

Nuclear Free Local Authorities

briefing



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Subject: Scottish nuclear and renewable energy update

i. Introduction

This report has been prepared by the NFLA Scotland Policy Advisor for new NFLA Scotland members and those interested in the Scottish nuclear and renewable energy debate. It provides members with a useful overview of the core issues that NFLA Scotland is focusing on. A further update will be provided for the next NFLA Scotland meeting being held in Glasgow City Chambers on the 26th October. This will also include a special seminar looking at nuclear transportation, radioactive waste, nuclear safety and renewable energy alternatives to nuclear power.

ii. Preamble

The last Scottish Update briefing was presented in April 2017 in Manchester. Download from: http://www.no2nuclearpower.org.uk/documents/SAFE_ENERGY_No73.pdf

If members would like to receive Daily Nuclear News updates by e-mail sign up here: <http://www.no2nuclearpower.org.uk/maillist/index.php>

Since there were Scottish local elections in May, for the benefit of new members, this report summarises the current state of play with important policy issues which concern the Scottish NFLA.

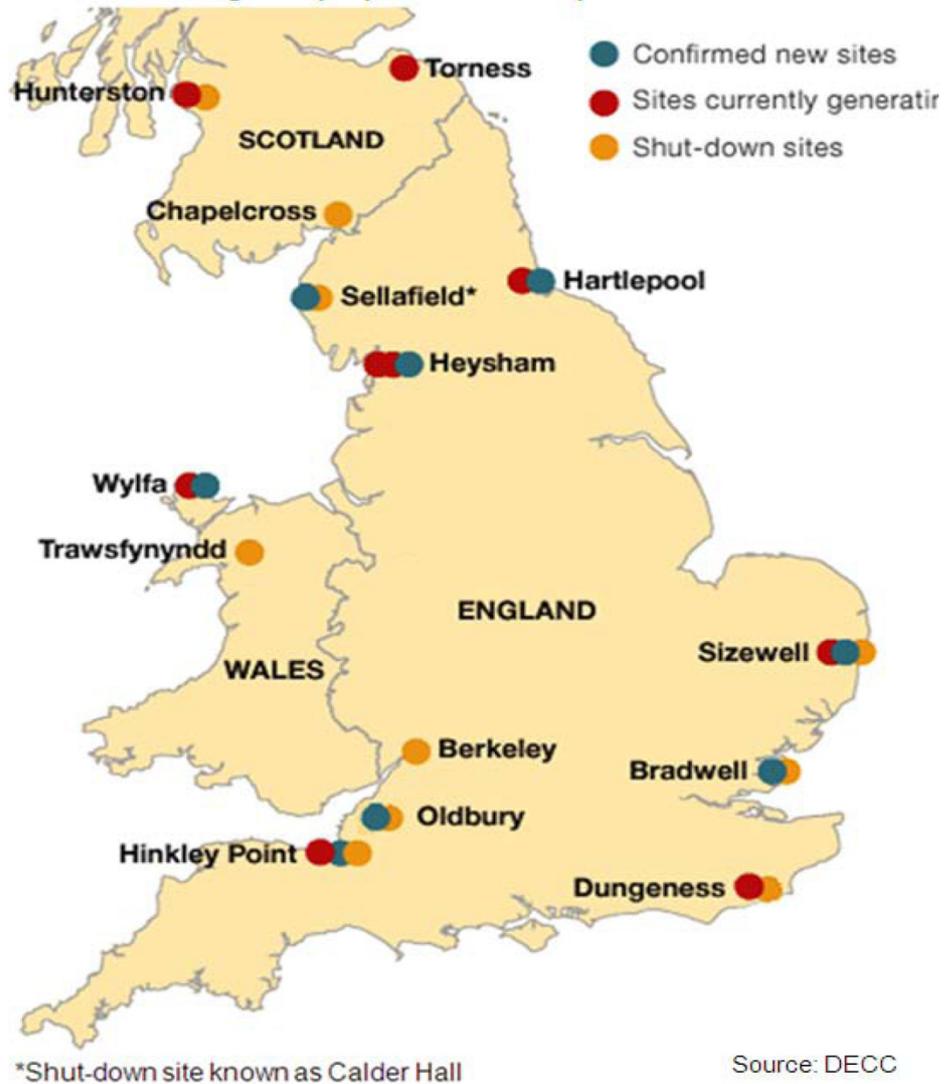
1. The UK's New Nuclear Programme

At the beginning of July it was revealed that the cost of Hinkley Point C in Somerset could rise to over £20bn with the start of operations possibly delayed until 2027. (1) The cost to consumers could mushroom to £50bn. Despite the fact that the Scottish Government is opposed to the construction of new nuclear power, this will also impact Scottish consumers because the £50bn cost would be spread across all consumers in Great Britain.

	Capacity	Annual output (90% load factor)	Investment Decision	Expected Opening Date
Hinkley Point C 2 x EPRs	3.2GW	25TWh	Sept 2016	2025-27
Sizewell C 2 x EPRs	3.2GW	25TWh		2027 – 2028
Wylfa Newydd 2 x ABWRs	2.7GW	21TWh	2018	2025 - 27
Oldbury 2 x ABWRs	2.7GW	21TWh		2027
Moorside (Sellafield) 3 x AP1000s	3.4GW	27TWh	End of 2018	2024 – 2026.
Bradwell 2 x Hualong One	2.3GW	18TWh	After 2022	?

**THE LOCAL GOVERNMENT VOICE ON NUCLEAR ISSUES:
WORKING FOR A NUCLEAR FREE, LOW CARBON WORLD**

Sites of existing and proposed nuclear power stations in the UK



New nuclear proposals

The reason for the increased cost to consumers is, ironically, a decline in electricity prices. Under the terms of the deal the Government has agreed with EDF, Hinkley Point C will receive a guaranteed price of £92.50 (index linked) for every megawatt-hour of power produced for 35 years. If wholesale prices are below that level, the difference is made up by consumers through levies on their electricity bills. Wholesale prices and projections of future prices have both fallen significantly since 2013. This has increased the estimates of the subsidy payments that will be required, making the project appear increasingly poor value. Government figures show that, as of September last year, the lifetime costs of Hinkley Point C were estimated at £49.9 billion. That compares with an estimate of £36.9 billion in 2015 and £14.5 billion in 2014. (2)

According to Matt Ridley, writing in *The Times*, “Almost nobody wants Hinkley to go ahead”. He says it’s time to scrap it. (3) *The Financial Times* agreed. (4)

Other new nuclear proposals struggling

EDF Energy is already struggling to finance Hinkley Point C, so it is difficult to see how it will be able to proceed with **Sizewell C** in Suffolk. **Wylfa and Oldbury** are being proposed by Horizon Nuclear which is a subsidiary of Hitachi, but Hitachi is scrambling to divest from the project. (5) There has been some talk of Korea Hydro & Nuclear Power (KHNP) - A Korean state-owned company - buying a slice of the proposed plant in Wales. (6)

The future of **Moorside** has been thrown into doubt by the financial troubles of Japanese giant Toshiba which owns the company developing the scheme - Nugen. Nugen is undertaking a strategic review of its options following what it calls “vendor challenges”, (7) although the

company says it is "110 per cent certain" it will be built. (8) South Korea's largest power company – Kepco - is in talks with Toshiba to rescue the £10bn project but it would want to use its own reactor design. A change in reactor design would delay the 2025 start date by at least two years. (9)

General Nuclear Systems (GNS) was set up to progress proposals for a new nuclear station at **Bradwell** in Essex. It is a joint venture between the China General Nuclear Corporation (CGN) which has a 66.5% share and EDF which has a 33.5% share. The proposal is to build two reactors of a new Chinese design – the Hualong One. The Office for Nuclear Regulation and the Environment Agency have now been asked by the government to begin the Generic Design Assessment (GDA) for the Hualong One reactor (also known as the HPR1000) – a process which is expected to take four or five years. (10)

Hartlepool in County Durham has been mentioned as a possible site for a Small Modular Reactor (SMR), as has Trawsfynydd in North Wales. (11) But there do not appear to be any current proposals for new reactors at Heysham in Lancashire.

