SUBMISSION FROM THE BORDERS NETWORK OF CONSERVATION GROUPS

Security of Supply - Call for Written Evidence

EET area of interest: Supply and whether there is sufficient generation to meet demand, in particular to the end of the decade. What role will new generation that is under construction, or has been consented play? The Scottish Government aims to have a "largely decarbonised electricity system by 2030". What does this mean in practice, and are there sufficient tools in place to bridge the move from fossil fuels to renewables?

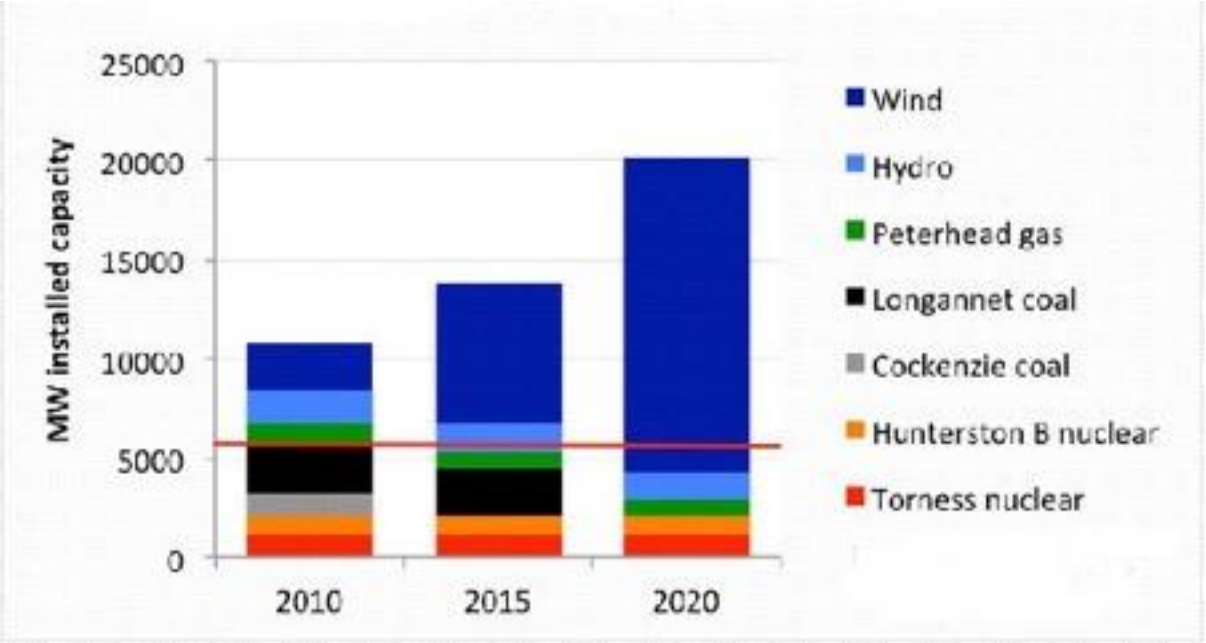
There is a rapidly developing crisis in Scotland's electricity supply, created by the policies of successive UK governments and unintentionally, we presume, exacerbated by the present Scottish Government.

This crisis has been widely predicted. It is a consequence of reducing Scotland's ability to balance electricity demand by rapidly increasing the variable supply from wind generated power. Wind power is intermittent, it is not secure, and it cannot be stored in the quantities required.

To some extent all governments in the last two decades seeking to increase the proportion of their energy requirements which could be met from renewable sources were entering uncharted territory. Consequently, the most responsible moved cautiously into the future, testing the way in which policy decisions affected:- the energy market; the behaviour of suppliers; the conduct of research and development. Those less risk-averse governments (or devolved governments less responsible for balancing the books) flung themselves boldly, or foolishly, depending on your point of view, into the unknown.

