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The Role of Green Energy in Scotland

Good morning everyone, my name is Rhys Stanwix and I am an energy advisor with Energy Scotland. Prior to that I had a career of over 30 years in the energy industry in a number of roles covering everything from engineering and construction through to business development, strategy and energy trading.

Any strong, sustainable economy needs to have secure, affordable energy supplies. It is the bedrock of any successful nation. In recent times we have added low carbon as an additional consideration, to reflect the need to combat the effects of climate change. These three considerations (security, cost and carbon emissions) are often referred to as the Energy Trilemma. The reason for this is that the three aspects of the trilemma are all linked and inevitably this means that any policy decision to focus on one of them results in a compromise for the other two. In my talk this morning, I am going to cover how the energy trilemma can be viewed from Scotland's perspective and the role that green energy can play in Scotland's future. I am going to focus predominantly on electricity, as that is the current policy focus.

When Scotland and the UK was rich in oil, gas and coal, electricity supplies were both secure and relatively cheap. Carbon emissions were not a consideration then. Since the early 2000s, decarbonisation received more prominence with successive Westminster

Governments putting ever more priority on this aspect of the Trilemma, culminating in the current Government, for which it appears to be an almost singular focus.

We are now seeing the effect that this singular focus has had on the other two elements of the Energy Trilemma. First, energy prices are going up (even without the added effect of the high gas prices) and second, we are far less energy secure with a far greater percentage of our energy being imported.

Scotland's electricity generation mix used to reflect the wider UK generation mix, but with the recent focus on building renewables and closing fossil fired generation, especially coal, what we are also seeing is a shift in the energy mix between what is in Scotland and what is in England and Wales (Ireland has its own separate market). It is important to understand this shift when considering what approach should be taken to the Energy Trilemma and future energy policy in Scotland.

The key differences are:

Scotland has a far greater amount of renewable generation than the national average, compared to demand. Scotland already generates more than 100% of its annual demand from renewable sources, whereas the UK average is far lower at only around 30%.

Scotland is a net exporter of electricity, whereas the UK is a net importer. In 2024, Scotland exported a net of almost 20TWh of electricity worth around £1.5 billion. 20 TWh is almost Scotland's entire annual demand and most of it was transported to England via the interconnectors.

Scotland now has less back up generation than the national average. It is becoming an increasingly difficult challenge to keep the lights on, on cold, still days when renewable output is very low. All the back-up gas fired power stations are in England and Wales apart from one (at Peterhead). The rush to decarbonise has had a direct effect on Scotland's energy security. This makes Scotland more reliant on energy imports when renewable output is low.

Scotland is essentially only directly interconnected to England (there is a small interconnector to NI). All the European interconnectors deliver to and from England and Wales. S cotland is therefore more reliant on a single trading partner.

Overlaid on top of these physical differences, Energy Policy is reserved to Westminster under the Scotland Act, meaning Scotland cannot unilaterally implement policy decisions, whereas Westminster can.

So, what do these features mean in terms of Scotland's potential approach to the Energy Trilemma. To examine this, I am going to consider each part of the Trilemma in turn, starting with the most topical one, given recent events in Spain:

Energy Security

Energy Security is National Security. Energy security is vital for a nation to sustain itself and grow its industrial base. The energy costs are better controlled and the negotiating positions stronger in nations that are energy secure.

The ultimate in energy security could be referred to as "Energy Sovereignty", which is where a nation directly controls its own energy sources.

A perceived failure of Westminster energy policy is that increasing electrical interconnection to Europe and LNG import facilities for gas is seen as energy security, when in fact it increases exposure to international prices and the willingness of supplying countries to want to do business, especially when supply chains are strained.

Arguably the UK's current energy strategy is not actually reducing global emissions, as we are simply moving emissions from one country to another and potentially even increasing them through transport.

Scotland's wealth of renewables means that Scotland is much closer to energy sovereignty than the UK as a whole and could adopt this as an aspiration, which would strengthen Scotland's position in a variety of areas.

The policy decision not to continue drilling for North Sea oil and gas is hindering this aspiration. Whilst we are still reliant on oil and gas for our energy needs, we may want to review this position.

There are still some challenges to be overcome to achieve this aspiration of energy sovereignty. Scotland's energy industry, like the rest of the UK, is in private ownership, so efficient regulation of those assets is imperative and nationalisation, maybe of some parts, is a possible option to move closer to actual sovereignty.

The lack of back up generation in Scotland needs to be addressed. There are many battery storage projects being supported, but batteries typically only last a couple of hours.

For back up that can last for days, another gas fired power station or two should be considered until greener options become available.

