

SAFE ENERGY E-JOURNAL No.71

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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/NuClearNewsNo90.pdf>

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<http://www.microgenscotland.org.uk/news/>

1 Torness and Hunterston B Life Extensions

EDF Energy is looking at the possibility of extending the life of Torness and Hunterston B even further than already announced. Paul Winkle, EDF's Scottish Business Director, speaking at an EDF fringe meeting at the SNP conference, suggested that their life span could be extended even further.

*"The current life for Hunterston is 2023 and Torness is 2030, and that is based on our assessment of ageing mechanisms in those plants and being absolutely sure that when they are shut down they are still safe to operate. But to go beyond that we will do assessments and **it may be possible to make some small further extensions**, but we will not operate them beyond when we are confident they are safe to operate. Our current estimate is, with Hunterston, we get to a point where, if we go beyond 2023 there will be uncertainty. We will do more analysis in due course. Those dates are based on our best judgement. (Emphasis added)" (1)*

Although further life extensions would infuriate some in the SNP who want Scotland to become nuclear-free as soon as possible, a spokeswoman for the Scottish government said that ministers would welcome any extensions, as long as these could be done safely: *"We support life extensions for existing nuclear power stations where the environmental and safety requirements continue to be met. Extending the operating life of Scotland's existing nuclear stations can help to maintain security of supply while the transition to renewables and cleaner thermal generation takes place."*

Lang Banks, the director of WWF Scotland said: *"Despite EDF's claims, there's simply no need for the two remaining nuclear power stations in Scotland to have their lives further extended. Independent analysis has shown that our electricity system could be powered almost entirely by renewables within two decades without the need for any gas, coal or nuclear power in Scotland. The analysis also shows that Scotland would maintain security of supply and its position as an electricity-exporting nation. From opinion polling, we know that the majority of the Scottish public support the view that all of our*

nation's electricity should be generated from pollution-free renewables. The Scottish Government's forthcoming energy strategy provides the perfect opportunity to set out a bold vision of becoming the EU's first fully renewable electricity nation by 2030. Embracing such a vision would ensure that we secure the maximum economic and social benefits that would come from a transition toward a zero-carbon society."

1.1 Graphite Core Cracking

Radio Four's *Costing the Earth* (4) has been investigating whether it is safe to keep reactors running long past their expected lifespan of about 30 years. Five of Britain's seven AGRs are already older (Torness and Heysham 2 are only 27 years old). Hinkley Point B and Hunterston B are already 40 years old but EDF energy wants them to continue operating for at least another 7 years.

In 2005 the Nuclear Installations Inspectorate (now the Office for Nuclear Regulation -ONR) expressed concern about the structure of the reactor core. 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.

Nuclear Engineering consultant John Large explains that graphite is not elastic, it doesn't bend, and it is not particularly strong. And now the graphite bricks are cracking. The core is an assembly of several thousand bricks, loosely stacked together and the expectation was that the core would never fail, so there was no facility to replace any individual blocks if they did become damaged. But now there are physical changes occurring in the core, in the individual bricks – cracking and fracturing – that must result in some loss of strength – not only of the individual bricks, but of the core as a whole.

The BBC used a Freedom of Information request to obtain a number of documents. One paper from ONR reveals that one third of the channels inspected at Hinkley B and Hunterston B contain what they describe as significant cracks. EDF says the cracks were anticipated at this stage in the reactors' life and it is safe to operate for years to come. It says evidence suggests that its predictions about cracking are accurate.

Brian Cowell, director of nuclear operations, says: *"in fact we are looking to extend life further (than 2023) if we can."* The analysis suggests that we can have more than 1,000 axial cracked bricks and still operate with massive margins of safety. 1,000 cracked bricks would exceed the current safety limit set by ONR, but the regulator is considering changing that limit.

Mark Foy – Deputy Chief Nuclear Inspector says the percentage of cracked bricks ONR is currently happy to accept is 10%, but they are considering increasing that to 20%. Foy says that the original safety case provided by EDF was on the basis of 10% cracking. As experience is gained and analysis and research is undertaken it allows EDF and ONR to gain a more informed and accurate view of what is acceptable and what isn't.

EDF has now provided ONR with a safety case for allowing 20% cracking. This is based on the analysis EDF has undertaken; samples they've taken and the inspections they've undertaken. The focus has

been to look at the likelihood of core disruption after an earthquake which could prevent the control rods being inserted. ONR is considering the new safety case.

1.2 Keyway Route Cracking

The ONR is also investigating a very specific and more concerning form of cracking. The keyway is a slot that holds each brick to the adjacent brick, the bricks underneath and the bricks on top. These keyways, which are acknowledged to be the limiting factor in the life of these reactors, are beginning to fracture. John Large points out that this will make the graphite blocks a very loose set of bricks.

Prof Paul Bowen of Birmingham University sits on the graphite technical advisory committee for ONR. He says the keyway cracks could potentially prevent the entry of the control rods. If the core distorts too much, it's easy to see how trying to feed anything in could become very difficult.

Seven of the keyways have been discovered to have cracks at Hunterston B. John Large believes the presence of keyway cracks casts doubt on the safety of the reactor in the event of an emergency like an earthquake. We have a cracked and deteriorating core that's lost its residual strength and we don't know by how much. Some of the design case accidents will test the core – one of these would be a seismic shake where the whole core is wobbled. If the core becomes misaligned, and the fuel modules get stuck in the core, the fuel temperature will get raised and could undergo a melt. If the radioactivity gets into the gas stream and the reactor is venting because it's over pressurised then you have a release to the atmosphere and you have dispersion and a contamination problem.

ONR agrees keyway cracks could compromise safety. One of the documents the BBC obtained said the discovery of keyway route cracks at Hunterston invalidates the previous safety case. EDF had to consider what information to present to ONR to satisfy them that the reactor was still safe to operate. EDF brought in articulated control rods and nitrogen injection systems to address the extra risks posed by the keyway route cracking. The new rods are bendy making them easier to insert into a distorted core and an injection of nitrogen could buy several hours of invaluable time in the event of an accident.

However, concern remains because we can't be certain how many keyway route cracks there are. John Large explains that to examine where the cracks are you have to take the fuel out of the reactor and put a camera down to inspect the inside of the bore, but these keyway cracks are on the outside of the bricks so you can't actually see them.

It's very hard to inspect the channels in which the fuel sits. Around 10% are inspected each time the reactor is shutdown. So there may be keyway route cracks that have never been seen at Hunterston and Hinkley. In the absence of a full visual inspection a mathematical model is used to work out the likelihood of cracks in particular parts of the reactor. The trouble is the model has already been shown to be flawed.

