

THE ECONOMICS OF RENEWABLES

BURNING QUESTION

CAN SCOTLAND POWER TO THE
FRONT OF NEW TECHNOLOGY?

THE SCOTSMAN
CONFERENCES

 **THE SCIENTIFIC
ALLIANCE**
Informed Scientific Debate

 **SCOTTISHPOWER**

A great opportunity or a white elephant waiting in the wings? Views differ on the merits of renewable energy, but as this week's Scot



Bearing the cost of cleaner energy

DELEGATES clashed on the subject of power bills, with one contributor claiming policies on renewable energy and climate change would continue to have a disproportionate impact on the most vulnerable in society.

However, Professor Tony Mackay's claim was rejected by both Fergus Ewing and David Wilson, director of energy and climate change in the Scottish Government. Wilson said additional costs to consumers were offset by the benefits, especially in terms of energy efficiency.

Mackay quoted a 2010 report by the Department for Energy and Climate Change which suggested the impact of renewable energy and climate change policies added 14 per cent to the costs of generation by 2010, but that this would rise to 26 per cent by 2015 and 33 per cent by 2020, raising the cost per megawatt hour by £40.

This meant renewable energy policies added about 5 per cent to domestic energy prices in 2010, predicted to rise to 19 per cent by 2020. There would be a greater impact on non-domestic users from these policies, Mackay added – up an average 26 per cent. But he said his biggest concern was the impact on the poorest communities in Scotland: “The impact will be greater for those on the lowest incomes, and as far as Scotland is concerned, that is a very serious issue.”

Energy bills are already 20 per cent higher in Scotland than the rest of the UK, Mackay said, partly due to climate and geography, while Scotland was behind England in terms of energy efficiency. Long-term progress had been made in tackling fuel poverty, he said, but this had stalled in the last two to three years, partly due to oil and gas prices and partly due to renewables policies.

“We need much greater transparency about the costs and benefits of renewable energy and other climate change policies,”

Mackay said. “Most consumers do not understand what the costs and the benefits are. The top priority is to reduce fuel poverty in Scotland – to make sure those on the lowest incomes do not make the highest contribution to renewable energy.”

Wilson accepted Mackay's figures, which he said equated to around £15-£20 on an average bill now, expected to rise to an extra £50 by 2020. But both he and Fergus Ewing stressed that this was far from the whole picture – and the vast majority of the £190 average rise in bills over the last year was attributable to the rise in wholesale gas prices.

Wilson added: “It is also very important to look at the benefits to consumers of the various government policies in terms of energy efficiency, the Green Deal, offers on cavity wall insulation and so on. The costs are greater in terms of various energy policy

“The impact will be greater for those on the lowest incomes”

Professor Tony Mackay

commitments, but on average this is more than compensated for by energy efficiencies and other efficiencies in the system.”

Wilson said these benefits were targeted at the most vulnerable, and groups who were suffering from rising bills were given disproportionate help.

Mackay said subsidies for onshore wind were too high, claiming a friend of his had invested £10,000 in six turbines and got a return of £220,000 after tax. “There is something wrong if companies can make such tremendous profits,” he said. “Particularly in relation to Feed In Tariffs, we need some radical changes. The market is distorted because subsidies are far too high.”

RENEWABLE energy has been given a privileged position by policy-makers which allows the government rather than the markets to plan progress.

That approach was “policy-making folly”, according to Professor George Yarrow, chairman of the Regulatory Policy Institute and one of the speakers at The Scotsman Conference: The Economics of Renewables.

Yarrow and others criticised the high costs and skewed market that favoured renewables over cheaper and more effective forms of generation – after a staunch defence of Scottish government policy by Energy Minister Fergus Ewing and Prof Jim McDonald, Principal of the University of Strathclyde and co-chair of the Energy Advisory Board in Scotland.

Ewing quoted Barack Obama – “The country that develops new forms of renewable energy will be the country that leads the global economy” – and insisted that government, industry and academia were coming together to help win a “glittering prize” for Scotland.

McDonald described the enormous assets Scotland had: major utilities; manufacturing success stories; serious inward investors; a “necklace” of port infrastructure around its coast; and test and demonstration facilities of international significance.

“The key is to connect research and development to demonstration and deployment. We have the intellectual horse-power, the research capability of scale that we can build a successful low-carbon energy industry around,” said McDonald, before outlining an ambitious vision for renewables – £7 billion GVA (Gross Value Added) to the economy in the next decade, another £6bn of indirect or induced GVA, and 28,000-plus direct full-time equivalent jobs (FTEs) in offshore wind alone, with another 20,000 indirect FTEs.

