A Post-Brexit Framework for Electricity Markets

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Executive Summary

- Electricity charges for households in England and Wales have risen by 50 per cent in real terms since 2001, partly as a result of policies designed to reduce greenhouse gas emissions.
- The decarbonisation policies adopted have been complex and inefficient, and have also been contradicted by other measures such as the reduced rate of VAT imposed on domestic fuel. Emissions reduction objectives could be achieved at much lower cost.
- The government should phase out the Climate Change Levy, the Energy Company Obligation, the Warm Homes Discount and the Carbon Price Floor.
- Utility bills should be taxable at the full VAT rate (20 per cent) rather than the reduced rate (5 per cent). Any help to vulnerable households should be in the form of electricity vouchers.
- If the goal is to reduce emissions, decarbonisation should be undertaken under a single market-based mechanism such as a cap-and-trade scheme or a carbon tax, which would apply to all CO2 emissions.
- Climate-change policy should be technology-neutral. The government should establish a decarbonisation target and allow energy markets to adjust to it in the most efficient way.

Since the turn of the century, successive British governments have put carbon emissions reduction at the centre of energy policy. Yet, decarbonisation as currently pursued in the UK is more inefficient than it needs to be. There are ways to achieve the government's emissions reduction objectives at lower cost.

The rising cost of electricity in the UK

Since 2001, electricity charges for households in England and Wales have increased by 50 per cent in real terms, from £352 to £537 (DECC 2016a).[1] This is in stark contrast to the decade prior to 2001, when, following liberalisation and privatisation, bills dropped by 26 per cent (Littlechild 2000). UK domestic electricity prices, on a per kWh basis, today are the ninth-highest in the EU, and the highest when VAT and other taxes are excluded (Eurostat 2016).[2]

The reversal has been even starker in the case of industrial electricity prices. After a drop of 25 to 34 per cent over the 1990s,[3] the average industrial consumer of electricity saw the real price per kWh double between 2004 and 2015 (Littlechild 2000; BEIS 2016b).[4] Today, Britain has the third-highest industrial electricity prices in the EU-15 for the average industrial consumer, 41 per cent above the median and 50

[1] The figures are deflated to 2010 GBP, for standard metering and assuming annual consumption of 3,800 kWh. There is some variation in charges depending on the payment method (standard credit, direct debit, or prepaid) and the figures are weighted by the prevalence of each payment method in 2015 (BEIS 2016a).

[2] The UK levies no taxes other than VAT on domestic electricity bills, but other EU countries do.

[3] The exact measure of the price decline depended on the size of the customer. Medium and large industrial consumers saw the biggest price drops (see Littlechild 2000).

[4] Industrial consumption of electricity dropped by 28 per cent during this period, no doubt partly in response to rising prices, though consumption had been on a downward trend since 1973 (BEIS 2016c).

per cent higher than in France (Eurostat/BEIS 2016). For large and extra-large non-domestic consumers, charges are the highest among all EU countries.[5]

State intervention is distorting the price mechanism

Electricity prices fluctuate with the price of fuels, notably natural gas and coal, which together still account for 50 per cent of electricity generation in Britain (DECC 2016b).[6] Yet, whilst the commodities rally in the first few years of the 21st century partly explains higher bills, the subsequent drop in both gas and coal prices from 2008 has not been accompanied by a drop in charges of a similar magnitude.[7] The chief reason for the discrepancy is that, in recent years, the link between retail electricity prices and the market price of fuels has been weakened.

The price of electricity consists of wholesale costs, i.e. the price paid by suppliers to generators on the wholesale market; network and distribution costs, which are regulated; environmental and social policy costs, which are determined by government; and taxes (Stagnaro 2015; Ofgem 2013). In recent years, the share of the regulated component – including environmental and social policy – in the final price of electricity has been growing. Only in 2010, environmental and social policy costs accounted for 4 per cent of the average bill, compared to 15 to 20 per cent today (Energy UK 2016).[8]

UK environmental policy: intentions vs consequences

Environmental and social policies include a number of government schemes aimed at cutting carbon emissions, encouraging energy-efficient homes and assisting those who might struggle to pay their energy bills. They include:

- *Contracts for Difference*, which give renewable generators a guaranteed price for the electricity they produce;
- *feed-in tariffs*, which subsidise renewables by fixing a cost-based price for their electricity;
- a *capacity market* to contract for surplus capacity to be tapped in times of high demand, particularly as many renewable sources are intermittent and thus not always available;
- the *Energy Company Obligation* (ECO) to subsidise home insulation and other cost-reduction measures for low-income households;
- the *Warm Homes Discount*, which gives low-income pensioner households an annual discount on their electricity bills in the winter months.

