

A Sustainable Energy System and Barriers to Achieving it

What is a sustainable energy system, in the context of heat and electricity?

To answer this question, we start with the context of the best scientific evidence on climate change, accepted by the Government, which means that as a nation we must at least reduce our greenhouse gas emissions by 60% from the 1990 levels by 2050. Increasingly, a consensus is emerging that this will not be sufficient to stabilise global greenhouse gas concentrations at a safe level.

To this we must add issues of security of supply, and not just in the short term. We have a significant amount of our generating capacity, both coal and nuclear fuelled, that is reaching the end of its useful life, and unless it is replaced in a timely fashion we will have an electricity crisis which will lead to an unsustainable economy. Our network infrastructure is also old, and we need to invest in the transmission and distribution system for the coming half century.

Electricity offers some of the most cost effective ways for reducing greenhouse gas emissions. Some countries already run electricity systems where greenhouse gas emissions are extremely low – admittedly either using special circumstances (such as Sweden or Switzerland) or decisions which the UK has not yet accepted (such as the high proportion of nuclear power in France). Nonetheless, a sustainable energy system is one which is going to be characterised by very low emissions of greenhouse gases, probably as much as a 90% reduction from 1990 levels.

Heat represents some 47% of our greenhouse gas emissions. We do not produce and use our heat very efficiently. Heat is wasted through losses from our buildings and inefficient boilers, and we have waste heat from power plants and other parts of the electricity system, that could be captured and used. A radical increase in the efficiency of heat use is part of a sustainable energy system. Moreover, we produce virtually all of our heat using fossil fuels, and we need to move aggressively to decarbonise the system through introduction of such fuels as wood pellets, other biomass, biogas, solar thermal, ground source heat pumps, etc.

To achieve these things, we need innovation, throughout the system to ensure that it can deal with any number of future scenarios. Much is being done today, but for a sustainable energy system the electricity networks need to be capable of accommodating new types of energy generation both large and small. New generating capacity will need to gain access and do so cost effectively. Like-for-like replacement of the electricity network won't be sufficient for achieving that. Innovation in the UK could lead to intellectual property that strengthens the economy, both because it is more productive and because we have more to offer to others.

All of these changes in the direction of a dramatic reduction in greenhouse gas emissions should also be completely aligned with improved energy security, requiring a lower level of imported fuel.

What are the barriers to achieving this radical vision? And how do they relate to the regulatory system we have in place?

- There is a lack of a focus on transforming the production and use of heat both in government policy and regulation. There is no policy support for renewable heat, and there is a perception that developing heat networks would entail high costs. So there is no focus for heat market development. The same applies to cooling.
- There is a short term price focus on the part of Ofgem. This is important for today's customers, but if we are to achieve a sustainable energy system a longer term view, and a broader understanding of the interests of future customers, will be necessary. Today we have Ofgem trying to deliver low cost energy as sustainably as possible, and we must move to sustainable energy delivered at the lowest possible cost.
- Our electricity transmission system is based on large scale generation from centralised plant. The entire system of transmission economics needs to be modified to better reflect intermittent sources which will play a larger role in the future. A lot of the new generation will also come from remote areas, including offshore, and transmission charges from these areas need to reflect the needs of a sustainable energy system. And the time for connection of new transmission (the so-called BETTA Queue) must be reduced. New players, often smaller than existing players in the market, must have an appropriate regulatory workload, not one which is so high as to discourage participation, and trading rules which actively promote their engagement rather than discriminating against them.
- The electricity distribution network can no longer be regarded as passive. Distributed generation requires more active management of the distribution network, for example to allow for small scale generators to sell surplus power while still ensuring the retention of reliable and balanced electricity services. Ofgem has taken initial steps on this, with their Innovation Funding Incentive, the creation of Registered Power Zones, and the Distributed Generation Incentive. Much still needs to be done to enhance their effectiveness.
- There are big gains to be made from energy efficiency measures, but stakeholders must gain confidence that Government is serious about this, and sees the value that can be obtained when carbon reductions are coupled with improved energy security and affordability. Efficiency efforts

must move from the big industrial users of energy to large/medium/small commercial users and households.

- The way we price electricity, especially in deals between generators and large users, impacts the entire system, and especially the economic attractiveness of combined heat, cooling and power. When this is coupled with volatility in fuel prices, it can be hard for major CHCP projects to get going without Government intervention. This does not argue for abandoning market principles, but rather for making sure that the market is not operating in a way to force a solution which works against a sustainable energy system.

These barriers are significant, but the power to overcome many of them is within the remit of Ofgem today. And where it is not, Government can and must help to move the situation forward if we are to achieve our long term goals.