

No.101 November 2017

1. **UK Clean Growth Strategy**
2. **Don't Nuke the Climate**
3. **The Helm Review**
4. **Sizewell C**
5. **Dodgy Decommissioning Deals**
6. **SMRs**
7. **Nuclear Safeguards and Brexit**



# 1. UK Clean Growth Strategy

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

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

Writing on the Business Green website, James Murray says the Strategy is ambitious, important, and exciting with the potential to revolutionise the British economy over the next decade. It is badly under-powered in crucial places and guilty of marrying a sense of urgency with a contradictory willingness to defer tough decisions. The government's green wing has presented a narrative that can help win their colleagues over, highlighted the areas where urgent progress is still needed, and effectively invited green businesses and campaigners to pile in and help them make the case for a new wave of climate action. (5)

Business Secretary, Greg Clark, says in his introduction:

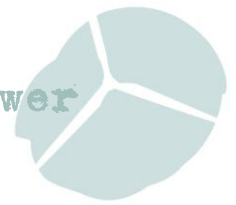
*“If we get it right, we will not just deliver reduced emissions, but also cleaner air, lower energy bills for households and businesses, an enhanced natural environment, good jobs and industrial opportunity. It is an opportunity we will seize.”*

The Prime Minister, Theresa May, says *“clean growth is not an option, but a duty we owe to the next generation”*, and she stresses that *“protecting the environment for the next generation also benefits our wider economic prosperity”*.

This is a marked and important change from the last government when cost concerns were dominant and fracking was talked up, and David Cameron talked of 'green crap' pushing up electricity bills. In contrast as the cost of clean energy has plummeted, May has been unequivocal with her backing for deep decarbonisation and has fully endorsed the idea this is the best growth path available for the UK.

## High Growth Low Carbon Economy

Under the heading a 'High Growth Low Carbon Economy' the strategy argues falling clean tech costs have left economic arguments against climate action with nowhere to go. *“Progress has altered the way that we see many of the trade-offs between investing in low carbon technologies that help secure our future but that might incur costs today,”* it states. *“Actions to cut our*



*emissions can be a win-win: cutting consumer bills, driving economic growth, creating high value jobs and helping to improve our quality of life." (6)*

Actions taken to tackle emissions have helped to reduce average energy bills for households as efficiency savings have more than offset the cost of financial support provided for developing low carbon technologies. The cost of policies delivering cleaner energy, support for vulnerable households and investing in upgrading our buildings accounts for around 12% of an average gas and electricity bill. However, these costs are on average more than offset by savings from improvements to the energy efficiency of people's homes, delivering a saving of £14 on average in 2016.

On the other hand, Green Party MP Caroline Lucas said the Government has blown the opportunity to put the UK on track to meet its climate targets. She criticised the failure to reinvigorate onshore wind, a lack of commitments on solar and tidal power, and the funding of R&D for nuclear power. (6)

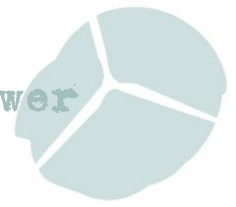
Despite several rumours that onshore wind was about to make a comeback it seems that even the conviction that the green economy is the UK's future is not enough to face down the rural Tory-voting minority who continue to oppose wind turbines. (Although the climate change minister Clair Perry was again reported in *Utility Week* on 3<sup>rd</sup> November to be keen to enable onshore wind projects to compete for subsidies in areas where they enjoy public support.) Solar power also failed hardly gets a mention. *The Guardian* commented:

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

On nuclear power the Strategy says the Government will "*deliver new nuclear power through Hinkley Point C and progress discussions with developers to secure a competitive price for future projects in the pipeline.*" And, of the £900m to be invested in innovation, more than half - £460m – are to be invested in areas including future nuclear fuels, new nuclear manufacturing techniques, advanced reactor design, and, just when we thought technological disastrous reprocessing was about to end in the UK - recycling and reprocessing. As part of the BEIS Energy Innovation Programme up to £7 million was announced for development of the capability of nuclear regulators who support and assess advanced nuclear technologies.

In a section headlined 'Clean Growth Innovation Challenges' the Strategy says: "*We need to bring down the costs of nuclear power through developing new materials and manufacturing processes, and exploring the opportunities of new fuels and reactor designs.*"

The Government has asked the Nuclear Innovation and Research Office (NIRO) to convene a new advisory Board, building on the success of the Nuclear Innovation and Research Advisory Board (NIRAB). The Board will provide independent expertise and advice to support and inform the Government's Nuclear Innovation Programme.



*Business Green* said there was no rational explanation for denying onshore wind and solar farms the chance to compete for clean power contracts that would all but match current wholesale prices. It is an open secret that plenty of sensible ministers would like to give the lowest cost form of clean energy a route to market and let the planning system do its job of blocking unacceptable landscape impacts. And yet, with the exception of the Scottish Islands, the strategy ducks the issue in an attempt to appease those Tory MPs who regard opposition to wind farms as a virility test.

In addition the strategy poses serious questions about the government's capacity to deliver deep decarbonisation alongside Brexit. The document contains so many reviews and consultations and promises to look again at certain issues that it amounts to an enormous body of work for the civil service.

Highlights include:

- There's the hugely welcome promise of a renewed focus on both domestic and industrial energy efficiency. The new strategy promises around £3.6bn to upgrade the energy efficiency of a million homes, with the Energy Company Obligation (ECO) extended to 2028 at its current level. Homes account for around 13% of the UK's emissions. But there is no mention of replacing the zero-carbon homes standard scrapped in 2015.
- The government proposes a new target for the business and industry sectors to improve their energy efficiency by "at least" 20% by 2030.
- The aspiration is for as many homes as possible to be improved to EPC Band C by 2035, where practical, cost-effective and affordable. But reducing demand for energy will not be enough. By 2050 home heating will need to be fully decarbonised. There are a number of low carbon heating technologies with the potential to support the scale of change needed, including heat pumps using hydrogen in our existing gas grid and district heat networks. At present it is not certain which approaches or combination will work best. So the strategy says the groundwork needs laying in this parliament, so decisions can be taken in the early 2020s on the long-term future of heat. Government has commissioned research into different heat demand scenarios, the use of hydrogen, what changes might be needed to the electricity grid in response to large scale uptake of heat pumps, the role that bioenergy might play in decarbonising heat and international activity. We plan to publish initial findings from a number of studies later this year, and a full report by summer 2018.
- Reaffirmation of the pledge to phase out unabated coal generation by 2025. The government hopes low-carbon sources of power (which in the Government's mind includes nuclear) will account for more than 80% of supplies by 2030, up from around 50% today.
- Beyond Hinkley Point C, the Government says further new reactors would have to be cheaper. It commits R&D funds to this cause. In partnership with the Research Councils and Innovate UK, the Government will oversee an investment of "around £460m" in the nuclear power sector, which will include "future nuclear fuels, new nuclear manufacturing techniques, recycling and reprocessing, and advanced reactor design."