Paul Bowen says they haven't been able to get the exact timing of the cracks right. The industry argued that cracks would appear first in layers 4 and 5, but they actually appeared in level 6. John Large says the model relied upon by ONR is not working, so they can't predict the strength of the core. More to the point they can't work out where to put their investigative probes to see where cracking is taking place. So they're in the dark.

If the ONR gives the go-ahead for an increase in the number of cracked bricks from 10 to 20%, it might be difficult for people living near these reactors to understand why the definition of “safe” seems to be changing.

1.3 Ayrshire’s Future

Ross Greer, Scottish Green MSP for West of Scotland, said that safety concerns about the Hunterston nuclear plant show the need for Ayrshire to plan an economic shift away from such a risky, high-cost industry. *“We must start planning now for an economy for Ayrshire that does not feature this risky, high-cost industry. There are alternative sectors we could be building up, whether in renewable energy, food and drink, manufacturing or in energy efficient housing.”* (5)

1.4 Torness

Meanwhile Scientists at the University of Bristol are developing an ‘early warning tool’ to predict the sudden, en masse appearance of jellyfish swarms which can cause serious problems by clogging the water intakes of coastal power plants.

Torness was offline for a week in June 2011 following a precautionary shutdown of both reactors after a blockage of cooling filters caused by a swarm of moon jellyfish. The project aims to develop a robust tool for the rapid evaluation of the likelihood and scale of jellyfish ingress at Torness based on simulated patterns of historic bloom dispersal within the North Sea from the last 20 years. The tool will also identify locations in the North Sea where ongoing monitoring is essential for an early warning. (6)

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1. Holyrood Magazine 17th Oct 2016 <http://www.holyrood.com/articles/news/lifetime-scotlands-nuclear-plants-could-be-extended-says-edf>
 2. Times 19th Oct 2016 <http://www.thetimes.co.uk/edition/scotland/nuclear-closures-could-be-delayed-to-keep-lights-on-mrd9xqj9j>
 3. Common Space 18th Oct 2016 <https://www.commonspace.scot/articles/9670/charities-reject-case-nuclear-extensions-edf-begins-lobbying-snp>
 4. Costing the Earth. Radio 4 BBC 2nd Nov 2016 <http://www.bbc.co.uk/programmes/b080t880>
 5. Scottish Greens 31st Oct 2016 <https://greens.scot/news/we-must-plan-an-economy-for-ayrshire-that-does-not-feature-nuclear>
 6. Bristol University 11th Oct 2016 <http://www.bristol.ac.uk/news/2016/october/jellyfish-invasions.html>

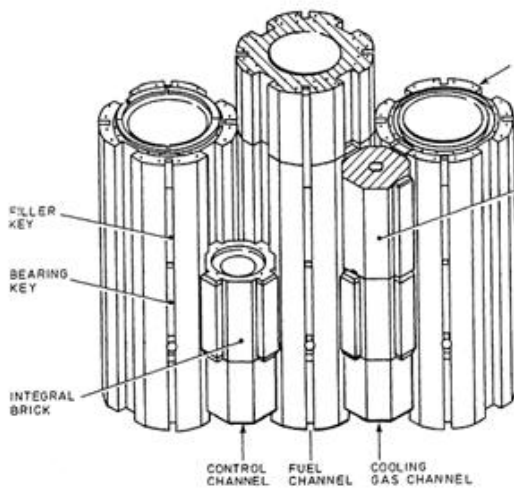


Figure 11: Diagram of the graphite keying structure



2 Consultation on amending Scottish Environmental Impact Assessment Regulations to Transpose Directive 2014/52/EU

Scottish Ministers have invited comment on proposals for implementing the European Directive 2014/52/EU amending the Environmental Impact Assessment (EIA) Directive. These amendments provide an ideal opportunity to close a loophole which means that under current legislation, there is no requirement for an Environmental Impact Assessment to be carried out before a Periodic Safety Review of a nuclear power station is approved, putting Scotland in breach of an international convention. It also means that the public has no say about extending the life of Scotland's nuclear power stations putting us in breach of another international treaty - the Aarhus Convention.

The consultation closed on 31st October 2016. The NFLA Response is available here:

http://www.nuclearpolicy.info/wp/wp-content/uploads/2016/10/A263_NB150_Scottish_EIA_Consultation.pdf

An international convention known as the Convention on Environmental Impact Assessment (EIA) in a Transboundary Context, or the Espoo Convention, took a decision in 2014 which means that all ageing nuclear power stations in Europe must now carry out an environmental impact assessment (EIA) before the approval of a periodic safety review.

The Implementation Committee of the Convention had earlier agreed that the extension of the lifetime of the nuclear power plant in the Ukraine, should be subjected to an EIA, even in the absence of any works. (1) Then, in June 2014, a Meeting of the Parties to the Conventions endorsed that decision. An EIA would have to compare the potential impact of extending the life of an old reactor with supplying energy from alternative sources such as renewable energy. (2)

The Meeting of the Parties also agreed that because the Ukraine hadn't carried out an Environmental Impact Assessment it was in breach of the Convention. The Espoo Implementation Committee urged Ukraine to carry out an EIA that would permit public participation and prepare EIA documentation before the next periodic safety review. Public participation in the EIA process is required under article 6 of the Aarhus Convention.

2.1 Scotland and ESPOO

The Office for Nuclear Regulation (ONR) is currently looking at the Periodic Safety Review (PSR) for Hunterston B and is expected to make a decision in January 2017. (3) EDF Energy has also announced that it plans to extend the life of Torness nuclear power station by 7 years to 2030. (4)

If Scotland or the UK approves the Periodic Safety Assessments for Hunterston B or Torness without first carrying out an Environmental Impact Assessment they will be, like the Ukraine, in breach with the Convention.

The Scottish Government confirmed in June 2014 that, under current legislation, there is no requirement for an EIA to be carried out before a Periodic Safety Review is approved. (5) This means that, should ONR approve the Periodic Safety Review for Hunterston B in January 2017, Scotland will be in breach of the ESPOO Convention.