No space left for renewables

If all of these reactors go ahead it will amount to a new capacity of almost 18GW. This would be a significant detriment to both the offshore wind industry and renewables in general because, as simple maths tells you, there would not be much capacity left for the renewables to supply. This would impact disproportionately on Scotland.

The Government's November 2015 projection shows that renewable energy production is expected to reach around 125 terawatt hours per year (TWh/yr – a billion kilowatt hours) by 2020. After that it virtually levels off. Electricity demand in 2030 is expected to reach around 350TWh/yr. 18GW of new nuclear would generate around 140TWh/yr. Allowing for a bit of old nuclear and a bit of gas this only leaves around 40TWh to be supplied by new offshore wind and solar PV.

Emeritus Professor Keith Barnham says if renewable expansion had continued at the same rate it did between 2010 and 2015 we could have achieved an all-renewable UK electricity supply by 2025. Why cull such popular and successful industries? The UK has more than 32GW of renewable power, 10 times the power the Hinkley Point C nuclear plant may achieve in 2030. Hinkley's power is not only almost irrelevant; its inflexible nature will make it redundant. Once operating, a nuclear reactor should run with constant output, 24/7, month to month, but power that complements wind and PV has to vary in less than one hour. (12)

What we need is flexible, not continuous baseload power generation to back up wind and photovoltaic (PV) power. The German Kombikraftwerk project showed how the electricity demand on a national grid like Germany, or the UK, can be supplied 24/7 all year by 80% wind and PV power. Only about 15% of flexible bio-electric power and 5% storage power back-up are needed. Many bio-electricity generators are capable of flexible operation. The government should be aiming its flexible capacity subsidies at new electricity generators fuelled by Anaerobic Digestion biomethane rather than polluting fossil fuel generators as at present. (13)

- (1) BBC 3rd July 2017 <http://www.bbc.co.uk/news/business-40479053>
- (2) Times 19th July 2017 <https://www.thetimes.co.uk/edition/business/hinkley-point-cost-could-soar-to-50bn-6brnph9q7>
- (3) Times 31st July 2017 <https://www.thetimes.co.uk/edition/comment/britain-s-energy-policy-keeps-picking-losers-v2ctn5pcb>
- (4) FT 4th Aug 2017 <https://www.ft.com/content/b5840c4a-785e-11e7-a3e8-60495fe6ca71>
- (5) Nikkei Asian Review 9th June 2017 <http://asia.nikkei.com/Business/Companies/Hitachi-scramblesto-divest-UK-nuclear-risks-after-Toshiba-fiasco>
- (6) Sunday Times 23rd July 2017 <https://www.thetimes.co.uk/edition/business/koreans-target-10bnwelsh-nuclear-plant-s5lswf9vh>
- (7) Utility Week 2nd May 2017 <http://utilityweek.co.uk/news/moorside-mothball-rumours-spark-visioncall/1301752>
- (8) ITV 3rd May 2017 <http://www.itv.com/news/border/update/2017-05-03/watch-new-nuclear-plant-will-goahead/>

- (9) Telegraph 28th June 2017 <http://www.telegraph.co.uk/business/2017/06/28/kepco-confirms-talks-toshibauk-nuclear-but-reactors/>
- (10) See <http://www.bradwellb.co.uk/>
- (11) See <http://www.no2nuclearpower.org.uk/nuclearnews/NuClearNewsNo76.pdf>
- (12) Guardian 10th May 2017
<https://www.theguardian.com/environment/2017/may/10/challengeconservatives-energy-priorities-cuts-renewables>
- (13) Independent 9th May 2016 <http://www.independent.co.uk/voices/the-government-should-scrap-its-costly-hinkley-point-deal-and-accept-renewables-can-keep-the-lights-a7021196.html>

2. Renewables just keep getting cheaper

Nuclear is vanishing as an answer to our energy needs. Nobody outside the industry now thinks the future of electricity generation is nuclear fission, according to the *Financial Times*. (1) "*Renewables have reached a tipping point globally*," says Simon Virley, of KPMG. "*A subsidy-free future is now in reach for a number of technologies and geographies*." (2)

Last autumn, Michael Grubb, Professor of International Energy and Climate Change Policy at University College London, told the House of Lords Select Committee on Economic Affairs that, although he had supported new nuclear during his time on the Committee on Climate Change, he felt "*times and conditions had substantially changed*." He said renewables are now clearly cheaper - costs have halved in the past few years. Committing to a 35-year contract for Hinkley Point C at the level agreed "*was economically inappropriate*". (3)

The cost of wind and solar has dropped 60% since 2009 and another nearly 40% reduction is expected over the next ten years. What started as a decarbonisation process, thanks to better technology, is becoming a process driven by costs. You could see governments and countries adding more and more wind and solar without any impact on final consumers. Larger turbines are reducing wind costs by producing power at much lower wind speeds. Effectively what used to require 20 knots, now only requires 10 knots. Goldman Sachs forecast that by 2020 renewables will cost less than the current average power price. This will trigger acceleration in investment - about \$3 trillion over the next 20 years. The transition to a low carbon economy is accelerating. (4)

So while the rest of the world is benefitting from falling power costs Scots could be stuck paying an index linked price for expensive electricity from nuclear power stations built in England and Wales.

In the UK **onshore windfarms** could be built for the same cost as new gas power stations and nearly half the cost of Hinkley Point C. The technology has become so cheap that developers could deliver turbines for a guaranteed price of power so low that it would be effectively subsidy-free in terms of the impact on household energy bills. Leo Murray, of climate change charity 10:10, said: "*It looks increasingly absurd that the Conservatives have effectively banned Britain's cheapest source of new power*." A report for Scottish Power found that windfarms could be delivered for a maximum of £50-55 per MWh across 15 years. Scottish Power hopes to persuade the government to reconsider its stance on onshore windfarms. If it did most new projects would be built in Scotland. (5)

One of the most striking cost reductions has occurred with **offshore wind**. In Germany in April Denmark's Dong Energy, the largest builder of costly offshore wind farms, said it would build two new schemes without subsidies, relying instead on market prices alone. Advances in wind technologies - including the prospect of much more powerful turbines - were one reason for Dong's move, a step others are expected to follow. (6)

The falling cost of offshore wind power could mean that it turns out to be 25% cheaper than energy from Hinkley Point C. Developers behind a series of proposed offshore wind farms are vying to secure government contracts that will guarantee a price for the electricity they generate for 15 years. It is hoped that winning projects could be as low as "£70 or less" per megawatt-hour (MWh) compared with £92.50/MWh for Hinkley Point for a 35-year contract. Just a few

years ago offshore wind was one of the most expensive technologies in the market. In 2014 the government awarded some projects a price of £150/MWh. (7)

