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This briefing does not necessarily deal with the UK Government's proposed new reactor programme. For an update on developments to do with new reactors see here:
http://www.no2nuclearpower.org.uk/nuclearnews/NuClearNewsNo100.pdf

1 The UK's New Nuclear Programme

Offshore wind costs as low as £57.50/MWh were announced in September, (1) *The Guardian's* editorial said the precipitous drop in the price of electricity from offshore wind turbines, from around £150/MWh in 2014, should "*blow away*" the UK's nuclear plans. It described Hinkley Point C (HPC) as "*like a dinosaur even before it arrives on earth*". Ministers should "*open the door to a greener, cleaner future where Britain meets greenhouse gas targets without more expensive nuclear plants*." (2)

A new report, Emeritus Professor of Energy Policy, Steve Thomas, says it is time to cancel Hinkley Point C. EDF and the French and UK governments may try to suggest that it's too late to stop and will talk up the costs which have already been incurred. But the start of construction, when the first structural concrete is poured, is still between 2 and 4 years away. Preliminary works are conspicuous but relatively cheap. EDF Energy will have incurred expenses since signing the deal with the UK Government in October 2016 and some of these may be compensatable. But these costs would be dwarfed by the costs of going ahead

If wholesale electricity prices do not rise, the extra cost to consumers over the 35 years from opening the plant would be about £50bn. If the wholesale price rises to, say £70/MWh, the cost would be about £27bn. (3)

Thomas says it would be surprising if there aren't further delays and cost increases. EDF's claim it will take the risk of cost increases does not seem credible, so further costs could fall on electricity consumers and taxpayers.

Thomas continued "Hinkley Point C would use a technology unproven in operation – the EPR - which has run into appalling problems of cost & time overruns in the 3 projects using it. It would be supplied by Areva NP, which is in financial collapse and might not be saveable and has been found to be falsifying quality control records for safety critical items of equipment for up to 50 years – a bizarre situation."

Meanwhile, electricity demand continues to fall. When the government first endorsed HPC it was projecting an increase in electricity consumption of 15% by now, whereas in practice we are

consuming 15% less than a decade ago. In other words it made a 30 % error. Further energy efficiency improvements could reduce the average householders bill by £270 a year and save the equivalent to the output of six HPCs. (4)

Gillian Martin MSP, who is Parliamentary Liaison Officer to the Cabinet Secretary for Environment, Climate Change and Land Reform – Roseanna Cunningham - said the Tories' "*wrong-headed*" energy policy had been shown up. "*This is excellent news for Scotland's flourishing and world-leading renewables sector - and shows how misguided the Tories are on energy policy. The price of offshore wind energy has been falling for years - yet the Tories insisted on pushing ahead with their expensive white elephant project at Hinkley Point. Renewable energy is the future - offering sustainable jobs, economic growth and helping us tackle climate change and meet our environmental targets. The Tory obsession with nuclear power is frankly bizarre.*" (5)

Drew Hendry MP – the SNP's Business, Energy and Industrial Strategy (BEIS) spokesman - attacked the Government's "*nuclear obsession*", claiming it will result in people paying higher bills. He asked the Minister for Energy and Industry Richard Harrington to "*…confirm that he's happy for people to pay higher bills for his Government's nuclear obsession*." Mr Harrington said the Government was "*…in favour of a mix of energy which includes nuclear*" adding it had "*ensured energy security and continuity of supply that everybody enjoys*". (6)

Kenny MacAskill said "*This Tory Government is prepared to throw £20 billion at a new nuclear power station at Hinkley Point that has been caustically assessed by the National Audit Office, never mind the safety implications from Fukushima and elsewhere. It's also privately fretted over by the security services, given China's involvement in its construction. This aspect seems particularly absurd given alleged recent cyber-attacks, never mind the ongoing industrial, if not military, espionage. The Tories are shamefully dissipating our natural asset for their nuclear folly*." (7)

Vince Cable, the leader of the Liberal Democrats, said the breakthrough in offshore wind costs should prompt a rethink of the government's energy plans, which have pencilled in atomic plants at Wylfa in Wales, Sizewell in Suffolk and Bradwell in Essex. "*The spectacular drop in the cost of offshore wind is extremely encouraging and shows the need for a radical reappraisal by government of the UK's energy provision,*" he said. (8)

The latest government auction handed out power-purchase contracts worth £176 million a year, to build offshore wind farms and other renewable technologies. All of the 11 selected projects, which will total 3 gigawatts of capacity, were cheaper than the price fixed for HPC. The most expensive was 19 percent cheaper and offshore wind is now over a third less. (9)

The falling cost of offshore wind won't change Britain's nuclear plans, according to a spokesperson for the U.K. Department for Business, Energy & Industrial Strategy: "*We need a diverse energy mix to ensure that demand for energy can always be met, and both nuclear and renewables will play an important role in this for many years to come*," he said. (10)

Tom Greatrex of the Nuclear Industry Association says it doesn't matter how low the price of offshore wind is because renewable energy is heavily intermittent. That £57.50 strike price looks very impressive compared to Hinkley's price, but it doesn't take into account the periods of time when the wind isn't blowing hard enough to move the turbines - or when it's blowing too hard.

The Telegraph says even this fight is a mark of how far the renewables industry has come. Only 10 years ago, the debate over the viability of renewables was not about intermittency or the problems it posed for the power grid. Instead, it was about the sheer cost of generating the power. That phase of the debate is now passing. Onshore wind is already cost competitive. Some solar farms are already operating in the UK without subsidy. These costs are forecast to fall even further in the coming years. Some estimates have suggested that the cost of building new wind and solar plants will fall by about 60% in the next 20 years. Just as the cost of renewable generation has come down, the technology for other associated infrastructure like power storage is also likely to drop dramatically in the coming years. (11)