“This is not a pipedream, it is about industry demand,” he insisted, before warning an “awful lot” had to happen by 2020 in terms of aligning the planning system, improving grid connections and de-risking the investment climate: “This is an opportunity that we only have a very few years to grasp. We can become a net exporter of wind-produced electricity but this is predicated on the need to improve the grid.” New connections were fundamental, but phenomenally expensive: “re-wiring Europe to de-risk the supply of energy across the continent” would cost between €600bn and €1 trillion, he said.

McDonald concluded: “Accelerated cost reduction is necessary to make this a feasible industry, but Scotland has the capability to be a world leader and to have a disproportionate impact.”

Gordon Hughes, Professor of Economics at the University of Edinburgh, cautioned against over-optimism. “Wind power is very expensive, roughly nine to ten times more expensive than the equivalent programme of gas-fired generation, which is the real comparison. This means investment has to be diverted from elsewhere in the economy to fund wind power.”

Hughes, who has 25 years' experience in environmental economics, also argued that wind power saved a “very small amount of carbon dioxide – but the costs are staggeringly high”.

He suggested the cost of installing and



Cranking u

operating wind power would fall over time, but not by as much as we might hope. Nuclear power was relatively expensive in the UK, but still cheaper than renewable energy, Hughes said, adding: “If we are seriously interested in reducing carbon emissions across the world, nuclear power is likely to be the way most of the world will go.”

Hughes also said intermittency of wind power was a problem and would cause major price fluctuations: “When the wind is not blowing, prices will be high; when it is blowing, they will be low.”

He warned that, currently, the cost of exploiting wind exceeds the value of the market: “If we want wind power, we cannot go on with the market for electricity we have today. If we are going to change, we cannot commit ourselves to guaranteeing prices via Feed In Tariffs. We have to get incentives right in terms of encouraging more efficient technologies, and get a

better deal in the long term. We need to reward people for bringing down costs – you cannot ante an initial price but must require it over time to match the market price.”

Part of the reason wind power was so unattractive, Hughes said, was the inability to store. The ideal complement to wind was large-scale hydro, he suggested, as it could be stored and deployed when the wind was not blowing. “Batteries were not the answer to storage issues because they were too expensive and a range of other disadvantages.”

Governments were very bad at identifying and developing new technologies, he claimed. He said markets were good at that, but that the outcomes were unpredictable. His solution? “We need to go a bit more sophisticated – reward those technologies that are economically sound in due course, but we have to get the incentive structure right and let the market deliver things that are economic.”

Yarrow also took up the theme of government intervention, and said there had been “a poor policy response” after environmental regulation took centre stage. As a result, the industry had become highly politicised – and industry became passive as it waited for government decisions. The “planning of progress” government was wrong, Yarrow said, as governments tended to be “wooden-headed” and easily shaken off a course once it was decided.

Instead of “planning progress” itself, government should allow the creation of incentives, like markets, which favour progress and encourage competition: “the most effective driver of information discovery and innovation known to man”, Yarrow said.

Dr John Constable of the Renewable Energy Foundation agreed that renewables were expensive and should not be “over-sheltered” by government. He accused supporters of hiding behind state subsidies, such as the one claiming renewable generation cost 2p per kWh because no-one understood that such an apparently small figure translated to upwards of £6bn.



man Conference, The Economics of Renewables, made clear, our growing future needs must be addressed urgently, writes David Lee



Pictures: Neil Hanna

up the debate

David Wilson, the Scottish government's Director of Energy and Climate Change, agreed that cost and intermittency were key issues – but said the Scottish government took them into account: “We plan on the basis that we have a large amount of intermittent wind on the system which at particular times will have an impact on other generation sources. We are designing a system to cope with intermittency.”

Cost issues could be addressed by factoring in a range of “external impacts” on other sources of generation including carbon costs, risks to conventional power generation – and the opportunities to bring down the cost of renewables. All energy policy had to try to address the “trilemma” of sustainability, security of supply and affordability, Wilson said.

The World Economic Council had demanded “vision-led and coherent energy policies” and Scotland aspired to this. Wilson said: “You have

to say yes to something and in Scotland, we can say it to a large number of things and there is no shortage of projects to bring forward baseload capacity.”

Fergus Ewing stressed that the Scottish government knew renewables was not the only answer: “Scotland under the SNP will not, does not and cannot rely on renewable energy alone; it will be part of a balanced mix as we continue the transition to the low-carbon economy, but we will need traditional geothermal energy for some time to come.

“I have examined the transition of Cockenzie from a coal-fired to a gas-fired power station and extended the life of our nuclear plants. Scotland will continue to have a mix of sources of supply. All our lights cannot be kept on by onshore wind – that would be absurd. But it is clear fossil fuels will run out – they are finite, an alternative is needed and we must look at reducing carbon emissions.”

