**AECB SUBMISSION**

**to: The House of Lords Economic Affairs Committee**

***The Economics of UK Energy Policy***

**30.09.16.**

**1. Introduction**

The Committee states:

* 'The core question for the Committee is: Are there failures in the energy market and what measures are needed in the future to correct them?'

In particular, the Committee requests answers to some or all of the following questions:

* What are the key economic challenges for the energy market which the government must address over the next decade?
* Have the market and the government responded effectively to changes in external circumstances, such as significant shifts in technology and prices?
* What are the emerging technologies which could materially change the energy market over the next decade and beyond? How should the government promote research and development - could any shift in public funding improve the efficiency of the energy market? How long might it take for new technologies to displace the established capital stock?
* What should the future balance between the roles of the public and the private sector be? Is further expertise needed within government to understand the issues and to negotiate with external investors and suppliers?
* Are returns for private investment in the sector adequate or excessive? How should the government attract sufficient investment?
* What is the relationship between high energy costs and the loss of industrial capacity in the UK? What measures should be taken to address this?
* What preparations could be made to cope with the risk of a shortfall in energy supply? What would be the cost to the economy of the breakdown of the existing system?
* What alternate ways of pricing energy should be considered to reduce the burden of high energy bills, in particular on less well-off consumers?

AECB responds below to most, but not all of the Committee's questions.

**1. Are there failures in the energy market and what measures are needed in the future to correct them?'**

We think that the truth of this statement is self-evident. We refer to comments a generation ago from the House of Commons Select Committee on Energy. In 1981, it stated:

'It remains quite extraordinary that the government still has no idea whether investing £1,300 M in a single nuclear plant is as cost-effective as spending a similar sum to promote energy [efficiency]'

and

'... It is our considered opinion that there are many [energy] conservation measures which are so much more cost-effective than most energy supply investment that the caveats expressed by the Dept. of Energy appear mere quibbles.'

35 years on, the general picture appears unchanged. **There has still not been a government study into whether improved energy efficiency is more cost-effective than new supply options.**

On McKinsey’s Global Greenhouse Gas Cost Abatement Curve, 35% of the list of abatement methods considered are 'net profit positive'. This means that 35% of energy efficiency measures save energy that is worth more than the measure costs. This is before one accounts for the CO2 displaced. These measures effectively abate CO2 emissions at a profit.

Over 35% of the measures would be 'net breakeven'; i.e., they would save as much energy as the measure costs. In addition, they would abate CO2 emissions at a reasonable cost; e.g., perhaps £25 per tonne.

A McKinsey report for the Confederation of British Industry stated in 2007:

'... this CBI Climate Change Task Force report shows that the United Kingdom's carbon reduction targets for 2020 are likely to be missed but that 2050 goals, while stretching, can be achieved at a manageable cost - provided a greater sense of urgency is now adopted by government, business, and consumers.'

*Nine years* later, despite the Paris agreement, the sense of urgency is almost invisible.

Andrew Warren, President of the Association for Conservation of Energy, pointed out to some peoples' surprise that UK domestic energy consumption has been falling since the mid 2000s. Some observers at first sight might interpret it to mean that 'the market' works. But the downwards trend appears to reflect:

* Obvious technologies that would have been installed anyway via 'market forces', regardless of UK policy; e.g., LED downlighters replacing halogen lamps;
* Easy legislation; e.g., the requirement for condensing gas and oil boilers from 2005/07;
* Implementation of EU Directives requiring energy-efficient white and brown goods.

EU Directives may cease to apply if the UK leaves the Single Market and negotiates a looser arrangement. The UK lobbied behind the scenes to water down EU initiatives and may apply this attitude to its own legislation. This mechanism for progress could slow or come to a halt.

**2. What are the key economic challenges for the energy market which the government must address over the next decade?**

The challenge is to remove market imperfections to implementing millions of energy efficiency technologies which are commercially available, or widely demonstrated, but not in widespread use. As the Select Committee said in 1981, they are so much more cost-effective than many energy supply investments that the usual caveats appear mere quibbles.

New measures have emerged faster over these 35 years than existing ones have been implemented. In some sectors, few of the available improvements have been implemented. Some commercial 'cold appliances' remain 'power-guzzlers' compared to their domestic sector equivalents.

Subsidising electricity from offshore wind - which costs over 15 p per kWh when delivered to consumers - but omitting measures which displace delivered electricity at 1-3 p/kWh or less is economically irrational. Irrational behaviour is an undesirable feature of government because it usually leads to sub-optimal outcomes for those governed.

It has persisted for at least 35 years, though and those responsible are rarely held to account. On the latest evidence, although the resources devoted to promoting low-cost measures were already insufficient to make progress at an acceptable pace, they have been cut further.