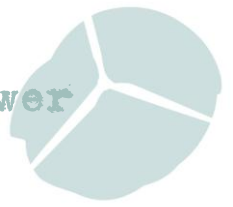
- Offshore wind will compete for up to £557m in low-carbon support, and onshore wind on Scottish islands will be also allowed to compete, subject to state aid approval from the European Commission. The next auction will be held in spring 2019.
- The strategy repeats a 10 gigawatt (GW) target for new offshore wind in the 2020s and says it will consider going even further “*if this is cost-effective and deliverable*”. The government will provide an update on its approach to small-scale renewables “*later this year*”.
- The strategy sets out plans to invest up to £100m in carbon capture usage and storage (CCUS) and industrial innovation.
- The transport sector accounts for 24% of UK emissions, with almost zero progress since 1990. The Strategy says almost every car and van will need to be zero emission by 2050, and by 2040 cycling and walking should be the natural choices for shorter journeys, or as part of a longer journey.
- On solar the Government wants to see more people investing in solar without government support and is currently considering options for the approach to small scale low carbon generation beyond 2019, and will provide an update later this year.

The Strategy presents three illustrative pathways. Firstly, an electricity pathway which replaces gas boilers with electric heating and we use around 80% more electricity than today, coming mainly from renewables and nuclear. Secondly a hydrogen pathway in which we adapt the gas grid so we can use hydrogen to heat our buildings, as well as to fuel many of the vehicles we drive in 2050. And a third pathway which uses biomass and carbon capture.

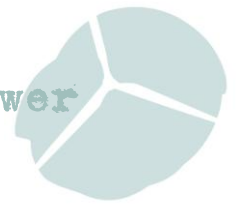
Despite its shortcomings, *Business Green* concluded that large parts of the strategy read as an almost complete endorsement of much of the latest environmental economic thinking. “*Much of it could have been written by Lord Stern or Mariana Mazzucato. None of this may be particularly new to those who have been making the case for clean growth for the best part of a decade, but to see it so forcefully embraced by the government sends hugely helpful signals to boardrooms and investors around the world.*”

The Government says it welcomes views on the Strategy. Comments and suggestions should be sent to [CleanGrowthStrategy@beis.gov.uk](mailto:CleanGrowthStrategy@beis.gov.uk) by the end of December 2017.

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1. Clean Growth Strategy, BEIS, 12<sup>th</sup> October 2017 <https://www.gov.uk/government/news/government-reaffirms-commitment-to-lead-the-world-in-cost-effective-clean-growth>
  2. Guardian 12th Oct 2017 <https://www.theguardian.com/environment/2017/oct/12/uk-puts-energy-efficiency-at-heart-of-climate-change-strategy>
  3. Guardian 12th October 2017 <https://www.theguardian.com/environment/2017/oct/12/uk-climate-change-masterplan-grownups-finally-won-clean-growth-strategy>
  4. Carbon Brief 12th October 2017 <https://www.carbonbrief.org/in-depth-how-the-clean-growth-strategy-hopes-to-deliver-uk-climate-goals>



5. **Business Green** 19<sup>th</sup> Oct 2017 <https://www.businessgreen.com/bg/blog-post/3019440/clean-growth-strategy-a-peaceful-revolution-but-victory-is-not-yet-assured>
6. **Business Green** 19<sup>th</sup> Oct 2017 <https://www.businessgreen.com/bg/blog-post/3019440/clean-growth-strategy-a-peaceful-revolution-but-victory-is-not-yet-assured>
7. **Energy Voice** 13th Oct 2017 <https://www.energyvoice.com/marketinfo/153157/clean-growth-plans-puts-uk-right-track-action-needed-government-warned/>



## 2. Don't Nuke the Climate

Nuclear power is, according to the nuclear industry, nearly carbon-free and indispensable for mitigating climate change as a result of anthropogenic emissions of greenhouse gases. In the official publications of the International Atomic Energy Agency (IAEA) and the nuclear industry no figures could be found regarding the present and/or envisioned future nuclear contribution to the reduction of the global emissions of greenhouse gases.

A new study by Jan Willem Storm van Leeuwen assesses the following questions:

- How large would the present nuclear mitigation share be, assumed that nuclear power does not emit carbon dioxide CO<sub>2</sub>?
- How large could the reduction become in the future, starting from nuclear generating capacity scenarios published by the IAEA, and also assumed that nuclear power does not emit CO<sub>2</sub>?
- How feasible are the projections of the nuclear industry?
- How large could the actual nuclear CO<sub>2</sub> emissions be, estimated on the basis of an independent life cycle analysis?
- Does nuclear power emit also other greenhouse gases?

### Present nuclear mitigation contribution

In 2014 nuclear power contributed 1.6% of global usable energy supply. If we assume nuclear power displaced fossil-fuelled electricity generation its contribution to emissions reduction would be about 4.7%, assuming nuclear power is free of Greenhouse Gases (GHGs) (which it is not).

### Nuclear mitigation contribution in the future

A hypothetical nuclear mitigation contribution in 2050, based on two IAEA scenarios (assuming nuclear power is free of GHGs) shows the following reductions in GHGs:

IAEA Low scenario - constant nuclear capacity, 376 GWe in 2050: 1.3 - 2.4% reduction

IAEA High scenario - constant nuclear mitigation share, 964 GWe in 2050: reduction 3.8 - 6.8%.