In response to a question at the Torness Local Liaison Committee meeting on 7th April 2016, about whether an Environmental Impact Assessment (EIA) had been carried out under the Espoo Convention before EDF Energy announced its intention to extend the life of Torness nuclear station from 2023 to 2030, the Company wrote to members of the Committee saying:

“The life extension decision did not require EDF Energy to request any material change to the authorisation or the limits within which the station operates. With regards to the Espoo Convention, it applies to projects that are likely to cause a significant adverse trans-boundary impact, so across national boundaries. Life extension at Torness is not covered by this requirement. There is no similar UK or Scottish legislation that requires an EIA for a nuclear plant life extension.” (6)

Yet the ESPOO Implementation Committee has said that:

“...the lifetime extension of NPPs could be considered as a major change to an activity ... and thus fell under the scope of the Convention.” And a lifetime extension is to be considered a major change *“even in the absence of any works”*. (7)

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1. Economic Commission for Europe, Meeting of the Parties to the Convention on Environmental Impact Assessment in a Transboundary Context Implementation Committee Thirtieth session Geneva, 25–27 February 2014
<http://www.unece.org/fileadmin/DAM/env/documents/2014/EIA/IC/ece.mp.eia.ic.2014.2.e.pdf>
 2. Economic Commission for Europe Meeting of the Parties to the Convention on Environmental Impact Assessment in a Transboundary Context Sixth session Meeting of the Parties to the Convention on Environmental Impact Assessment in a Transboundary Context serving as the Meeting of the Parties to the Protocol on Strategic Environmental Assessment Second session Geneva, 2–5 June 2014
http://www.unece.org/fileadmin/DAM/env/documents/2014/EIA/MOP/ece.mp.eia.20.e.Add.1-ece.mp.eia.sea.4.e.Add.1_advance_copy.pdf
 3. Hansard, Nuclear Power Stations: Safety: Written question – 200777, answered 23rd June 2014
<http://www.parliament.uk/business/publications/written-questions-answers-statements/written-question/Commons/2014-06-16/200777/>
 4. BBC 16th Feb 2016 <http://www.bbc.co.uk/news/business-35583740>
 5. Scottish Parliament 25th June 2014
<http://www.parliament.scot/parliamentarybusiness/28877.aspx?SearchType=Advance&ReferenceNumbers=S4W-21757&ResultsPerPage=10>
 6. Letter from Paul Winkle, Torness Station Director to LLC Committee Members dated 22nd April 2016.

7. Report of the Implementation Committee on its thirtieth session; Meeting of the Parties to the Convention on Environmental Impact Assessment in a Transboundary Context, Geneva, 25–27 February 2014
http://www.unece.org/fileadmin/DAM/env/documents/2014/EIA/IC/ece.mp.eia.ic.2014.2.as_resubmitted.pdf page 13 paras 4 and 5.

3 Decommissioning

Working with the regulators and the Nuclear Decommissioning Authority, the Department for Business, Energy & Industrial Strategy (BEIS) has identified what it calls “*an opportunity to improve current arrangements that apply to the regulation of the final stages of nuclear site decommissioning and clean-up ... to enable a more flexible approach to site clean-up that takes account of a range of possible site end states and opportunities to optimise waste management.*” (1)

BEIS has issued a discussion paper and wants responses by 29th December 2016.

The Guardian said the proposals would allow more contaminated soil and rubble to remain at the sites of Britain’s old nuclear power plants rather than going to a dedicated dump. Officials insisted that the sites would not be left in a hazardous state because international radiological standards would still be upheld. They argued the changes would mean former nuclear sites could be cleaned up more quickly, less waste would need to be moved around the country, and decommissioning would be cheaper than under today’s regime. (2)

The Office for Nuclear Regulation (ONR) currently oversees the licensing of 17 nuclear sites that are slated for decommissioning and cleanup. The final stage involves dealing with large amounts of rubble, concrete, brick and soil, some of which is radioactive and designated low level waste (LLW). That waste currently goes to the UK’s only LLW site, at Drigg in Cumbria, which is almost full. Industry, the regulator and the government want that last stage of the process to no longer be the ONR’s responsibility, and for the LLW to instead stay at the former nuclear sites. Former sites would no longer be considered “nuclear” at the end of their clean-up, and therefore no longer the responsibility of the ONR. Regulation would fall instead to the Health and Safety Executive and environment agencies.

“*What the government is suggesting is, they’re turning off the liability but they’re not turning off the risk or hazard,*” said John Large, a nuclear consultant who has advised the UK government on nuclear issues.

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1. Discussion Paper on Regulation of Nuclear Sites in the Final Stages of Decommissioning and Clean Up. BEIS Nov 2016
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/565233/Discussion_Paper_3_November_2016_.pdf
 2. *Guardian* 10th Nov 2016 <https://www.theguardian.com/environment/2016/nov/10/nuclear-waste-to-remain-at-old-uk-plants-rather-than-moved-off-site>



4 Scottish Energy Strategy

The Scottish Government is developing a new, over-arching Energy Strategy. It has already set ambitious renewable and emissions-reduction targets and improvements in energy efficiency. The energy ambitions outlined in the Electricity Generation Policy Statement (2013) and Heat Policy Statement (2015) remain unchanged.

However, because of shifts in UK Government policy, new powers being devolved to the Scottish Parliament, emerging trends in energy systems worldwide, and the Scottish Government's strengthened ambition to tackle climate change, which is being developed in a new Climate Change Plan (Scottish Government's third report on the policies and proposals that will enable Scotland to meet its emissions reduction targets), a new Energy Strategy, is thought to be required.

The Strategy will set out a long term vision for the energy system in Scotland, build on the Climate Change Plan, and demonstrate how to facilitate and capitalise upon the transition to a low carbon economy, reaping social, economic and environmental benefits.

Three themes have been developed which will form the basis of the strategy:

A stable, managed energy transition: ensuring Scotland has secure and affordable energy supplies in the future, as we decarbonise our energy system in line with this Parliament's Climate Change Act;

An integrated, 'whole systems' approach: consideration of Scotland's energy supply AND consumption as equal priorities, and building a genuinely integrated approach to power, transport and heat; and

A truly local vision of energy provision: promoting local energy solutions, planned with community involvement and offering community ownership of energy generation.

The strategy will include detailed proposals for de-carbonising the heating and transport sectors. Paul Wheelhouse, Scottish Energy Minister told MSPs in November that it will be launched in tandem with a public consultation on onshore oil and gas exploration as well as a draft new environment bill which will set out proposed new targets to further reduce greenhouse gas emissions. At the same time, new nuclear power stations – big or small – will be specifically excluded. (1)

The draft Energy Strategy was originally expected to be published before the end of 2016, but it has been slightly delayed to early 2017. It will be published for public consultation, alongside the draft Climate Change Plan. The results of the consultation will inform the production of the final Energy Strategy which will be published in the latter half of 2017. (2)

4.1 50% Renewable Energy by 2030

Environment groups and industry body Scottish Renewables have been calling for the inclusion of a 50% renewable energy target for 2030.

Now a new report (3) commissioned by WWF Scotland, Friends of the Earth Scotland and RSPB Scotland shows that such a goal is achievable. The report, based on independent analysis by Ricardo Energy and Environment, is called "*The Energy of Scotland: Heating, moving and powering our lives*



from now to 2030". The report paints a picture of a country in 2030 which exports vast amounts of electricity to the rest of the UK by producing 40 per cent more than it needs; where half of the buses and a third of cars are electric – improving air quality and public health – and where fuel poverty is “eradicated”. Two-fifths of Scotland’s homes should be heated from renewable sources, with a Warm Homes Act helping ensure access to cleaner, more affordable heat; a national energy efficiency programme should help reduce energy use in homes by 30%, with millions of homes across the country insulated.