Solar power, once so costly it only made economic sense in spaceships, is becoming so cheap that it will push coal and even natural-gas plants out of business faster than previously forecast according to Bloomberg New Energy Finance (BNEF). The research group estimated solar already rivals the cost of new coal power plants in Germany and the U.S. and by 2021 will do so in quick-growing markets such as China and India. Green energy is taking root more quickly than most experts anticipated. Solar electricity costs are almost a quarter of what they were in 2009, and likely to fall another 66% by 2040. (8)

Dieter Helm, an economist at the University of Oxford, has been asked by the Department for Business, Industrial and Energy Strategy (BEIS) to carry out a review of energy costs. He has been a vocal critic of the costs of both renewable power and nuclear in the past. The Conservative manifesto promised the resulting report would be the first step towards “*competitive and affordable energy costs*”. Helm believes funding should be directed at next generation renewable technologies, such as more efficient solar panels. He also backs emerging technologies such as smart grids and battery storage. The new energy minister, Richard Harrington, has already said the government is still committed to a new generation of nuclear power stations, but Helm’s review could provide justification for abandoning those ambitions on cost grounds. (9)

- (1) FT 26th May 2017 <https://www.ft.com/content/6ba2437a-3be7-11e7-ac89-b01cc67cfeec>
- (2) FT 18th May 2017 <https://www.ft.com/content/44ed7e90-3960-11e7-ac89-b01cc67cfeec>
- (3) The Price of Power: Reforming the Electricity Market, House of Lords Economic Affairs Select Committee. Feb 2017. <https://www.publications.parliament.uk/pa/ld201617/ldselect/ldeconaf/113/113.pdf>
- (4) Goldman Sachs 6th June 2017 <http://www.goldmansachs.com/our-thinking/pages/alberto-gandolfi-wind-and-solar-boom.html?cid=scl-pd-twitter-windandsolarboomuk-video-201707--2>
- (5) Guardian 23rd July 2017 <https://www.theguardian.com/environment/2017/jul/23/drop-in-wind-energy-costs-adds-pressure-for-government-rethink>
- (6) FT 18th May 2017 <https://www.ft.com/content/44ed7e90-3960-11e7-ac89-b01cc67cfeec>
- (7) Times 30th June 2017 <https://www.thetimes.co.uk/edition/business/offshore-wind-power-could-be-25-cheaper-than-hinkley-s-nuclear-qk77fqhd9>
- (8) Bloomberg 15th June 2017 <https://www.bloomberg.com/news/articles/2017-06-15/solar-power-will-kill-coal-sooner-than-you-think>
- (9) Guardian 12th July 2017 <https://www.theguardian.com/environment/2017/jul/12/renewable-power-energy-costs-review-dieter-helm>

3. The media generates electric vehicle ‘nuclear demand scare’ – whereas falling demand is the real news story

Following the announcement by the Government that it will ban petrol and diesel cars and vans from 2040 some sections of the press have generated nuclear demand scare stories based on predictions about the growth of electricity demand to power electric vehicles (EVs). Some of the media highlighted a National Grid report’s extreme scenario which looked at a peak demand increase of 18GW. The *Daily Mail*, for instance, talked about “*five new Hinkley Points*”. (1) The *Express* claimed we would need ten new nuclear plants and 10,000 turbines for cars to go electric by 2040. (2) The *Financial Times* called it the “*equivalent to capacity of 6 nuclear plants by 2050*” (3) but pointed out that the big increases in peak demand would only happen if EV charging is unmanaged, but smart charging could minimise the problem.

The Guardian pointed out that shifting the charging of cars to times when demand is lower would reduce the extra peak demand to 3.5GW in 2030, a similar capacity to the new reactors being built at Hinkley Point. (4) Since we are already consuming 15% less electricity than we were a decade ago this need not be a huge concern. (5)

Andrew Warren, chairman of the British Energy Efficiency Federation argues that when the UK government first endorsed Hinkley Point C, (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. This is despite a 13% increase in GDP over the last decade and the increase in the number of gadgets we all own. **We don't need to keep arguing for new power stations to fill the so-called energy gap because there isn't one.** (6)

This consumption revolution has been prompted by vastly improved electricity efficiency in industry, in consumer white and brown goods, and in areas like lighting, where household consumption has dropped from 20.7TWh in 2007 to 14.2TWh this year. In 1990 when Compact Fluorescent Lightbulbs (CFLs) were scarce in UK homes 26.6TWh of electricity were consumed in UK domestic properties for lighting. The average household is spending £87.36 per year on lighting, but if consumption levels had remained at 1990 levels that figure would have been £164 per year. This trend is set to continue. By 2025 LEDs will probably have replaced most CFLs and incandescent light bulbs, and LEDs themselves are becoming more efficient. Consumption is expected to fall a total of 89% compared to the year 2000, and annual expenditure will fall to just £16. (7)

A crash programme to replace all the lights in the UK with LEDs could cut peak electricity demand by about 8GW, a saving of another 15% of all power consumption. LEDs produce less waste heat and so can sometimes cut the need for air conditioning in places such as hotels and large office buildings. Even a much more restricted national campaign that just focused on domestic houses would have a dramatic impact. If we switched the lights in the parts of the house that are in use in early evening - essentially the kitchen and living areas - we would reduce home demand by more than 50%. Importantly, these rooms are the places where we now often use halogen downlighter bulbs, the most inefficient lights currently on the market. A standard halogen GU10 bulb uses 50W of power. The LED equivalent does the same job with just 5W. (8)

Tom Burke of the E3G Consultancy points out that: "*If there is even a feeble effort to improve energy efficiency electricity demand will fall further below the 30% Andrew Warren has pointed out. This means that a future energy minister will face the daunting task of explaining to consumers why he or she is having to pay renewable generators to switch off cheaper electricity in order to take the expensive electricity we have already bought from HPC. Imagine how much more difficult that task will be if we have by then bought the rest of the Government's proposed programme.*" (9)

- (1) Daily Mail 13th July 2017 <http://www.dailymail.co.uk/sciencetech/article-4691314/Britain-needsequivalent-FIVE-extra-Hinkley-Points.html>
- (2) Express 27th July 2017 <http://www.express.co.uk/news/uk/833529/electric-cars-michael-gove-nationalgrid-power-hinkley-point-diesel-petrol-demand>
- (3) FT 12th July 2017 <https://www.ft.com/content/11528c98-66fa-11e7-8526-7b38dcaef614>
- (4) Guardian 13th July 2017 <https://www.theguardian.com/business/2017/jul/13/electric-car-boom-powerdemand-national-grid-hinkley-point-c>
- (5) Guardian 5th July 2017 <https://www.theguardian.com/uk-news/2017/jul/05/nuclear-is-to-wind-asbetamax-is-to-netflix-why-hinkley-point-c-is-a-turkey>
- (6) Guardian 5th July 2017 <https://www.theguardian.com/uk-news/2017/jul/05/nuclear-is-to-wind-as-betamaxis-to-netflix-why-hinkley-point-c-is-a-turkey>
- (7) "Don't Cut Through this Red Tape" Andrew Warren, Energy in Buildings and Industry, June 2017
- (8) Ecologist 8th June 2016 http://www.theecologist.org/blogs_and_comments/commentators/2987760/the_urgent_case_for_an_mass_switch_to_led_lighting.html
- (9) Personal Comment

4. Dounreay decommissioning issues

Dounreay was the UK's centre of fast reactor research and development between 1955 and 1994 and is now described as Scotland's largest nuclear clean-up and demolition project. In April 2005 the Nuclear Decommissioning Authority (NDA) took over the ownership of the Dounreay nuclear facility in Caithness on the north coast of Scotland from the United Kingdom Atomic Energy Authority (UKAEA).