A large thermal power plant can also provide grid support, such as reactive power and inertia, that renewables cannot. This was reported as a weakness which caused the Spanish grid to recently collapse.

Scotland may want to consider continuing oil and gas exploration to improve energy security while we are still reliant on fossil fuels and to generate revenue to help fund the transition to a greener economy at a pace that does not compromise our energy security or energy affordability.

And finally, of course, all these measures cannot be implemented unilaterally without Scotland having ownership of its own energy policy. This means that either full independence, or at least having energy policy devolved, is an absolute imperative.

Price

The next point on the Trilemma is Price.

The UK has some of the highest industrial electricity prices in the developed world and the highest in Europe and the G7. This is significantly hampering not only the continued investment in green technologies, but our very way of life; our homes, our industry and our prosperity as a nation.

I regularly get asked the question "Why is this?", so I thought I would address it here. There are essentially two reasons why our prices are so high:

First, the structure of the market.

Scotland operates within a single GB wide electricity wholesale market (NI is part of the all-Ireland market). All generators sell into this market and all suppliers buy out of it.

The market was designed when gas and coal were the major electricity generators and was used to select the most efficient plants first. All the coal power plants have since been closed, leaving only gas generators to compete with each other.

A key feature of the wholesale market is that it is a cleared price market. This means that the most expensive generator needed to satisfy demand sets the price and every other generator gets paid that price, even if their actual costs are well below it.

With gas prices being high and gas generation still needed to meet demand on top of renewables, nuclear and so on, this means that gas generation is still setting the price of electricity virtually 100% of the time, despite now only being around 30% of the total generated volume.

Britain is interconnected to Europe and the markets are linked, so we all have the same issue with high gas prices setting high electricity prices, but in GB gas sets the price more of the time than in other European countries.

With gas generators setting the price, any generator with a fixed operating cost, like renewables and nuclear, will make more and more profit as gas prices go up, all of which the consumer is paying for.

Currently, this wholesale price accounts for about 45% of a domestic consumers bill, the largest component of the bill by far. If the wholesale price reflected the actual cost of each generator and not the cost of the most expensive one, domestic, commercial and industrial energy bills would be substantially reduced.

The more renewable generation that comes onto the system, the less fit for purpose this market structure is and the more pressing the need for a better structure that is more reflective of the actual cost of generation.

Some steps have been taken to address this issue, by moving newer renewables onto fixed price contracts, but they are still small in number and have little effect on consumer prices.

There is also a proposal to split GB into several separate markets, which has received very mixed and polarised views from generators and consumer groups.

This will potentially result in lower prices in Scotland; however each market has the same pricing structure as the current one and hence all the weaknesses that go with it.

The second point is that, contrary to the mantra of successive Westminster Governments, Net Zero is not cheap.

The main focus for renewable generation is wind, which is currently cheaper than gas generation, but only when the wind is blowing.

Solar is another current favourite, but this is the UK and solar is nowhere near as effective as it is in sunnier countries in Europe and the US. In the UK solar only generates at around 10% load factor – that's 10% of its maximum amount – compared to almost 25% in the US. That seems a very high cost and visual intrusion for a very low contribution.

To provide a greener form of back up generation, batteries are being deployed in large numbers across the country, which are both expensive and don't give power for very long.

When the wind is not blowing and the sun is not shining for longer periods of time, gas fired generation is required, so, unlike coal, the gas plants are still needed and cannot be closed.

All these sources of electricity generation are remunerated largely through the wholesale market, which as I mentioned is around 45% of our bill. Even though the wholesale market is clearly not fit for purpose, there is still a lot of cost to be remunerated, so the chances of wholesale prices reducing dramatically appear small.

Most of the renewable generation is in Scotland, far away from where the electricity is needed so huge grid reinforcement and extension is needed. You will be aware of the Beauly Denny transmission line, which is now being upgraded. There are two new undersea interconnectors between Scotland and England under construction, along with a host of new overground power lines across the UK.

This is why the transmission grid costs account for about 20% of our bill, a cost that is rarely quoted by politicians when they say that renewable energy is cheap.

In addition to the cost of generating and transporting electricity, UK consumers are also paying the costs of successive Westminster Government green policies such as smart meters, heat pump grants, insulation and so on. These account for another 12% of our bill.

Don't be fooled, becoming Net Zero costs money, and lots of it. UK energy policy dictates that all these energy related costs are passed through to us, the end consumers. None of it is funded from general taxation.

So, Britain has market prices set by expensive gas generation, even when very little gas generation is needed. There are also considerable additional costs being borne by consumers which are not in any way subsidised, unlike for example France. This is why Britain has the highest electricity prices in Europe.