“The country that develops new forms of renewable energy will be the country that leads the global economy”

Fergus Ewing, MSP, quoting President Barack Obama



But will it generate jobs?

THERE was disagreement about whether or not Scotland could build an economic development strategy around renewable energy. Graeme Blackett, of BiGGAR Economics, whose report, “Powering Scotland”, was published by Reform Scotland this week, argued that it could.

“Energy policy and economic development policy must be joined up, and the economic impacts [of renewables] can be significant,” he said.

Richard Marsh and Tom Miers, of Verso Economics, fundamentally disagreed and said arguments about economic benefits should not be used to justify renewable energy policy. Marsh and Miers looked at the employment impact of renewables in a report published earlier this year, “Worth The Candle, The Economic Impact of Renewable Energy Policy in Scotland and the UK”.

Marsh said there were a number of different approaches to measuring “green” jobs, “renewables” jobs and “low carbon” jobs. All of them suffered from a paucity of contemporary data, a lack of detail, a clear definition of what should and shouldn’t be included and the “persistence of benefits” – how long jobs in areas like construction would last.

He claimed that as a result of all this, estimates were often “unclear and optimistic”. In a “visionary” scenario outlined by Professor Jim McDonald, Marsh said the figure of 48,600 jobs was given, but that the report quoted by Prof McDonald had a range of assumptions and different scenarios, with job creation numbers as low as 1,600. Job growth depended on developing technology to the point where it could be exported, Marsh argued.

The Verso report concluded that the displacement of jobs from traditional sources of energy generation to renewables would trigger a net loss of jobs across the UK and a broadly neutral impact in Scotland.



“Energy policy and economic policy must be joined up”

Graeme Blackett, BiGGAR Economics

Economic benefits are, prominently, exaggerated,” Marsh said. “We can make a case based on energy security or environmental impact, but it is very difficult to do so based on purely economic benefit.”

Blackett argued renewable energy was actually “the best economic opportunity for a generation”. Finance secretary John Swinney had made the transition to the low-carbon economy a key strategic priority this year, he added, and this was right because a fossil fuel-dominated supply mix was not financially sustainable in the long term.

Blackett claimed that renewables could lead to exports of at least £2 billion per year. “Renewables have a price disadvantage but this has narrowed and will be eliminated over time,” he added. He also claimed that there were very broad employment opportunities across R&D, the supply chain, operations and maintenance and new technology.

But Miers cautioned: “Renewable energy is presented as an economic opportunity but we are replacing one form [of power generation] with another and would not expect to see an economic impact – especially if the replacement is more costly.”

However, Adrian Gillespie of Scottish Enterprise said this analysis “flew in the face of everything I hear from businesses”. And he warned: “If investment does not come here, it will go elsewhere.”

Oil and gas expertise a vital factor

FERGUS Ewing admitted that driving down costs was one of the key challenges in ensuring Scotland capitalises on its renewable energy opportunity.

And Adrian Gillespie, pictured below, and David Butler went on to explain how Scottish Enterprise was aiming to do this, especially in terms of harnessing expertise and experience from the oil and gas sector.

Gillespie, senior director of energy and low carbon technologies for Scottish Enterprise, said: “Cost reduction is a business opportunity in itself and it is innovation that will bring down the cost of offshore renewables. As Sir Ian Wood said, we can help a new young industry [renewables] grow with the help of an established industry [oil and gas].”

The renewables

and oil and gas industries were increasingly meeting to discuss specific business opportunities, said Gillespie, who added he was unashamedly optimistic about the future, despite the high cost of renewables: “At the moment, offshore renewables are much more expensive. That’s not surprising for a small industry – that’s economics and it’s what every industry will witness.

“The cost of onshore wind has come down about 40 per cent in the last 20 years, and in offshore it will happen more quickly because we have scaled up more quickly. By 2020, there is a 25 per cent potential saving in

offshore wind and 50 per cent in marine. With each very rapid iteration, we will see a substantial drop in the costs of energy.”

Gillespie highlighted cost-cutting opportunities in offshore wind as: widening the “weather window” for maintenance; using more remote devices; bulk manufacturing; faster installation methods.

Butler, market analysis manager for Scottish Enterprise, said it was key to cut the cost of energy to sustainable levels – and this was around £60 per kilowatt hour.

Butler added that, in terms of innovation savings, there were great opportunities in wind turbine design. Overall, he said, harnessing and exploiting oil and gas expertise could shave around 20 per cent off capital expenditure over the lifetime of a large offshore project.