Shaft & Silo

In 1958 the Scottish Office authorised use of an underground shaft – built to remove spoil during construction of a sub-sea effluent discharge tunnel – as a disposal facility for intermediate level radioactive waste. More than 11,000 disposals took place between 1959 until 1977, when a chemical explosion occurred and the practice ceased. Decommissioning the 65-metre deep shaft is a major challenge. A second facility, the intermediate-level waste silo, also needs to be emptied and its contents made safe. A concrete-lined box built just beneath the surface, it was used to dispose of waste between 1971 and 1998. Contractors started to prepare the ground for a major new plant which will retrieve radioactive waste from the underground shaft and silo in March 2009. Based on the current plan, construction of the new facilities will begin in 2020 and waste retrieval operations in 2024. (1) Encapsulation of shaft and silo waste is due to be completed by 2028. (2)

Radioactive Particles

Another major problem is the appearance of radioactive particles in the environment. These small fragments of irradiated nuclear fuel have been found on the seabed off Dounreay, on several beaches including some open to the public. Radioactive particles will likely keep polluting public beaches for decades to come, and the environment will never be completely cleaned up. Despite assurances that the risk is low of a member of the public coming into contact with a particle which is a serious hazard to health, we cannot be certain that this will continue to be the case.

Since 1983 almost 500 radioactive particles have been found on three local beaches near Dounreay. More than 200 of these have been found on the publicly accessible Sandside beach. The Dounreay foreshore and Sandside beach are monitored on a regular basis. Strathy beach and Murkle beach act as 'gatekeepers' and are monitored twice a year to ensure that the offshore work has not adversely impacted the surrounding beaches.

Radioactive particles were also discovered on the seabed in 1997. As a result a fishing ban was implemented to prevent the removal of fish, crustaceans and molluscs in an area of 2km (1.2 mile) radius centred on the disused Dounreay discharge point near where the highest density of particles has been detected. An underwater clean-up started in August 2008, targeting a 60-hectare area of seabed where the most hazardous particles are found. By the end of 2012 when the underwater clean-up ended, more than 2200 particles had been removed from the seabed. (3)

Worryingly the Scottish Environment Protection Agency (SEPA) has given up on its aim of returning the seabed to a "pristine condition". The Agency has admitted that the contamination will never be completely cleaned up. To do so, it said, could cause "*more harm than good*". SEPA opted instead to encourage remediation "*as far as is practically achievable*" but to abandon any hope of removing all the radioactive pollution from the seabed. (4)

Reactors

There are three reactors on the civil site which need to be dismantled: the Dounreay Fast reactor (DFR); the Prototype Fast reactor (PFR) and the Dounreay Materials Test Reactor (DMTR).

DFR closed down in 1977. Decommissioning it is one of the most significant challenges in the UK today. It is due to be dismantled by 2022.

PFR closed in 1994. It was de-fuelled and the 1,500 tonnes of bulk sodium that once flowed through the primary and secondary circuits removed. The world's largest liquid metal destruction plant was built at PFR to destroy this sodium, and destruction was completed in August 2008. The reactor itself is due to be dismantled by 2026.

DMTR closed in 1969. It is due to be dismantled by 2022. Companies are currently being invited to bid for a contract to demolish DMTR - Scotland's first operational reactor in 1958. A contractor is expected to be appointed in the first half of 2018. (5)

Scottish Minister raises serious concerns

In August this year, serious concerns about the environmental and safety record of the Dounreay nuclear plant were raised by Scottish environment secretary Roseanna Cunningham. In a letter to UK energy minister Richard Harrington, she complained of a disappointing lack of progress across a range of projects that sat oddly with the planned reduction in workforce at the site. (6)

Her concerns come after shortcomings in safety performance at Dounreay were identified in the NDA's annual report (7) and criticism of the environmental management at the plant by the Scottish Environment Protection Agency. Local SNP MSP Gail Ross has echoed the minister's concerns. (8)

Last year the Scottish Environment Protection Agency (Sepa) gave an end-of-year "at risk" rating for the management of radioactive waste and a "poor" rating for the management of low-level waste vaults. The issues were highlighted the NDA's annual report, alongside a "deterioration" in safety performance. (9)

There were three serious incidents. They included workers dropping a glovebox which caused the release of radioactive contaminants. A radioactive fuel assembly was also dropped but nobody was injured in either incident. (10)

In addition, the NDA annual report presented in stark terms the lack of progress at Dounreay across a wide range of projects.

Unions were surprised in April by an announcement by the consortium decommissioning Dounreay when it announced plans to cut 200 workers from the project. Although it was expected that the 1,100 strong workforce would be reduced as decommissioning progresses, the cuts are deeper than anticipated. (11) Gary Smith, general secretary of the GMB union in Scotland, said: "*Morale is rock bottom, so [requests for voluntary redundancy] may end up being oversubscribed, but ultimately it is the taxpayer that picks up the bill to make the staff redundant. Our big concern is that on a nuclear, safety-critical site, morale is already through the floor, trust in the management is at rock bottom, and now the workforce is going to get another message about job losses. We know if you have bad morale on the site it's bad for safety. To protect jobs in a remote community that's totally dependent on this industry, we should be attempting to retain skills, not get rid of staff on pack ages that the taxpayer will ultimately pay for.*" (12)

Of 10 Business Plan activities expected in 2016/17 as part of the Dounreay Decommissioning Programme seven were deferred including several the NFLA have been following with interest: Beginning operations at the silo headworks to remove waste from the waste silo; beginning operations at the solid waste treatment and packaging plant; beginning operations at the shaft headworks for waste removal from the waste shaft; transferring Prototype Fast Reactor (PFR) irradiated fuel material to the spent fuel store; and reaching an agreed end-point with particles remediation. (13)

The Minister said the "*disappointing state of affairs ... sits oddly with the planned reduction in workforce at Dounreay.*" (14)

(1) See <https://dounreay.com/about/decommissioning-projects/shaft-silo/>

(2) NDA Business Plan 2017 – 2020

[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/604324/NDA Business Plan 2017 to 2020.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/604324/NDA_Business_Plan_2017_to_2020.pdf)

(3) See <https://dounreay.com/about/decommissioning-projects/particles/>

(4) Guardian 21st September 2011 <https://www.theguardian.com/environment/2011/sep/21/scottish-nuclear-leak-clean-up>

(5) DSRL 11th August 2017 <https://dounreay.com/2017/08/dounreays-oldest-reactor-demolished/>

(6) Scottish Government Press Release 6th August 2017 <https://news.gov.scot/news/environmental-and-workforce-concerns-at-dounreay>

(7) NDA Annual Report and Accounts 2016/7

[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/630177/NDA Annual Report and Accounts 2016 to 2017.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/630177/NDA_Annual_Report_and_Accounts_2016_to_2017.pdf)

- (8) Sunday Times 6th Aug 2017 <https://www.thetimes.co.uk/edition/scotland/dounreay-safety-concerns-raised-by-cunningham-sf7nd5d9b>
- (9) Times 7th Aug 2017 <https://www.thetimes.co.uk/edition/scotland/assurances-sought-over-risks-of-dounreay-clean-up-6lnshpqbh>
- (10) STV 6th Aug 2017 <https://stv.tv/news/north/1395102-safety-concerns-over-radioactive-waste-at-nuclear-plant/>
- (11) Telegraph 17th April 2017 <http://www.telegraph.co.uk/business/2017/04/17/dounreay-job-losses-reignite-nuclear-clean-up-cost-fears/>
- (12) Times 12th April 2017 <https://www.thetimes.co.uk/edition/scotland/redundancies-at-nuclear-site-raise-safety-concerns-h0glm7r5j>
- (13) NDA Annual Report and Accounts 2016/7
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/630177/NDA_Annual_Report_and_Accounts_2016_to_2017.pdf
- (14) STV 6th Aug 2017 <https://stv.tv/news/north/1395102-safety-concerns-over-radioactive-waste-at-nuclear-plant/>

