

# Nuclear Sector Report

1. This is a report for the House of Commons Committee on Exiting the European Union following the motion passed at the Opposition Day debate on 1 November, which called on the Government to provide the Committee with impact assessments arising from the sectoral analysis it has conducted with regards to the list of 58 sectors referred to in the answer of 26 June 2017 to Question 239.
2. As the Government has already made clear, it is not the case that 58 sectoral impact assessments exist. The Government's sectoral analysis is a wide mix of qualitative and quantitative analysis contained in a range of documents developed at different times since the referendum. This report brings together information about the sector in a way that is accessible and informative. Some reports aggregate some sectors in order to either avoid repetition of information or because of the strong interlinkages between some of these sectors.
3. This report covers: a description of the sector, the current EU regulatory regime, existing frameworks for how trade is facilitated between countries in this sector, and sector views. It does not contain commercially-, market- or negotiation-sensitive information.

## Description of Sector

4. The UK has been a member of the European Atomic Energy Community (Euratom) since joining the European Common Market in 1973. On 29 March 2017 the Prime Minister notified the European Commission that the UK would be leaving the European Union and consequently the Euratom Community. The Euratom Treaty, which covers civil nuclear only, has a number of elements which include nuclear research and training, the provision of nuclear safeguards inspection and assurance, the Euratom Supply Agency, free movement of nuclear goods and nuclear workers, nuclear health and safety, and nuclear agreements with third countries. The Euratom regulatory regime exists inside a wider international framework under the International Atomic Energy Agency (IAEA), a UN body. In common with other EU Member States, the UK's agreements with the IAEA are currently delivered through its membership of Euratom. On leaving the EU, and whatever the nature of the UK's future relationship with Euratom, the UK will continue to be a member of the IAEA and comply with all its international obligations.
5. In some areas, the Euratom Treaty goes beyond the IAEA standards, for example in respect of its safeguards regime and the role of the Euratom Supply Agency. Various international agreements, in addition to the agreement with the IAEA, are also currently delivered by virtue of the UK's membership of Euratom.
6. Nuclear power contributes to the UK's ability to meet its low carbon commitments. In the context of increasing deployment of intermittent generating technologies such as wind

turbines, nuclear power provides important (and not weather-dependent) electricity to the system and greater diversity of electricity source.

7. There are 26 civil nuclear licensed sites in the UK, including eight generating sites with 15 operating civil nuclear reactors. Additionally, there are plans and proposals for new nuclear reactors to further support energy security in the UK. Hinkley Point C, now under construction and scheduled to come on-line in the mid-2020s will be the UK's first new nuclear power station in a generation. With the closure of fossil fuel power plants, civil nuclear power will play an increasingly important role in energy security, which in turn plays a significant role in supporting the UK economy.
8. Operating the UK's current civil nuclear programme and delivering on the nuclear new build proposals relies on transfers of nuclear material, equipment and technology from many countries, in the EU and elsewhere. The UK also exports nuclear material, equipment and expertise around the world and reprocesses spent nuclear fuel for overseas customers. These activities are undertaken as part of international agreements, subject to export licensing controls and nuclear safeguards arrangements under the supervision of Government/Regulators. This includes Euratom for nuclear safeguards.
9. The Nuclear Decommissioning Authority (NDA)<sup>1</sup> is responsible for decommissioning 19 sites across the UK with a budget of £3.25bn per annum (approx. two thirds of which is from Government funding), as set out in their annual accounts<sup>2</sup>. The work is undertaken by site licensed companies appointed by and on behalf of the NDA, which are responsible for the day to day operation of the site.
10. In addition to the current nuclear operations, industry has set out proposals to develop 18GW of new nuclear power at six sites in the UK<sup>3</sup>, broken down as follows:
  - EDF: are building two European Pressurised Reactor (EPR) reactors at Hinkley Point C (3.2GW) and developing proposals for two more at Sizewell (3.2GW). EDF/CGN also propose to build two Hualong reactors at Bradwell (2.2GW).
  - Horizon Nuclear Power: owned by Japan's Hitachi Ltd, proposes to build two Advanced Boiling Water Reactor (ABWR) reactors at each of its sites in Wylfa and Oldbury (2.7GW each).
  - NuGen: currently owned by Toshiba (Japanese) proposes to build three AP1000 reactors (3.4GW – US (Westinghouse) technology) at Moorside near Sellafield.
11. To help ensure significant UK content in new build projects, developers are aiming for at least 60% of the content of these projects to be fulfilled by UK companies. This will help to create up to 1,000 permanent jobs during operation and more than 14,000<sup>4</sup> supply chain jobs over the lifetime of each project. Industry and Government collaboration to increase the capability of the UK to play a significant role in the supply chain is also

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<sup>1</sup><https://www.gov.uk/government/organisations/nuclear-decommissioning-authority/about>

<sup>2</sup> <https://www.gov.uk/government/publications/nuclear-decommissioning-authority-annual-report-and-accounts-2016-to-2017>

<sup>3</sup> <https://www.gov.uk/government/news/uk-business-to-benefit-from-new-nuclear-projects>

<sup>4</sup> [http://www.nugeneration.com/download/About\\_NuGen\\_February-2016-AW.pdf](http://www.nugeneration.com/download/About_NuGen_February-2016-AW.pdf)

critical to the ability of the UK to increase exports. The UK has a strong record in the nuclear sector of spending within the UK, for example £1.6 billion of the NDA's £3 billion gross expenditure is spent in the supply chain<sup>5</sup>, and the vast majority of EDF's annual supply chain spend of £650 million<sup>6</sup> is delivered by UK suppliers. An Oxford Economics Report<sup>7</sup> also indicated that the UK currently has the ability to deliver 45% of the new build supply chain for a 16.5MW programme to 2030, with the potential for this to increase to 60%.