1. For instance even the Spectator says "Hinkley Point C was the best idea available when it was first mooted seven years ago, but time and technology are inexorably overtaking it." Spectator 16th Sept 2017 https://www.spectator.co.uk/2017/09/the-city-still-leads-the-financial-world-but-it-faces-a-fight-on-all-fronts/
2. Guardian 13th September 2017 https://www.theguardian.com/commentisfree/2017/sep/13/the-guardian-view-of-offshore-wind-cheaper-and-greener
3. Steve Thomas' report "Time to Cancel Hinkley" is available at: http://www.no2nuclearpower.org.uk/wp/wp-content/uploads/2017/09/Time-to-Cancel-HinkleyFinal.pdf
4. UK Energy Research Centre 6th Sept 2017 http://www.ukerc.ac.uk/news/unlocking-britains-first-fuel.html
5. The National 12th Sept 2017 http://www.thenational.scot/news/15528850.Offshore_wind_power_now_cheaper_than_nuclear/
6. Press and Journal 12th Sept 2017 https://www.pressandjournal.co.uk/news/world/1324008/snp-attacks-governments-nuclear-obsession/
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8. Guardian 11th Sept 2017 https://www.theguardian.com/environment/2017/sep/11/huge-boost-renewable-power-offshore-windfarm-costs-fall-record-low
9. Bloomberg 11th Sept 2017 https://www.bloomberg.com/news/articles/2017-09-11/u-k-offshore-wind-costs-fall-to-record-in-latest-auction
10. Green Tech Media 29th Sept 2017 https://www.greentechmedia.com/articles/read/cheap-offshore-wind-wont-make-uk-give-up-on-nuclear
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2 UK Clean Growth Strategy.

On 12th October the UK Government released its long-awaited Clean Growth Strategy. This sets out how it intends to meet its legally binding commitments to reduce greenhouse gas emissions. The Strategy covers the period from 2023 to 2032. (1)

Robert Gross, the director of the Centre for Energy Policy and Technology at Imperial College London, said the politics of the strategy were crucial and showed the greener wings of the Tory party had won out. (2) Yet the strategy will actually leave the UK significantly off track achieving its targets. The government will be largely relying on hoped-for policies or carbon budget "flexibilities". (3) And these targets were set to avoid warming of more than 2°C above pre-industrial levels rather than the more ambitious Paris Agreement limit of 1.5°C. However, the framing implied by pairing "clean" and "growth" represents a positive shift in the Government's thinking. (4) Prosperity and low carbon are no longer a compromise but aligned objectives for the economy.

Highlights include:

- The new strategy promises around £3.6bn to upgrade the energy efficiency of a million homes, with the Energy Company Obligation (ECO) extended to 2028 at its current level. Homes account for around 13% of the UK's emissions. But there is no mention of replacing the zero-carbon homes standard scrapped in 2015.

- The government proposes a new target for the business and industry sectors to improve their energy efficiency by "at least" 20% by 2030.

- The strategy says the groundwork needs laying in this parliament, so decisions can be taken in the early 2020s on the long-term future of heat. It will assess a range of options for decarbonising heat, including electric heat pumps, using hydrogen or biogas in the gas grid and heat networks.

- Reaffirmation of the pledge to phase out unabated coal generation by 2025. The government hopes low-carbon sources of power (which in the Government's mind includes nuclear) will account for more than 80% of supplies by 2030, up from around 50% today.

- Beyond Hinkley Point C, the Government says further new reactors would have to be cheaper. It commits R&D funds to this cause. In partnership with the Research Councils and Innovate UK, the Government will oversee an investment of "*around £460m*" in the nuclear power sector, which will include "*future nuclear fuels, new nuclear manufacturing techniques, recycling and reprocessing, and advanced reactor design*."

- Offshore wind will compete for up to £557m in low-carbon support, and onshore wind on Scottish islands will be also allowed to compete, subject to state aid approval from the European Commission. The next auction will be held in spring 2019.

- The strategy repeats a 10 gigawatt (GW) target for new offshore wind in the 2020s and says it will consider going even further "if this is cost-effective and deliverable". The government will provide an update on its approach to small-scale renewables "later this year".

- The strategy sets out plans to invest up to £100m in carbon capture usage and storage (CCUS) and industrial innovation.

- The transport sector accounts for 24% of UK emissions, with almost zero progress since 1990. The Strategy says almost every car and van will need to be zero emission by 2050, and

by 2040 cycling and walking should be the natural choices for shorter journeys, or as part of a longer journey.

Despite several rumours that onshore wind might be about to make a comeback it seems that even the conviction that the green economy is the UK's future is not enough to face down the rural Tory-voting minority who continue to oppose wind turbines. Solar power also failed to get a mention. The Guardian comments:

"*Despite looking these gift horses in the mouth, and ignoring tidal power, the plan promises yet more cash for those with their snouts in the nuclear trough. The hyper-expensive Hinkley Point farce has not dulled the appetite for more new nuclear power and it intends to plough by far the biggest sum of its innovation funding into the one energy technology where costs are always rising*."

Green Party MP Caroline Lucas said the Government has blown the opportunity to put the UK on track to meet its climate targets. She criticised the failure to reinvigorate onshore wind, a lack of commitments on solar and tidal power, and the funding of R&D for nuclear power. (5)

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2. Guardian 12th Oct 2017 https://www.theguardian.com/environment/2017/oct/12/uk-puts-energy-efficiency-at-heart-of-climate-change-strategy
3. Guardian 12th October 2017 https://www.theguardian.com/environment/2017/oct/12/uk-climate-change-masterplan-grownups-finally-won-clean-growth-strategy
4. Carbon Brief 12th October 2017 https://www.carbonbrief.org/in-depth-how-the-clean-growth-strategy-hopes-to-deliver-uk-climate-goals
5. Energy Voice 13th Oct 2017 https://www.energyvoice.com/marketinfo/153157/clean-growth-plans-puts-uk-right-track-action-needed-government-warned/

3 Scotland's Climate Change Targets

The Committee on Climate Change (CCC) has warned the Scottish government its ambitious plans to cut greenhouse gas emissions lack credibility and risk stalling unless its strategies improve dramatically. Scotland had so far led the UK in its efforts to cut emissions, reducing its actual CO_2 emissions by 38% by 2015 compared with 35% at UK level. Scotland is now on the brink of meeting its 2020 target to cut emissions by 42% several years early. But CCC said "*without firm new policies, reductions in Scottish emissions are unlikely to continue in the 2020s*." (1)

The Scottish Government has been consulting on plans to set a fresh target of cutting emissions by 90% by 2050 but faces heavy criticism from anti-poverty charities and the Scottish Green party, who have urged the first minister to take faster, tougher action. The CCC, the UK's government-funded advisory committee, said the policies needed to hit that target were too weak and ill thought out, singling out proposals in a draft plan to heavily cut emissions by sharply increasing low carbon home heating to 80% by 2032. Those were "very unlikely to be feasible", it warned. The committee said

ministers needed instead to put far greater emphasis on cutting the country's rising transport emissions – an area largely neglected by the Scottish government until now. The Government's proposals to dramatically increase the use of electric and ultra low emission vehicles by phasing out sales of new petrol and diesel-powers vans and cars by 2032 is a significant step forward. (2)

CCC says the Scottish Government must come up with firm new policies and make sweeping changes on transport, agricultural and heating if it is to stand any chance of meeting its 'world class' targets.