5. Dounreay Waste Transports

The first of 90 rail and sea shipments of nuclear material from Dounreay in Caithness to Sellafield in Cumbria was made overnight by rail on 16th/17th December 2012. The BBC reported that the journey was understood to have been made under armed escort. (1)

The material being transported falls into two categories. The first category is around forty-four tonnes of “breeder material”, which is being moved in about 40 trainloads over a four or five year period. This material formed the uranium-238 blanket in the Prototype Fast Reactor at Dounreay, so it is not thought to be terribly radioactive, but there is concern the plutonium formed by the neutron bombardment of the uranium could be a prime target for theft. The NDA estimates that although these transports will cost around £60m, it is a cheaper option than trying to deal with it at Dounreay. This “breeder material” is expected to be reprocessed in the old Magnox reprocessing plant at Sellafield to separate out the plutonium.

The second category is a mixed bag of material called “exotics”. This includes fuel containing unirradiated highly-enriched uranium; unirradiated plutonium and irradiated fuels. This will be transported from Dounreay to Sellafield in 50 or 60 journeys over six years from 2014 or 2015. Nuclear engineer John Large condemned these proposed transports. He said: *“We’re talking about bomb-grade material that would be a target for terrorists. It is also fuel from an experimental reactor which will have got broken up and will have been in storage in an uncertain condition. It will be very difficult to inspect it before it is transported and the only safeguard is based on their assumption that they would not encounter an accident with a big enough impact to break open the flask.”* (2)

In March 2016 the Oceanic Pintail, the only ship owned by the NDA travelled from Scrabster to Barrow-in-Furness with a cargo of ‘exotic’ nuclear materials including unirradiated plutonium and highly enriched uranium fuels on their way from Dounreay to Sellafield. This ‘weapons useable’ material would be a prime target for terrorists. The use of the 29 year old Oceanic Pintail – now almost 5 years past her sell-by date (company practice has been to retire ships at or before 25 years of service) – and the sea route from Scotland via the often treacherous waters of the Minches from Cape Wrath southwards, has been much criticised as unnecessarily dangerous. (3)

In May this year, the Sunday Post published pictures of a cargo of Dounreay Exotics being transported by road at night to the port of Scrabster for onward transport to Sellafield. (4)

There is annoyance that the hugely-popular tourist driving route - North Coast 500 - faces disruption while a stretch is used to transport nuclear waste. With the UK terror threat remaining “severe,” police have been granted the power to close a nine-mile stretch of the lucrative route for public safety reasons. The move is to allow shipments to be transported along the A836 from the Dounreay atomic plant in Caithness to Scrabster. (5)

The lack of an Emergency Towing Vessel on the west coast of Scotland has been an area of particular concern.

In 2016 it was reported that 700kg of highly enriched (bomb-grade) uranium was to be transported from Dounreay in up to nine flights to the USA over the subsequent 18 months and that the first flight had left in September 2016. According to Paul Monaghan, SNP MP for Caithness, Sutherland & Easter Ross, the Wick John O'Groats airport runway is 1,600ft too short despite a recent upgrade for the aeroplanes used for these transports. A US air force C17 Globemaster aircraft requires a runway length of 7,600ft to take off safely but the one at Wick is only 6,000ft long. As a result planes are routed through RAF Lossiemouth in Moray to be drained of fuel before heading to Wick. They refuel at Lossiemouth on the return leg. (6)

In June this year the *Sunday Post* reported that an American military plane arrived at Wick Airport to transport the second shipment of highly enriched uranium to the US. Dozens of armed police stood guard while the uranium was loaded on to a giant American Air Force transport jet – a C-17 Globemaster. Nuclear engineer John Large said the risks of transporting this material by aircraft included “*in the event of a crash, the fuel being engulfed in fire, the packages breaking down and the fuel igniting*”. The waste sent to the US will be swapped for medical grade uranium to make radio isotopes for detecting cancer. Armed police guarded two trucks carrying the uranium in reinforced steel flasks as they travelled the 32 miles from Dounreay to Wick airport. Roads around the airport were closed and sealed off as the deadly waste was delivered. (7)

For more info see:

http://www.theecologist.org/News/news_analysis/2987643/ukus_air_transports_of_high_enriched_uranium_global_security_at_risk_for_commercial_gain.html

- (1) BBC 17th December 2012 <http://www.bbc.co.uk/news/uk-scotland-highlands-islands-20754726>
- (2) John O Groat Journal 23rd November 2011 <http://www.johnogroat-journal.co.uk/News/Green-light-for-transfer-of-spent-nuclear-fuel-from-Dounreay-22112011.htm>
- (3) CORE 14th March 2016 <http://corecumbria.co.uk/briefings/barrows-plutonium-ships-and-their-toxictrade-at-home-and-overseas-no-0216/>
- (4) Sunday Post 7th May 2017 <https://www.sundaypost.com/fp/photos-reveal-covert-operation-of-moving-highly-dangerous-nuclear-waste-through-scotland-at-night/?sso-c=MC4wODcxNTEwMCAxNTAyNDYyNDY2>
- (5) Press & Journal 10th July 2017 <https://www.pressandjournal.co.uk/fp/news/highlands/1285030/nuclear-disruption-for-nc500/>
- (6) Times 1st Oct 2016 <http://www.thetimes.co.uk/edition/news/scottish-airport-not-safe-for-us-uraniumjetsbwd57s3nk> and Sunday Post 2nd Oct 2016 <https://www.sundaypost.com/news/risky-scots-airportshortgiant-waste-transport-planes-despite-8-million-upgrade/>
- (7) Sunday Post 4th June 2017 <https://www.sundaypost.com/fp/toxic-cargo-of-nuclear-waste-leaves-for-us/>

6. Hunterston & Torness life extensions

At the end of 2012 EDF Energy announced that it would like to extend the life of Hunterston B nuclear power station in Ayrshire by seven years to 2023. Then in 2016 it said it wanted to extend the life of Torness nuclear power station in East Lothian to 2030. All of these reactors are Advanced Gas-cooled Reactors (AGRs).

Hunterston B (and its sister station Hinkley Point B in Somerset) opened in 1976 making it older, or the same age as, all but one of the eight reactors which Germany has already shut down. Despite being opposed to the construction of new reactors in Scotland, Scottish ministers have repeatedly said they will not oppose plans by EDF Energy to apply to UK regulators to keep Hunterston B going until 2023.

The recent discovery of cracked graphite bricks in the core of Hunterston B has raised questions about whether it is safe to keep these reactors running long past their expected lifespan of about 30 years. In 2005 the Nuclear Installations Inspectorate (now the Office for Nuclear Regulation -ONR) expressed concern about the structure of the reactor core. A report by Large Associates – an independent nuclear engineering consultancy – on problems at Hinkley Point B which

analysed a bundle of documents received under the Freedom of Information Act, concluded that there are:

“...significant uncertainties over the structural integrity and residual strength of the moderator cores in ... AGR plants ... in view of the increased risk presented by continued operation of these nuclear plants, the reactors should be immediately shut down and remain so until a robust nuclear safety case free of such uncertainties has been established.”