12. The UK is to a degree dependent on a global nuclear supply chain. There are a number of different nuclear reactor designs proposed to be deployed within UK new nuclear, which use technology sourced internationally from the vendors' home countries (France, Japan, US and China) and largely pre-existing supply chains sourced from various countries around the world.
13. Beyond electricity generation, other UK nuclear industry sector segments include: uranium enrichment; nuclear fuel fabrication; and decommissioning activities, including managing nuclear waste and reprocessing spent nuclear fuel. In addition, there are a wide range of non-nuclear fuel cycle uses of radioactive materials (for example; medical and industrial uses). This is complemented by a UK global presence in research and development programmes most prominently Joint European Torus (JET) and International Thermonuclear Experimental Reactor (ITER) fusion projects, both of which are Euratom projects. There are also synergies between UK civil nuclear and the defence nuclear programme, particularly in terms of the transferability of the skilled workforce.
14. Nuclear medicine uses radiation to provide diagnostics and treatment. This covers a range of radioisotopes, the key ones being:
  - Technetium-99m: used in medical imaging. This is produced from Molybdenum-99 and accounts for around 80% of procedures<sup>8</sup>.
  - Caesium-137: used for low-intensity sterilisation of blood.
  - Cobalt-60: used in sterilisation and high activity Co-60 is used in brain cancer treatment.
15. The Euratom Treaty references medical radioisotopes several times, such as in the context of promoting research (under Article 4 and Annex I of the Treaty), notification of industrial activities (Article 41 and Annex II), and prohibition of customs duties between EU Member States and restrictions of imports and exports (Article 93 and Annex IV). The Treaty does not place restrictions on medical radioisotopes outside the EU; therefore, the UK's ability to import will not be affected by withdrawal from Euratom.

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<sup>5</sup> <https://www.gov.uk/government/publications/nuclear-decommissioning-authority-annual-report-and-accounts-2016-to-2017/nda-annual-report-and-accounts-2016-to-2017>

<sup>6</sup> <https://www.edfenergy.com/about/climate-change-solutions/plex>

<sup>7</sup> Oxford Economics and Atkins, 2013, The Economic Benefit of Improving the UK's Nuclear Supply Chain Capabilities.

<sup>8</sup> <http://researchbriefings.parliament.uk/ResearchBriefing/Summary/POST-PN-0558>

## Sector contribution to Gross Value Added (GVA)

16. In 2014 the GVA of the UK's nuclear energy sector was £3.5bn (0.2% of total UK GVA in that year)<sup>9</sup>. In 2016, nuclear electricity generation accounted for a round 21% of the total UK electricity generation, which in turn has an estimated GVA of £18bn (1.1% of UK total)<sup>10</sup>. ONS statistics show that all sectors of the economy save one have positive intermediate consumption of goods and services produced by the electricity sector and therefore depend on its effective functioning<sup>11</sup>. In particular 3.7% of total intermediate demand is spent on the electricity, distribution and transmission sector (Sector 35.1 in official ONS labelling).
17. To deliver each of the new nuclear plants currently proposed by industry (the six sites mentioned above, including Hinkley Point C under construction), industry investment of £14-18 billion is likely to be required. An Oxford Economics study<sup>12</sup> estimated that 16.5 GW of nuclear new build would add an estimated £27.6 billion to £37.3 billion to gross value added (and between 444,000 and 587,000 job years). This includes direct, indirect and induced impacts, depending on the ability of the UK to increase the supply chain from a baseline figure of 44% to 63% (which is around the aim stated by the developers of Hinkley Point C).

Table 1: Key statistics on the Nuclear Power generation sector

	UK Nuclear Power Sector
<b>Businesses</b>	2,000
<b>Turnover (£'000s)</b>	3,473,000
<b>Exports (£'000s)</b>	43,500
<b>Imports (£'000s)</b>	303,000
<b>Employees (FTEs)</b>	15,500
<b>Acquisitions of Capital Assets (£'000s)</b>	1,422,000

Source: ONS UK Environmental Accounts: UK nuclear power sector, 2014

18. In 2015 almost 78,000 people were working in the UK nuclear and radioactive waste management sector (this includes all those working in the sector not just those in power generation).

<sup>9</sup> The nuclear power sector as defined by the ONS includes businesses producing electricity, and those supporting these activities through consultation, producing or installing infrastructure. Decommissioning and waste processing activities are excluded. R&D from public organisations is also out of scope. Companies involved in new build developments are included in the estimates if they had turnover, employment, or acquisitions of capital assets. The estimates provided are of the direct nuclear power sector only and do not include any indirect or induced effects.