The progress report warned:

- Scotland is behind on its 2020 target of 60% of household waste being recycled, composted or reused. There needs to be more progress if the Scottish Government is to meet a 75% recycling rate by 2025.

- Transport emissions increased in 2015, and while sales of electric vehicles in England rose by over 32% in 2016, Scotland lagged behind with just a 5% rise. Emissions from aviation rose by 7% in 2015, and are now 82% higher than in 1990, prompting the committee to call for the Scottish Government to work with the UK government to address balancing demand for flights with environmental concerns.

- A lack of progress on agricultural emissions and focus on voluntary measures was "concerning". The report calls for the sector to make a greater contribution to meeting emissions targets and calls on ministers to consider if compulsory measures are needed for farming to "*make the necessary contributions to meeting Scotland's ambitious climate targets*". (3)

A host of organisations including Christian Aid Scotland and Oxfam Scotland want the Scottish Government to speed up cuts to carbon emissions. They have warned that the "devastating" impacts of hurricanes, floods and famine heralded the need for "bold" legislation to see a 77% emissions reduction by 2030 – and zero emissions by 2050 at the latest. "Climate change is an issue of justice, with people in developing countries often most affected by climate change having done the least to cause it. Our agencies are supporting some of the world's poorest women, men and children who find themselves on the frontline of climate change. Yet we know the impact is likely to get significantly worse unless rich countries like Scotland do much more to cut their emissions." (4)

Stop Climate Chaos Scotland (SCCS) said more than 17,000 people had responded to a consultation calling on the Scottish Government to aim for zero climate emissions by 2050 at the latest, instead of its target of a 90% reduction. People want Scotland to be at the forefront of the global effort to overcome that challenge. (5)

WWF Scotland and the British Lung Foundation have called for the Scottish Government to include a target in the Climate Change Bill to ensure every home in Scotland has an Energy Performance Certificate band C. Both are members of the Existing Homes Alliance, a coalition of environmental, anti-poverty and housing campaigners, which argues that boosting home energy efficiency would reduce levels of fuel poverty, save millions for the NHS and create new jobs. (6)

Meanwhile, environmental groups applauded the new Programme for Government (PFG) announced in Holyrood at the beginning of September, which contains a host of 'green' measures.

Friends of the Earth believe such steps will improve the lives of people in Scotland through cleaner air, reduced waste, investment in green energy and ensuring the transition to a low carbon economy is fair. Key measures announced in the PFG: phasing out diesel and petrol vehicles from 2032; tackling air pollution with 4 Low Emission Zones across Scotland by 2020; new Just Transition Commission to help Scotland move to a low-carbon economy fairly; new National Investment Bank to fund long term, patient projects; and a deposit return scheme for bottles and cans. (7)

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2. Guardian 25th September 2017 https://www.theguardian.com/uk-news/2017/sep/25/scotlands-greenhouse-emissions-strategy-criticised
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4. BBC 22nd September 2017 http://www.bbc.co.uk/news/uk-scotland-scotland-politics-41355673
5. The National 21st Sept 2017 http://www.thenational.scot/news/15547768.Scots_back_faster_action_from_Holyrood_to_tackle_climate_change/
6. Holyrood 28th Aug 2017 https://www.holyrood.com/articles/news/wwf-scotland-and-british-lung-foundation-call-low-carbon-infrastructure-investment
7. Holyrood 5th Sept 2017 https://www.holyrood.com/articles/news/campaigners-welcome-%E2%80%9Cgreenest-programme-government-history-scottish-parliament%E2%80%9D

4 Scottish Energy Company

SNP leader Nicola Sturgeon used her 2017 conference speech to announce plans for a not for profit, publicly owned energy company. (1)

The idea of a Government Owned Energy Company was trailed in the Scottish Government's consultation on Energy Strategy earlier this year. (2) In its response to the consultation NFLA said the Government will need to take into account the work already being done by some Scottish local authorities to establish locally-owned energy companies so that these work in conjunction with each other. Aberdeen, Edinburgh, Glasgow and the Western Isles are all at various stages in the process of establishing an Energy Service Company. (3)

Ms Sturgeon said more details about the energy company would be set out in the government's forthcoming energy strategy. But the idea is that energy will be bought wholesale or generated here in Scotland – renewable, of course – and sold to customers as close to cost price as possible:

"*No shareholders to worry about. No corporate bonuses to consider. It would give people – particularly those on low incomes – more choice and the option of a supplier whose only job is to secure the lowest price for consumers*."

The plan is to set up the new energy company by 2021 to supply both electricity and gas.

Dave Toke, reader in energy politics at Aberdeen University called the plan a "*welcome boost to the flagging hopes of renewable energy workers and supporters … this should be a big opportunity for an industry that has been laid low by Westminster's refusal to fund any further land based wind or solar projects. The Scottish Government's emphasis is on keeping costs down, but that is not a problem for onshore renewable energy whose costs have been declining rapidly in recent times. What they lack at the moment is long term guarantees about income to be earned for energy generation*". (4)

Toke says the new company could give long term guaranteed incomes flows to solar, wind, and micro-hydro projects. The company could conduct auctions for the right to be given long term power purchase agreements (PPAs), with companies competing to offer the lowest price per MWh to supply a given tranche of contracts. Community renewable schemes could be offered a standard rate for their power, perhaps linked to the wholesale power price.

Dr Ariel Bergmann, an energy economist at Dundee University, warned the scheme could mean taxpayers would be "exceptionally badly harmed" because they would be at risk from volatile market prices. "*Both electricity and natural gas can be quite volatile in daily prices, even within the day prices.*" However he conceded that the company could be successful if it secures talent to strike the best deals and grows at the right pace.