For energy prices in Britain to be affordable one or more of three things needs to happen: First, the gas price must fall, which we have no control over, so this is merely a blind hope, not a strategy.

Second, consumer prices are discounted, which in the current financial climate seems unlikely; or

Third, we structure our energy market to be more cost reflective. There seems to be little appetite in Westminster for such a change and Scotland cannot currently do it unilaterally, so once again having energy policy devolved is an imperative.

Decarbonisation

The third point of the Trilemma is Decarbonisation.

The Scottish Government most recently enacted the Climate Change Act 2024, which committed Scotland to Net Zero carbon emissions by 2045. Successive Westminster Governments have set ever more ambitious carbon reduction targets, culminating with the current Labour Government's commitment to Net Zero by 2030 – less than 5 years away.

Scotland is uniquely placed to support decarbonisation, but we also want to be to be prosperous as a nation, with successful industries and good job prospects. Therefore,

decarbonisation must be a means to an end and not an end in itself, as it often appears to be at the moment.

Whatever decarbonisation target is adopted, there are two key things we must ensure happen during the transition away from a fossil fuel-based economy.

These are:

The development of new clean power projects must be net value adding for Scotland, not net value reducing; and

The transition of jobs and industry must be managed so that employment and GDP are improved, not adversely affected.

In both of these areas, I think there are questions to be asked:

On the first point, Scotland has the probably the greatest renewable energy resources in Europe, but whereas there is intrinsic value in oil and gas; wind and water are free – it is the technology to harness that resource and turn it into electricity that creates the value and unfortunately very little of that technology is made in Scotland.

In a typical wind farm, around 85% of the cost of the wind farm is in the technology, all of which is imported. Most of the remainder of the cost is spent during construction, on roads, concrete bases and so on. There is very little ongoing operation and maintenance costs that benefit Scotland, most of this goes back to the technology providers to satisfy warranty conditions.

The benefit to Scotland of battery farms is even more skewed, with almost the whole battery system being imported, normally from China, constructed using fossil fuels and then shipped at an additional environmental cost to Britain.

The current Westminster Government recommendation is that developers should offer local communities £5,000 per MW of capacity for the life of the project, but I have heard feedback that that rarely happens.

As I have mentioned before, Scotland does not have control of energy policy, so awarding contracts and licencing new generators rests with Westminster. However, Scotland does have control of planning permission and hence the Scottish Parliament could steer what gets built, where and under what conditions. Whether the negotiating power awarded through this process is being utilised to the full is a question for Holyrood to answer and we should press them for an answer.

On my second point, the speed of transition away from fossil fuels into clean energy must be managed.

Creating new industries and jobs is a far slower process than closing industries and erecting wind turbines. The Net Zero by 2030 target runs the risk of fossil fuel-based industries being shut, well before the new industries and infrastructure necessary to support green energy is even in place.

I am originally from the northwest of England and witnessed first-hand the de-industrialisation of West Cumbria without consideration of what, if anything, would replace it. We have 'previous' when it comes to shooting ourselves in the foot. We are already seeing evidence of this, with closures of oil and gas projects, Port Talbot and the refinery at Grangemouth. Our grid reinforcement, reserve generation capacity and the development of green industries such as heat pumps lag well behind the speed of wind turbine deployment.

Decarbonisation is well within reach for Scotland, but doing so whilst preserving Scotland's industrial strength and employment prospects represents a clear challenge that must be addressed.

Industrial Strategy

In covering the Energy Trilemma, I have mentioned industry many times. Scotland has a long and proud industrial heritage and must nurture and foster a proud green industrial heritage.

I am an engineer by profession and a strong believer that strong nations are built on strong industry. In fact, this aspect is so crucial that I and my colleagues at Energy Scotland often refer to the Energy Quadrilemma, with the fourth focus being Industrial Strategy.

There are many industrial applications to both generate and use green energy. Hydro power has been around for decades and wind and solar are becoming well established, but wave and tidal energy are still being developed, with several projects in development in Scotland.

Hydrogen has many potential uses that are just being explored, where excess wind power can be used to generate hydrogen, that can be used for heat or transport.

Carbon capture and storage is a potential way forward to enable processes that must burn fossil fuel to do so without releasing the emissions to atmosphere.

The use of green energy in generating heat using heat pumps has been promoted by successive Governments but is being hampered by high electricity prices and the relatively high up-front cost of installing them.

District heating schemes are a more efficient way of managing heat as there are economies of scale, but uptake of these schemes has been slow, again largely due to high electricity prices and an unwillingness of consumers to switch from gas.