<sup>10</sup> See DUKES 2016, Chapter 5:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/540933/Chapter\\_5\\_web.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/540933/Chapter_5_web.pdf)

<sup>11</sup> See "Table 2 - Int Con 2015" in the following spreadsheet:

<https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/inputoutputsupplyandusetables>

<sup>12</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/168017/bis-13-633-the-economic-benefit-of-improving-the-uk-nuclear-supply-chain-capabilities.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/168017/bis-13-633-the-economic-benefit-of-improving-the-uk-nuclear-supply-chain-capabilities.pdf)

Table 2: Employment in nuclear and radioactive waste management sector

Number of Employees by Activity (FTEs) in 2015					
	England	Wales	Scotland	Northern Ireland	Total
<b>Nuclear Power Plants</b>	3,310	560 <sup>13</sup>	1,120	-	4,990
<b>Decommissioning/spent fuel and nuclear waste management sites</b>	17,580	580	2,640	-	20,800
<b>Non-nuclear radioactive waste management</b>	-	-	-	-	-
<b>Supply chain</b>	5,320	220	330	-	5,870
<b>Support services</b>	9,110	250	1,760	-	11,120
<b>Defence<sup>14</sup></b>	25,440		7,720	-	33,160
<b>Nuclear New Build</b>	1,690	250		-	1,940
<b>Total</b>	62,450	1,860	13,570	-	77,880

Source: Nuclear Energy Skills Alliance, Nuclear Workforce Assessment 2015<sup>1516</sup>

### Patterns of Trade

19. The potential commercial export opportunities for the industry are significant if UK firms are able to grow their share of the global nuclear market across new build, fuel, operations, maintenance, decommissioning and waste handling. 65 reactor units are currently under construction internationally, and current proposals indicate that as many as 300 new reactors may come on line by 2030.

20. The Oxford Economics and Atkins 2013 report<sup>17</sup> 'The economic benefit of improving the UK's nuclear supply chain capabilities' (the "2013 report") estimates the potential value of UK exports. According to the World Nuclear Association (WNA), on current plans the value of nuclear new-build is in the order of £930 billion, with significant international procurement expected to be approximately £25 billion per year through to 2030.<sup>18</sup> The report set out that there are certain areas of the nuclear supply chain where UK firms are

<sup>13</sup> Wales NPP refers to Wylfa (now defueling)

<sup>14</sup> While defence activities are not within the scope of the Euratom Treaty, the employment figures have been included here as the skills/workforce is transferrable.

<sup>15</sup> <http://www.cogentskills.com/about-cogent-skills/research-policy/nuclear-workforce-assessment/>

<sup>16</sup> Note: 2017 total employment (demand) is 87,560, see

[www.cogentskills.com/media/76523/nwa2017\\_public.pdf](http://www.cogentskills.com/media/76523/nwa2017_public.pdf)

<sup>17</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/168017/bis-13-633-the-economic-benefit-of-improving-the-uk-nuclear-supply-chain-capabilities.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/168017/bis-13-633-the-economic-benefit-of-improving-the-uk-nuclear-supply-chain-capabilities.pdf)

<sup>18</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/168017/bis-13-633-the-economic-benefit-of-improving-the-uk-nuclear-supply-chain-capabilities.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/168017/bis-13-633-the-economic-benefit-of-improving-the-uk-nuclear-supply-chain-capabilities.pdf)

likely to have a competitive advantage, including design and engineering, construction management, and decommissioning.

21. The Department for International Trade, based on business forecasts and intelligence from its international networks, estimates that projects receiving HMG export promotion support could deliver approximately £4.1 billion of UK export wins for the nuclear sector for the period 2016-2021.
22. During 2015-16 UK Trade and Investment (UKTI), which is now part of the Department for International Trade, supported a total of £1.243 billion in 'business wins' across the civil nuclear sector. Business wins recorded the total value of the deals which Government was involved in supporting. The Department for International Trade now uses a new 'export win' metric, which quantifies the UK export value of export deals which the Department supports, drawing on wider cross-Government levers and facilitating cross-Government activities as necessary. Exports from the civil nuclear sector relate to goods and services across the nuclear life cycle, including front end programme management and technical support, through life operational support, waste management and decommissioning.
23. The UK's export of engineering services and equipment manufacture is tied to our ability to secure UK content in the UK's new build nuclear programme. The vision is that UK companies use the domestic new build programme as a springboard into new build markets elsewhere. As stated above the scope for UK opportunities is vast.
24. The UK remains interested in the potential of modular reactors, both domestically and as a new export opportunity for the UK supply chain. At least some potential export markets would require the UK to have a Nuclear Cooperation Agreements (NCAs) in place with the relevant countries. There would also need to be agreement on the transfer of radioactive materials for testing in advanced reactors. Further detail on NCAs is provided in para 45 of this report.

### **Future Prospects**

25. Future prospects for the sector are now focused on growth. For example:
  - New nuclear power stations (see above).
  - Lifetime extensions confirmed by operator EDF for existing nuclear plants at Hartlepool, Heysham and Torness, in February 2016, taking the life of the newest AGR plant out to 2027.
  - Up to £180m<sup>19</sup> has been committed by HM Treasury in this spending review period for an ambitious nuclear R&D programme, including support for advanced nuclear reactor technologies.
  - There has been progress in the faster and safer decommissioning of Sellafield.
  - Publication in 2014 of a White Paper on geological disposal route for the final disposal of the UK's higher activity radioactive waste.

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<sup>19</sup> NDA Business Plan:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/604324/NDA\\_Business\\_Plan\\_2017\\_to\\_2020.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/604324/NDA_Business_Plan_2017_to_2020.pdf)

26. These developments present significant opportunities and growth for the UK over the coming years.
27. The global picture is less clear. Although some sector analysts are optimistic (see above), there are some countervailing signals too. Following the accident at the Fukushima Dai-ichi Nuclear Power Plant in 2012 some states have slowed their nuclear new build plans while others, such as Germany, have decided to phase out nuclear power altogether. Japan shut down all their nuclear power stations, and the vast majority have yet to be restarted. Other states, (for example China, Russia, UAE, France, Finland, Pakistan), are continuing with the new civil nuclear plans. China has been reported to have plans to build 20<sup>20</sup> new power plants to add to their existing suite of 34 reactors.