David Pike, who set up consumer-run People's Energy in East Lothian earlier this year said similar companies already exist in the private sector "*without the need for government intervention*". He said: "*I'm confused about why it's needed when we're already doing it and going further. We're doing green energy, we're giving the profit straight back to our customers – and we're doing it now, not in 2021. I've written to the First Minister to ask her motivation for doing this. We're a Scottish company and everything she spoke about we can do now without them wasting money*." (5) Pike said the new energy company would drain money away from public services and might not be able to offer cheaper deals. SSE, one of the Big Six suppliers, has warned that such a company could lead to disruption in the market and questioned whether it would be able to offer less expensive tariffs. (6)

Brian Monteith attacked the proposals writing in the Scotsman, pointing at losses made by Nottingham City Council's Robin Hood Energy. (7)

On the other hand, Alastair Martin chief strategy officer of Flexitricity, the demand management company based in Edinburgh, says we've already seen how community energy companies in Aberdeen, Gateshead and Nottingham have worked. Community schemes can find synergy between different energy uses and generation capabilities. One site's cooling problem is another's heating opportunity. A solar farm might be held back by network constraints just when it's sunniest, but not if there's a local vehicle charging station ready to soak up the excess. Community energy doesn't just diversify the energy mix; it can actually make money for the consumer. Better yet, community energy means community engagement. Creating a challenger supplier is a lot cheaper than

nationalisation, and it's more likely to have the desired effect of forcing established suppliers to improve their game. But by supporting community energy, "Sturgeon Power" as he calls the new company, could transform the dynamics of the Scottish energy system.

Martin says the new business should support a decentralised network of community energy assets of all types, underpinned by full use of smart grid technology to ensure these assets are used to maximum efficiency. It'd be big, bold and unprecedented – but the time for timidity is over. Energy is transforming anyway. By getting into the heart of that change and directing it towards communities, the First Minister can achieve her goal of protecting vulnerable people, and at the same time make energy work for everyone. (8)

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2. Consultation on a Scottish Energy Strategy: The future of energy in Scotland, Scottish Government, January 2017 https://consult.scotland.gov.uk/energy-and-climate-change-directorate/draft-energy-strategy/
3. NFLA 7th March 2017 http://www.nuclearpolicy.info/wp/wp-content/uploads/2017/03/A268_NB155_Scottish_energy_strategy.pdf
4. Dave Toke's Blog 10th Oct 2017 http://realfeed-intariffs.blogspot.co.uk/2017/10/three-cheers-for-sturgeon-as-she.html
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5 Balancing Green Energy

The secret to switching to an energy system based entirely on renewables may lie in the universe's most abundant substance – hydrogen. Research and development is being backed by some big energy companies including Shell and Uniper (formerly part of Eon) in addition to carmakers BMW and Audi. They're supporting research into how the element can be used to store energy for weeks or even months beyond what lithium-ion batteries can manage.

Batteries are increasingly being used to store surplus electricity generated at times of the day when demand is low so that it can be used at times of the day when demand is high. But batteries will tend to go flat if the electricity isn't used within a few weeks. Hydrogen, however, can be stored

indefinitely in tanks. That would allow, for example, voltage collected from solar panels in the summer to be used in winter. (1)

Excess power from wind or photovoltaics can be used to drive electrolysis, separating water into its component hydrogen and oxygen elements. The hydrogen captured by that process could, whenever needed, feed natural gas power plants or fuel cells to make electricity. Industrial plants like oil refineries can also use hydrogen for chemical processes.

One technology, known as Power to Gas (or P2G) is discussed in a new book by Chris Goodall called "*The Switch*". P2G generates hydrogen from surplus renewable energy which can then be combined it with carbon dioxide to make methane. A P2G plant is already being operated in Lower Saxony by Audi. The CO_2 comes from a neighbouring anaerobic digestion plant. The resultant methane can then either be injected into the gas grid to provide green gas, or it can be used to generate electricity when renewables are not producing sufficient electricity. (2)

P2G has already surpassed its 2020 cost reduction target set by the European Union. ITM Power, the leading electrolyser company in the UK, says its power-to-gas product is now half the price it was just a few years ago. The firm's work in Germany – where it has two groundbreaking projects – shows that not only is the process possible, it's pretty much commercially viable. Renewable energy sometimes has to be 'constrained' because there is too much power to make use of – on a windy, sunny day for example. This can mean that we are paying renewable operators to turn off their renewable generators. Power-to-gas could change this — by turning all that surplus electricity into hydrogen, which can be used at anytime and in any number of ways. The hydrogen gas at the end of power-to-gas can be used as is, or it can be turned back into electricity, or it can be mixed with carbon dioxide (captured from industrial or fossil fuel facilities even) to make a synthetic natural gas. Perhaps its most straightforward application is injecting it directly into the natural gas grid, something which power-to-gas pioneer Germany has been doing for years. (3)

'Power to gas' will be the key grid stabilisation technology and source of long term storage capacity, according to Goodall. A vital step towards commercialisation of P2G has been announced by the French manufacturer McPhy which has won a €1.3m contract with the Austrian gas storage specialist RAG. RAG will install an electrolyser and pump hydrogen into a sealed underground cavern alongside CO_2 from a biogas plant. Microbes in the cavern will absorb the H_2 and CO_2, exuding methane (natural gas) as the waste product. The methane will then be injected into the gas grid. The electrolyzer can respond within 30 seconds to instructions to take less or more electric power. Electrochaea's Copenhagen pilot plant has shown that methane-generating microbes can respond similarly quickly to enhanced availability of hydrogen. (4)

Goodall says there is now even talk of converting electricity from offshore wind farms into hydrogen on artificial energy islands in the North Sea. This is an indication of the growing realisation that large scale supply stabilisation using electrolysis will be cheaper than using batteries. (5)

While the process of splitting water into hydrogen and oxygen by electrolysis has been well known for years, recent breakthroughs have placed the technology firmly at the cutting edge of scientific research, due to its huge potential for large-scale and renewable hydrogen production. There has been a lot of media attention recently given to the idea of storing surplus renewable electricity in

lithium ion batteries. But the timescale over which energy can be stored in these electrochemical devices is relatively short. Hydrogen, however, can sit in a tank for months, years and even decades. Moreover, hydrogen produced from electrolysis can also serve as a renewable feedstock for the chemical industry, at a scale that is commensurate with the world population. This is a really important point because, eventually, in an energy economy that is completely sustainable without fossil fuels, we will still need a way to have chemical energy for the production of fertilizers, pharmaceuticals, plastics and many other materials. (6)