Whilst wind energy is relatively cheap, we are still some way from maximising its value. Having already built more wind turbines than the grid can cope with, we are facing a

situation where we have more power than we can manage when it is windy and not enough when it is not windy.

Storage and other innovative ways of smoothing out this feast and famine problem are in development. Batteries are an obvious starting point, but as I mentioned they have their limitations and almost no value stays in Scotland. Storage through water, air or as heat are all in development in Scotland.

More intelligent systems in the home could manage demand to better fit what is available, using more when we have a surplus and reducing demand when there is less.

All opportunities for Scottish industry.

Governance

The last topic I want to cover is Governance. I have also mentioned several times that Scotland may wish to manage its energy industry quite differently to the way Westminster is choosing to do it. I am going to finish by looking at ways in which this could be done.
Energy policy is currently reserved to Westminster under the Scotland Act 1998, as I mentioned earlier, so to get full power over energy, either full independence is required, or getting energy policy devolved, through negotiation, perhaps using planning powers as leverage, or through other diplomatic means.

If the Scotland Act is examined in detail, though, there are several activities that Scotland can already undertake, within the Act.

For example, the Scotland Act refers to electricity, not energy, so development of a national heat industry could be done, within the ownership of the Scottish state, without breaching the Act.

A National Heat Company, or Companies could be established, either through central or local authority ownership to generate and distribute heat and further develop district heating networks. There are successful models for this already in Scandinavia.

Within electricity, whilst the Scottish Government cannot implement its own market now, it can develop specific applications. For example, community energy schemes could be developed by local authorities, communities or housing associations. Local authorities could develop their own flexibility, such as storage, or back up, such as a Gas Turbine, to help manage local grids.

Other alternatives to Local Authority ownership could be Mutuals or Co-Operatives, where the people of Scotland could hold the shares in a Scottish Energy Company, which would then develop local energy networks, heating schemes and so on and reinvest the profits in the local communities.

If the Scottish Government wanted to develop energy infrastructure outwith Westminster's energy policy, there are a number of ways in which it can be done and pursuing some or all of these areas should be actively encouraged.

Remember that planning consent is wholly within Scottish Governments remit and should be used judiciously to only allow energy development in Scotland that is genuinely in the interests of the people of Scotland. I am not convinced that is always the case.

Summary

In summary, Scotland has huge riches in clean energy potential, but we must be wise in how that fits in with other objectives of secure, affordable energy, a thriving industrial base and a prosperous nation.

Oil and gas have huge value and we are still dependent on them, yet we have stopped drilling for any new fields, opting instead to import £25 billion worth of oil and gas per year from Norway, who have extracted it from the same seabed we share with them.

To pursue an almost evangelical green agenda we are building huge numbers of wind farms, sourced almost entirely from abroad. We are supporting them with batteries and solar panels, all imported almost entirely from China, where they have been manufactured using coal generation and shipped to Britain at an additional environmental cost.

And we are spending billions of pounds on new grid, to allow the power from all of that foreign investment to be transported out of Scotland and into England where it is needed.

That power is then traded in a market that uses expensive gas prices to dictate the price for everything we buy, even though only 30% of it is actually generated from gas.

The UK Government tells us that our energy is secure, but 40% of it is now imported, from as far afield as the USA and Qatar. GB is still one market, with the same high prices and the same lack of security, even though Scotland should be in a far more secure and far less costly situation.

Valuable oil and gas jobs are being lost, offshore and in Grangemouth. Many thousands of green jobs are promised, but where are they? We can see oil rigs covered in hard working people, but look at a wind farm and how many people do you see? Almost none.

Energy security is an absolute must for any Nation to be sustainable and ideally what I have called energy sovereignty, not necessarily through ownership, but certainly through control.

Scotland has the potential to achieve this, and it should be a key priority, but it is difficult to do without Energy becoming a devolved matter, which is an absolute imperative.

With control of energy comes the ability:

- to have a Scottish wholesale market that better reflects the energy mix and cost in Scotland,

- to set energy policy, to get a better balance in the four aspects of the Energy Quadrilemma,
- to stimulate industries that play to Scotland's strengths, not just rely on imported technology and
- to develop new technologies of our own, to grow our green industries whilst continuing to support vital traditional industry through the transition period.

But even without ownership of energy policy, there are things that Scotland can do in the interim to develop green industry. Heat is not a reserved matter, and neither is local ownership of aspects of energy development, all of which can be used to influence and complement central policy.

As I mentioned, Scotland has the power over the planning process and could use this to steer a more secure, affordable, greener and prosperous future.

Scotland has enormous potential in the energy sector, but current Westminster energy policy is not fit for purpose for Scotland.

There are ways of changing this trajectory, but we must act and act now.

Thank You.