### **Research and development**

28. The UK is currently a world leader<sup>21</sup> in nuclear R&D and the Government has committed to maintain and build on this. In a recent Future Partnership paper 'Collaboration on Science and Innovation'<sup>22</sup>, the Government explained that it intends to continue working with the EU on nuclear R&D, including the Joint European Torus (JET) and the International Thermonuclear Experimental Reactor (ITER) fusion programmes.

### **Fusion**

29. As part of the Euratom Research & Training Programme (R&T), the UK participates in two world leading fusion research projects; JET and ITER. JET is hosted at the Culham Centre for Fusion Energy (CCFE) in Oxfordshire. The EU contributes 88% of the JET operating costs with the UK providing the remaining funds. EU funding is also used to support another UK experimental reactor (MAST-U), and other areas of research associated with fusion. The CCFE employs around 1300 people, including 600 highly skilled scientists and engineers. ITER membership has already enabled the UK to win around €500 million worth of ITER contracts, with the potential for a further €1 billion before construction completes in 2025.
30. The UK will seek to build on its extensive history of working with EU partners on nuclear research. There is precedent for third-party involvement in fusion research via participation in the Euratom R&T Programme and the Joint Undertaking for ITER (known as Fusion for Energy).
31. The UK's contract to host JET is due to expire at the end of 2018 and the Commission is currently deciding whether to extend that contract until the end of 2020. On 27 June 2017 the UK Government committed to continue funding its fair share of the JET costs until 2020 if the contract is extended<sup>23</sup>.

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<sup>20</sup> World nuclear Association (<http://www.world-nuclear.org/information-library/country-profiles/countries-a-f/china-nuclear-power.aspx>)

<sup>21</sup> <https://www.epsrc.ac.uk/newsevents/pubs/indrevfissionfusion/>

<sup>22</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/642542/Science\\_and\\_innovation\\_paper.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/642542/Science_and_innovation_paper.pdf)

<sup>23</sup> <https://www.gov.uk/government/news/government-commits-to-continue-funding-its-share-of-europes-flagship-uk-based-nuclear-fusion-research-facility>

## **Fission**

32. Participation in international collaboration and access to the findings also allows the UK to maintain its status as a world leader in nuclear fission R&D. In 2015/2016, UK organisations participated in 33 projects that were receiving Euratom funding. UK organisations received €9m of direct funding for fission R&D, while participating in the projects provided access to a total of €230m of research, of which €120m was provided by the EU, as well as access to research findings, facilities and collaboration with the world's top research groups. Organisations from countries that are not Euratom members are eligible to bid as part of consortia to undertake Euratom projects, in order to contribute to research and gain access to findings, but are not normally eligible for funding.
33. The UK recognises the importance of international collaboration in nuclear research and the UK's key role in R&D. Last year, the Government announced the first phase of a nuclear innovation programme for fission R&D.

### ***EU funding receipts***

34. Over the last year, 48<sup>24</sup> nuclear research projects involving UK participants have been funded through Euratom and Horizon 2020 research programme. These projects have seen an EU contribution of €185.6m, of which €20.4m was given to UK organisations including universities and research facilities and industrial organisations.
35. The UK fusion programme, co-ordinated by the UK Atomic Energy Authority, also receives £60m of Euratom funding per year to operate the Joint European Torus (JET) fusion facility at Culham near Oxford. It currently operates under a 5 year (2014-2018) contract with the EU Commission, although discussions are underway within the Commission about an extension to the contract to 2020. JET is effectively the prototype for the larger ITER<sup>25</sup> fusion programme, and provides a useful test bed for robotics and advanced materials to be used in ITER. JET supports approx. 600 high skilled jobs at UK Atomic Energy Agency's (UKAEA) site at Culham in Oxfordshire.
36. The UK is a member of the ITER Agreement through our membership of Euratom and Fusion4Energy (F4E). The total budget for ITER is around €13 billion of which the European Union contributes €6.6 billion (until 2020), this leaves the other members US, Japan, South Korea, China, India and Russia each contributing roughly 10% to make up the remaining €7 billion. The UKAEA supports UK industry bidding for contracts under the ITER programme, the fusion experiment currently under construction in the South of France; UKAEA estimate that UK industry has secured around €500 million worth of ITER contracts to date.
37. The nuclear sector has previously received funding from the European Regional Development Funding for supply chain/skills projects linked to nuclear. Funding was

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<sup>24</sup> CORDIS database assessment ([http://cordis.europa.eu/projects/home\\_en.html](http://cordis.europa.eu/projects/home_en.html))

<sup>25</sup> "The Way" in Latin



withdrawn earlier this year, based on EU guidance, to stop European Regional Development Fund (ERDF) funding nuclear related supply chain activity.

### **Regional presence**

38. The nuclear sector has its greatest employment presence in the North West, including west Cumbria, (44%), the South West (13%) and South East (9%)<sup>26</sup>.

- West Cumbria is home to a concentration of civil nuclear companies. Around 11,000 people are employed on the Sellafield site, which is the focus of the UK's decommissioning activities. The National Nuclear Laboratory is a government supported laboratory with over £350m of facilities, mostly in the north west of England.
- Parts of the nuclear fuel cycle (uranium purification and enrichment) take place in Cheshire and Lancashire. Warrington (Birchwood Science Park) is home to a cluster of nuclear companies.
- There is a cluster of businesses in South West and South East including EDF Energy, Magnox Ltd, BAM Nuttall, Kier, Wood Group supporting the decommissioning of 6 Magnox Reactors and operation of Hinkley Point B. Somerset is also home to new build Hinkley Point C, while Horizon's proposed Oldbury site is located in Gloucestershire. The (JET) fusion project is located in Culham, Oxfordshire.