Closer to home, the Levenmouth Community Energy Project – led by Bright Green Hydrogen (BGH) in Methil, Fife – is a collaborative initiative supported by Fife Council and Toshiba. This facility is demonstrating how hydrogen can be derived from a renewable turbine and solar resources. It is the first project of its kind in Scotland to use green hydrogen to fuel a fleet of hybrid/electric vans. (7) Some of the hydrogen is used to run a fleet of 17 low-emission refuse trucks and vans, while the rest is stored in fuel cells and can be called upon to generate low-carbon electricity when output from the renewables devices is poor. A 'smart' microgrid controls how much hydrogen gets stored and how much is converted into power to supply businesses. As well as commissioning two specially adapted dual-fuel bin lorries, the scheme aims to help local firms boost their environmental credentials by offering a range of hydrogen-powered vehicles for hire. (8)

Earlier this year an international summit on hydrogen was held in Aberdeen to bring together bus operators and re-fuelling companies to present study findings of large scale hydrogen re-fuelling. The event showed the economic benefits of hydrogen to the area. (9) Key industry and public sector players have joined forces to fund and deliver the World's largest demonstration of hydrogen fuel cell buses in Aberdeen. The project will deliver a hydrogen infrastructure in Aberdeen, including:

- Production of hydrogen from a 1MW electrolyser - supplied by Hydrogenics;
- Establishing a state-of-the-art hydrogen refuelling station, Scotland's first commercial-scale hydrogen production and bus refuelling station that will include hydrogen production through electrolysis;
- Deployment of a fleet of 10 hydrogen buses, to be operated by First Group and Stagecoach;
- The development of a hydrogen safe maintenance facility, within an operational fleet maintenance depot;

The buses will only emit water vapour, reducing carbon emissions and air pollution, as well as being quieter and smoother to run. (10)

Meanwhile the Orkney island of Eday will draw excess power from a community wind turbine and surplus tidal power from Orkney's European Marine Energy Centre to produce hydrogen to provide auxiliary power for vessels in Kirkwall harbour and ultimately CalMac ferries serving Scotland's islands. The hydrogen will be shipped to Kirkwall harbour – a distance of about 20 miles –and fed into a hydrogen fuel cell to provide auxiliary power for vessels in the harbour. (11)

At the end of August, researchers in Orkney announced they had generated hydrogen using electricity from tidal arrays at the European Marine Energy Centre (EMEC). Researchers at the site believe it is the first time tidal power has produced hydrogen anywhere in the world. Traditional

production of hydrogen is very energy intensive, negating much of the carbon gains of using the fuel instead of petrol or diesel in cars, or using hydrogen instead of natural gas in heavy industries. Producing hydrogen using clean power sources therefore opens a route for the fuel's widespread use in transport and industry. The team used power from the tidal energy test site at Orkney to fuel an electrolyser provided by hydrogen firm ITM Power, which uses electricity to split water into hydrogen and oxygen. The project was bankrolled with £3m in funding from the Scottish government. Neil Kermode, managing director of EMEC, said the production of hydrogen marked a "tremendous milestone" for the team involved. (12)

At the official opening of the Orkney hydrogen energy project a partnership of Orkney Islands Council and the Orkney Renewable Energy Forum released a Sustainable Energy Strategy for Orkney. The strategy sets out five key goals: The achievement of ambitious carbon reduction targets; The reduction and eradication of fuel poverty; Positioning Orkney as the globally recognised innovation region to develop solutions for the world's energy systems challenges; Ensuring a secure energy supply during transition to a low carbon future, and Maximising economic opportunity and investment in Orkney. (13)

Meanwhile the UK Government's much delayed Clean Power Plan may reignite plans for a £50bn hydrogen overhaul of the country's gas grid. A report from KPMG found that converting the UK gas grid to use hydrogen could be £150bn to £200bn cheaper than rewiring British homes to use electric heating powered by lower-carbon sources. Crucially, the consultants said hydrogen heating would be the least hassle for energy customers because very few appliances would need to be replaced. The existing gas grid would need only minor upgrades because it was originally designed for hydrogen, the report added. A return to hydrogen heating is already being trialled by Northern Gas Networks which is working to transform Leeds to become a "hydrogen city" by the late 2020s. (14)

Political leaders in the Western Isles are still waiting for the results of a consultation run by the Westminster Government which closed in January. The consultation sought views on whether non-mainland onshore wind should be considered a separate technology from onshore wind more generally? (15) There are two major schemes on the Western Isles, which already have planning consent, and are expected to result in a £1bn investment in Lewis. But with the ending of subsidies for onshore wind these schemes have been put on hold. Energy firms argue that without the subsidies, it would be too expensive to lay a sub-sea cable to bring the electricity from the islands to consumers on the mainland. (16)

There have been discussions about laying 'interconnectors' to the islands at least since the ultimately unsuccessful plans for the first giant wind farm for Lewis were unveiled in 2001 - over 15 years ago. By 2013 it was difficult to overstate the anger and sheer frustration felt in the islands as the vision of creating an age of prosperity founded on wind, wave and tidal energy appeared to be disappearing over the horizon. Three and a half years later, the anger and frustration have intensified. The Western Isles faces a 13.7% decrease in population by the year 2039, and desperately needs an economic catalyst. But the UK Government's plans to curb subsidies for new onshore wind farms have been yet another hammer blow. At least the new consultation offers a glimmer of hope. (17)

The UK Government's Clean Growth Strategy has suggested that wind farms on Scottish Islands may be able to apply for subsidies in 2019, but there is still no guarantee that funds will be forthcoming.

Perhaps now is the time for Scotland's grid constrained island communities to look at establishing a hydrogen infrastructure.