So the Nuclear Free Local Authorities, Friends of the Earth Scotland and WWF Scotland wrote to Scottish Energy Minister Fergus Ewing in June 2011 asking him to commission an independent study on the risks of continuing to operate 35-year old graphite moderated reactors, and extending the life of such reactors beyond 2016. The response from Ewing was negative.

John Large said it was *“gambling with public safety”* to allow Hinkley Point B and Hunterston B to continue operating. The documents, written by the former Nuclear Installations Inspectorate, reveal that AGRs are structurally defective and their continued operation is increasing the risk of a radioactive accident. The bricks which make up the reactor cores of the AGRs are cracked. These bricks, made of graphite, help control the nuclear reaction by influencing the speed of neutrons. Channels also run through the bricks which enable control rods to be inserted to shut-down the reactor in an emergency. However, the cracked graphite bricks could prevent them from being inserted causing the nuclear fuel to overheat, potentially resulting in a radiological release. The core is made up of 6,000 graphite blocks. Around half of these are 1 metre tall with a bore or channel running through each block. Around 200 of these channels contain rods of nuclear fuel. If anything goes wrong control rods are inserted between the channels to dampen the nuclear reaction and shut down the reactor.

John Large also explained to the BBC Radio 4's 'Costing the Earth' that graphite is not elastic, it doesn't bend, and is not particularly strong. And now the graphite bricks are cracking. The core is an assembly of several thousand bricks, loosely stacked together, but because the expectation was that the core would never fail, there was no facility built into the design to replace any individual blocks if they did become damaged. The graphite bricks are cracking and starting to lose weight due to decades of bombardment by radiation and the effects of the CO₂ gas coolant on the material. The bricks are crucial to the structural integrity of the reactor cores and also act to moderate the nuclear reaction; it will not function without them. The cracking and fracturing must result in some loss of strength – not only of the individual bricks, but of the core as a whole.

Whilst all UK reactors have closure dates 'for accountancy purposes' this does not necessarily mean this is when they will close. These dates are kept under review and can be adjusted (in either direction) at any time to take account of commercial, technical and safety issues. A Periodic Safety Review (PSR) is carried out for each operating nuclear power station every ten years. The review requires an operator to prove that its nuclear power plant is safe and complies with site license conditions. The Office for Nuclear Regulation (ONR) does not have a formal decision-making process on life extensions, but when each reactor undergoes its periodic safety review every 10 years ONR will tell the nuclear operator what modifications it needs to make to keep the station running then the operator decides whether implementing the required changes is economic. ONR says it is working with EDF Energy to extend the life of its nuclear power stations and that it is *“content for the plants to continue to operate”*, as long as they pass regular safety tests.

The Office for Nuclear Regulation spent most of 2016 examining EDF Energy's Periodic Safety Review on Hunterston B and Hinkley Point B. In February 2017 it published its assessment. ONR also accepted EDF's revised graphite core safety case for both sites, but included a number of recommendations as part of this acceptance. Acceptance of the safety case is reliant on a revised inspection and monitoring strategy.

Despite the fact cracks are beginning to appear in the graphite core of these reactors, increasing the risk for us all, the Scottish public has never been asked for its opinion about whether they should be allowed to continue operating.

EDF Energy will have to submit a Periodic Safety Review for Torness to ONR in 2019.

For more information see “Plant Life-Time Extensions for Scotland’s Ageing Reactors the Lack of Public Participation in the Decision-Making Process” by Pete Roche January 2017, commissioned by Scottish Green MSPs:

<https://greens.scot/sites/default/files/Nuclear%20lifetime%20extensions%20-%20Pete%20Roche.pdf>

7. **Scottish Government Higher Activity Waste Policy**

The Scottish Government has published its strategy on the long-term management of higher activity radioactive waste in Scotland. (1) There is a summary of the policy from the NFLA perspective available here:

http://www.nuclearpolicy.info/wp/wp-content/uploads/2017/01/Rad_Waste_Brfg_67_Scottish_Government_radwaste_policy.pdf

The Strategy has been developed to support Scotland’s Higher Activity Radioactive Waste Policy published in 2011 (2) which is that long-term management of higher activity radioactive waste should be in near-surface facilities. Facilities should be located as near to the site where the waste is produced as possible. Developers will need to demonstrate how the facilities will be monitored and how waste packages, or waste could be retrieved.

Unlike the rest of the United Kingdom the Scottish Government does not support deep geological disposal of Higher Activity Waste. The policy does not set out to identify new sites, with long-term management of higher activity radioactive waste continuing to take place in near-surface facilities. A process for developing a full siting strategy is expected to begin after 2030, with construction expected to begin on disposal facilities post-2070.

Publication follows an extensive public consultation and work with the Nuclear Decommissioning Authority (NDA), site stakeholder groups, the Scottish Councils Committee on Radioactive Substances (SCCORS) and the NFLA.

The term Higher Activity Waste (HAW) can be confusing. It covers High Level Waste (HLW), as well as Intermediate Level Waste (ILW) and a small proportion of Low Level Waste (LLW) which is not suitable for disposal at existing low level waste facilities. There is currently no waste which is officially defined as High Level Waste in Scotland, so the 2011 Policy covers mainly Intermediate Level Waste.

Spent Nuclear Fuel is still not classified as waste and continues to be transported to Sellafield for reprocessing or storage. In addition to spent fuel there are other radioactive substances and materials which are not currently classified as radioactive waste, such as, plutonium, uranium or other such radioactive fuels and materials. These materials are considered a reserved issue and managed by the UK Government. These are being transported to Sellafield for storage pending disposal in a future Geological Disposal Facility (GDF).

Nor does the Policy and Strategy cover radioactive waste arising at defence establishments not subject to the Radioactive Substances Act 1993 including waste arising at Faslane, Coulport and Vulcan (adjacent to Dounreay). Nor do they cover HAW arising from the decommissioning and dismantling of redundant nuclear submarines including those berthed at Rosyth.

It has long been the contention of the NFLA that a set of clear environmental principles should be used when deciding how to manage nuclear waste. Amongst these is the rejection of the idea that radioactive waste can be ‘disposed’ of. The dictionary definition of the word ‘dispose’ is to get rid of something. Clearly it is not possible to ‘get rid of’ nuclear waste. If radioactive waste is placed in a deep underground geological disposal facility or a near surface facility radioactive substances could eventually leak out and be dispersed throughout the environment.

In contrast ‘disposal’ is defined by the Scottish Governments as “...*placing the waste in a suitable specialised land-based facility without the intent to retrieve it at a later time*”. This does not mean the waste cannot be retrieved if that proves necessary – it just means there is no present intention to retrieve it.