### **Devolved Administrations**

39. Nuclear policy including safety, security and safeguards are reserved matters. International Agreements on nuclear are likewise reserved and new agreements referenced in this document will be UK-wide. Devolved administrations have the following interests:

- Scotland: Operating nuclear sites at Hunterston and Torness together with decommissioning activities at Dounreay support around 6% of nuclear sector employees. Babcock Dounreay Partnership (BDP) took ownership of Dounreay Site Restoration Ltd (DRSL) in 2012. The contract, awarded to BDP (a joint venture between Babcock, CH2M Hill and URS) by the Nuclear Decommissioning Authority (NDA). The Scottish Government has a published policy of no new nuclear in Scotland.
- Northern Ireland: There is negligible employment in the nuclear sector and no existing or proposed sites or supply chain activity.
- Wales: Horizon Nuclear Power's proposed new nuclear plant at Wylfa-Newydd, together with Decommissioning sites at Wylfa and Trawsfynydd support 2% of nuclear sector employees. The Welsh Government supports Wylfa-Newydd as a strategic priority.

40. In addition, certain aspects of radioactive waste management are devolved to Scotland, Wales and Northern Ireland.

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<sup>26</sup> Nuclear Industry Association (NIA) Civil Nuclear Jobs Map 2017 – figures shown only include those that are members of NIA, but that constitutes 95% of civil nuclear sector.

## The current EU regulatory regime

### *Main sector-specific rules governing the provision of activity in the EU*

41. The most important European instrument affecting the UK nuclear sector is the Treaty establishing the European Atomic Energy Community (Euratom), and in particular the elements of the Euratom Treaty which:
- establish a Common Market for nuclear materials and equipment within the Euratom Community;
  - establish a nuclear safeguards regime within the Euratom Community to confirm that states are not diverting nuclear material or technology from civil programmes into non-peaceful uses;
  - establish a framework for nuclear safety and the safe and responsible management of radioactive waste;
  - create a system that governs the shipment of radioactive waste across the borders of EU Member States; and
  - Allow for third party co-operation agreements between Euratom and countries outside the EU.
42. Other European Union rules or systems directly relevant to the UK nuclear sector include:
- The 1985 EU Declaration of Common Policy (“Dublin Declaration”), simplifying export control (licensing) arrangements on the export and import of nuclear material, equipment and technology with EU states; and
  - Council Directive 2008/68/EC<sup>27</sup> on the inland transport of dangerous goods by road and rail.
43. The Euratom Treaty establishes a Community for a common approach on civil nuclear and radioactive waste management. All Euratom Member States are EU Member States, and vice versa. The UK became a Member of the Euratom Community at the same time as joining the European Union in 1973. The purpose of Euratom is the promotion of civil nuclear uses of atomic energy. It covers civil nuclear and radioactive waste management issues only – it does not cover military/defence uses of nuclear technology.
44. In the UK, the Euratom Treaty is given effect by a very wide range of legislation and administrative arrangements including the Nuclear Installations Act 1965<sup>28</sup>, the Health and Safety at Work, etc, Act 1974<sup>29</sup>, the Environmental Permitting Regulations 2010<sup>30</sup>, the Energy Act 2013<sup>31</sup> and secondary legislation made under these statutes. The majority of the Euratom obligations have either been implemented using domestic legislation or are directly applicable as Euratom Regulations.

<sup>27</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0068>

<sup>28</sup> <https://www.legislation.gov.uk/ukpga/1965/57>

<sup>29</sup> <https://www.legislation.gov.uk/ukpga/1974/37>

<sup>30</sup> <https://www.legislation.gov.uk/ukdsi/2010/9780111491423/contents>

<sup>31</sup> <http://www.legislation.gov.uk/ukpga/2013/32/contents/enacted>

## ***Broad areas covered by the Euratom Treaty***

### *Common Market / Cooperation agreements*

45. The UK is party to a number of existing nuclear co-operation agreements, some of which are between Euratom and a third country and some of which are bilateral between the UK and a third country, the latter being permissible under Euratom rules provided they have been declared to Euratom in advance. Euratom currently has eight NCAs with third countries. The UK Government has made clear its intention to have new legally binding agreements in place with third countries that require them as a condition of nuclear trade (USA, Japan, Canada, Australia) in anticipation of the UK no longer being party to the Euratom agreements with those countries. Other new NCAs are also being explored but are not a requirement for continuity of trading.
46. Both the Euratom common market and NCAs, as well as the 1985 EU Declaration of Common Policy ("Dublin Declaration"), simplify export control (licensing) arrangements on the export and import of nuclear material, equipment and technology with EU Member States and those countries with which Euratom has NCAs (It should be noted that even where an NCA exists export control rules apply, although processes may be simplified).
47. Additionally, Euratom establishes the Euratom Supply Agency (ESA), which is intended to ensure a regular supply of nuclear materials to Euratom Member States and facilitate materials transfer arrangements (to date no Member State has had the need to use the ESA to supply nuclear material).