### Global construction pace

By 2060 nearly all currently operating nuclear power plants (NPPs) will have closed because they reach the end of their operational lifetime. The current construction rate for new capacity of 3-4 GWe per year is too low to maintain global nuclear capacity at the current level, so it is declining. To maintain current capacity the construction rate needs to be doubled. For the IAEA High Scenario it would need to increase to around 27 GWe/yr until 2050. In view of the massive cost overruns and construction delays that plague the nuclear industry such a high construction rate looks highly unlikely.



## Prospects of new advanced nuclear technology

The nuclear industry talks about advanced nuclear systems that would enable mankind to use nuclear power for hundreds to thousands of years. These concepts concern two main classes of closed-cycle reactor systems: uranium-based systems and thorium-based systems. However, the prospects seem questionable in view of the fact that, after more than 60 years of research and development in several countries (e.g. USA, UK, France, Germany, the former Soviet Union) with investments exceeding €100bn, still not one operating closed-cycle reactor system exists in the world. If nuclear power ends up relying exclusively on a once-through cycle, as seems likely, the size of the uranium resources will be a restricting factor.

## Nuclear generating capacity after 2050

In the highly unlikely event that the nuclear industry does manage to build 964 GWe of new nuclear capacity by the year 2050 these will be operating for 40-50 years. Will the industry expect to continue expanding?

## Uranium demand and resources

Assuming, for the sake of argument, that no new nuclear power stations are built after 2050 with nuclear power phased out by 2100, presently known world recoverable uranium resources would be adequate to sustain the IAEA Low scenario, but not High scenario. A common view amongst nuclear proponents is that more exploration will yield more known resources, and at higher prices more and more uranium would become economically recoverable. In this view uranium resources are virtually inexhaustible. However, the amount of energy consumed per kg of recovered natural uranium rises exponentially with declining ore grades. No net energy can be generated by the nuclear system as a whole from uranium resources at grades below 200-100 ppm (0.2-0.1 g U per kg rock); this relationship is called the energy cliff.

## Actual CO<sub>2</sub> emission of nuclear power

The nuclear process chain is a sequence of industrial activities which are required to generate nuclear electricity. CO<sub>2</sub> emissions will result from the burning of fossil fuels and chemical reactions throughout the nuclear chain, except the nuclear reactor itself. The sum of the CO<sub>2</sub> emissions of all processes in the chain are estimated at: 88-146 gCO<sub>2</sub>/kWh.

## CO<sub>2</sub> trap

The energy consumption and consequently the CO<sub>2</sub> emission of the recovery of uranium from the earth's crust strongly depend on the ore grade. As the average ore grade approaches 200 ppm, the specific CO<sub>2</sub> emission of the nuclear energy system will surpass that of fossil-fuelled electricity generation. This phenomenon is called the CO<sub>2</sub> trap. If no new major high-grade uranium resources are found in the future, nuclear power might lose its low carbon profile within the lifetime of new nuclear build.

## Emission of other greenhouse gases

No data are found in the open literature on the emission of greenhouse gases other than CO<sub>2</sub> by the nuclear system, likely such data never have been published. Assessment of the chemical processes required to produce enriched uranium and to fabricate fuel elements for the reactor





indicates that substantial emissions of fluorinated and chlorinated gases are unavoidable; some of these gases may be potent greenhouse gases, with global warming potentials thousands of times greater than CO<sub>2</sub>. It seems inconceivable that nuclear power does not emit other greenhouse gases. Absence of published data does not mean absence of emissions.

### **Krypton-85, another climate changing gas**

Nuclear power stations, spent fuel storage facilities and reprocessing plants discharge substantial amounts of a number of fission products, one of them is krypton-85, a radioactive noble gas. Krypton-85 is a beta emitter and is capable of ionizing the atmosphere, leading to the formation of ozone in the troposphere. Tropospheric ozone is a greenhouse gas, it damages plants, it causes smog and health problems. Due to the ionization of air krypton-85 affects the atmospheric electric properties, which gives rise to unforeseeable effects for weather and climate; the Earth's heat balance and precipitation patterns could be disturbed.

### **Questionable comparison of nuclear GHG emission figures with renewables**

Scientifically sound comparison of nuclear power with renewables is not possible as long as many physical and chemical processes of the nuclear process chain are inaccessible in the open literature, and their unavoidable GHG emissions cannot be assessed. When the nuclear industry is speaking about its GHG emissions, only CO<sub>2</sub> emissions are involved. Erroneously the nuclear industry uses the unit gCO<sub>2</sub>eq/kWh (gram CO<sub>2</sub>-equivalent per kilowatt-hour), this unit implies that other greenhouse gases also are included in the emission figures, instead the unit gCO<sub>2</sub>/kWh (gram CO<sub>2</sub> per kilowatt-hour) should be used. The published emission figures of renewables do include all emitted greenhouse gases. In this way the nuclear industry gives an unclear impression of things, comparing apples and oranges.

A second reason why the published emission figures of the nuclear industry are not scientifically comparable to those of renewables is the fact that the nuclear emission figures are based on incomplete analyses of the nuclear process chain. For instance the emissions of construction, operation, maintenance, refurbishment and dismantling, jointly responsible for 70% of nuclear CO<sub>2</sub> emissions, are not taken into account. Exactly these components of the process chain are the only contributions to the published GHG emissions of renewables. Solar power and wind power do not consume fuels or other materials for generation of electricity, as nuclear power does.

Climate Change and Nuclear Power: An analysis of nuclear greenhouse gas emissions by Jan Willem Storm van Leeuwen. <https://wiseinternational.org/will-nuclear-power-save-climate>

Also see Don't Nuke the Climate: <http://www.dont-nuke-the-climate.org/?lang=en>

The solutions to the climate crisis are clear: A rapid, just transition to a nuclear-free, carbon-free energy system. The only sure way to stop the global warming impacts of energy use is to transition as quickly as possible from antiquated energy models of the 20th Century and their polluting nuclear power and fossil fuel technologies ... to the safe, clean, affordable and sustainable renewable, efficient, and smart technologies of the 21st Century. Nuclear power in particular cannot solve the climate crisis. Indeed, its continued use exacerbates global warming by preventing the deployment of clean energy systems.