There were always bound to be unintended consequences. In Scotland, the consequences of a less cautious approach are beginning to take effect and must be mitigated against soon and with commitment, otherwise this country and its citizens will fall behind others and be left with expensive energy that no-one needs, wants or can readily use or store, *and* the lights will start going out here. This appears even more likely to happen, and earlier, should Scotland become independent in the next decade, since the cushioning support of the UK energy market and more secure energy supply could not be counted upon in that eventuality.

What has happened is that guaranteed subsidies to wind generators make the wind energy sector a logical investment for energy companies, while the preference given to wind power in particular on the grid reduces the profitability of conventional generation. Indeed, no conventional, dependable generation is being built and Scotland's largest dependable generator, Longannet, is due to close due to lack of profitability (the fact that this is partly because of a connection charging regime from the UK grid which favours South Eastern suppliers against suppliers more remote from that main market is neither here nor there at present: this has been known in Scotland for years and should have been taken into account earlier and not at the last minute).



The changing pattern of electricity generation in Scotland. Maximum power demand in Scotland is 6GW, shown by the red line. Data from EuanMearns.com and the Scottish Government. (Some figures are approximate.)

In 2010 Scotland had a secure and balanced electricity supply.

There were two nuclear, two coal and one gas-fired power stations, a suite of hydro electric stations providing dispatchable, ie available on demand, power of about 8.4GW. There was a nominal wind capacity of just over 2.5GW. The red line shows approximate peak demand of 6GW. Scotland's electricity needs were safe and secure. Even the loss of a major power station for maintenance or emergency would not have required import of power from south of the border.

By 2015, a major transformation has taken place: the system is still secure but perhaps only just; the lights are still on but it is costing more.

Cockenzie coal-fired station has been closed. Although Peterhead gas power station now has a reduced capacity there is still 6.7GW of dispatchable power, comfortably in excess of peak demand but susceptible to a nuclear outage.

Where the transformation occurred was in the expansion of wind to 7.1GW nominal capacity. Flexible dispatchable power, ie coal, gas and hydro, totals 4.7GW. (Nuclear cannot be conveniently turned on and off so, although it is dispatchable, it is not flexible.) When the wind blows hard, there is still conventionally generated power to take off line, and the capacity to export up to 3.3GW via interconnection to England. In 2010, there was 8.6GW of generating capacity; today there is a theoretical 13.9 GW capacity.

However, potential problems are beginning to emerge. Minimum wind load factors of less than 5% can occur so that wind generation can be lower than 0.35GW. (At 2.30pm on 19 January 2015, UK wind load factor was 2.2%.) If low wind generation coincides with a reduction in dispatchable generation, power has to be imported. Indeed, imports of power have been required on 162 days in the last three years.

Conversely, high wind speeds resulting in load factors of more than 80%, have at times of low demand required output reductions from Longannet, currently the only major resource

that can be turned down relatively easily. This increases the cost of operating the plant, and along with other factors such as carbon taxes has made it unprofitable.

Wind turbines may also need to be shut down to avoid overloading the grid, in which case their operators receive 'constraint payments' well in excess of their lost revenue.

How predictable peak demand is at present, and how is this likely to change in the coming decade. In particular, what impact will the development of demand side response have? What could be done to improve developments in this area?

Rather than looking at demand in the future, which other contributors will be able to do better than BNCG, we have looked at broadly predictable supply which, after all, will have arguably as significant an influence on energy security as a largely unpredictable reducing demand.

The 2020 configuration in our diagram assumes that already consented wind farms totalling 8.68GW will have been built, exceeding the Scottish Government's '100% renewable generation' by nearly 20%.

Having become unprofitable, Longannet is due to close down. The two nuclear plants should still be operational. There will be 4.4GW of dispatchable power, 1.6GW below the safe threshold. Although the 15.8GW of wind capacity operating above 10% capacity should cover that for most of the time, when load factors fall below this then significant shortfalls will occur. These will have to be met by importing dispatchable power from England, assuming that adequate capacity does in fact exist there. The 2.07GW of nuclear power should provide reliable base load regardless of the weather. However, when one of these nuclear plants is off line for scheduled or unscheduled maintenance, Scotland's security of supply will become entirely dependent upon imports.