Substantial resources are still devoted to subsidising costly measures [[1]](#endnote-1). The effect of this policy is to help the least effective strategies the most and distort the market more than if we had no subsidies at all.

In the area of Building Regulations, we might expect a more satisfactory situation. Government accepts that the free market in this field is imperfect and it intervenes to require measures which are shown to be socially cost-effective.

This appears not to be happening in quite the way that it should. Thus, in rural areas, a new house might be heated by an LPG or oil condensing boiler. One can economically justify more insulation for these fuels than Part L of the Building Regulations require [[2]](#endnote-2).

It is also irrational to allow the construction of houses which will cost several £100 per year more to heat than if their walls were insulated to the optimum thickness. The government could be failing in its duty of care to taxpayers and homebuyers.

**3. Have the market and the government responded effectively to changes in external circumstances, such as significant shifts in technology and prices?**

Generally not: we cite a specific example.

In 1973 and 1979, the world price of oil quadrupled overnight. Denmark reacted to the new situation by making its energy system less dependent on oil, including *inter alia* the use of its North Sea natural gas in combined heat and power plant and construction of more heat networks. It also introduced building insulation standards comparable to the UK's Building Regulations 30 years later.

Facing a not dissimilar situation in the late 1970s, the UK 'turned on the gas taps' and extended its natural gas network. It did not improve its Building Regulations dramatically until 2002 [[3]](#endnote-3). It emptied its North Sea fields of gas in the following 40 years.

**4. What are the emerging technologies which could materially change the energy market over the next decade and beyond?...**

We could possibly devote 95% or 99% of the resources expended to deploying known technology and transferring it from places where it has already been demonstrated - sometimes abroad - to where it is needed. This is the main challenge. There is no need to invent new technology or use unproven technologies.

The challenge is not primarily in looking for 'exciting', 'novel' or 'innovative' devices. 'Silver bullets' are popular with the media and politicians, but are usually illusions and unlikely to deliver.

**5. What should the future balance between the roles of the public and the private sector be?**

Within the confines of private sector ownership, we think that de-regulating the retail supply of gas and electricity in 2002 was a significant error. It makes easy and widespread implementation of cost-effective energy efficiency measures on consumers' premises by private gas and electricity companies almost impossible; the incentives are in the other direction.

By contrast, it is practicable to mandate vertically-integrated and regulated electricity or gas suppliers to invest in this, as past US experience has shown. The UK *was* making slow progress in this direction in the 1990s.

UK developments after 2002 have broadly consisted of 'liberalisation and deregulation'. These have been more damaging in our view than the changes between the late 1980s and 2002. These were broadly the 'privatisation and regulation' phase.

As an earlier report explained, the second phase of the UK's move away from state ownership of gas and electricity suppliers has introduced more market imperfections than the first phase [[4]](#endnote-4). The fact that the liberalisation and deregulation phase is sometimes described as moving towards 'choice and competition' deepens the irony.

**6. Are returns for private investment in the sector adequate or excessive? How should the government attract sufficient investment?**

After any re-regulation of utilities, returns would be lower. Business risks are lower for regulated utilities.

The private water companies are de-risked as a matter of government policy. They are mostly debt-, not equity-financed [[5]](#endnote-5). Welsh Water has no shareholders; cf Network Rail, and is debt-financed.

In recent years, one water company issued bonds to borrow for investment over 50 years at a real; i.e., inflation-adjusted, interest rate of 1% per year. In this environment, it is not difficult to finance long-term energy efficiency measures.

The low risk/low return model is applicable to electricity, piped gas and heat if utilities are able to plan with relative certainty and have statutory powers to lay pipes/ wires as needed [[6]](#endnote-6). It is not feasible if companies compete in a liberalised, fragmented 'free market'.

**7. What is the relationship between high energy costs and the loss of industrial capacity in the UK?**

This is outside AECB's remit.

**8. What preparations could be made to cope with the risk of a shortfall in energy supply? cost to the economy of the breakdown of the existing system?**

The short-term risks lie in the electricity system. Electricity makes up 18% of final energy although only 12-13% of final energy has to be in this form.

We are not sure if the Committee appreciates the distinction between forms of energy which can be stored and those which cannot. Liquid gaseous and solid fuels can be cheaply stored in bulk and give rise to little concern if supply is interrupted for, say, a few days or a week. Heat; i.e. hot water, can be stored short-term or seasonally in very large insulated tanks. Large-scale hot water storage is fairly cheap.

Although rural areas may lose their electricity supply several times a year, the consequences are limited. The incident usually only affects at best a modest area for a few hours. Longer cuts, such as 6-8 hours, are usually due to planned maintenance; e.g., tree cutting. To some extent, rural consumers may be prepared; e.g., farms usually have generators. But the interruptions are increasingly disruptive as society becomes more dependent on a continuous supply of electricity.