Such a programme will create new jobs; warmer, healthier homes; and cleaner air helping reduce the burden on the NHS. Electricity supply would be “almost entirely renewable” creating 14,000 new jobs. Fossil fuel emissions from transport should fall by 40 per cent by 2030 with renewables providing 20 per cent of the energy consumed – up from just four per cent today. The report concludes that generating half of all the country’s energy from renewables by the end of the next decade is “the most cost-effective way” to achieve Scotland’s climate targets. (4)

At last count Scotland generated the equivalent of 57% of its electricity consumption from renewables and had reduced climate emissions by 39.5% since 1990. This is a tremendous achievement, but there are no grounds for complacency. This report sets out the scale of development that Scotland must embrace if it is to retain its place in the global vanguard of the energy transition, and in the process create a thriving, healthy, economically-active low-carbon society. (5)

4.2 Committee on Climate Change Report

Scotland is leading the UK in greenhouse gas emissions reductions, but much more needs to be done to ensure future targets are met, according to a new report for the Scottish Government published by the Committee on Climate Change. Since 1990, gross Scottish emissions have fallen nearly 40%, compared to nearly 33% at a UK level. There has been good progress in deploying renewable electricity generation capacity in Scotland, and excellent progress in installing community and locally-owned energy projects (meeting the target for 500 MW of capacity five years early). However, to meet Scotland’s ambitious targets beyond 2020, much more will be required, says the CCC’s report. Whilst emissions have fallen by an average of 3.3% per year since 2009, this has been mostly due to progress in the power sector with reduced coal and expanded renewable generation. Other sectors now need urgent attention, such as transport, heat and agriculture and land-use. (6)

4.3 Fuel Poverty

Campaigners have urged the Scottish Government to “redouble its efforts to end the scourge of fuel poverty”, after ministers conceded they will not meet the statutory target set for November. The Existing Homes Alliance, whose members include WWF Scotland, Scottish Federation of Housing Associations and Energy Action Scotland, has proposed a plan it say will improve the energy efficiency of cold and draughty homes. Measures include significantly increasing public investment in home energy efficiency, and for the forthcoming Programme for Government to set an objective for a national infrastructure programme that supports every home to reach at least an Energy Performance Certificate (EPC) band C by 2025. The group say the latter would largely eliminate energy inefficiency as a driver of fuel poverty, benefit 1.5million households, help reduce energy bills, cut the nation’s carbon emissions, reduce NHS costs of treating illnesses related to cold and

damp homes and create up to 9,000 new jobs spread across Scotland. Furthermore they are calling for ministers to publish a delayed consultation on the regulation of energy efficiency in the private sector, which they say would leverage private investment into tackling fuel poverty and help those in rented accommodation, where the energy efficiency of homes is lowest. (7)

More government investment in home energy efficiency programmes could help tackle climate change and create up to 9,000 jobs, economists have said. Researchers said increased spending could boost economic activity across Scotland and reduce fuel poverty. (8)

Scotland defines fuel poverty as households that must spend 10% or more of their total income to have regular and adequate heating. When this year's figures are finalised, they will confirm that well over 30% of households are still in this category. Levels also vary widely across regions and households – 70% of households in the Western Isles, for example. The situation has grown steadily worse since the target to eliminate fuel poverty by 2016 was set in 2002. Scotland is back in the same position as in 1996. Fuel poverty has got worse again because of the recession and rising energy prices, and because of the poor condition of Scottish housing stock. (9)

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1. Scottish Energy News 10th Nov 2016 <http://www.scottishenergynews.com/exclusive-new-scottish-energy-strategy-will-de-carbonise-heating-and-transport-sectors/>
 2. See <http://www.gov.scot/Topics/Business-Industry/Energy/energystrategy>
 3. The Energy of Scotland: Heating, Moving and Powering Our Lives from Now until 2030 https://assets.wwf.org.uk/downloads/ricardo_energy_report_web.pdf
 4. BBC 10th Oct 2016 <http://www.bbc.co.uk/news/uk-scotland-37601603> and Independent 10th Oct 2016 <http://www.independent.co.uk/environment/scotland-energy-renewables-half-by-2030-report-wind-solar-a7353831.html>
 5. WWF Scotland 10th October 2016 <http://assets.wwf.org.uk/custom/stories/energy-of-scotland/>
 6. Scottish Energy News 13th Sept 2016 <http://www.scottishenergynews.com/new-uk-climate-change-cmttee-report-confirms-scotland-has-hit-its-emissions-target-but-needs-more-action-on-heat-and-transport/>
 7. Holyrood 30th Aug 2016 <https://www.holyrood.com/articles/news/campaigners-call-scottish-government-action-missed-fuel-poverty-target>
 8. Third Force News 13th Sept 2016 <http://thirdforcenews.org.uk/tfn-news/energy-efficiency-could-be-shot-in-the-arm-for-economy>
 9. The Conversation 31st Oct 2016 <https://theconversation.com/scotlands-not-even-close-to-getting-on-top-of-fuel-poverty-heres-why-67917>

5 Brexit and Nuclear Waste Management

A paper was presented to a recent Scottish Councils Committee on Radioactive Substances (SCCORS) on the implications for radioactive waste management of Brexit.

The primary legislation governing the nuclear sector in the European Union is the Euratom Treaty. All EU Member States are automatically obliged to be part of the EURATOM treaty, which promotes the development of nuclear power throughout the EU. Although the Euratom Treaty is a standalone treaty, it is likely that triggering Article 50 for the UK to leave the European Union will automatically trigger the UK's exit from the Euratom Treaty. (1)

Under the Euratom Treaty the European Commission is able to deal with Nuclear Safety; Radioactive Waste & Decommissioning; Radiation Protection; Nuclear Fusion Research; Nuclear Safeguards; Nuclear Security and Nuclear Fuel Supply

The original purpose of the Euratom Treaty was to create a specialist market for nuclear power in Europe, develop nuclear energy and distribute it to member states. It provides a mechanism for providing loans to finance nuclear projects in the EU. Its purpose is unambiguous. It is a pro-nuclear treaty. And like the Non-Proliferation Treaty, the Euratom Treaty aims to prevent nuclear materials intended for civilian use being diverted for military purposes, but it has the contradictory aim of promoting the development of nuclear power amongst member states. Euratom also promotes standardised safety standards for workers and the public. So it promotes and regulates nuclear power – a dangerous contradiction.