### 3. The Helm Review

The Government-commissioned review of energy costs, led by Oxford academic Professor Dieter Helm, has concluded that energy prices have been pushed up by years of government policymaking distorting the market and shackling consumers with hefty legacy costs. The review argues the costs of high-profile clean energy policies such as the Renewable Obligations Certificate, Feed-in Tariff and Contracts for Difference (CfD) schemes are largely responsible for rising energy prices. (1)

Helm accused the Government of getting its sums “*spectacularly*” wrong on the energy market and locking customers into excessive prices for years to come. Hinkley is one of the long-term agreements referred to - and though the report did not come to any specific conclusions on the project, it did warn about the impact of the uncertainty surrounding its completion. Helm talked of a “*cliff edge*” for electricity capacity leading up to 2025 amid uncertainty about when the much-delayed new nuclear reactor at Hinkley Point C comes online. He said prices had gone up for many households and businesses despite lower wholesale costs and greater efficiencies. The report said that Government models of energy costs in the first half of the current decade had at times been “*spectacularly bad*”, as they predicted surging fossil fuel prices. (2)

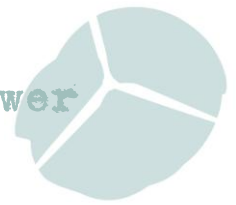
In the *Telegraph*, Diego Zuluaga from the free-market think-tank – the Institute of Economic Affairs - says Helm’s review “*corroborates*” that “*onerous regulation*” is the “*culprit*” when it comes to “*rising energy prices*”. He says “*we can have cheaper energy and a clean environment if we stop pursuing contradictory policies*”. (3) *The Times* leader says the record of government interventions has been poor, not least because there have been far too many: “*...government interventions in pursuit of climate change targets have not only been done in a way that imposes excessive costs on consumers — officially estimated at 20% of electricity bills or more than £100bn by 2030 — but could almost have been designed to lower public support for a green strategy ...The poor are made to pay to salve the consciences of the do-gooding rich.*” (4)

Helm’s paper suggests without excessive market intervention the cost of energy should fall as technologies improve and costs continue to come down. The solution, according to Helm, is to radically simplify the energy market to allow market forces to find the most efficient route to decarbonisation.

#### Unified Equivalent Firm Power

A new “*unified equivalent firm power (EFP) capacity auction*” should be put in place to replace Feed-in Tariffs (FiTs) and other low-carbon Contracts for Differences (CfDs). This would ensure “*the costs of intermittency rest with those who cause them*”. This system would encourage intermittent generators – such as wind farms or solar farms – to team up with stabilising technologies such as battery storage to secure a power supply contract, it claims. (5)

Emeritus Professor Dave Elliott says this could mean a race to the bottom in price terms, with no one looking to whole system balancing. Helm wants a technology neutral approach, but Elliott asks would ‘one size fit all’? The RO and CfD were subdivided. Would a single EFP auction suit all the various technologies? Would they yield enough balancing capacity of the right type? The current capacity market auction rounds arguably did not, and linking the backup/balancing



capacity to *individual* generation projects doesn't make much sense – it's a (shared) system level issue. And, finally, would enough low cost renewable capacity be backed- e.g. will on-shore wind be let back in? (6)

Sam Hall senior research fellow at “liberal conservative” think-tank Bright Blue warns the EFP auction would risk creating inefficiencies and added costs for consumers: *“Instead, the grid should continue to be balanced at the system level rather than for individual projects, in order to optimise the use of all existing generation and storage assets.”* For instance, as Bob Ward of the Grantham Research Institute points out, if the owners of offshore wind farms were forced to enter into arrangements to provide power to the network from alternative sources when wind speeds were too low to do so. *“This would be likely to create unnecessary additional costs.”* (7)

### Universal Carbon Price

Helm argues that the most efficient way to meet the Climate Change Act's 2050 target and its nearer term carbon budgets is to implement a new universal carbon price across the entire economy. Bob Ward, policy and communications director at the Grantham Research Institute at LSE, says Helm's idea would confront fossil fuels with their real costs and help to correct the distortions in the electricity market. But Dr Jonathan Marshall, energy analyst at the Energy and Climate Change Intelligence Unit (ECIU), argues that while Helm is right that a more uniform and systematic carbon tax would be a good idea, introducing one has proven politically difficult in a number of countries. Sam Hall at Bright Blue argues an economy-wide carbon price is a volatile and uncertain price signal for investors, subject to short-term political and economic forces, that would struggle on its own to drive the required investment in the low carbon economy. (8)

Adding a price of carbon to customers using gas central heating is one of the most widely quoted examples for improving the efficiency with which the energy sector could reduce its emissions. This is because gas used for heating currently faces no carbon price, whereas electricity does. The Committee on Climate Change (CCC), and many others, have said this might lead to more efficient decarbonisation (as the Helm review would like), but it has proved politically unpalatable. (9)

### Legacy Bank

Helm says the legacy cost of clean energy policies should be ring-fenced into a 'legacy bank' and charged *“separately and explicitly”* on consumer bills, with industrial customers exempt from the charges. (10)

Helm puts the total legacy cost at well over £100bn by 2030, incurred mainly due to what he sees as an over-emphasis on high cost renewables, in part due to the impact of the EU Renewables Directive. We are already committed to paying this, but he says *“once taken out of the market, the underlying prices should then be falling”*. To oversee all this, the government *‘should establish an independent national system operator (NSO) and regional system operators (RSOs) in the public sector, with relevant duties to supply, and take on some of the obligations in the relevant licences from the regulated transmission and distribution companies’*, with the role of Ofgem in network regulation *‘significantly diminished.’*



It's a radical set of proposals, urgent he says *"not just because of the many failures of the current market, but also because of the pressing need to meet the new and exciting challenges ahead which will come with the digitalisation of the economy, electric transport, new storage, demand-side opportunities, and the development of decentralised energy systems. This new world stands on their head the current assumptions on which the industry is structured: the new world is likely to be more zero marginal cost and capacity-driven, rather than a marginal cost-driven wholesale energy market world"* He claims that we may move to *"a purely zero marginal cost world"* in which *"there is only capacity. The energy itself is free"* and he says *"it is hard to underestimate the scale of the revolution this entails"*.