In addition, non-household users of electricity pay the *Climate Change Levy* (CCL), which has been increasing steadily since 2010 and now accounts for 5 to 6 per cent of the average industrial electricity bill.[9] Finally, electricity prices are also affected by EU policy, notably the *Emissions Trading Scheme* (ETS) – on top of which the UK has placed a carbon price floor – and a target for 20 per cent of EU energy requirements to be met by renewable sources by 2020.

[5] The large and extra-large categories comprise all firms with annual consumption above 20,000 MWh (see Eurostat/BEIS 2016).
[6] The crude oil price is also relevant, as the price for liquefied natural gas (LNG) has traditionally been linked with the oil price because it is considered the next-best alternative fuel. See Sakmar (2016) for a brief account of the relationship between the two.
[7] There was a small drop in household electricity charges between 2014 and 2015. Industrial prices also fell from the first quarter of 2015, but only if we exclude the Climate Change Levy.
[8] Ofgem puts the share of environmental and social obligations at 13 per cent (see Ofgem 2016). This is probably due to methodological differences in calculating the overall cost of environmental and social policies.
[9] Note that energy-intensive firms, as well as those that use little electricity or obtain it from renewable sources, may obtain relief from a large share of their CCL bill. https://www.gov.uk/green-taxes-and-reliefs/climate-change-levy

Some of these schemes, such as the ECO and the CCL, add directly to electricity charges. Others, notably the renewables targets and subsidies, and the Emissions Trading Scheme, affect retail prices in a more roundabout way – by increasing the wholesale cost of electricity and creating a need for additional capacity to substitute for intermittent renewables. Both, however, contribute to increasing bills and to prices which are less responsive to market supply and demand.

Whilst all of the above schemes are ostensibly aimed at reducing CO2 emissions, not all of them are cost-effective. For instance, the National Audit Office recently estimated that the ECO and the Green Deal – a lending facility to make homes more energy-efficient – cost £94 per tonne of CO2 abated (NAO 2016). This is 10 to 20 times the recent 'market price' of carbon in the EU ETS, which reflects the marginal cost of CO2 abatement. Even if we include the price support from the Carbon Price Floor introduced by the coalition government – currently at £18 per tonne of CO2 – this number is only a third to a quarter the size of the cost of some environmental measures (Ares and Delebarre 2016).

A plethora of contradictory policies

UK energy policy currently aims to promote a range of objectives, not all of which have environmental benefits or are economically efficient. On one hand, there is a wish to make electricity use affordable, and consumption is subsidised via a reduced VAT rate – 5 per cent against the standard rate of 20 per cent – as well as targeted transfers such as the Warm Homes Discount. Furthermore, there is concern about ensuring adequate supply at all times, for which purpose a capacity mechanism has been established to pay suppliers to keep idle generators available for times of unusually high demand or low supply from regular sources.

On the other hand, climate change policy demands the reduction of CO2 emissions across the board for the foreseeable future. This is attempted via a number of different devices including the ETS, the Carbon Price Floor, and energy-efficiency stimulus measures such as the ECO. Furthermore, more environmentally friendly capacity such as renewables is promoted through quantity measures – such as EU-level supply targets – and subsidies from feed-in tariffs, Contracts for Difference and, in the case of nuclear power stations, a guaranteed future price considerably above the prevailing spot price for electricity.

It is obvious that these policies will often contradict one another. A lower VAT rate will encourage more consumption even as other schemes seek to reduce it. The promotion of renewables will lead to more intermittent capacity, requiring additional emergency supply which will in most cases be provided from dirtier fuels. A guaranteed electricity price will discourage the competitive provision of electricity, thereby compromising affordability for consumers. Finally, price subsidies will create disincentives to innovation in clean electricity generation, making an escape from intermittent and expensive renewable sources a less likely and more distant prospect.

The alternative: market-based decarbonisation

The existing state of affairs can be changed without sacrificing any of the government's goals. The first thing that needs to take place is a decoupling of the competing objectives which are currently bundled together in environmental policy. Emissions reduction to tackle climate change needs to be separated from the pursuit of affordability for low-income households. The use of industrial policy to achieve a particular mix of sources is also unnecessary to promote a cleaner environment. And the role of the price system in guiding resource allocation and consumption decisions must be harnessed rather than thwarted by government policy.

If the public policy goal is to reduce emissions, then all that government needs to do is mandate lower emissions. A market-based mechanism such as a scheme of tradable pollution permits is perfectly well-suited to that task. All that would be required from public authorities is to specify a target of emissions cuts

– say, 30 per cent by 2050 – and a linear or exponential schedule of implementation,[10] and to leave electricity suppliers and users to trade the permits so as to arrive at the most efficient outcome.