It is the view of the NFLA that the use of the term “disposal” in this way is likely to cause public perception problems when the search for a site for new facilities begins in 2030. However, the crucial point is that: “*The Policy requires that disposal facilities should be monitored and that there should be a capability to retrieve waste packages and waste if necessary.*” The Implementation Strategy points out that “*Although there is no intention to retrieve the waste, any proposed disposal facilities in Scotland will have to demonstrate ‘retrievability’. Retrievability means that, if necessary, waste could be removed from the facility at a later time.*” The Scottish Government says its ethos “*is that radioactive waste should not be considered “out of sight, out of mind” and that there needs to be a continued oversight of the waste whether it is in storage or in a disposal facility.*”

So, unlike England and Wales where the intention is to find a site for the construction of a Deep Geological Disposal Facility for disposing HAW (including spent fuel), the radioactive waste within the purview of the Scottish Government will be placed in near surface facilities as near to the site where it is produced as possible with no intention to retrieve it but where it will be monitored and could be retrieved if necessary. About 60% of the waste in question will not arise until 2070 and the rest will be managed in purpose built stores on the reactor sites until then. About 60% of the waste on the Dounreay site is currently thought to be unsuitable to be placed in a near surface facility, but research will be carried out to find a suitable method of management for this waste. A search for a suitable site or sites for a near surface facility will begin after 2030, but construction will not begin until after 2070. It is anticipated that monitoring of near-surface disposal facilities will continue for around 300 years. By 2120 there should be no further HAW waste arisings in Scotland.

- (1). Scottish Government 15th Dec 2016 <http://news.gov.scot/news/haw-implementation-strategy-published>
- (2) Scotland’s Higher Activity Waste Policy January 2011
<http://www.gov.scot/Resource/Doc/338695/0111419.pdf>

8. Nuclear Submarine Dismantling Project

The Ministry of Defence says the aim of its Submarine Dismantling Project (SDP) is to provide a safe, environmentally responsible and cost effective solution for the dismantling of 27 of the UK’s de-fuelled nuclear powered submarines after they have left service with the Royal Navy.

The Royal Navy has 19 old nuclear-powered submarines – 7 stored at Rosyth and 12 at Devonport waiting to be dismantled, with another eight due to retire and join them in the coming years. HMS Dreadnought, the Navy’s first nuclear-powered submarine, has been waiting to be dismantled since it retired 36 years ago.

Initial dismantling will take place at Devonport and Rosyth. The Reactor Pressure Vessels (RPVs) will be removed whole from the submarines and dispatched to an interim store. These are typically 2.5 to 3 metres in diameter and 4 meters high and weigh between 50 and 80 tonnes. A transport container for the RPVs will need to be designed and constructed to transport the RPVs from Devonport and Rosyth to the interim store. This will go out to tender soon.

The first submarine to be dismantled to demonstrate the process will be HMS Swiftsure at Rosyth. Removal of the Low-level waste began in December 2016 – but nothing will happen to the RPV until planning permission and regulatory authorisations have been received for an interim store to be built at Capenhurst in Cheshire where RPVs will be stored until a deep geological disposal facility is ready to receive them. So Swiftsure will be returned to storage afloat for a time after up to 2 years has been spent removing LLW.

Swiftsure will be in dock until around August 2018. (1) Afterwards Resolution will go through the same process. After Resolution, Swiftsure will go back into the dock for Reactor Pressure Vessel (RPV) removal.

Contaminated metal will go for decontamination. This work will have to go out to tender, but the part of the Swedish company – Studsvik – which carries out waste treatment work at Lillyhall in

Cumbria and in Sweden – and has done work for Rosyth in the past - has been bought by EDF and is now called EDF Cyclife.

- (1) Scotsman 17th Feb 2017 <http://www.scotsman.com/news/politics/when-will-roseyth-s-nuclear-submarinesfinally-be-scrapped-1-4369308>

9. **Scottish Government Energy Policy**

This year the Scottish Government has been running various consultations including on the following:

- In January 2017, the Scottish Government published a draft of its third Climate Change Plan which sets out policies to reduce greenhouse house emissions by 66% by 2032 compared with 1990. (1) A final Plan is expected in early 2018.
- The Climate Change Plan, sits alongside the Scottish Government's forthcoming new Energy Strategy, and provides the strategic framework for the transition to a low carbon Scotland. The Draft Energy Strategy sets out the path to a low carbon economy while helping to deliver sustainable economic growth and secure the wider benefits to a greener, fairer and healthier Scotland. The Draft Energy Strategy covers a longer period up to 2050, by which time greenhouse gas emissions should be reduced by 80%. This proposes that by 2030 50% of all energy (including heat, power and transport) should come from renewables. (2)
- Alongside the draft Strategy the Scottish Government also consulted on a draft Onshore Wind Policy Statement; (3) Scotland's Energy Efficiency Programme; (4) and Local Heat and Energy Efficiency Strategies, and Regulation of District Heating. (5)
- Following the increased global ambition represented by the Paris Agreement, the Government committed to a new Climate Change Bill to reduce emissions further. Proposals for a new Bill were outlined by the Cabinet Secretary for Environment, Climate Change and Land Reform, Roseanna Cunningham in a statement to Parliament in June 2017. A consultation on these proposals will run until 22nd September. (6)

Energy Strategy Response

In March 2017 the Nuclear Free Local Authorities (NFLA) Scotland published a summary consultation response to the draft energy strategy. (7) The NFLA warmly welcomed anew focus on local energy economies, but was disappointed by a lack of practical concrete support for the solar industry. It expressed concern about the impact of shifting large numbers of households onto electric heating, and supported instead establishing more district heat networks, and more of a focus on green gas to avoid the grid problems associated with the huge peaks in electricity demand likely on a cold winter's day. NFLA supports the aspirations of the Scottish Energy Efficiency Programme, but feels the timetable is far too slow and plans short on detail. It feels that the focus for the oil and gas industry should be on assisting a just transition for those working in the industry rather than maximising recovery of oil and gas from the North Sea which could well end up being a dead end.

Climate Change Bill Response

Under current plans Scotland has a target to reduce greenhouse gas emissions by 80% by 2050. The Scottish Government has made moves to improve that and raise the target to 90%.

WWF Scotland says the proposals the Scottish Government have put on the table for a new Climate Change Bill fall well short of delivering the low carbon future we need and the majority of Scots want. Stop Climate Chaos Scotland (SCCS) is urging members of the public to get involved and to act for our future by sending a message to the First Minister that they want more ambition in areas such as homes, transport and agriculture which are failing badly to play their part in cutting our emissions. It's time for Scotland to follow the ambition of other nations such as Sweden, which recently adopted a target to be carbon neutral by 2045, and France recently announced a 2050 carbon neutral target.

WWF and Stop Climate Chaos want to see a target of zero greenhouse gas emissions by 2050 at the latest, and a reduction of 77% by 2030. It also wants the Government to, amongst other things, ensure that all homes have at least Energy Performance Rating 'C' by 2025 helping to reduce greenhouse gas emissions, tackle fuel poverty and create jobs all across Scotland. (9)

Renewable Targets

Scotland is now generating the equivalent of around 60% of its annual electricity needs from renewables, mostly wind, and is aiming for 100%, with new nuclear blocked unilaterally. So it is a little surprising that there have not been more studies of this unique initiative. That's soon to change with a new book, 'A critical review of Scottish Energy Policy' by a group of Scottish academics edited by Geoff Wood and Keith Baker, to be published Palgrave in October. It focuses on renewables and low carbon options and related policy, planning, legislation and regulation issues. The overwhelming message is that, despite the endless debate about whether renewables can work large scale, here's a country actually doing it.