A government press release announcing the publication of the review was non-committal over the extent to which it would take his advice on board. It has already committed up to £557m for a CfD auction for *"less established renewable technologies"* - a category that includes offshore wind, wave, tidal and biomass, but in reality is likely to be dominated by offshore wind and biomass projects with the next one to be held in Spring 2019. This time, however, onshore wind on the Scottish Islands will be allowed to bid. (11)

James Court, head of policy and external affairs at the Renewable Energy Association, said the review contained ideas the *"renewables industry can get behind, especially that we need to decarbonise in the lowest cost way, and that uncertainty and continual government interventions can add to overall costs. The energy market is changing rapidly, and the future energy market can be lower cost, lower carbon and centred around the consumer,"* he added. *"This report hints at the evolution of the industry, but perhaps doesn't fully recognise the fundamental shift that is happening from centralised and inflexible generation to a smarter, more connected and decentralised energy system, and the policy framework needed to make that happen."* (12)

Dustin Benton, policy director at think-tank Green Alliance, said the 67 recommendations laid out by Helm stood to be *"so broad"* that the concern was government would merely *"cherry pick the bits it prefers"*. Benton added the *"Green Alliance is calling on the government to adopt Professor Helm's call for significant new regulation for energy efficiency and to separate 'legacy' nuclear and renewables costs from decisions on future bills"*.

## Helm on Solar

Helm was markedly upbeat about the potential for next-generation solar technologies to play a pivotal role in future decarbonisation. He speaks of *"radical breakthroughs"* in new materials that have changed the face of generation and suggested that next-generation solar presented *"exciting new opportunities"*, the speed and success of development of which could be *"core to industrial strategy"*.

However the Solar Trade Association has dismissed Helm's mentions of next-generation solar and R&D, suggesting that they are an *"unfortunate distraction"* from key suggestions within the review. The STA said more details will need to be revealed regarding the EFP auctions - particularly in relation to the costs associated with technology intermittency - before they can be considered. *"We need to look into his auction proposals in more detail, but it is obviously cheaper and more efficient for renewables variability to be handled at a systems level rather than on a plant by plant basis. Furthermore the cost of variability depends very much on the surrounding system, which is in flux. We are also not clear how auctions would enable a world*



where consumers, including households and businesses, can play their own part in the energy market through on-site generation, storage and demand-side response," the association's head of policy Chris Hewett said. (13)

Matthew Bell – former Chief Executive of the Climate Change Committee says the focus on objectives is one of the outstanding successes of the Helm review. Throughout, Helm is clear about the need to meet the objectives enshrined in the Climate Change Act and to ensure a secure supply of energy. Whatever else you hear in the debate about the review, there is no doubt that Helm is committed to both. The review then centres on a diagnosis of how we have got to where we are and on how we could do things better – and at lower cost – in the future. (14)

### Helm on Hinkley

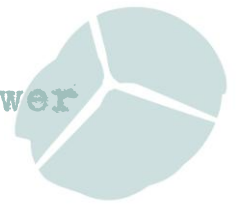
Helm says it is outside his remit to reach any conclusions on Hinkley Point C. But the nuclear plant will be always run so it will reduce the market available to newer technologies until mid-century or possibly longer. *"This could act as a brake on technical change"*.

Helm says it is critical for the system operator to know to what extent, and by when the government's nuclear ambitions are delivered – both the amount of new capacity that will be built, and the uncertainty about precisely when it will come on stream. The difference to the system of up to 13GW (sic) of new nuclear capacity versus none, or just Hinkley, is an enormous uncertainty for the system operator to handle. Nuclear is a very political technological choice. Helm recommends that the government should as a matter of urgency give guidance to the system operator as to what measures it should take to mitigate this large-scale system risk, and the extent to which extra capacity should be auctioned 'just in case' new nuclear is either late or not delivered. Failure to do so could result in sharp spikes in the wholesale market.

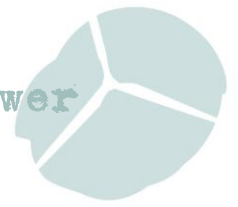
He continues: *"A final complication is the possibility that, in the event of one or more global nuclear accidents, the safety standards might be further tightened, and in the process existing stations are retired earlier (perhaps instantaneously) or new ones are delayed for regulatory safety reasons."*

Dr Matthew Lockwood is Senior Research Fellow, Energy Policy Group at the University of Exeter and a member of the IGov Team, says some of Helm's preferred policies will tend to reinforce the power of the large energy corporations who can afford to throw large sums of money at political lobbying. For example, he likes auctions, and while well-designed auctions might help drive down costs, they also tend to work best for large players, and can lead to the kind of concentration we are now seeing in offshore wind, for example. More widely, Helm likes to let markets rip, but the reality is that in markets with barriers to entry and economies of scale, big players get established and become powerful lobbyists. (15)

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1. BEIS 25<sup>th</sup> October 2017 <https://www.gov.uk/government/news/independent-review-on-cost-of-energy-published>
  2. Sky News 25th Oct 2017 <http://news.sky.com/story/government-made-spectacularly-bad-call-on-energy-prices-report-11098293>



3. Telegraph 27th Oct 2017 <http://www.telegraph.co.uk/business/2017/10/27/can-have-cheaper-energy-clean-environment-stop-pursuing-contradictory/>
4. Times 29th Oct 2017 <https://www.thetimes.co.uk/edition/comment/the-do-gooding-rich-make-us-pay-for-their-green-follies-v0tf52h6h>
5. Carbon Brief 27th Oct 2017 <https://www.carbonbrief.org/reaction-dieter-helms-least-cost-ideas-for-meeting-the-uk-climate-targets>
6. Environment Research Web 28th Oct 2017 <http://blog.environmentalresearchweb.org/2017/10/28/the-helm-energy-cost-review/>
7. Carbon Brief 27th Oct 2017 <https://www.carbonbrief.org/reaction-dieter-helms-least-cost-ideas-for-meeting-the-uk-climate-targets>
8. Carbon Brief 27th Oct 2017 <https://www.carbonbrief.org/reaction-dieter-helms-least-cost-ideas-for-meeting-the-uk-climate-targets>
9. Carbon Brief 27th Oct 2017 <https://www.carbonbrief.org/guest-post-dieter-helms-review-not-radical-as-might-first-appear>
10. Business Green 25th October 2017 <https://www.businessgreen.com/bg/news/3019837/dieter-helms-cost-of-energy-review-calls-for-government-to-radically-simplify-energy-system>
11. Business Green 11th October 2017 <https://www.businessgreen.com/bg/news/3018987/government-delivers-gbp557m-green-energy-boost-ahead-of-clean-growth-strategy-launch> and BEIS Press Release 11th Oct 2017 <https://www.gov.uk/government/news/boost-for-island-wind-projects-as-uk-government-announces-new-funding-for-renewable-generation>
12. Business Green 25th October 2017 <https://www.businessgreen.com/bg/news/3019837/dieter-helms-cost-of-energy-review-calls-for-government-to-radically-simplify-energy-system>
13. Solar Power Portal 25th Oct 2017 [https://www.solarpowerportal.co.uk/news/helm\\_review\\_pitches\\_unified\\_firm\\_power\\_auctions\\_lauds\\_potential\\_of\\_next\\_gen](https://www.solarpowerportal.co.uk/news/helm_review_pitches_unified_firm_power_auctions_lauds_potential_of_next_gen)
14. Carbon Brief 27th Oct 2017 <https://www.carbonbrief.org/guest-post-dieter-helms-review-not-radical-as-might-first-appear>
15. See <http://electricityinfo.org/comment/on-professor-helms-political-economy/>