In the urban UK, a 6-12 hour interruption affecting 500,000 people would cut off the internet, supermarket tills; i.e., food sales, and mobile telephones. London would lose its main public transport system. 'Keeping the lights on' seems to be the least of it.

The economic and social disruption would be large. According to a German study, a two day interruption in urban electricity supplies would lead to civil disorder. Loss of life is possible.

Life as we know it depends on a continuous electricity supply. We are more dependent on it than we were 50 years ago. Not even oil or gas central heating systems or solar water heating systems function; their pumps and controls need small amounts of electricity.

This weakness could have been addressed by past government policy, in Building Regulations, requiring a small UPS in new rural buildings. It was not done.

As a matter of policy, the internet and mobile telephone systems could have been built up to be as 'resilient' as the landline telephone system. This network has battery backup and should work for a considerable time in power cuts. This did not happen.

We think that the UK should consider making it mandatory to fit small battery systems in new rural buildings to supply *basic* power; i.e., lights, ventilation, internet, TV, white goods, small appliances, central heating pumps and controls and possibly a microwave oven for 24-48 hours if the mains fails. Given that a very energy-efficient house can operate on an average consumption of 100 W(e), we envisage sufficient capacity to supply around 100 W for 2 days; i.e., 5 kWh(e).

100 W(e) does not suffice for heating loads; e.g., heat pumps or for all cooking being electric. But it could run most other services, including internet.

Such battery banks could complement roof-mounted PV systems and reduce overvoltage problems. But batteries are an energy security, or rather insecurity, proposal, more than they are a renewable energy proposal [[7]](#endnote-7).

We think that built-up areas should be protected via Combined Heat and Power plants at the sub-stations which convert electricity from 11,000 to 415 volts [[8]](#endnote-8), using dual-fuelled gas engines and underground fuel stores. These plants would in effect become emergency electricity generators if the national grid goes off, keeping built-up areas secure. They would also help decarbonise heat supplies faster than electric heat pumps could do, meet the peak load on heat networks and meet the peak winter lighting load in December and January.

**9. What alternate ways of pricing energy should be considered to reduce the burden of high energy bills, in particular on less well-off consumers?**

We should pay low-income consumers a decent wage/salary. If they are unemployed or retired, we should pay them adequate benefits or pensions. Adjusting energy prices to reflect a consumer's income amounts to means testing, which is demeaning; consumes scarce resources in administration and adds further market distortions.

We arguably have too many of these distortions already. Please see our answer to the Committee's first question, 'Are there failures in the energy market?...'

**References**

1. http://www.eceee.org/all-news/columnists/richard-cowart-and-jan-rosenow/we-need-a-lorry-load-of-savings. [↑](#endnote-ref-1)
2. We have seen new houses under construction with only 100 mm of wall insulation. One is likely to be able to justify a thickness of 250 to 300 mm in a house using these fuels, assuming the same methodology as the UK uses to set the Building Regulations; i.e., lifecycle costing and a 3.5%/y return on capital. [↑](#endnote-ref-2)
3. 2002 was the first occasion on which Building Regulations were raised and insulation manufacturers noted a significant extra demand for their product. Manufacturers had previously prepared themselves for a growth in demand and been disappointed by the outcome. [↑](#endnote-ref-3)
4. Olivier, D and Simmonds, A, *LESS IS MORE: Energy Security After Oil*. Sustainable Buildings Association, www.aecb.net (2012). [↑](#endnote-ref-4)
5. This could change if proposals proceed to allow consumers to buy water from any supplier. The income stream for each individual supplier would be less predictable. [↑](#endnote-ref-5)
6. Electricity in Great Britain is managed by four different bodies. Generation is managed by companies which are broadly separate from the companies looking after the high-voltage transmission system. They are in turn distinct from the companies responsible for the medium and low-voltage distribution, which are separate from the companies supplying electricity to retail consumers.

In some regions; e.g., Nebraska, USA, or Ireland one entity owns all the power stations, transmission and distribution and supplies electricity to consumers. It is challenging to find evidence that the UK's four-part structure brings benefits which outweigh the greater transaction costs and complexity versus a) unitary state-owned systems or b) the regulated monopoly model for private utilities pre-2002. [↑](#endnote-ref-6)
7. Of the world's 14 most serious electricity blackouts to date, defined by numbers affected and duration, 11 have been in the 21st. century. Three were in the 20th.; i.e., 1965, 1978 and 1999. See https://en.wikipedia.org/wiki/List\_of\_major\_power\_outages [↑](#endnote-ref-7)
8. First proposed by Orchard Partners London Ltd. in 2008. [↑](#endnote-ref-8)