Wind turbines at Doune Hill, Stirling. The Scottish government's ambitions for renewable energy are seen by many to be marooned, metaphorically speaking, high on a distant hill
Picture: Ian Rutherford

Winding up a complex argument

THIS week's conference has enabled both sides of the renewable energy argument to be put forward and discussed. Despite official assurances that wind energy capacity has to be massively expanded and that this will be for the benefit of the Scottish consumer and economy, evidence was presented that the reality may be very different.

The government argues that renewable energy will keep energy prices lower and less volatile in the longer term, as oil and gas prices soar.

But this ignores two very basic issues.

The first of these is that such a scenario relies on a rigged market, with carbon dioxide emissions priced by government on a scale which increases year by year. In these circumstances, renewable, low-carbon power is given an increasingly important competitive edge.

But according to Professor George Yarrow, chairman of the Regulatory Policy Institute and one of the speakers: "The current privileged position of renewables is damaging. Poor environmental regulation has undermined better energy regulation, and this has become highly politicised. Government wooden-headedness is taking us down the cul-de-sac of subsidies and centralised planning, rather than fostering healthy competition."

Dr John Constable, director of the

The SNP wants Scotland to become the renewable energy capital of Europe, but big obstacles need to be overcome



Opinion Martin Livermore

Renewable Energy Foundation, also speaking at the conference, said: "The Scottish public is being misled. The additional costs to consumers across the UK of present policies would be £15 billion – 1 per cent of GDP – by 2020, which is clearly not sustainable.

"Rather than spending large levels of consumer subsidy in an effort to reach arbitrary targets, government should be enabling markets to invest in technologies which can deliver energy security at an affordable price. We need a more honest approach."

But, cost apart, there is a second fundamental flaw in the foundations of current policy, which will, sooner or later, undermine the entire edifice.

"Everyone knows that the wind doesn't blow all the time; wind simply cannot generate power reliably at the times when it

is needed. Like all renewable energy technologies, with the exception of burning biomass, it is intermittent."

The renewables industry argues, with some justification, that wind can be forecast with a reasonable degree of certainty. However, even when the wind blows, it rarely does so consistently. Output fluctuates massively over both long and short timescales. A particular problem is that when the UK experiences maximum power demand – long, cold winter evenings – it is not uncommon for there to be stationary high-pressure weather systems over both the entire British Isles and much of the near Continent.

The inconvenient truth is that no

"The inconvenient truth is that no amount of wind farm building would ever give full energy security. There will be times when very little power is generated"

amount of wind-farm-building would ever give full energy security.

There will be times when very little power is generated, and politicians would face an electoral backlash if they allowed a situation to arise where this caused otherwise-avoidable blackouts. This means that sufficient conventional generating capacity has to be available to replace essentially all the wind output.

But experience elsewhere is not encouraging. Denmark has much more wind-generating capacity than Scotland: about 20 per cent of its electricity output comes from wind. However, only 10 per cent of the electricity Danes themselves consume comes from wind. Much of the time, too much wind power is being produced, and the excess is exported to neighbouring Norway, Sweden or Germany at low prices (the high availability tends to lower the spot price).

Unfortunately, the claims made about the potential of wind energy today are the same as those made 20 years ago.

Professor Gordon Hughes said in his presentation that the capital cost of wind generation is about nine

times that of a gas-fired station when all factors are taken into account. Although prices of some

components have fallen significantly, further large cost decreases cannot be expected. Governments are very bad at identifying and developing technologies; something much better left to market forces.

The Scottish government has a vision of the country being the renewable energy capital of Europe, harvesting much of the available wind energy (and, in future, wave and tidal energy as well) and enjoying a healthy income from its export. A recent report by Reform Scotland estimates this would be worth £2bn annually, but this does not seem credible, based on the evidence presented.

Projections are made for the creation of tens of thousands of jobs, but many of these would in fact be short-term ones while wind farms and power lines are built. The possibility of Scotland creating a large-scale and successful wind turbine manufacturing sector which competes with established companies – and the low costs of China – seems remote. Investment in innovative new technologies may give future growth, but these are risky enterprises which will take many years to grow.

This may seem a pessimistic view, but it is critical for the future of Scotland that the right policy decisions are made now. The path to Hell is paved with good intentions.

● Martin Livermore is director of The Scientific Alliance

"BELIEVE THOSE WHO ARE SEEKING THE TRUTH.

DOUBT THOSE WHO FIND IT"

André Gide

 **THE SCIENTIFIC ALLIANCE**

CHALLENGING AND INFORMED SCIENTIFIC DEBATE

T: 01223 421242

www.scientific-alliance.org