## 4. Sizewell C

EDF aims to produce the first power from Sizewell C by 2031, according to the company's departing UK chief executive Vincent de Rivaz. This is a decade later than originally planned in 2008. In recent years the company has refused to disclose a target date for Sizewell, having been scarred by the experience of repeatedly having to delay its target for Hinkley Point. However, in a leaving speech, Mr de Rivaz, set out his "*thoughts, hopes and expectations*" for EDF Energy 16 years from now. (1)

EDF has said that it knows Sizewell C has to be significantly cheaper than Hinkley Point. It has carried out two stages of public consultation in Suffolk over the Sizewell project. It is looking at the feedback received and will revise plans for further public consultation before submitting a planning application.

Mr de Rivaz also "*strongly hopes*" Bradwell B will be generating by 2033.

EDF says it is aiming to reduce the cost of its future EPR projects by 30%, based on lessons learned from the delayed construction of the Flamanville-3 project in northern France and the Olkiluoto-3 project in western Finland. It hopes to achieve the reduction by avoiding a number of unexpected contingency costs of the kind incurred during the construction of the two existing EPR projects. Standardisation of the design, construction, safety and licensing process is vital for controlling project costs. Better project management and more digitalisation are some of the ways EDF can move forward. (2)

If EDF was to be successful in reducing the cost from £92.50/MWh by 30% to £64.75/MWh, with the cost of renewables falling rapidly, there must surely still be a question-mark over whether that is enough of a reduction.

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1. Times 30<sup>th</sup> Oct 2017 <https://www.thetimes.co.uk/edition/business/sizewell-c-nuclear-power-to-come-on-stream-in-2031-35nw6wwsv>
  2. NucNet 23<sup>rd</sup> Oct 2017 <http://www.nucnet.org/all-the-news/2017/10/23/edf-says-lessons-learned-could-make-future-epr-projects-30-cheaper>



## 5. Dodgy Decommissioning Deals

As we reported in April, the UK Government was forced to pay out £97m in a settlement with two US companies – Energy Solutions and Bechtel - for mishandling the way it awarded the £6.1bn Magnox nuclear decommissioning contract.

The BBC's File on Four has been delving in to some of the details of the contract, and what they have discovered suggests what went on was more than just "*dramatic levels of incompetence*", as the Labour Party called it, but was, in fact, a deliberate attempt to manipulate the outcome of the tender process.

In 2012 the Nuclear Decommissioning Authority (NDA) put the second stage of the decommissioning process for the ten Magnox sites and two research reactor sites at Harwell and Winfrith out to tender. Up for grabs was a 14 year contract to take these sites to an Interim End State. The contract was expected to be worth £6-7bn. Energy Solutions – the company which did the early decommissioning work at these sites – bid for the contract along with Bechtel. About £20m was spent on putting the bid together with a team of up to 100 people working on it. The final bid included 750 pages of text; a cost estimate of up to 2,000 pages and 11,000 pages of supporting documents.

The bid was scored according to around 700 criteria. In the end the contract went to the Cavendish Fluor Partnership (CFP). But in September the NDA formally gave CFP 2 year's notice that the contract would end 9 years early. It blamed a significant mismatch between the work outlined in the tender and what actually needed doing. BBC Reporter Jane Deith continued: "*But more serious than that – the NDA rigged the tender. It was only caught because Energy Solutions smelled a rat and took them to Court*".

Ian Bowes, who was working for Energy Solutions until March 2016 told the BBC that the Company identified a series of areas that technically they believed the NDA had got wrong in their evaluation. They also looked at the scoring of CFP and it seemed that Energy Solutions were not getting equal treatment. Documents from the NDA tracked how the scoring had been carried out. Someone had gone back into the computer and changed the scores initially awarded to the Energy Solutions bid.

A High Court Judge agreed with Energy Solutions. He said 22 of the scores awarded to Energy Solutions were wrong. Had the right scores been awarded the results of the competition would have been reversed. CFP should have been disqualified according to the technical criteria, and the NDA knew that. In the words of the Judge – Justice Peter Fraser – the NDA fudged it in order to keep CFP in the competition.

*"By the word fudging I mean choosing an outcome and then manipulating the evaluation to reach that outcome."*

And, he said the NDA limited any permanent record of what it was up to, at one stage telling the evaluators to shred their notes. The NDA had acted unlawfully. It was forced to pay Energy Solutions and Bechtel £97m. Adding other costs such as the £8.5m cost of fighting the case in court, the National Audit Office says brings the total cost to the taxpayer to £122m.





The BBC asked the NDA why it manipulated the tender process. Was it because it was under pressure to select the cheapest bidder? If not, what was the reason? But it didn't get an answer. Chief Executive, David Peatie, who arrived after the Magnox mess, apologised for past mistakes and said procedures have now changed.