Euratom is an undemocratic institution and the European Parliament is almost entirely excluded from decision-making. The European Commission continues to promote nuclear power is by regularly publishing an illustrative nuclear programme or (PINC), which it is required to do under the Treaty. This indicates, in particular, nuclear energy production targets and the investment required for their attainment. The latest draft Nuclear Illustrative Programme, PINC 2016, was unveiled in April 2016. It is the sixth presented under article 40 of the Euratom Treaty since 1958, and the first to be published since the Fukushima-Daiichi nuclear disaster in 2011.

No new reactors have come on line and no new construction has been started since PINC 2007, while there are 21 fewer reactors operating. Yet the Commission uses very ambitious and seemingly unrealistic targets which envisage maintaining most European nuclear capacity up to 2050, using a combination of new reactors and a huge programme of plant lifetime extensions. There are 129 nuclear power reactors in operation in the EU across 14 Member States. 10 of those states are planning to build new-build reactors Assuming 90% of the existing fleet is replaced between now and 2050 to maintain a nuclear capacity of between 95 and 105 GWe this would require an investment of EUR 350-450 billion.

No real lessons are drawn, for instance, from the financial disasters of EPR projects in Olkiluoto or Flamanville or the obstacles to the investment decision regarding Hinkley Point C. According to a report for the European Green MEPs by WISE Paris the Commission appears to underestimate by more than half the possible costs for decommissioning and waste disposal, and it underestimates the costs and challenges of a programme of reactor life extensions. In conclusion WISE says: *“The investment needs presented by PINC 2016 are a groundless mix of underestimated costs applied to overestimated projections.”* (2)

The European Council adopted a new Radioactive Waste and Spent Fuel Management Directive in 2011 intended to regulate the safe management of radioactive waste. (3) The Directive imposes strict obligations on member states – they are required to draw up national programmes for the

construction of modern disposal facilities, including a timetable, costs assessment and description of activities to be used in waste management. The UK's first report on this was to be presented to the Commission in August 2015 and must be updated regularly. (4) Initially concerns were expressed in response to a European Commission consultation which closed in May 2010 that the Directive would force all member states to use Deep Geological Disposal as the main means of managing Higher Activity Wastes - preventing Scotland from implementing its near surface, near site radioactive waste policy. The final Directive, however, doesn't seem to have pushed this point. (5)

5.1 Basic Safety Standards Directive

Article 2 of the Euratom Treaty provides for the establishment of uniform safety standards to protect the health of workers and of the general public. Article 30 of the Euratom Treaty defines "basic standards" for the protection of the health of workers and the general public against the dangers arising from ionising radiations. These Basic Safety Standards have recently been revised to take into account new recommendations from the International Commission on Radiological Protection (ICRP), new scientific evidence and operational experience. The Scottish Government is still working to implement the BSS Directive by the deadline of February 2018, and there may be consultations on how to do this. As a country outwith Euratom we would probably want to respond to recommendations from international bodies like ICRP in any case.

Similarly whilst the UK may no longer be obliged to submit information about planned discharges of radioactivity into the environment under Article 37 of the Euratom Treaty to enable the Commission to consider whether such a plan is liable to result in the radioactive contamination of the water, soil or airspace of another Member State, we are signatories to the Convention on Environmental Impact Assessment in a Transboundary Context. This means the UK will probably want to retain legislation requiring developers to undertake transboundary environmental impact assessment under its general environmental laws to secure compliance with its obligations under that Treaty

Euratom is designed to provide a common market in nuclear materials, to guarantee a supply of nuclear fuels, and to ensure that nuclear materials are not diverted from their intended purpose. According to Article 1 of the EURATOM Treaty, the task of EURATOM Safeguards is to make certain that nuclear materials are not diverted to purposes other than those for which they are intended.

Basically, by agreement, Euratom carries out a lot of the safeguards work which outside of the European Union would be done by the IAEA. Typical Euratom safeguards inspection frequencies range from three weeks in every four at sites like Sellafield, to monthly inspections at enrichment plants, less frequent inspections at power stations and inspections only once every several years at selected locations with smaller inventories of material. More than 100 UK facilities or other duty holders are currently subject to Euratom safeguards, with some 220 inspections (about 1000 person days of Euratom effort) during 2014. All of this will probably have to be replaced by the IAEA. (6)

5.2 Article 35 Visit

Under Article 35 of the Euratom Treaty nuclear operators are required to provide facilities for continuous monitoring of radioactivity in air, water and soil to ensure compliance with BSS. Euratom Inspectors carried out a verification visit to Torness on 24th October. So this was an audit of both the operator and the regulator – the Scottish Environment Protection Agency (SEPA).



1. Guardian 27th Sept 2016 <https://www.theguardian.com/environment/2016/sep/27/brexit-could-trigger-uk-departure-from-nuclear-energy-treaty>
2. PINC 2016: The Nuclear Illusory Programme, WISE Paris 2016, <http://www.greens-efa.eu/fileadmin/dam/Documents/Studies/160314-WISE-Paris-PINC2016-Analysis.pdf>
3. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:199:0048:0056:EN:PDF>
4. UK National Report on Compliance with European Council Directive 2011/70 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/457893/UK_National_Report_-_final.pdf
5. See for instance NFLA Radioactive Waste Management Briefing No.24, European Waste Consultation, 20th April 2010 http://www.nuclearpolicy.info/docs/radwaste/NFLA_RWB_24_European_consultation.pdf
6. <http://www.onr.org.uk/safeguards/euratom.htm>

6 Dounreay Notes

All of the radioactive liquid waste - called raffinate - which arose from reprocessing spent fuel from the Dounreay Fast Reactor has been immobilised by mixing it with cement powder inside 875 500-litre drums, which will be stored on-site. The team has now begun preparations to deal with raffinate in Dounreay's Prototype Fast Reactor. The NDA has described the completion of the DFR work as "a milestone". The drums of cemented waste will be stored at Dounreay until a decision is made in the future on how it should be disposed of. Raffinate at Dounreay is classified as Intermediate Level Waste so it is covered by the Scottish Government's policy on managing Higher Activity Wastes.

BBC 7th Sept 2016 <http://www.bbc.co.uk/news/uk-scotland-highlands-islands-37295206>

Amec Foster Wheeler has won a £7m contract to provide a new effluent treatment plant for the Dounreay nuclear site. The contract was awarded by Dounreay Site Restoration Limited (DSRL). The new plant is a key link in the chain to enable the retrieval, processing and packaging of waste from the Dounreay Shaft and Wet Silo. The overall objective is to make the waste safe for long-term storage and disposal. The scope of work includes concept and detailed design, manufacture of the modular process plant, offsite testing, delivery to the Dounreay site and onsite installation and commissioning. Liquid effluent from the new plant will be managed, processed and discharged by pipeline to the existing low level liquid effluent treatment plant.

