is supplied to buildings. The infrastructure to provide this has been developed over several decades. It is estimated that there is over 20,000km of district heating pipeline in Denmark, for a population of only 5 million.

District heating is big business – there are over 300 district heating companies in Denmark, with district heating revenues estimated to be over £1bn per year. District heating schemes are not unknown here – there's one in Southampton. But in order to reap the benefits more widely, significant changes in the planning and location of future power stations and dwellings are needed. District heating schemes require integrated and decentralised CHP systems rather than large, isolated power stations. It is also worth noting that there are major new developments in the decentralised micro-generation market, based both on fuel cell and Stirling Engine technology. These are considered to have enormous potential but currently pose significant challenges.

Further opportunities for energy savings lie within the end-consumer group. From Figure 2 it may be seen that providing energy to buildings accounts for 40% of all energy consumed. Most of this is associated with heating and cooling buildings, and it is well known that there is a wide range of energy efficiency in the UK building stock. Older buildings are typically less well insulated, have inefficient energy management systems and inefficient lighting. Even within new buildings that are intended to be low energy, there are considerable variations in energy efficiency.

For example, air-conditioned buildings, which are increasingly becoming the norm, typically cost more and consume twice the energy of the non-air conditioned type. Somewhat surprisingly, it has also been found that in many cases air-conditioned buildings do not deliver significantly better internal temperatures. Properly designed non-air-conditioned buildings provide a major opportunity for energy savings within the building sector.

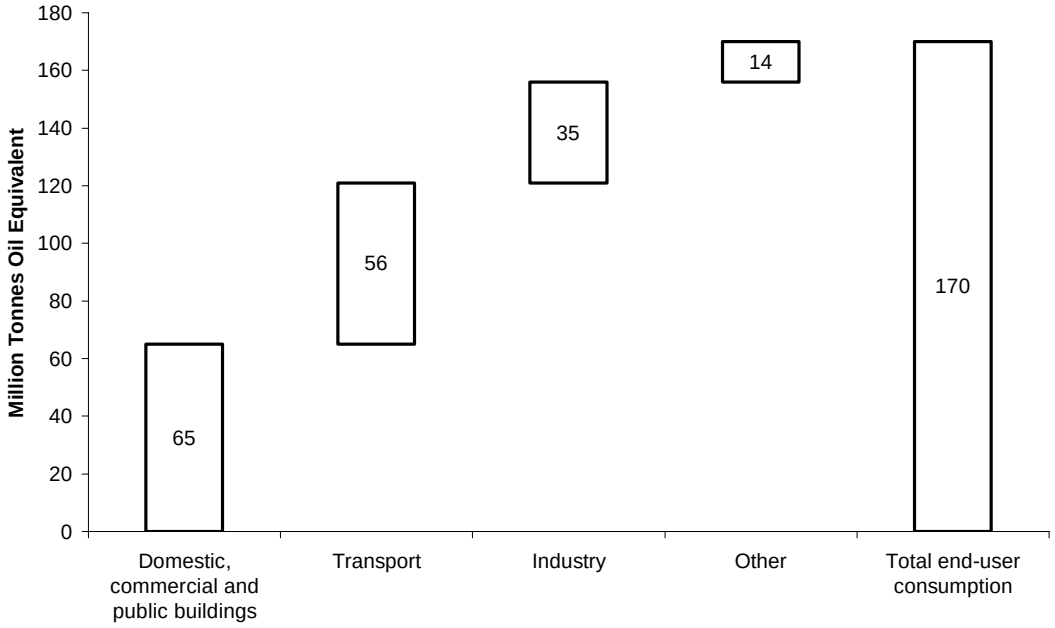

Figure 2. 2003 energy consumption in UK from DTI Digest of United Kingdom Energy Statistics.

What are the other major drains on the UK energy supply? Transport accounts for 30% of the UK consumption. The opportunities here are for improvements in efficiency of current modes of transport, as well as a shift from the individual car towards rail or bus rather than the other way round. There are encouraging moves in the motor industry – the introduction of the hybrid car by Honda and Toyota demonstrates that significant opportunities are available, and represents new business opportunities for the manufacturers. Making the public transport system more attractive, and even an option for those in remote locations, requires further investment.

Finally, there are also opportunities within the industrial sector. Larger industrial organisations are involved with Climate Change Levy Agreements and the EU Emissions Trading Scheme. Smaller and medium sized enterprises have enormous potential for savings through energy efficiency, which are largely unrealised through lack of resources or awareness. Improvements in energy efficiency typically require new investment. Decisions regarding each opportunity tend to be based on the expected financial return. In this era of rising energy prices, where prices have doubled in the last 12 months, there will doubtless be new opportunities for energy savings driven by economics.

The key questions that need to be addressed are:

1) What measures should be put in place to increase the uptake of existing and development of new technologies so that the vast opportunities for energy savings can be realized? Can we rely on

market forces to make the energy saving schemes financially attractive in the near-term? Are government-led financial incentives required, or is new legislation needed beyond recent mandates such as the EU Energy Performance Directive for Buildings?

2) With appropriate measures in place, what is the full potential for improving our energy efficiency – what proportion of the forecast energy gap can be closed?

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