Business Secretary, Greg Clark, has ordered an independent inquiry. Steve Holliday, former boss of the National Grid, is interviewing witnesses and will report next year. But the fallout could be huge because Ministers gave the whole Magnox contract approval. The NDA says the Government should take some share of the blame. Emeritus Professor of Energy Policy, Steve Thomas, says he thinks the NDA feel resentful that the Department of Energy (now the Department for Business Energy and Industrial Strategy – BEIS) has loaded the blame onto them rather than taking some responsibility themselves because the contract was approved by the Treasury and the Department of Energy and Climate Change, but only if it achieved savings of at least 10%. The bidding process and the overly complicated criteria were things they should have looked at.

The House of Commons Public Accounts Committee will look at this at the end of November. Meg Hillier, chair of the committee, says the fiasco rings many alarm bells about how it could have happened with so many people in the NDA and Government looking into this contract.

The Government says it monitors the NDA more closely now. The 10% saving target was meant to secure value for money and the right level of commercial expertise. In 2015 the Government cancelled a contract to clean up Sellafield saying it was too complicated for a private sector contract. It took back control of Sellafield and may do the same with the Magnox sites.

Cavendish is also decommissioning Dounreay as part of a consortium. It won the £1.5bn contract in 2012 beating a bid by Energy Solutions and Amec. The BBC revealed that Energy Solutions believe just like with the Magnox contract the scores for the Dounreay bid were “fudged”. Energy Solutions didn't go to Court at the time because it didn't want to upset the NDA and ruin its chances of winning the Magnox contract.

People in the NDA confirmed to Energy Solutions that scores had been changed for the purpose of ensuring that it did not win the contract. The Magnox inquiry has spoken to witnesses about the Dounreay contract tendering process. If the inquiry seriously criticises the Dounreay contract it would mean the NDA had mishandled three multi-billion contracts. The NDA didn't respond to allegations that scores for the Dounreay contract had been manipulated.

The NDA hasn't decided what to do about the Magnox contract, but the fiasco raises serious questions about the NDA's capability to handle the complex and dangerous job of safely taking apart ageing nuclear reactors. Steve Thomas says if the contract is to come back in house the NDA would clearly need a major shake-up. One of the serious issues about long delays to decommissioning is that there are lots of things that can go seriously wrong. What's clear is that our atomic past will still be part of tomorrow's world.

BBC File on 4, The Nuclear Option - Powering the Future and Cleaning Up the Past, 31<sup>st</sup> October 2017  
<http://www.bbc.co.uk/programmes/b09byv6k>



## 6. SMRs

The *Financial Times* reports that the Government is preparing to revive the faltering effort to create a new generation of small-scale nuclear reactors in spite of an official analysis that cast doubt on the economic case for the technology. Talks have intensified in recent weeks between government officials and companies including Rolls-Royce, the UK engineering group, over potential public funding to support development of so-called small modular reactors (SMRs).

Development of SMRs is regarded as crucial to the future of the nuclear industry as it struggles to remain competitive against the rapidly falling cost of renewable wind and solar power. Support for SMRs is expected to be part of a wider commitment to nuclear engineering in a new industrial strategy to be unveiled by the government this month.

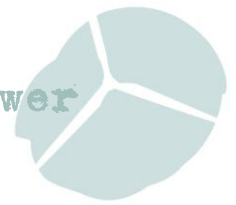
However, the enthusiasm has been complicated by a technology assessment, commissioned by the business department and carried out by EY, the accounting firm, which reached a negative verdict on the cost-effectiveness of SMRs. The findings are expected to be published in the coming weeks and will confront the government with awkward questions about why public money should be used to help commercialise the unproven technology.

Competitors are expecting the government's funding for SMRs to be split into three areas, with the largest portion being committed to technology ready for rapid deployment over the next decade. In the future there may also be funding for more experimental technology, with a third area of potential financial support for suppliers working alongside SMR developers, according to people briefed on the government's plans. The most intense competition for funding is in the first of these areas, with Rolls-Royce vying with rivals including NuScale and Westinghouse of the US. (1)

At the Tory Party Conference the Policy Exchange organised a fringe meeting entitled "*A Nuclear Reactor in Every Town*". According to Matthew Rooney, who is the Policy Exchange's Energy and Environment Research Fellow, "*It is fair to say large nuclear reactors are not doing very well in the nuclear world*" as evidenced by Hinkley Point C "*It is very difficult in liberalized economies to fund large nuclear reactor projects these days and that is where small modular reactors could come in.*" Small modular reactors (SMRs), he said, offer the potential to provide scalable and reliable low carbon power and heat. (2)

It's easy to see why Rolls Royce and other companies in the nuclear engineering business are pushing the UK government finance the development a new generation of SMRs says Oliver Tickell, writing in the *Ecologist*. Whether the project succeeds or fails, there are juicy profits to be had for them at taxpayers' expense. But it is much harder to see why the Government might fall for the industry's techno-optimism which is pure fantasy for a second time in a little over a decade. (3)

According to a recent report by Rolls-Royce and its partners in the 'SMR Consortium' (SMRC), a UK SMR program could create 40,000 skilled jobs, contribute £100 billion (\$132 billion) to the economy and open up a potential £400 billion global export market. Nuclear Industries Association chairman Lord (John) Hutton claims in the foreword that a UK SMR programme could "help the UK become a vibrant, world-leading nuclear nation." He asserts his belief that "it



*is fundamental for the UK to meet its 2050 decarbonisation targets and will deliver secure, reliable and affordable electricity for generations to come."*

The SMRC report envisages an approximate doubling of the UK's 9.5GW existing nuclear capacity by 2030, then another doubling by 2050 to around 40GW. That implies that come 2050, SMRs would be delivering some 30GW - the output of 100 300MW units scattered around the UK.

There are just two problems with the rosy scenario, says Tickell. First, the techno-optimism that oozes from every page is a fantasy. The cost of renewables is falling so fast that nuclear power will be utterly irrelevant in meeting decarbonisation targets. There is no £400 billion export market. Who would want SMRs in 2050, when their power will be 50-100 times more expensive than solar?

Secondly, nuclear power stations have got bigger to achieve economies of scale: it's much cheaper to build a single 1.2GW unit than four 300MW units, or a dozen 100MW units. There is nothing new about SMRs - they have been powering submarines and aircraft carriers ever since the 1950s. If there really are huge cost savings to be achieved from the mass production of SMRs, how come they have not already been achieved?