1. Bloomberg 5th September 2017 https://www.bloomberg.com/amp/news/articles/2017-09-05/better-than-a-battery-big-energy-backs-hydrogen-power-storage
2. See https://www.carboncommentary.com/switch
3. Unearthed 2nd Sept 2017 https://unearthed.greenpeace.org/2016/09/02/power-gas-storage-solution/
4. McPhy Press Release 7th September 2017 http://mcphy.com/wp-content/uploads/2017/09/PR_McPhy_Power-to-Gas_RAG_V7_E_VDEF.pdf
5. Carbon Commentary Newsletter 17th Sept 2017 http://mailchi.mp/ed07ef0389a1/carbon-commentary-newsletter?e=59b188af48
6. Medium 11th Sept 2017 https://medium.com/@cH2ange/making-h2-while-the-sun-shines-2cbd04b496c7
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9. Aberdeen City Council 5th Feb 2017 http://news.aberdeencity.gov.uk/first-international-summit-on-hydrogen-supply-chain-to-be-held-inaberdeen
10. Hydrogen Bur Project http://aberdeeninvestlivevisit.co.uk/H2-Aberdeen/Hydrogen-Bus/Hydrogen-Bus-Project.aspx
11. Sunday Times 6th August 2017 https://www.thetimes.co.uk/edition/scotland/islanders-set-sail-on-pollution-free-ferries-project-5w52s66bd See also http://www.surfnturf.org.uk/
12. Business Green 14th September 2017 https://www.businessgreen.com/bg/news/3017307/worlds-first-tidal-energy-generated-by-hydrogen and BBC 13th Sept 2017 http://www.bbc.co.uk/news/uk-scotland-scotland-business-41257407
13. Scottish Energy News 29th Sept 2017 http://www.scottishenergynews.com/
14. Telegraph 2nd Sept 2017 http://www.telegraph.co.uk/business/2017/09/02/50bn-plan-hydrogen-gas-sparks-back-life/
15. BEIS 9th Nov 2016 https://www.gov.uk/government/consultations/consultation-on-treatment-of-non-mainland-gb-onshore-wind-projects
16. BBC 9th Dec 2017 http://www.bbc.co.uk/news/uk-scotland-highlands-islands-38251910
17. Herald 14th Dec 2016 http://www.heraldscotland.com/opinion/14964264.David_Ross__Winds_of_change_in_the_Highlands_and_Islands__blowing_in_the_wrong_direction/

Orkney Surf 'n Turf, Fully Charged Video 27th August 2017 & 13th September 2017

https://www.youtube.com/watch?v=Rybpaqhg5Qg&feature=youtu.be

https://www.youtube.com/watch?v=VEh7V9_uIqM

6 Dounreay

Work has begun on the "challenging" task of removing radioactive fuel elements stuck inside the most famous of Dounreay's reactors. Closed since 1977, the Dounreay Fast Reactor is known for its dome-shaped exterior. Almost 1,000 fuel elements have been in the reactor for years after the work to remove them was halted because they were swollen and jammed in. Now, after many years of designing and testing remotely-operated equipment, a decommissioning team has started to recover the elements. It is expected to take around three years to remove them all. Once all the elements have been removed work can begin on dismantling the reactor. According to Dounreay Site Restoration Limited emptying the reactor vessel is one of the biggest engineering challenges to be faced in decommissioning the site. Once all the elements have been removed work can begin on dismantling the reactor. (1)

Aboriginal Australians are challenging proposals to transport nuclear waste from Dounreay to a sacred site. Wallerberdina, 280 miles north of Adelaide, has been identified as a potential location for Australia's first nuclear waste dump as part of a deal that returns spent fuel processed at Dounreay, Caithness, to its country of origin. The Dounreay Waste Substitution Policy, agreed in 2012, sees waste from Australia, Belgium, Germany and Italy reprocessed at Dounreay being returned to its country of origin. Campaigners have complained that the intended South Australian destination forms part of an Aboriginal heritage site rich in burial mounds, fossilised bones and stone tools. Gary Cushway, a dual Australian/British citizen, who lives in Glasgow, has written to the first minister asking for the first shipment to be stalled "until a satisfactory final destination is finalised by the Australian government". He said the Scottish government had "an opportunity to take the lead in mitigating the mistakes of the past that the UK government has made, not least the testing of nuclear weapons on indigenous homelands in South Australia and the forced removal of indigenous people that took place to facilitate this". (2)

Around 800 spent fuel elements from research reactors in Australia, Belgium, Germany and Italy were reprocessed at Dounreay before a key chemical plant broke down in 1996. The resulting liquid waste would be mixed with cement, solidified in drums and returned to the countries of origin, in line with government commitments. However, "substitution arrangements" allow for the exchange of nuclear waste with a "radiologically equivalent" amount of material from Sellafield. (3)

1. BBC 12th Sept 2017 http://www.bbc.co.uk/news/uk-scotland-highlands-islands-41245375 and Dounreay 12th Sept 2017 https://dounreay.com/2017/09/dounreay-team-begins-empty-reactor-nuclear-material/
2. Times 26th Sept 2017 https://www.thetimes.co.uk/edition/scotland/aborigines-challenge-nuclear-waste-transfers-from-dounreay-kt8vw9r0j
3. Herald 25th Sept 2017 http://www.heraldscotland.com/news/15555286.Dounreay__The_massive_and_most_complex_nuclear_clean_up_in_Europe/

7 Nuclear Transports

Anti-nuclear campaigners met in Findhorn, Moray to raise awareness of flights of weapons-grade uranium from Dounreay to the United States via Lossiemouth which are done in secret for security reasons. The uranium is loaded on to planes leaving Wick Airport but the US Air Force aircraft need to touch down at RAF Lossiemouth because the runway at Wick is too short when they are fully-fuelled. Activists have called for the waste to be kept in the north of Scotland to reduce the potential for risks during the transfers.

Tor Justad, chairman of Highlands Against Nuclear Transport, said: "By transporting the waste you are vastly increasing the risk of some kind of terrorist attack. It's unthinkable what might happen." Highlands and Islands MSP John Finnie spoke at the meeting about the "challenges" facing the planet from nuclear power. And the Green MSP believes waste from Dounreay should be stored there instead of being moved off site. He said: "The public will remember the MV Parida, which was carrying cemented radioactive waste from Dounreay to Rotterdam – it caught fire and drifted towards a Beatrice oil rig which required to be evacuated. "That shows how reckless plans to transport waste down Scotland's stormy west would be. "Most recently we've seen a publicly funded multimillion pound upgrade to Wick Airport's runway and the ridiculous situation of weapons-grade waste being flown to the United States via Lossiemouth." (1)

A plane carrying weapons-grade uranium left the Highlands the day after the UK's terror threat level was raised to "critical". Armed police and anti-terrorism specialists stood guard at Wick John O'Groats Airport as the enriched uranium was loaded onto a US Air Force C-17 Globemaster transporter jet. Opponents slammed the decision to go ahead with the flight, just a day after the London tube bomb attack. Up to 10 more flights are expected in the future as the decommissioning at Dounreay continues. (2)

1. Press & Journal 20th Aug 2017 https://www.pressandjournal.co.uk/fp/news/moray/1311598/campaigners-aim-to-raise-awareness-of-moray-nuclear-flights-at-meeting/
2. Energy Voice 18th Sept 2017 https://www.energyvoice.com/otherenergy/nuclear/150794/nuclear-waste-flight-takes-off-despite-attack/

8 Dalgety Bay

Radiation remediation work at Dalgety Bay has edged closer with the start of ground surveys at the contaminated beach. Investigations into ground conditions began in September, before the long-awaited clean-up of dumped radioactive debris from the Second World War, which is due to begin in spring 2019. The Ministry of Defence confirmed this week engineers are now on site, having secured access. Stephen Ritchie, of the MoD's Defence Infrastructure Organisation, said: "Work started on site on a ground investigation survey which has been the subject of ongoing negotiations with the landowner. That's likely to take six weeks, depending on the weather."