Construction Index 26th Sept 2016 <http://www.theconstructionindex.co.uk/news/view/amec-foster-wheeler-wins-7m-dounreay-waste-treatment-contract>

A report from the Committee on Medical Aspects of Radiation in the Environment (Comare) has concluded that cancer cases around Sellafield and Dounreay were very unlikely to have been caused by radiation exposure. The committee said rural population mixing may have been a factor. Comare now wants more research to be carried out into the role that infection plays in the development of leukaemia and non-Hodgkin lymphoma. It has been suggested that an infectious agent could be introduced into rural communities by an influx of people, triggering a rise in cases of these rare cancers. (1)

A report in 1984 found an increased incidence of leukaemia in under 25s living in Seascale, a village near the Sellafield nuclear site in northwest England. A second report in 1988 found higher rates of leukaemia in children and young people living near the Dounreay nuclear site in Caithness. (2)

Dr Ian Fairlie says COMARE downplays radioactive releases from nuclear power plants as an explanation for the nearby raised levels of cancers. Instead it champions the Kinlen hypothesis. Since 1988, Professor Kinlen has been suggesting that increases in childhood cancers near nuclear facilities are due to an infective, perhaps viral, agent arising from the influx of new workers to rural areas. But most scientists throughout the world discredit this theory because of its myriad problems and inconsistencies. First, the idea leads to the expectation of a sharp rise in leukaemia incidence, followed by a decline as the situation settles down. However at Dounreay and Sellafield most of the leukemias arose several decades after the population influxes. In addition, increased leukemias and NHLs continued long after the influxes had stopped and indeed were STILL occurring as recently measured in the 2000s, and are probably still arising today, were the Government to release all the relevant and most recent data. Second, for the hypothesis to be true the leukaemias should occur in the indigenous population and not in the migrants. In fact, at Sellafield, the reverse is mainly the case. Third, the theory does not explain why leukemias have arisen near nuclear facilities without population influxes, eg Aldermaston and dozens of reactors in other countries. Fourth, and most tellingly, no infective agent or virus has ever been found despite intensive research over many decades.

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1. BBC 30th Sept 2016 <http://www.bbc.co.uk/news/health-37517770>
 2. BMJ 3rd Oct 2016 <http://www.bmj.com/content/355/bmj.i5337>
 3. Ian Fairlie 3rd Oct 2016 <http://www.ianfairlie.org/news/kinlen-theory-debunked/>

7 Nuclear Transports

On 17th September armed officers escorted a lorry carrying two heavily reinforced containers from Dounreay through Thurso to Wick Airport. This was the first plane load of Highly Enriched (bomb-grade) Uranium (HEU). A US military Boeing C-17 transport aircraft then took off from the Airport en route to South Carolina. (1)

700kg of highly enriched uranium from Dounreay will be transported by up to nine flights over the next 18 months in the largest ever movement of highly toxic fissile material out of the UK. (2) Roads around Wick Airport will be regularly shut over that period so HEU can be flown to the US after an agreement was made between David Cameron and Barack Obama to transport the HEU to South Carolina in exchange for other forms of uranium to be shipped to Europe to be used in producing medical isotopes. Politicians and activists have condemned the move, warning that flying the material is excessively dangerous. (3)

The NDA has remained silent on the issue, but an £18million upgrade of the airport was recently carried out to make it suitable for larger planes. Highland Council published a road closure order in September which revealed minor routes around the airport will be closed over the coming months. The closures could happen at any time and last up to five hours each time.

Dr Richard Dixon, director of Friends of the Earth Scotland, said: *“Nuclear waste should be dealt with as close to where it is produced as possible, rather than risking transporting it between continents.”* Caithness, Sutherland and Easter Ross SNP MP Paul Monaghan and Highlands and Islands Green MSP John Finnie have both condemned the plan.

Independent nuclear consultant John Large raised concerns about the transport of the material. He said if there was an accident it would involve an extremely vulnerable and potentially radiologically significant material. *“The radiological consequences of even a relatively small amount of this material would be very serious,”* he said. *“In terms of nuclear safety, the International Atomic Energy Agency recognises that the transportation of radioactive materials is the one at most risk and is most prone and vulnerable to terrorist attack. The risk in transport by aircraft is the fuel being engulfed in fire, the packages breaking down and the fuel igniting.”*

In the 1990s Dounreay was touting for reprocessing business from research reactors fuelled by HEU. The customers included reactors in Australia, Germany and Belgium. Under the UK-US deal signed earlier this year, the HEU extracted from the spent fuel during reprocessing which is now stored at Dounreay is being sent to the US. (4)

According to Paul Monaghan, SNP MP for Caithness, Sutherland & Easter Ross, the Wick John O’Groats airport runway is 1,600ft too short despite the recent upgrade. 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. (5) Tor Justad, chairman of Highlands Against Nuclear Transport, said: *“This latest revelation confirms that our campaign to retain all nuclear materials at Dounreay under constant monitoring is the current safest option. That would remove the risk involved in transporting weapons-grade uranium by air 4,000 miles which, along with the rail and sea movements, are disasters waiting to happen.”* (6)

Marine Radioactivity Research Consultant, Tim Deere-Jones, spoke at a public meeting in Ullapool organised by Highland Against Nuclear Transport on 28th October Transporting nuclear materials by sea from Scrabster to Barrow-in-Furness poses a risk of accident or terrorist attack which would threaten the natural environment of the west coast which is enjoyed by local people and tens of thousands of visitors every year boosting the local economy: (7)

A petition calling for the reinstatement of an emergency towing vessel (ETV) for the Western Isles has been handed to the UK government. Until 2012, Scotland had two ETVs available for towing ships that had grounded or broken down on Scotland’s north and west coasts. One ship continues to operate out of the Northern Isles. The Maritime and Coastguard Agency (MCA), which manages ETVs, has ruled out reintroducing a second tugboat. Councillors on the Western Isles were among the organisers of the 1,500-signature petition. The islands’ local authority, Comhairle nan Eilean Siar, has support from Orkney and Shetland island councils and local MPs and MSPs in its call for the reinstatement of a second ETV. They have said the grounding of the drilling rig Transocean Winner at Dalmore on Lewis in early August has highlighted the need for two tugs. (8)

The UK Government asked BP five years ago to pay for an emergency tug for the Western Isles, but BP refused because it had no operations in the area and did not use the Minch / Western Isles sea lanes. However BP warned that the Western Isles required a dedicated emergency towing vessel. (9)

The Nuclear Free Local Authorities (NFLA) and KIMO International (an international local authority organisation working to protect and enhance the marine environment) expressed amazement that the UK Government attempted to encourage the oil company BP to pay for a second Emergency Towing Vessel (ETV) in Scotland, rather than pay for its maintenance itself – a service it has duly cut. (10)