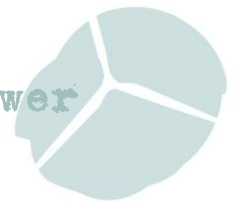
We now know thanks to Andy Stirling and Philip Johnstone of Sussex University that the government wants to use the civilian nuclear programme to generate expertise, and technology, for military use, especially reactors for Trident nuclear submarines. Lord Hutton gave the game away in his introduction to the SMRC report when he wrote: *"A UK SMR programme would support all 10 'pillars' of the Government's Industrial Strategy and assist in sustaining the skills required for the Royal Navy's submarine programme."*

Senior civil servants revealed that the government's decision to build a new generation of civil nuclear power stations starting with Hinkley Point is linked to maintaining enough skills to keep Britain's nuclear deterrent. The disclosure came at a hearing of the Commons Public Accounts Committee looking at the huge cost of building Hinkley Point power station which critics see as uneconomic and not properly costed.

Stephen Lovegrove told the committee *"I was in regular discussion with Jon Thompson, former Permanent Secretary at the MOD, to say that as a nation we are going into a fairly intense period of nuclear activity ... We are building the new SSBNs (nuclear armed nuclear submarines) and completing the Astutes ... We are completing the build of the nuclear submarines which carry conventional weaponry. We have at some point to renew the warheads, so there is very definitely an opportunity here for the nation to grasp in terms of building up its nuclear skills."* (4)

With regard to Hinkley, Stirling and Johnstone say there is a *"remarkable persistence and intensity of UK Government attachments to what is increasingly recognised as an economically untenable project."* The persistence of this nuclear attachment looks to be at least partly due to a perceived need to subsidise the costs of operating and renewing the UK nuclear-propelled submarine fleet. (5)

The government's new Clean Growth Strategy includes, amongst other things, £20m R&D/innovation funding for low carbon heat and energy efficiency, but that is dwarfed by the



£480m proposed for nuclear R&D including R&D on SMRs. In terms of low carbon research priorities there are arguably more urgent options to explore such as Power to Gas (P2G) especially. (see Balancing Green Energy, nuclear News No.100 <http://www.no2nuclearpower.org.uk/nuclearnews/NuClearNewsNo100.pdf>) The Government's funding priorities need to be debated further. (6)

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1. FT 7<sup>th</sup> November 2017 <https://www.ft.com/content/bddfda80-c314-11e7-b2bb-322b2cb39656>
  2. Politics Home 4<sup>th</sup> Oct 2017 <https://www.politicshome.com/news/uk/energy/nuclear-power/opinion/nuclear-industry-association/89540/nuclear-reactor-every-town> and see <https://policyexchange.org.uk/pxevents/a-nuclear-reactor-in-every-town/>
  3. Ecologist 24<sup>th</sup> October 2017 [http://www.theecologist.org/News/news\\_analysis/2989401/small\\_nuclear\\_reactors\\_are\\_a\\_1950s\\_mirage\\_come\\_back\\_to\\_haunt\\_us.html](http://www.theecologist.org/News/news_analysis/2989401/small_nuclear_reactors_are_a_1950s_mirage_come_back_to_haunt_us.html) See also Jonathon Porritt's Blog <http://www.jonathonporritt.com/blog/small-modular-reactors-nuclear-industrys-latest-pipe-dream>
  4. Tribune 22<sup>nd</sup> Oct 2017 <http://www.tribunemagazine.org/2017/10/new-nuclear-power-plants-linked-to-trident-weapons/>
  5. <http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/public-accounts-committee/hinkley-point-c/written/70983.pdf>
  6. Environmental research Web 4<sup>th</sup> Nov 2017 <http://blog.environmentalresearchweb.org/2017/11/04/energy-transitions-in-the-uk/>



## 7. Nuclear Safeguards and Brexit

The government cannot guarantee Britain will have enough nuclear inspectors when it leaves the EU. The Office of Nuclear Regulation has recruited four new safeguards inspectors but says it needs more time to fill the specialised roles. Nuclear minister Richard Harrington said there was "*plenty of time*" to recruit the staff needed. But he stopped short of offering a firm guarantee. The government has stressed that nuclear safeguards - the processes by which the UK shows its civil nuclear material is not diverted into weapons programmes - are different from nuclear safety - the prevention of nuclear accidents. Mr Harrington said the UK was committed to leaving Euratom in March 2019. (1)

Industry figures have warned about significant disruption to energy production in the UK if there is not a new inspection regime ready to go to, to replace the one currently overseen by Euratom.

Dr Mina Golshan gave evidence on behalf of the Office for Nuclear Regulation to the Safeguards Bill Committee on 31<sup>st</sup> October 2017. (2) Dr Golshan completely ducked addressing the most important aspect of the bill, according to nuclear security expert Dr David Lowry. It is not the operational technicalities which concern Lowry, but the diplomatic acceptability of a nation state asserting that it will replace an independent international safeguards verification regime with a self verified regime, albeit one that intends to be populated by the appropriate expertise from a current recruitment drive.

Dr Golshan also overlooked the fact the current trilateral safeguards agreement (UK-EURATOM-IAEA) has an opt out of safeguards application to fissile material, under its article 14, if the Government so decides; and this has actually been done over 600 times since September 1978, when the trilateral safeguards agreement came into force. Foreign states regard this as UK 'do-it-yourself' nuclear proliferation on an industrial scale, as comments at successive NPT review conferences attest, but ministers routinely ignore.

Indeed, the ONR itself now publishes annual data on such withdrawals on its web site, <http://www.onr.org.uk/safeguards/withdrawals.htm>

See: Nuclear Safeguards Bill 2017-19 – Library briefing, <http://researchbriefings.files.parliament.uk/documents/CBP-8107/CBP-8107.pdf>

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1. BBC 2<sup>nd</sup> Nov 2017 <http://www.bbc.co.uk/news/uk-politics-41836855>
  2. Hansard 31<sup>st</sup> Oct 2017 [https://hansard.parliament.uk/commons/2017-10-31/debates/805f6dd4-a8f6-483e-8af4-6d44113a317b/NuclearSafeguardsBill\(FirstSitting\)](https://hansard.parliament.uk/commons/2017-10-31/debates/805f6dd4-a8f6-483e-8af4-6d44113a317b/NuclearSafeguardsBill(FirstSitting))