Some of the criticism are simply due to disbelief that renewables like wind energy (now the dominant renewable in Scotland) can work on a large scale, without massive backup, beyond what is likely to be available. It is certainly true that the UK governments decision to abandon the £1bn Carbon Capture and Storage programme (including the Peterhead project) removes the potential for a lower carbon approach to continued fossil fuel use, and arguably would make the use of gas plants for backup less attractive, given their unabated emissions. But then high-cost CCS probably wouldn't have made sense with flexible gas peaking plants- which would only operate occasionally to back up renewables. In any case, in addition to hydro pumped storage, and power imports balanced by exports, there are other low carbon supply/demand balancing options, including Combined Heat and Power/district heating networks linked to heat stores and smart grid demand response systems, all of which Scotland is looking at, as this book notes. (10)

- (1) Draft Climate Change Plan - the draft Third Report on Policies and Proposals 2017-2032, Scottish Government January 2017 <http://www.gov.scot/Publications/2017/01/2768>
- (2) Draft Scottish Energy Strategy: The Future of Energy in Scotland, January 2017 <http://www.gov.scot/Publications/2017/01/3414>
- (3) Onshore Wind Policy Statement, Scottish Government January 2017 <http://www.gov.scot/Publications/2017/01/7344>
- (4) National Infrastructure Priority for Energy Efficiency, Scottish Government January 2017 <http://www.gov.scot/Publications/2017/01/2195>
- (5) Consultation on Heat and Energy Efficiency Strategies, Scottish Government, January 2017, <http://www.gov.scot/Publications/2017/01/9139>
- (6) See <https://consult.scotland.gov.uk/energy-and-climate-change-directorate/climate-change-bill/>
- (7) NFLA Briefing No.155 http://www.nuclearpolicy.info/wp/wp-content/uploads/2017/03/A268_NB155_Scottish_energy_strategy.pdf
- (8) Scotsman 11th Aug 2017 <http://www.scotsman.com/news/opinion/government-must-work-harder-to-achieve-low-carbon-future-scots-want-and-need-1-4526559>
- (9) <http://www.stopclimatechaos.org/>
- (10) Environment Research Blog 22nd July 2017 <http://blog.environmentalresearchweb.org/2017/07/22/scotland-shows-the-way-forward/>

10. Hydrogen – useful for dealing with intermittency?

One of the technologies NFLA Scotland has looked at as a possible way of balancing intermittent renewable energy has been using surplus renewable energy to generate hydrogen gas from water. This is discussed in a new book by Chris Goodall called "The Switch". A system called Power to Gas (or P2G) which generates hydrogen from surplus renewable energy and then combines it with carbon dioxide to make methane is already operating in Lower Saxony. The plant is operated by Audi. The CO₂ 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.

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 is the world's foremost facility demonstrating hydrogen 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. (1) 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. (2)

An international summit on hydrogen held in Aberdeen which brought 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. (3)

Rather than storing electricity in batteries Orkney has chosen to divert unused renewable energy into affordable heat. Renewable energy generators on Orkney are being curtailed due to the constraints on the distribution of electricity around the Orkney grid, but fuel poverty levels are at 63% for all households in Orkney. Despite insulation and energy efficiency work across the Islands, residents still need an affordable source of heat. The Heat Smart Orkney project will provide a demand-side management solution by installing secondary heating systems into local homes willing to participate. These secondary heating systems will be charged when the participating turbines are constrained. (4)

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 – where it will be fed into a hydrogen fuel cell and used to provide auxiliary power for vessels in the harbour. (5)

- (1) Allmedia Scotland 6th Feb 2017 <http://www.allmediascotland.com/media-releases/121452/media-releaseife-based-living-solutions-takes-delivery-of-cutting-edge-hydrogen-electric-green-energy-vehicle/>
- (2) Scotsman 14th June 2017 <http://www.scotsman.com/news/environment/pioneering-green-energy-project-switches-on-at-methill-docks-1-4475876>
- (3) Aberdeen City Council 5th Feb 2017 <http://news.aberdeencity.gov.uk/first-international-summit-on-hydrogen-supply-chain-to-be-held-inaberdeen>
- (4) Scottish Energy News 7th Nov 2016 <http://www.scottishenergynews.com/heat-smart-orkney-launchesproject-to-divert-unused-renewable-energy-into-affordable-heat/>
<http://www.scottishenergynews.com/local-energy-challenge-fund-helps-deliver-1-2m-wind-farm-to-combat-fuel-poverty-in-orkney/>
- (5) Sunday Times 6th August 2017 <https://www.thetimes.co.uk/edition/scotland/islanders-set-sail-on-pollution-free-ferries-project-5w52s66bd>

11. Renewable energy news

The last turbine has been installed at the world's first full-scale floating offshore wind farm off the Aberdeenshire coast. Five giant wind turbines make up the Hywind pilot development, about 15 miles (25km) from Peterhead. The Norwegian oil firm Statoil has been working on developing the project for more than 15 years. It allows turbines to be installed in much deeper waters than conventional offshore installations. Their height from the water line is 172m, which is almost four times the height of the Forth Bridge. The company is now hooking up the cables and hopes to generate the first electricity in October.

See: BBC 16th Aug 2017 <http://www.bbc.co.uk/news/uk-scotland-north-east-orkney-shetland-40947146>

Citizens Advice Scotland has called for households who use district heating schemes to be given more consumer protection. The consumer group said in a new report, entitled Different rules for different fuels, which states there is a "clear need" for greater protection as district heat is not regulated in Scotland in the same way gas and electricity are. The report calls on the Scottish Government to introduce statutory protection measures around billing, metering, standards of

service and pricing. It also recommends a statutory licence for district heating suppliers. And it adds there is wide support from suppliers and other stakeholders for more regulation of the sector, which is expected to grow significantly in the next few years.

See: Utility Week 26th May 2017 <http://utilityweek.co.uk/Citizens-Advice-demands-consumer-protection-for-district-heating>

The Scottish Government's Low Carbon Infrastructure Transition Programme (LCITP) will provide £43 million of new funding to be shared among 13 innovative projects. Scottish firm Star Renewable Energy will receive £3.5 million to supply eco-friendly heat to buildings in the Gorbals using pioneering heat pump technology on the Clyde. A local power system on Fair Isle, and an energy storage project in Shetland will also receive funding. Low-carbon heat networks in Dundee, Stirling, Clydebank and Glenrothes will also receive funding. Canadian-owned firm SHARC Energy Systems was awarded grant support to install waste water heat recovery systems at five locations across Scotland. The technology works by using a heat pump to amplify the warmth of waste water in sewers – such as from showers, dishwashers and washing machines. It will soon be used to heat Kelvingrove Museum in Glasgow, a leisure centre and public library in Campbeltown, a leisure centre in Orkney and a new district heating scheme at the Clyde Gateway regeneration project in Glasgow.

See: Scotsman 10th May 2017 <http://www.scotsman.com/news/project-generating-heat-from-sewers-given-funding-boost-1-4442083>

A pioneering 'smart energy' project is powering ahead after more than a quarter of local residents signed up to take part. The SMART Fintry project links homes in Fintry to local sources of renewable electricity. The project aims to set a new blueprint for communities to become more energy-self-sufficient by making better use of local wind, solar and other renewable resources. In its first six months, more than 80 households in Fintry signed up to a special renewable electricity tariff with new, smarter meters to help monitor their electricity use more closely. At the same time, the project secured deals to help match their electricity use with the output from three local renewable generators, including two wind turbines and an anaerobic digestion plant – creating a local market for local clean power. SMART Fintry is funded by the Local Energy Challenge Fund and the project is being run by a consortium of commercial, academic and local partners: including Fintry Development Trust, Veitch Cooper, Energy Assets, Heriot Watt University, and renewable energy supplier Good Energy. Good Energy aim to develop similar projects with other communities across the UK.

See: Scottish Energy News 27th April 2017 <http://www.scottishenergynews.com/good-energy-delivers-fuel-bill-savings-for-scottish-village-in-community-renewable-scheme/>