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1. Daily Record 17th Sept 2016 <http://www.dailyrecord.co.uk/news/scottish-news/gun-cop-8859315>
 2. Times 1st Oct 2016 <http://www.thetimes.co.uk/edition/news/scottish-airport-not-safe-for-us-uranium-jets-bwd57s3nk>
 3. Press & Journal 2nd Sept 2016 <https://www.pressandjournal.co.uk/fp/news/highlands/1014760/fury-over-nuclear-flights/>
 4. BBC 19th Sept 2016 <http://www.bbc.co.uk/news/uk-scotland-highlands-islands-37406068>
 5. Times 1st Oct 2016 <http://www.thetimes.co.uk/edition/news/scottish-airport-not-safe-for-us-uranium-jets-bwd57s3nk> and Sunday Post 2nd Oct 2016 <https://www.sundaypost.com/news/risky-scots-airport-short-giant-waste-transport-planes-despite-8-million-upgrade/>
 6. Press and Journal 3rd Oct 2016 <https://www.pressandjournal.co.uk/fp/news/highlands/1044573/runway-fears-over-nuclear-cargo/>
 7. HANT 3rd Nov 2016 <http://hant.co.uk/news-item-21>
 8. BBC 6th Sept 2016 <http://www.bbc.co.uk/news/uk-scotland-highlands-islands-37284237>
 9. Scottish Energy News 24th Oct 2016 <http://www.scottishenergynews.com/uk-govt-asked-bp-to-provide-emergency-tug-for-western-isles/> and Scottish energy News 26th Oct 2016 <http://www.scottishenergynews.com/grounding-of-n-sea-oil-rig-in-western-isles-sparks-call-to-halt-shipments-of-dounreay-nuclear-waste-through-the-minches/>
 10. NFLA 26th Oct 2016 <http://www.nuclearpolicy.info/news/nfla-kimo-astounded-uk-government-asked-bp-pay-second-scottish-emergency-towing-vessel/>

8 Local Energy

Local Authorities across the globe are showing an increasing interest in energy. In June 2016 the Global Covenant of Mayors for Climate & Energy, which represents more than 7,100 cities, and more than 600 million people, agreed to work together in an unprecedented alliance to tackle climate change. Michael Bloomberg, at the time the Mayor of New York City, writing in the Guardian, said: *“One of the best steps national governments can take to fight climate change is to empower their cities with the tools and autonomy they need to act.”* (1) The Global Covenant Mission Statement says the cities participating in this initiative commit to targets that will eventually be more ambitious than those their respective national governments presented last year at the Paris COP21 Climate Change Summit. (2)

Local Authorities in Scotland are no exception. A new report from NFLA details how 30 local Councils across the UK are delivering a decentralised local energy revolution. This includes news from Aberdeen, Edinburgh, Fife, Glasgow, Shetland and the Western Isles.

It is hoped that this will be updated fairly regularly, so if your local authority is launching a project please let the NFLA Secretariat know.

http://www.nuclearpolicy.info/wp/wp-content/uploads/2016/11/A265-_NB152_-Decentralised-energy-best-practice.pdf

Here are some Scottish projects which have been announced since the report was published:

- A £2.1m partnership between E.ON's energy efficiency business and Edinburgh City Council is set to reduce on-site energy costs by 24% at nine public buildings, as part of the city's overarching aim to reduce carbon emissions by more than 40% by 2020. The agreement means that E.ON's energy efficiency business Matrix will guarantee savings from the implementation of energy conservation measures such as LED lighting and Combined Heat and Power (CHP) systems at buildings including seven schools, the Usher Hall and UNESCO World Heritage Site the City Chambers. The upgrade programme is designed to save more than £330,000 in energy costs and reduce carbon emissions by more than 1,500 tonnes per year. (1)
- Currie High School pupils helped celebrate the completion of a project to install solar panels on 24 buildings, including schools, community and leisure centres, in partnership with the Edinburgh Community Solar Co-operative (ECSC), supported by Energy4All. The initiative, which is believed to be the largest community-owned urban renewable energy project in the UK, will benefit participating buildings with cheaper electricity, generating savings. On 7th October members of the solar co-op were joined by councillors, pupils and community representatives to toast the occasion over a solar panel-themed cake at Currie High School – the last building to be energised. (2)
- Plans are afoot to use the heat produced at a biomass plant built for the defunct Tullis Russell Papermakers to develop a district heating network in Glenrothes. The RWE Markinch Biomass CHP plant was commissioned in 2014 to replace Tullis Russell's previous coal and gas-fired plant with additional power being exported to the grid. Tullis Russell Papermakers went into administration in early 2015 and its electrical crepe paper division was later bought out by a group of employees to form Glenrothes Paper, which is still powered by the RWE biomass plant. Now Fife Council, RWE and the Scottish Government are working on a business case for using some of the additional heat generated at the plant to meet local residential and commercial needs. (3)

1. Edie 2nd Nov 2016 <http://www.edie.net/news/6/E-ON-teams-up-with-Edinburgh-City-Council-to-reduce-public-building-energy-costs/> Scottish Energy News 2nd Nov 2016
<http://www.scottishenergynews.com/edinburgh-coouncil-aims-to-cut-energy-costs-by-24-in-deal-with-big-six-provider/>

2. Edinburgh Solar Co-op 7th Oct 2016 <http://www.edinburghsolar.coop/news-items/edinburgh-solar-co-op-powers-up-at-currie-high/>
3. Herald 24th Aug 2016
http://www.heraldscotland.com/business/14700216.Tullis_Russell_biomass_plant_to_be_put_to_use_in_district_heating_project/

9 Energy Storage Notes

PLANS for a renewables storage scheme on the Isle of Lewis which could power 200,000 homes have been unveiled. Eishken Limited - which owns the Eishken estate in Lochs - wants to build a large pumped storage hydro (PSH) scheme capable of generating 300MW of electricity. The company estimates over 150 jobs will be created during the three to five-year construction period. The large pumped storage hydro (PSH) scheme will store electricity, principally generated by windfarms on Lewis. It will also double the use of the Western Isles Link, the cable being installed by the National Grid to export and import electricity generated from renewable energy sources on the islands.