Updating south and west Fife councillors on progress, Mr Ritchie also said it was hoped planning consent would be issued soon for the remediation works. (1)

Plans for the remediation were expected to be approved by councillors at the beginning of October. Under the proposal, particles with a radioactive value of 40kBq – which is about the same as some smoke detectors – would be removed from the site. It is anticipated the work will happen during the summers of 2018 and 2019, from April to September. Before work can start on site, an investigation will have to be carried out into the extent of the contamination and there is a question mark over what is contained at the headland. The planning report being considered by the committee states: "*In the event that contamination not previously identified by the developer prior to the grant of this planning permission is encountered during the development, all works on site shall cease immediately and the local planning authority shall be notified in writing within two working days*." Should this happen, a remediation strategy would have to be approved by the council before works recommence. Nearly 30,000 tonnes of rock armour will be installed at the foreshore, arriving on a 160ft barge. "A total of 31 barge-loads would be required over the two, six-month construction periods," said the report. (2)

1. Dundee Courier 8th Sept 2017 https://www.thecourier.co.uk/fp/news/local/fife/504987/surveys-begin-of-radium-contaminated-fife-beach-ahead-of-mod-clean-up/
2. Dundee Courier 3rd October 2017 https://www.thecourier.co.uk/fp/news/local/fife/518480/plans-to-tackle-dalgety-bay-radiation-expected-to-be-approved-by-councillors/

9 Geothermal

The site of a former whisky bottling plant is to be transformed into a low carbon development with an investment of £5.3 million. The Scottish Government will provide an initial £3.5 million for the former Johnnie Walker bottling plant in Kilmarnock. The HALO project also includes an enterprise and innovation hub for business start-ups, a renewable energy centre and commercial and leisure units. A further £1.8 million will be provided to a low carbon infrastructure transition programme for a new "geothermal" heating system that will provide low-cost, renewable energy for hundreds of affordable homes.

Scottish Renewables, said: "*Geothermal energy has exciting potential in Scotland and could play a role in meeting our ambitious renewable heat targets, but only a handful of legacy projects exist today. The funding provided here through the low carbon infrastructure transition programme should enable the demonstration of the technology at scale and could serve as a launchpad for an industry able to tap the heat resource which lies beneath our feet.*" (1)

This will be Scotland's first deep geothermal heating system. A 2km deep well is to be drilled next year to enable water to be heated by the surrounding rocks, pumped back up again and then into properties in Kilmarnock. Engineering firm Arup, which is involved in the project, said the renewable energy source would help reduce fuel poverty by providing heating at below market rates to homes being built at the former Johnnie Walker bottling plant, which is being redeveloped. (2)

1. Herald 30th Aug 2017 http://www.heraldscotland.com/news/15504363.Former_Johnnie_Walker_plant_to_be_turned_into_low_carbon_development/
2. Independent 19th Sept 2017 http://www.independent.co.uk/news/uk/home-news/scotland-energy-renewable-geothermal-heating-system-low-carbon-a7955591.html

10 Offshore Wind

One of the offshore wind farms which won the UK government tendering competition was Moray East, sited between Fraserburgh and Wick in the Moray Firth, When completed in the next five years, the 950MW scheme will be Scotland's biggest offshore wind farm - overtaking the 588MW Beatrice field being constructed nearby. With around 100 204m-tall turbines, Moray East will generate enough electricity for around one million homes. The development, a joint venture between Spanish renewables giant EDPR and French utility firm Engie, is the only Scottish wind project to have been awarded a 15-year Contract for Difference (CfD) from the Department for Business, Energy & Industrial Strategy in the current round of licensing. The new agreement, with a strike price of £57.50 per megawatt hour, represents a significant drop in the cost of offshore wind generation. The latest price is nearly two thirds less than in 2015 and dramatically cheaper than the £92.50 per megawatt hour deal with the new Hinkley C nuclear power station. (1)

One of the reasons why offshore wind costs have fallen is because they are using bigger turbines, each several times more powerful than their predecessors from older wind farms. Off the coast of Liverpool, the wind turbines that began turning in May as part of Dong Energy's Burbo Bank Extension scheme each stand 195m tall and are capable of generating 8MW of electricity. Just one of these turbines generates more electricity than the whole of the world's first offshore wind farm, Vindeby in Denmark, which was decommissioned earlier this year after 25 years of operation. And the turbines continue to grow, both in height and power. For the Hornsea Project Two off the coast of Yorkshire, which also just won subsidies, Dong is projecting turbines that could be as powerful as 15MW. (2) The UK's offshore wind sector could power a £17.5bn investment in the UK economy over the next four years.

The 1.4GW Hornsea Project Two, and the 860MW Triton Knoll farm were the two other offshore wind projects to be awarded contracts. DONG Energy's Hornsea Project Two is expected to be operational off the Yorkshire coast by 2022, and also achieved a strike price of £57.50/MWh. Tritton Knoll, off the coast of Lincolnshire, achieved £74.75/MWh (3)

1. Scotsman 12th Sept 2017 http://www.scotsman.com/news/environment/massive-offshore-wind-farm-set-to-be-built-in-moray-firth-1-4557262
2. FT 11th Sept 2017 https://www.ft.com/content/28b0eb2e-96f1-11e7-a652-cde3f882dd7b
3. Edie 11th Sept 2017 https://www.edie.net/news/10/Historic--unprecedented--astounding--Industry-reacts-to-falling-offshore-wind-costs/

11 Tidal Power

One company which missed out on contracts in this auction round was marine power developer Atlantis Resources. Its Meygen marine power project in Scotland failed to keep pace with plummeting offshore wind costs in the hard -fought auction. Tim Cornelius, chief executive officer of Atlantis, said: "*We've made great strides in reducing our cost of generation so that we can slash our requirement for revenue support, and I am incredibly proud of the work the Atlantis team has done in this respect. However, I must acknowledge the difficulties of competing on a level playing field with established technologies like offshore wind, which has been operating at commercial scale in the UK for over a decade*." (1)