### *Safeguards*

48. Euratom establishes measures to confirm that states are not diverting nuclear material or technology from civil programmes into non-peaceful uses - Commission Regulation (Euratom) No 302/2005 of 8 February 2005 on the application of Euratom safeguards establishes reporting requirements, while Articles 81/82 of the Euratom Treaty specify Commission inspections to verify safeguards information and reporting.
49. Euratom safeguards provisions obliges users to keep accurate records and make declarations on civil nuclear material and programmes to the European Commission. The Commission verifies these declarations and performs inspections.
50. Failure to comply with Euratom safeguards requirements can, and has led to, Commission sanction and/or infraction proceedings under the Treaty. The UK, during its membership of Euratom, has not been subject to such sanctions or infraction proceedings by the Commission.

### *Nuclear safety / radioactive waste management*

51. There are several Euratom Directives and Regulations that establish a framework for nuclear safety and the safe and responsible management of radioactive waste. These include:

- Council Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations as amended by 2014/87/EURATOM of 8 July 2014 amending Directive;
- Council Directive 2011/70/EURATOM of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste;
- Council Directive 2013/59/Euratom of 5 December 2013 on the protection against the harmful effects of ionising radiation ('the Basic Safety Standards Directive'). This Directive, among other things, specifies requirements for nuclear emergency preparedness and response arrangements in Members;
- Regulation 300/2007/Euratom: Council Regulation of 19 February 2007 establishing an Instrument for Nuclear Safety Cooperation (It facilitates the Euratom Community financing of measures to support the promotion of a high level of nuclear safety, radiation protection and the application of efficient and effective safeguards of nuclear material in third countries).

52. The Euratom Treaty also places specific obligations on the UK in relation to nuclear safety and radioactive waste management including reporting. While compliance with this reporting does not require transposition into domestic legislation (instead compliance is achieved through administrative arrangements) failure to report as required can result in infraction proceedings. The main reporting requirements are:

- Article 37 - the provision of general data on proposal to dispose of radioactive materials;
- Article 35/36 the reporting and verification of monitoring arrangement; and
- Article 41 – the communication to the Commission of information on investment projects relating to new installations and major projects.

### *Transport*

53. Council Directive 2006/117/Euratom on the supervision and control of shipments of radioactive waste and spent fuel creates a system that governs the shipment of radioactive waste across the borders of EU Member States.

### **Main cross-sectoral rules, technical requirements and frameworks**

54. In addition to the nuclear/radioactive waste specific legislation listed above, this sector is subject to health and safety legislation (at the EU level the Health and Safety Framework Directive, the Workplace Directive, Manual Handling Directive, etc) which has been implemented through domestic legislation such as the Health and Safety at Work, etc, Act 1974 and the Management of Health and Safety Regulations 1999. This general health and safety legislation applies to all work activities in the UK so is not specific to the nuclear/radioactive waste management sector.

55. The Euratom Treaty has specific provisions on the movement of workers and for the free movement of capital for investment in the field of nuclear energy.

### **Rules affecting current trade between the UK and non-EU countries**

56. Within the Euratom Community/EU there is a tariff-free common market in nuclear materials and equipment. From an export control and licensing perspective, the global import and export of nuclear materials, equipment and technology is covered by Nuclear Suppliers Group, of which the UK is a full member. The 1985 EU Declaration of Common Policy (“Dublin Declaration”) established simplified arrangements for the export control of nuclear material, equipment and technology.
57. The Euratom Community has in place a range of Nuclear Cooperation Agreements (NCAs) with States outside of the EU. These agreements apply to the Euratom Community as a whole and also to individual Member States and allow the trade and movement of materials, equipment and technology. Without coverage by such agreements the UK would need to negotiate individual NCAs with each state which require such an agreement. The UK itself does not require NCAs to be in place, but some countries have legal or political requirements which make such agreements necessary. For the majority of countries, Government to Government Assurances are sought in support of export licence applications, as is current practice.
58. Transfers of nuclear material within the Euratom Community and with third countries are subject to Euratom Safeguards arrangements (as well as IAEA safeguards requirements that are in large part complied with through the UK’s membership of Euratom).

### **Devolved areas of responsibility and impacts on Gibraltar, the Crown Dependencies and Overseas Territories**

59. Civil nuclear is generally a reserved matter, with the exception of certain aspects of radioactive waste management being devolved to Scotland, Wales and Northern Ireland.
60. Gibraltar does not have a civil nuclear sector though they have transposed the relevant legislation into law. Gibraltar is responsible for radioactive waste management which is restricted to low level materials such as those used in the medical profession and sealed sources used for non-destructive testing.
61. IAEA safeguards obligations do not for the most part extend to Gibraltar, the Crown Dependencies or overseas territories (certain aspects of the Additional Protocol could theoretically apply however); Euratom safeguards obligations do in principle extend to Gibraltar, the Crown Dependencies and the overseas territories (though we understand that no material that would be subject to Euratom safeguards is in fact held in any of these jurisdictions).

### **Planning for the future**

62. The White Paper *The United Kingdom’s exit from and new partnership with the European Union* (Cm 9417) published in February 2017<sup>32</sup> outlined 12 principles which will guide the Government in fulfilling the democratic will of the people of the UK. The key

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<sup>32</sup> <https://www.gov.uk/government/publications/the-united-kingdoms-exit-from-and-new-partnership-with-the-european-union-white-paper>

principles of relevance here are: providing certainty and clarity; taking control of our own laws; controlling immigration; ensuring free trade with European markets; securing new trade agreements with other countries; ensuring the United Kingdom remains the best place for science and innovation; and delivering a smooth, orderly exit from the EU.