This is one aspect of the problem that an unbalanced electricity supply will produce. The other, ironically, is what to do with a surplus of power. We have assumed that demand cannot be reduced dramatically within five years and that peak times will remain largely the same, but a reduction in demand would make the following scenario even more wasteful. Peak demand is at around 6pm on a week day in winter, and minimum demand is always at night at the weekend in summer. This minimum is about 38% of peak, roughly 2.3GW. Night-time summer demand for electricity would be almost met by the two Scottish nuclear power stations, neither of which can be turned down easily.

With approximately 15GW of installed wind capacity operating at a realistic maximum of 80% load factor, wind generation could peak at 12GW, nearly all of it surplus to Scotland's needs.

Since producers get paid their elevated guaranteed price regardless of whether or not there is demand for the power, this represents a substantial cost to consumers - unless the surplus can be used effectively.

Renewable energy enthusiasts talk about **storing electricity** but currently the only available means of large scale storage is pumped hydro. There are two such schemes in Scotland and two in Wales. These have a storage capacity of only 27GWh, just over three quarters of an hour of UK average demand. The new Coire Glas scheme, approved but awaiting a final investment decision, is the only addition currently proposed. This would have a storage capacity of 30GWh. Average daily electricity consumption in Scotland is about 100GWh. Peak excess production over a very windy 24 hours could be nearly

300GWh but Coire Glas would only handle 0.6GW. To absorb 12GW of excess generation would require at least 20 schemes of this size. The geography and hydrology of such projects is so restrictive that it is not clear if there are *any* further suitable sites in the country, let alone 20.

A number of new transmission network projects are currently under construction or being planned. What role will these have in securing electricity supplies, and where should future investment be directed? What role might the distribution network, and a single European electricity market play in securing supplies?

Interconnection capacity to England is to be increased to 6GW (at great cost), but this will only be capable of carrying about half of the possible excess which will be produced by Scotland. The current Scottish Government plan is evidently for Scotland to somehow profit from exporting its surpluses. However, when the wind blows hard here it is also usually blowing hard in England and Europe, and consequently spot power prices hit rock bottom. As it is extremely unlikely that Scotland's neighbours would be prepared to pay the premium prices which the wind generators have been guaranteed, the cost of the difference will fall on local consumers.

A number of significant changes to the electricity market have recently been finalised and are being put in place to ensure competition and cost reflective prices for consumers. Are policies such as the Capacity Mechanism under Electricity Market Reform adequate, and what other long term signals might be necessary to ensure security of supply?

We have already pointed out that grid connections in Scotland are more expensive than in the south east of the UK. However there is also a higher grid-level system cost anywhere in the world for renewables (compared to conventional energy technologies). Added to the fact that *plant-level* generation costs of renewables are 'still significantly higher than those of conventional technologies' (OECD/Nuclear Energy Agency report of 2012 *Nuclear Energy and Renewables: System Effects in Low-carbon Electricity Systems,* p.131) this, we argue, means that only a very wealthy country with money to burn would aim to have a "largely decarbonised electricity system by 2030".

Any other matters concerning security of supply that you would like to bring to the Committee's attention.

The Borders Network of Conservation Groups believes that it is time that the Scottish Government and all political parties in Scotland as well as the UK acknowledge the truth: that the blind dash for wind is pointless, will continue to be hugely expensive, and that degrading even more of Scotland's landscapes will be futile. Not only is there no need for any more wind in Scotland's energy mix but the country's lack of conventional supply will ensure long-term reliance on the UK and Europe for the safety of Scotland's electricity supply.

Jack Ponton

Vice Chair

4 May 2015