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INTERNATIONAL PUBLIC POLICY INSTITUTE

# Elephants in Energy

## 5 things to consider in energy policy

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**Making a difference to policy outcomes locally, nationally and globally**

**OCCASIONAL PAPER**

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## Introduction

Given my love of African safaris, I am familiar with the term ‘the big five' to describe the animals you should see. The easiest of these to spot is the elephant, but for two hundred years we have used the expression 'the elephant in the room' to describe things that should be tackled but are too frequently ignored. That is what lies behind my title of ‘Elephants in Energy’. I intend to address my view of the big five elephants in the Scottish energy policy environment.

## 1. The first elephant: The need for an integrated energy policy.

My first elephant is the need to take an integrated point of view on energy. Development of energy policy tends to focus on electricity, with some thought on heat, while transport is frequently dealt with entirely separately, even up to Ministerial level. The reality, however, is that we face carbon and energy security challenges that ignore these divisions and we should do the same. Heat makes up about half of total energy and this is where our energy efficiency efforts should be focused. With the new powers available to the Scottish government we should tackle heat on an area by area approach and regard it as a national infrastructure project that will take 10 years to complete.

We need to move beyond exhorting people to lag their lofts. We need to look at the true obstacles to energy efficiency which are usually not monetary, but can involve decisions about aesthetics, convenience and trust. We need different policies for new and existing houses. We need to differentiate between owner occupied and rental and between domestic and commercial.

[1] This is the text of Ian Marchant’s ‘Town and Gown’ lecture held on 28 September 2016 in the Court Senate at the University of Strathclyde

In looking at energy efficiency we should embrace modern technology for home automation. We need to make fitting and retrofitting these technologies easier. It needs to be 'plug and play' like an iPad, not like a build your own computer from the 1970s. My dream would be that every household in Scotland will benefit from home automation within ten years, so let's make Scotland the best place in Europe to deploy this technology.

One consequence of an integrated energy policy is likely to be an increase in the relative importance of electricity. With this will come increased scale and variability of electricity demand. . This brings us to energy storage. The biggest source of storage we have at present are the coal stocks at power stations - but these are going and we have to plan on a future without them. We are seeing significant money and innovation in the field of batteries which will affect all aspects of the electricity industry. We will see storage devices in the home, at the substation and at the generator, but will it ever replace the resilience and flexibility that the petrol tank in your car provides? We need to understand this. We also need to ensure that Scotland is a great place to invest in electricity storage on the grid - and in the home.

When we consider the affordability of energy it will be important to look at the three energy bills in aggregate; power, heat and fuel. A switch to an electric car increases the power bill but that doesn't make fuel poverty more likely as even more will be saved at the petrol pump. For most people the cost of filling their car each year is about the same as their annual power and gas bill combined, so let's start looking at all three together.

We need to combine all three aspects of energy as we consider policy, technology deployment and affordability and give Scotland a truly world class integrated energy policy.

## 2. The second elephant: The need for a demand side trilemma.

My second energy elephant is the need to focus on the demand side. The demand side of energy involves decisions by millions of different people whereas there are probably only a hundred or so companies involved in the supply side. The scale of decision is also different from hundreds of pounds to hundreds of millions. Just consider your personal decision about whether to replace your gas boiler and your corporate decision whether to replace your gas fired power station. As supply side energy assets give good photo opportunities, they dominate the policy agenda. The supply side is like a black hole which sucks into itself all the life from the energy policy debate.

So let's get rid of the black hole – and quickly. Given its gravitational pull, the supply side has hi-jacked the so called 'energy trilemma' we use to summarise the energy policy debate. The three issues of affordability, security of supply and sustainability are a useful framework for a policy discussion but it's invariably a supply side discussion with occasional lip service to the demand side. If you consider each of the three terms you can see what I mean. Sustainability is about low carbon or high carbon generation. Security of supply is about the capacity margin on the network. Affordability is about cost of the unit price of electricity. All of these are important subjects. The supply side trilemma is important. But it is only half the story. We need a demand side trilemma and these are my suggestions:

- Flexibility
- Meeting needs
- Affordability

Firstly, flexibility or possibly convenience. Our current energy system is flexible but in a constrained way. When we flick the switch, the light comes on and when we turn up the thermostat, the boiler fires up. But the constraint is economic in that the cost of providing that flexibility varies enormously over the day and the year but we are unaware of that variability. For example, the variable cost of producing electricity can vary from effectively zero to hundreds of pounds per MWh but our tariff is fixed

regardless. As users we actually want more flexibility and more convenience. We want to be able to control our central heating and lights from wherever we are. As businesses and consumers we increasingly want to be able to match our own generation with our own demand. So as a 'Prosumer' I want more flexibility.

However, it isn't that simple. The electricity industry also wants to increase flexibility and control but for its own convenience. There are two perspectives. The network operators want to use flexibility to manage their networks more efficiently and to avoid expensive, asset heavy reinforcement. The supply side, on the other hand wants to make sure that demand knows the economic cost of its choices, which means more flexible pricing so that we will pay a variable amount for our energy depending on its cost of production. This bit of the industry wants you to run your dishwasher when it's windy, charge your car when it's sunny and sit in the dark when it's a still, clear night.