### *Nuclear safeguards*

63. The civil nuclear sector is subject to robust international non-proliferation measures, which include nuclear safeguards and material accounting. Nuclear safeguards are reporting and verification processes to demonstrate that civil nuclear material is not diverted into military or weapons programmes. The UK's current international safeguards obligations are primarily fulfilled through the UK's membership of the Euratom Treaty. Safeguards arrangements are essential to enable the UK to continue to trade and to fulfil the UK's international obligations as a responsible nuclear state.
64. Because the UK relies on its membership of Euratom to fulfil its current safeguards obligations, the decision to leave Euratom will require changes to the UK's current safeguards arrangements. We have a clear objective of ensuring that continued safeguards arrangements are in place to maintain the UK's reputation as a non-proliferation leader and to ensure compliance with the UK's international obligations through agreements with the IAEA. To do this the UK will be required to:
- Renegotiate, or amend, existing International Atomic Energy Agency (IAEA) agreements; in particular a Voluntary Offer Agreement (VOA) and Additional Protocol (AP); and
  - Establish a State System of Accounting and Control (SSAC). Euratom currently performs the function of a State System of Accounting and Control (SSAC) for all Member States.
65. A domestic SSAC consists of three basic components:
- An infrastructure and IT system to obtain, process and ensure timely submission to the IAEA of all the nuclear material accounting and other safeguards reports required by any future safeguards agreements, and reporting to States required by Nuclear Cooperation Agreements;
  - Assurance arrangements to ensure the quality of the reporting provided by the UK to the IAEA. This can include domestic telemetry (e.g. cameras and seals installed by the SSAC) and inspections for assurance purposes; and
  - Arrangements to facilitate and otherwise support IAEA verification activities in the UK at facilities chosen for inspection. This includes supporting IAEA telemetry at UK sites.

### *Safeguards regime*

66. The UK will be required to set up a domestic SSAC. This will constitute a major project to set up and deliver. The Office for Nuclear Regulation (ONR) currently performs some inspections on UK nuclear facilities for a range of purposes including safety and security. They are also involved in aspects of the current reporting regime to Euratom and other

third country States. ONR have a significant capability and knowledge base in respect of the UK's safeguards, therefore they are well positioned to take on the function of an SSAC. There will however be a need to substantially increase the ONR's inspection and assurance capabilities before they are able to take on the role of an SSAC.

67. Primary legislation will be required to give the ONR the function of establishing and maintaining a UK SSAC, and ensuring that it has the necessary powers to do so. It is the intention of the UK Government that the future domestic safeguards regime, to be run by the ONR, is robust and as comprehensive as that currently provided for by Euratom. The Nuclear Safeguards Bill and the regulations that will be made using the powers provided for in the Bill, are designed to establish a future UK safeguards regime that will deliver a regime of broadly equivalent standards to existing Euratom standards and exceeds the standard that the international community would expect from the UK as a member of the IAEA.

***Enabling trade: movement of technology and material between UK and countries outside the EU***

68. The Government's priority is to ensure that UK companies are able to maintain the ability to trade in civil nuclear material, equipment and technology. In particular, for international partners that require Nuclear Cooperation Agreements (NCAs), this means ensuring that new bilateral NCAs are negotiated and in place to ensure smooth transition.
69. NCAs are needed only with countries which themselves have a legal or policy requirement for an NCA to be in place. It is not UK policy to require a NCA with any other countries to enable bilateral civil nuclear trade. However, the UK will need to ensure that we have agreements in place with the limited number of states which have legal or policy requirements for NCAs; this is the case for USA, Canada, Japan and Australia. New agreements with those countries are therefore being prioritised.
70. Once the UK withdraws from Euratom we will continue to be able to engage in civil nuclear trade with European partners, as neither the UK nor Euratom has a requirement for an NCA to be in place. Euratom facilitates trade with third countries as it can negotiate NCAs on behalf of the community. NCAs facilitate trade but are not in themselves trade agreements. Being in Euratom enables the UK to conduct civil nuclear trade through Euratom's NCAs (these are with; Argentina, Australia, Canada, Japan, Kazakhstan, South Africa, Ukraine, US, and Uzbekistan). Once the UK has withdrawn from Euratom we will no longer be covered by these NCAs. We will need to make alternative arrangements to replace the provisions Euratom currently provides.
71. Separately to Euratom's agreements the UK has bilateral agreements in place with key partners (including with Australia and Japan). These are however, predicated on the UK's safeguards arrangements and membership of Euratom; hence there will be a need to update these existing bilateral NCAs to reflect the UK's new arrangements outside of Euratom, including on safeguards provision.