Herald 23rd Aug 2016

http://www.heraldscotland.com/news/14700067.Electricity_storage_scheme_on_Lewis___39_would_provide_electricity_for_200_000_homes__39_/

A new report from industry body Scottish Renewables says there was a risk that “under-delivery” of pumped hydro (PSH) could result in a higher-cost, higher carbon energy system. The study produced by DNV GL and part-funded by the Scottish Government, SSE and ScottishPower lays out 20 benefits of pumped hydro, but warns the market and policy framework around it must change if the potential of the technology is to be realised. There are four operational pumped hydro schemes in Scotland at the current time and two with planning. The largest of those consented is SSE’s £800 million Coire Glas scheme. SSE development director Mike Seaton said: *“At a stroke, SSE’s consented 30GWh Coire Glas project would more than double the total amount of current pumped storage capacity in the UK. We’d like to see all parties working closely together to examine what steps can be taken to remove investment barriers which prevent new pumped storage projects being built.”*

Dundee Courier 5th Oct 2016 <https://www.thecourier.co.uk/fp/business/business-news/295010/call-for-level-playing-field-for-pumped-hydro-sector/>

The island of Gigha is to play an important role in pioneering work to find a way to store power generated by wind turbines, which could revolutionise the global green energy industry. The island is host to the first community-owned grid-connected wind farm in Scotland, the ‘Dancing Ladies’, which initially consisted of three turbines christened Faith, Hope and Charity. A fourth was added later, but its operation has had to be constrained. The turbines are an important income stream for the Isle of Gigha Heritage Trust which led the headline community buyout of the island completed in 2002. Now the turbines are to be connected to a “vanadium redox flow battery”, which is the size of a shipping container. It is a new piece of engineering which some hold could be a game-changer. Energy can already be stored using technologies ranging from pumped hydro schemes to large-scale lithium-ion batteries. But the UK government-funded trial on Gigha, will demonstrate that vanadium redox flow is now commercially viable.



Herald 15th Sept 2016

http://www.heraldsotland.com/news/14742762.Gigha_s_wind_power_to_be_stored_under_UK_government_funded_trial/

Rather than storing electricity in batteries Orkney has chosen to divert unused renewable energy into affordable heat. Heat Smart Orkney Ltd. - a subsidiary of Rousay Egilsay & Wyre Development Trust - will co-ordinate the community engagement of the Heat Smart Orkney project, whilst project delivery partners Community Energy Scotland will support the delivery of the project as well as engaging with technical and installation contractors. The Heat Smart Orkney project had been funded by the Scottish Government's Local Energy Challenge Fund.

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. The Heat Smart Orkney system will switch on secondary heating systems installed in local homes, charging storage heaters, or storing energy in wet radiator systems or thermal stores by heating the water. By doing this, the installations provide a new intelligent demand on the grid that utilises the linked turbine's generation prior to it reaching grid pinch-points at times when the turbine would otherwise be curtailed to protect the grid.

Scottish Energy News 7th Nov 2016 <http://www.scottishenergynews.com/heat-smart-orkney-launches-project-to-divert-unused-renewable-energy-into-affordable-heat/>

Castle Rock Edinvar Housing Association been involved in an exciting and innovative heat storage project called EAST-HEAT (Edinburgh and Surrounding Towns Heat Energy Action through Thermal-storage). The project has received over £3 million funding from the Scottish Government, through the Local Energy Challenge Fund and more than £4 million of investment in solar panels from Edison Energy. The lead partner on the project is Sunamp, a small company based in East Lothian which designs and manufactures innovative heat storage 'batteries'. Other partners include East Lothian Housing Association and Edison Energy, a solar company. The project has developed and tested the heat storage batteries in a variety of different situations, with the aim of increasing residents' comfort and tackling fuel poverty. EAST-HEAT has involved various Castle Rock Edinvar properties, including sheltered housing developments at Balfour Court in Edinburgh and Salisbury View in Mayfield, and over 600 individual house and flats across central Scotland.

Basically the system allows surplus electricity of solar panels to be converted to heat rather than exported to the grid and then stored in a heat battery which can be used to heat hot water for the central heating system.

Castle Rock Edinvar Housing Association (accessed) 6th Nov 2016

http://www.castlerockedinvar.co.uk/about_us/green_organisation/casestudy_east-heat.aspx



10 Weapons Convoys

The nuclear bomb convoys that shuttle across the country have reported 43 safety incidents in the last three years, according to Ministry of Defence (MoD) reports published by *The Ferret*. The hitherto unknown mishaps include three collisions and a series of breakdowns and equipment failures. They bring the total number of incidents that have plagued nuclear convoys to 180 since 2000. Brakes have failed, fuel has leaked and engines have overheated. The convoy has got lost and been delayed or diverted by bad weather, accidents and protests. On one occasion it had to cope with “dogs loose on the carriageway”. The SNP described the revelations as “chilling” and “shocking” and warned that communities were being put at risk. But the MoD insisted that the convoys were safe. (1)

A SERIOUS road accident involving the nuclear bomb convoy in Glasgow could contaminate a large swathe of the city and put hundreds of thousands of people at risk, according to a new analysis. Using US defence software, disarmament campaigners have mapped the impact of a major crash at the junction of the M8 and M74 near the city centre. Radioactive plutonium and uranium could leak from nuclear warheads and be blown up to 17 kilometres across East Dunbartonshire, they say. The analysis assumes that a conventional explosion caused by the crash breaches warhead containment, as emergency exercises conducted by the Ministry of Defence (MoD) have envisaged. But the MoD insists that a radiation leak is not a “reasonably foreseeable accident scenario”.

Stirling Council has said that nuclear convoys are not welcome in a motion passed by a council meeting. Such convoys frequently pass through the city and neighbouring towns, transporting nuclear warheads to and from Faslane Naval Base on the Clyde. All parties voted unanimously for the motion that called for Stirling to be a “nuclear free zone” except for the Conservative group. (3)

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1. The Ferret 21st Sept 2016 <https://theferret.scot/nuclear-convoy-safety-incidents/>
 2. Sunday Herald 25th Sept 2016
http://www.heraldscotland.com/news/14763222.Video__Nuclear_bomb_convoy_crash_a_fallout_threat_to_Glasgow/
 3. Stirling News 11th Oct 2016
http://www.stirlingnews.co.uk/news/14794842.Stirling_councillors_pass_motion_against_nuclear_weapons_convoys/

11 Submarine Dismantling

The seven decommissioned nuclear-powered submarines moored at Rosyth will probably commence ‘Initial Dismantling’ before the end of this year. Subject to regulatory permission Low Level Waste (LLW) will be removed from a demonstrator submarine (Swiftsure). Generally LLW will leave the site as soon as it has been segregated and prepared for safe transport by road.

Stephen Lovegrove, permanent secretary at the MoD, told the Commons defence committee final dismantling of the first submarine was still not scheduled to begin for at least five years. Intermediate Level waste would be sent to a storage facility at Capenhurst in Cheshire until the deep geological disposal facility is ready.

HMS Dreadnought, the Navy's first nuclear-powered submarine, has been waiting to be dismantled since it retired 36 years ago.

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1. Telegraph 18th Oct 2016 <http://www.telegraph.co.uk/news/2016/10/18/navys-old-nuclear-submarines-will-not-be-finally-disposed-of-unt/>