Therefore the three demands for flexibility can pull in different directions. The network wants you to charge your electric car when demand is low, the generator wants you to charge it when supply is high and you want to know how much the different choices will cost and then make your own decision. Demand side policy has to address this flexibility challenge but there are two other factors.

People don't want kWhs of electricity or therms of gas. They want their phones charged and their houses warm. The trouble is that we don't know how much these things cost, we just get an estimated bill covering a few months. Smart metering will clearly help here but we still won't know what we are spending money on, just when we are spending it. Because we don't know what is happening we overcompensate by using more energy that we need to make 100% sure that our needs are meet. The setting of central heating time clocks is the best example here. Demand side policy needs to put meeting of actual needs in the foreground, not just consumption., and we don't have a clear view of what those actual needs are as all out data is based on consumption

The third leg of a demand trilemma is the same as in supply; affordability; but this time with a difference. The supply side addresses the unit cost of energy but the demand side looks at unit consumption. This is often referred to as energy efficiency and that is a key part of making energy affordable but we mustn't simply be wasting energy more efficiently. It's no good if my car has a good fuel efficiency if I drive it when I should be using video conferencing.

So there we have it; a demand side trilemma. Flexibility and whether it should be customer or industry led. Meeting needs without just using more energy and affordability by managing consumption. I long for the day when as much time is spent on the demand side as was spent on the Electricity Market Reform process.

## 3. The third elephant: New challenges for renewables.

My third elephant in the energy room is that renewables will have to adapt to the next stage of the energy challenge. I think that the Scottish renewable industry has done a great job over the past15 years and with production now well over 50% of demand we are truly world class. However, that phase is nearly over and the next 15 years will bring different challenges and only those that adapt will survive.

The first challenge will be to make more of the existing assets that we have. Some examples will include increasing output from existing assets using new technology like LIDAR[2] and new light weight blades, repowering older assets as wind farms built over ten years ago are sub-scale and increasing the predictability of output through better control and use of embedded storage.

The second challenge will be to get the costs of established technologies such as wind, hydro and solar down as more and more of their output will have to compete in a market with ever decreasing subsidies. The recent report from Scottish Renewables

[2] a surveying technology that measures distance by illuminating a target with a laser light

highlighted this but although this pointed out the elephant in the room, I'm afraid it is still there. We need a simpler, quicker and cheaper approach to approval. We need to build sites that maximise output whilst minimising impact. We need to lower land and construction costs. We need to design and build to maximise output not capacity.

The third challenge is that we have to focus on more than wind. Scotland has a global lead in tidal energy but we are in danger of losing that lead as sites aren't available for all developers for the next stage of development and support for deployment needs to be certain. It's also more about than electricity, for too long renewable heat and transport fuels have been the ugly sisters.

The final renewable challenge is something that isn't being addressed quickly enough. As renewable electricity penetration increases then the level of curtailment also increases. There are three possible responses to the problem; building more network assets, investing in energy storage and increasing demand side management. Given Scotland's aspirations for renewable electricity we will need to do all three and we need to plan to do them or we will just see curtailment increase.

The renewable industry needs to address the elephants in its own room to play a larger role in the next stage of the Scottish energy industry.

## 4. The fourth elephant: The need to readdress nuclear

So far I have been relatively uncontroversial but my next two elephants are more contentious but need to be addressed none the less. And the first is nuclear. First let me clear. I am, and always have been, against Hinkley Point. I think it is important that I explain why even though the UK government has approved the project as it puts into context my main point. I have ten things I hate about it.

1. PRICE. The published figure for Hinkley power is £92.50 per MWh in 2012 prices. It is out of date and after nearly four years it must be around £100MWh. That's more than double the current wholesale power price, more than a third above the cost onshore wind and more than any other country seems to be paying for nuclear power.

2. DELIVERY DATE The latest date I've heard is 2025 but I suspect this is just a guess. Put it another way. It's not going to make a difference to the UK's current security of supply crunch.

3. DURATION. When the plant does eventually come on-line we will then be forced to pay the inflated price for 35 years. We are being forced to take a 45 year bet on energy prices.

4. TECHNOLOGY. My issue isn't with nuclear power itself, it is that we have chosen to build a technology that is based on 20th century ideas and which isn't exactly problem free. The first two stations of this variety being built in Finland and France are so late and over budget they make public sector projects look well run!

5. SIZE. The new units at Hinkley Point will be 1600MW which will cause the network operator issues and therefore cost in making available sufficient back up reserve.

6. OWNERSHIP. After leading the world in electricity privatisation we are dependent on the French largely state owned EDF and a wholly state owned Chinese company to build this station.

7. WASTE. I know proponents say that new nuclear doesn't generate much waste but surely we shouldn't dig the hole a little deeper before we know where we are going to build the hole.

8. TRANSPARENCY. The deals being done to get this plant built are extremely complex. For example, I understand that the power contract is over 400 pages long and has never been subject to independent scrutiny. I do wonder what devil lies in the detail.