## Existing frameworks for how trade is facilitated between countries in this sector

72. The arrangements described in this section are examples of existing arrangements between countries. They should not be taken to represent the options being considered by the Government for the future economic relationship between the UK and the EU. The Government has been clear that it is seeking pragmatic and innovative solutions to issues related to the future deep and special partnership that we want with the EU.
73. The Prime Minister has set out that the UK is seeking an ambitious arrangement with the EU which builds on our unique position of regulatory alignment. Internationally there are a number of rules, agreements and treaty based approaches that govern nuclear trade which demonstrate that there are existing frameworks for trade in this sector.
74. Nuclear Safeguards are overseen by the International Atomic Energy Agency (IAEA) on a global basis. As a Nuclear Weapon State (as defined by the Treaty on the Non-Proliferation of Nuclear Weapons (NPT)), the UK is not required to have IAEA safeguards oversight of its nuclear facilities, but voluntarily agrees to accept the application of IAEA safeguards to its civil nuclear facilities. The UK's "voluntary offer" on nuclear safeguards currently constitutes a tripartite arrangement involving the UK, IAEA and Euratom through two agreements: a "voluntary offer agreement" and "Additional Protocol". All states (with the exception of North Korea and Iran) that have a nuclear sector follow the IAEA approach and are signatories to the Non-proliferation Treaty. Non Euratom states implement their own safeguards arrangements domestically and these are verified by the IAEA rather than - as with Euratom Member States - being subject to a supra-national approach administered by the European Commission. Euratom nuclear safeguards arrangements, as applied to the UK, are similar, but more extensive in scope, to IAEA nuclear safeguards arrangements – at sites the IAEA currently inspects (primarily Sellafield and URENCO Capenhurst), it collaborates with Euratom safeguards inspectors to reduce duplication of effort.
75. Since 2014, Switzerland has participated in Euratom programmes as an associated state (through an "agreement for scientific and technological cooperation") - this arrangement only covers Research and Development. The agreement is also contingent on other aspects of the EU acquis such as the free movement of people.<sup>33</sup>
76. Global export controls for nuclear material, equipment and technology are derived from the Guidelines agreed by the Nuclear Suppliers Group (NSG), of which the UK is a full member. Euratom has no special role within the NSG.
77. In relation to safety and environmental considerations there are international instruments in place that largely mirror or are reflected in the objectives of relevant Euratom/EU Directives that apply in the nuclear field. For example, the Nuclear Safety Directive has broadly the same objectives as the international Convention on Nuclear Safety. The UK is a contracting party to the following binding international agreements that underpin Euratom or EU obligations such as: the Convention on Nuclear Safety (Nuclear Safety

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<sup>33</sup> [http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:22014A1230\(01\)](http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:22014A1230(01))



Directive); the Joint Convention on Radioactive Waste and Spent Fuel Management (the Radioactive Waste and Spent Fuel Directive); and the ESPOO Convention (Environmental Impact Assessment Directive). Additionally the UK also supports the non-binding IAEA General Safety Requirements (the international equivalent to the emergency planning and response elements of the Basic Safety Standards Directive), which represent international best practice in the field of nuclear emergency planning and response.

78. Nuclear Cooperation Agreements (NCAs) are binding treaties between parties that provide assurances in relation to safeguards and non-proliferation. While not trade agreements they provide a framework within which trade is permitted between states. It is not UK policy to require a NCA with any other countries to enable bilateral civil nuclear trade. NCAs are needed only with countries which themselves have a legal or policy requirement for an NCA to be in place; this includes the USA, and Canada. For the majority of countries, Government to Government Assurances are sought in support of export licence applications. It is not a legal requirement for Euratom to have NCAs to enable bilateral civil nuclear trade. However, the Euratom Community as a whole does have in place NCAs with a range of states where it is beneficial/necessary to have such an agreement in place. The existing Euratom NCAs are with Argentina, Australia, Canada, Japan, Kazakhstan, South Africa, Ukraine, US, and Uzbekistan.
79. Free-trade Agreements (FTAs) may include, aspects of trade in nuclear material, for example lowering of tariffs and quotas, though they are still subject to both parties meeting international non-proliferation and safeguards obligations. For example the EU-Korea FTA covers tariffs on nuclear materials and equipment and provisions on limitation to market access. Not all FTAs include such provisions though - for example, CETA does not (see below).
80. CETA is an existing free trade agreement between Canada and the EU. It seeks to strengthen their economic relationship through the creation of an “expanded and secure market” for their goods and services. Beneficial aspects of the agreements include: savings on customs duties; the creation of a more level playing field for intellectual property rights; ease of access to professionals on account of mutual recognition of professional qualifications; commitment from both sides to sustainable development. CETA does not include a nuclear aspect as this relationship specifically covered by an NCA between Canada and Euratom.
81. European Economic Area (EEA) Agreement entered into force on 1 January 1994 and brings together the EU Member States and the three EEA EFTA States — Iceland, Liechtenstein and Norway — in a single market, referred to as the "Internal Market". In order to be part of the EEA, and be part of the Internal market, states need to demonstrate compliance with the EU/Euratom Acquis. (Switzerland, who have a civil nuclear programme, are also an EFTA state but are not an EEA State). The EEA EFTA Member States are not Members of the Euratom so do not participate in its processes. None of the current EEA States have a civil nuclear sector programmes though they do need to manage non-civil nuclear power radioactive waste (for example, hospital wastes) in line with the Acquis.

82. World Trade Organisation's (WTO) General Agreement on Tariffs and Trade (GATT) is the WTO's principal rule-book for trade in goods. The WTO rules also include rules for dealing with trade in services, relevant aspects of intellectual property, dispute settlement, and trade policy reviews. Through these agreements, WTO members operate a non-discriminatory trading system that spells out their rights and their obligations. Each country receives guarantees that its exports will be treated fairly and consistently in other countries' markets. Each promises to do the same for imports into its own market. Under WTO rules civil nuclear trade is subject to relevant, standard, tariffs which differ depending on the materials/goods being traded (for example; concrete needed for the building of nuclear power plants is subject to a different level of tariff to nuclear fuel).

## **Sector views**

[This information was provided by the Government to the Committee, but the Committee has decided not to publish this section]

HOUSE OF COMMONS EXITING THE EUROPEAN UNION COMMITTEE

## **Annex: Stakeholder Engagement on European Union Exit (EU Exit) in the Department for Business, Energy and Industrial Strategy**

[This information was provided by the Government to the Committee, but the Committee has decided not to publish this section]

HOUSE OF COMMONS EXITING THE EUROPEAN UNION COMMITTEE