Economists have long recognised that one of the hallmarks of a free price system is that it leads those who most urgently require a resource – i.e. those who are most willing to pay for it – to acquire it (Coase 1960). In the context of CO2 emissions, pollution permits would be acquired by those whose cost of polluting was lower than the social benefit – as captured by electricity prices – of emitting carbon. Conversely, those who delivered benefits below the cost of a permit would sell permits and either reduce their activity or invest the proceeds in CO2 abatement technologies which enabled them to produce the same output at a lower level of emissions.

The introduction of a carbon tax is theoretically equivalent to a cap-and-trade scheme in its impact on emissions reduction. In that case, policymakers would set a tax rate equivalent to the social cost of carbon – i.e. the cost of electricity generation not borne by consumers – thereby reducing the level of emissions on the margin. Again, where benefits lay below the cost of generation plus the carbon tax, there would be a marginal reduction in CO2 emissions. However, from a public policy perspective a cap-and-trade scheme appears more desirable because of the difficulty of determining the social cost of carbon with any certainty, and the historical experience of politicians' using taxation for purposes far removed from the ones for which it was originally intended (see, for example, Wellings 2012).

How to deal with redistribution and industrial policies in the energy sector?

With an emissions trading system in place, government could pursue its other goals in energy policy without compromising the efficiency of decarbonisation. If it is believed that poor households' electricity use ought to be subsidised, then an appropriately targeted way of achieving this is through electricity vouchers which eligible households could offset against their monthly bills. These vouchers might also be used to make homes more energy-efficient. An indiscriminate VAT subsidy such as the one currently in place, on the other hand, is undesirable because it promotes greater energy consumption across the board, thereby defeating the purpose of climate change policy.

Similarly, schemes such as the Warm Homes Discount and Energy Company Obligation would be unnecessary if electricity vouchers were instituted. Any additional cost from winter weather or energy-inefficient homes could, if deemed suitable, be incorporated into the cash subsidy provided to the poor. Again, there would cease to be subsidies to well-off households who would, like all non-vulnerable consumers, face the full cost of their electricity consumption.

The government could also carry on with its industrial policy regarding energy sources if it so desired. Elsewhere, we have warned of the frequent failure of state intervention into dynamic markets, and the inauspicious past experience of industrial policy in Britain and around the world (Shackleton and Zuluaga 2016). However, if it was decided to continue to support particular energy technologies or fuels, this could

be done with public subsidies for R&D. What should be avoided is to seek to encourage renewable supply through quantity regulation – i.e. specifying a share of all electricity supply to be provided from renewable sources – or price supports, as both of these have contributed to increased intermittency of electricity supply in Britain, and to the sustained rise in prices since 2001.

The Brexit opportunity

The UK's departure from the EU offers a chance to undertake extensive reform of domestic electricity markets, for a number of reasons. Firstly, leaving the EU will remove Britain from the European Emissions

[10] Arguably an exponential schedule, which would see required annual emissions reductions increase over time, would be more appropriate, as it is in the nature of innovation to deliver incremental benefits at a steadily lower cost. Thus, an exponential schedule might be less costly to electricity consumers. However, the choice of schedule does not affect the broader point made regarding the efficiency of cap-and-trade.

Trading System, as well as the 20-20-20 targets for renewable energy generation.[11] The government will be able to repeal and replace these policies with domestically generated – and, one hopes, more economically efficient – alternatives such as the cap-and-trade system proposed above.

It can choose whether to enact this programme of pollution permits on its own, or together with like-minded countries such as Canada and Australia. The obvious advantage of partnering with third countries is that the costs of carbon generation are global, so a limit on emissions that applied more widely would better internalise the externality. The political drawback would be that the UK would no longer have certainty over the overall level of emissions from UK industry, as permits would be traded among all the countries participating in the scheme.

Secondly, the government has made plain its intention to reform policy so as to ensure British business remains competitive after Brexit, and so that all households can grasp the benefits of future economic growth. The above proposal would help these objectives. It would eliminate crude interventions and subsidies which contribute to higher electricity prices for both consumers and industry. And it would replace the existing host of measures with a market-based system that harnesses prices and encourages innovation to achieve lower emissions.

Finally, this proposal is more amenable to transparent control by Parliament than the existing hodge-podge of measures. The emissions target could be altered as new information emerged regarding the likelihood and magnitude of climate change, whilst an all-encompassing system of pollution permits is less vulnerable to capture by special interests than the programme of subsidies, quotas and price interventions currently in place.

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[11] The 2020 Climate Action package sets three targets for the EU to reach by 2020: a 20 per cent cut in greenhouse gas emissions from 1990 levels; 20 per cent of EU energy to be obtained from renewables; and a 20 per cent improvement in energy efficiency. https://ec.europa.eu/clima/policies/strategies/2020_en

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