The MeyGen tidal energy project in the Pentland Firth generated 700MWh of clean power during August - a world record for a tidal stream power station. Atlantis Resources said generation was now approaching 2GWh in total since the launch of the project last year. (2)

Unfortunately missing out on the subsidies has thrown into doubt the future of a project intended to prove the viability of marine renewable energy and establish production of subsea turbines in Scotland. Atlantis may now switch their focus to France. With four subsea turbines installed since last year, the MeyGen scheme has become a key test of the commercialisation of electricity generation from tidal streams and last month claimed world record monthly output of more than 700MWh. But the Edinburgh-based developer says its plans are threatened by the UK government's decision to force tidal schemes to compete directly with larger and technologically more mature offshore wind projects. (3)

1. Telegraph 11th Sept 2017 http://www.telegraph.co.uk/business/2017/09/11/offshore-wind-power-175bn-investment-boom-costs-halve/
2. Business Green 31st Aug 2017 https://www.businessgreen.com/bg/news/3016469/atlantis-resources-hails-tidal-energy-generation-record-for-meygen-project
3. FT 10th Sept 2017 https://www.ft.com/content/24321f5a-9561-11e7-a652-cde3f882dd7b

12 Onshore Wind

ScottishPower has called for political support to develop more onshore windfarms after hitting a record high of power from the sector. After the completion of a £650 million infrastructure project, ScottishPower Renewables has passed the 2,000 megawatt (MW) UK milestone. The company has now called for politicians and regulators to back the development of the industry in Scotland in order to keep up with an anticipated increase in demand.

Keith Anderson, CEO of ScottishPower Renewables, said: "*It's now cheaper, easier and faster to build onshore wind. In a little over 18 months we have built over 470 MW of onshore wind, delivering enough power for more than 280,000 homes and with it significant environmental and financial benefits for the UK. If the UK Government is serious about reducing carbon emissions and having*

enough clean power to support the huge expected growth in electric vehicles, then more onshore wind is essential. One new onshore wind turbine could power around 7,000 electric vehicles, but we need to act now to meet growing demand." (1)

1. Scotsman 25th Sept 2017 http://www.scotsman.com/future-scotland/tech/energy-firm-calls-for-political-support-for-more-onshore-windfarms-1-4569037

13 Local and Community Energy

Over the past few years an increasing number of communities have sought to harness the natural assets of their neighbourhood to generate green power and bring in cash to benefit their local society. On Tiree, a notoriously windy outpost, a 75m-tall wind turbine known affectionately as Tilley produced enough electricity in July to supply 50 homes for a year. The profits from the scheme, around £150,000 a year, are invested in the local community - a not inconsiderable sum on an island with just 653 inhabitants. In a completely different set of circumstances, in Scotland's capital, Edinburgh Community Solar Co-operative has installed solar PV systems on the roofs of 25 public buildings owned by the local city council. These include schools, community centres and leisure facilities, and will carry a combined generating capacity of approximately one megawatt - making it the largest scheme of its kind in the UK.

But cuts by Westminster in support for all forms of renewable energy generation since 2015 have damaged the sector's growth. This means it will be challenging for some initiatives, particularly small-scale hydro or wind, to compete in the energy market in future. But new ways of capturing and using power are providing some relief, according to industry experts. Energy storage - such as creating ponds to collect water to drive hydro schemes or using batteries or hydrogen conversion to store electricity across all technologies - allows power produced from "intermittent" renewable sources to be used all day every day, not just when the sun is shining, rivers are in full flood and the wind is blowing. And although the income renewables schemes receive for electricity produced has been cut, they say on-site use remains an option. Systems that can use most of their power rather than exporting it to the grid can still be worth it financially. (1)

There are hopes that a £500,000 Rural Energy Challenge Fund will have a significant impact on local economies. Typical projects the fund could support include solar and storage systems to provide heat and power for dairy farms, or to help a group of tourism businesses join forces to reduce energy costs during the summer peak season. The launch of the fund, part of the Community & Renewable Energy Scheme (CARES) administered for the Scottish Government by Local Energy Scotland, comes at a time of increasing focus on the potential for communities to have much greater involvement in energy production.

The Scottish Government's draft energy strategy published in January increased the target community and locally-owned energy generation by 2020 to 1 gigawatt (GW), and 2GW by 2030. The CARES scheme was set up by the Scottish Government to encourage local and community ownership of renewable energy across Scotland. A loan fund established in 2011 provides financial help for

projects which offer significant community engagement and benefit. A previous “challenge” funding scheme under CARES, the Local Energy Challenge Fund, was launched in 2014 and currently supports a number of large-scale low carbon demonstrator projects. Projects backed include Edinburgh and East Lothian-based Eastheat, set up to develop and implement local solutions to addressing fuel poverty designed around the use of innovative heat batteries. Led by Macmerry-based battery technology firm Sunamp, partners in the project include the Castle Rock Edinvar Housing Association and East Lothian Housing Association. Some 1,000 solar panels are being installed on properties and hundreds of homes are being fitted with batteries designed to store excess electricity as heat which can later deliver hot water on demand. (2)

Now there are calls for the Scottish Government (SG) to establish a mechanism to enable ‘subsidy free’ community renewable schemes. Because of the decline in wind and solar power costs it seems likely that some renewable energy projects in Scotland could be established assuming current levels of power prices that generators can receive on wholesale power markets. The projects would certainly count as ‘subsidy free’. But they need long term assurances about income streams, something that the Scottish Government could provide at minimal risk to the public purse. A scheme could be established by the SG to set up a back-up loan facilities to give ‘top-up’ payments for community renewable generators. This could ensure that the generators received at least the income that they would do if wholesale power prices were at the current level of, say, £45 per MWh. Any loans paid would be paid back when power prices rose above the £45 per MWh level. This arrangement could be guaranteed for 20 years and could be enshrined in agreements issued by the SG to specific schemes. This would give schemes long term financial confidence that could allow them to raise money from banks and investors. A pilot basis would consist of the scheme being restricted, for an initial proving phase, of no more than 100 MW of capacity. (3)

1. Scotsman 5th Sept 2017 http://www.scotsman.com/news/opinion/ilona-amos-get-the-low-down-on-do-it-yourself-green-power-1-4550923
2. Scotsman 22nd Aug 2017 http://www.scotsman.com/news/new-fund-could-help-spark-a-rural-energy-revolution-1-4537561
3. Dave Toke's Blog 1st Oct 2017 http://realfeed-intariffs.blogspot.co.uk/2017/10/how-scottish-government-could-implement.html