9. DECOMMISSIONING. Whilst it is many years in the future and therefore conveniently ignored currently, at some point the mass of irradiated steel and concrete will need to be made safe.

10. NEED. And finally, do we actually need it? The relentless drive for new nuclear started back in 2006 when experts felt that peak electricity demand in 2015 would be around 65GW. A combination of energy efficiency and economic drivers means that actual peak demand was only 55GW (about six Hinkleys less) so even if we needed it then, do we still need it now?

I may not have convinced you on all ten points but the charge sheet is long and surely a guilty verdict on a few should have been enough to make us think again. I had hoped the recent review would have looked at this evidence but it seems that with nuclear development, like a nuclear power station itself, once you've started you have to carry on.

I firmly believe that we should not be building this enormous, expensive piece of old and curiously unproven technology. However, we should not ignore the fact that nuclear does produce base load zero carbon electricity and Scotland will need some of that. I spent some time earlier this year looking at small modular nuclear reactors. They are much smaller, should be cheaper and quicker to build, are safer by design, produce less waste and decommissioning risk and represent true 'new nuclear'. From my research I was convinced that this sort of nuclear power was worth another look and I think that, here in Scotland, we should take a fresh, independent and evidence based look at this emerging new generation of modular nuclear power stations. I think

the Scottish Government should set up an expert review group to tackle my fourth elephant and look again at truly new nuclear.

## 5. The fifth elephant: The inconsistency between our oil production and $CO_2$ objectives

And so to my final elephant. For too long the issue of carbon has been the elephant in the fossil fuel part of the energy room. The science that underpins climate change is now well established and the fact that man-made emissions of carbon, mainly from fossil fuel, are one of the principal causes is becoming increasingly accepted.

This means there is growing conflict between maximising the production of fossil-fueled energy and minimising climate change. For example the UKs Energy Research Centre says that "a third of oil reserves, half of gas reserves and over 80% of current coal reserves globally should remain in the ground and not be used before 2050 if global warming is to stay below the 2 degree C target agreed by policy makers".

Let me give you the numbers. The total proven fossil fuel reserves and resources would account for 2860 gigatonnes of CO2 if we burned it all. A 2013 report by Carbon Tracker and London School of Economics illustrates the total amount of CO2 we could emit against probabilities of meeting global temperature limits out to 2050. If we are serious about limiting the rise to only 1.5℃ we can only emit just over 500 gigatonnes of CO2 meaning that only 18% of global fossil fuel reserves can be used by 2050.

Squaring the circle between the abundance of fossil fuels and climate change will be the defining energy challenge of this century and in Scotland we cannot hide from that by simultaneously aiming for maximum economic recovery of North Sea oil whilst taking a world leading position on reducing carbon emissions. It is not defensible to say that we can burn our reserves whilst other countries should keep theirs in the

ground when we have enjoyed the fruits of carbon emissions for the past two hundred years.

The challenge in the North Sea is, I believe, really about undertaking an efficient and sustainable decommissioning programme whilst managing the decline in production rather than squeezing out every last drop and emitting every last tonne of carbon. If we get a successful integrated decommissioning programme going then we will have a skill and expertise to build a new export industry on which can create jobs that will survive long after North Sea oil and gas production has ended.

So in summary, my big five elephants in the energy world are:

1. We need an integrated energy policy that combines power, heat and transport and which applies the full force of technology and policy to all three areas. As a personal suggestion I think we should make Scotland a centre for home automation.

2. We need to put the demand side on the same footing as the supply side. I believe that a new demand trilemma of flexibility, meeting of needs and affordability should help to achieve that refocus.

3. The renewable energy industry in Scotland has to accept that its golden era is over but it can have a successful future if adapts quickly to the new challenges, the new technologies and the new environment.

4. Despite my strong opposition to Hinkley Point C I believe that Scotland should have a fresh, independent, evidence based look at small modular nuclear reactors to determine if they have a place in our new energy future.

5. We have to address the inconsistency between our low carbon ambitions and maximising economic recovery of North Sea reserves. The challenge in the North Sea is to minimise the economic cost of decommissioning.

I'm sure you will have your own list and I encourage you to make sure that whatever issues you feel are important are aired and addressed. Silence is not an acceptable response to the 21st energy and carbon challenges we face. My biggest single plea is that we have an honest and informed debate on Scottish energy policy. It's too important not to.

**About the author:**

**Ian Marchant** is Chair of the Advisory Group and Visiting Professor at the Centre for Energy Policy, Strathclyde; a Visiting Professor at Edinburgh and Durham universities as well as being a member of the Prince's Council of the Duchy of Cornwall and the President of the RZSS. He is chairman of the quoted energy services company, John Wood group, on the board of Aggreko, the temporary power supplier and, through his company, Dunelm Energy, invests in early stage energy and clean tech companies

He was Chief Executive of SSE plc, a leading UK energy utility company, for over 10 years until stepping down in the summer of 2013. Ian is also a former Chairman of Scotland's 2020 Climate Delivery Group, President of the Energy Institute and Chairman of the renewable energy firm, Infinis.

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