

LEAVING THE EU THE EURATOM TREATY PART 2: A FRAMEWORK FOR THE FUTURE

Institution of
**MECHANICAL
ENGINEERS**

The nuclear industry is facing huge uncertainties, as the UK leaves the Euratom Treaty at the same time as the European Union. No amendment has been made to allow for a consistent transition for the nuclear industry, leaving the UK with the prospect of developing a new State System of Accountancy and Control (SSAC) and new Nuclear Co-operation Agreements (NCAs) to allow for international co-operation, trade and to conform to international treaties on non-proliferation.

In February 2017, the Institution of Mechanical Engineers' Leaving the EU: The Euratom Treaty policy statement^[1] recommended that the UK Government develops a suitable transitional framework to provide the UK nuclear industry with an alternative SSAC prior to leaving the EU and Euratom treaties. In this second policy statement, the Institution details a transition pathway to a new SSAC and describes the actions needed. This pathway does not need the development of a whole new system like Euratom, but makes efficient use of existing systems and frameworks and focuses on the development of new NCAs over the next two years, prior to our departure from Euratom.

The Institution of Mechanical Engineers recommends:

1. That the UK Government adopts the framework approach to safeguarding, Nuclear Co-operation Agreements, Research & Development (R&D) and regulation for the nuclear industry, replacing mechanisms lost as a result of the UK's departure from Euratom.
2. That the UK works towards developing a new nuclear Safeguards regime, through the development of a UK Safeguarding Office, to ensure the country conforms to international rules on safety and non-proliferation.
3. That the UK Government remains an associate member of Euratom for the specific purpose of research & development activities in the nuclear sector. The exact detail of this associate membership should be arranged before the deadline for exiting the EU.
4. That the UK Government should include within the UK's nuclear sector strategy a long term commitment to nuclear R&D programmes including, a pathway for developing Small Modular Reactors (SMRs). This should be achieved through the SMR competition, followed by opportunities for demonstration and commercialisation. The UK Government, in collaboration with the Welsh Government, should support making the existing nuclear licensed site at Trawsfynydd in North Wales available as a potential location for the building and demonstration testing of an SMR following a comprehensive site selection process.

PART 2: LEAVING THE EU THE EURATOM TREATY: A FRAMEWORK FOR THE FUTURE

As we move into the two years of negotiation prior to our final departure from the Euratom and EU treaties, it will be critical that new Nuclear Co-operation Agreements are developed within that time.

One way for the UK to manage a transition to a new era outside Euratom, is through using existing structures to develop a framework that provides the same Safeguards and benefits as Euratom. **Table 1** makes recommendations to the UK Government on possible pathways to achieving this outcome.

Table 1: Possible Pathways

ACTIVITY	SUGGESTED PATHWAY	
SAFEGUARDING IAEA – headquarters in Vienna Timeframe As this system already exists, adaptation to this system could be done in time to meet the 2019 deadline. <i>These transitional arrangements must be in place if disruptions to trade are to be avoided, as NCAs are predicated on appropriate Safeguards being in place.</i>	<p>This pathway is suggested to provide transition arrangements. The UK will need to establish its own Safeguards regime and set up a Safeguards Office to do this.</p> <p>The UK is already a member of the International Atomic Energy Agency (IAEA), which has an International safeguarding and non-proliferation programme, offering international inspection. Safeguards are a series of technical measures applied to nuclear materials to verify that they are being used only for peaceful purposes. This would also cover the safe management and disposal of radioactive waste, as well as progress on geological disposal of waste.</p> <p>This programme includes:</p> <ol style="list-style-type: none">1. Collection and evaluation of Safeguards-relevant information Collects, processes and reviews all available Safeguards-relevant information about a State, to evaluate its consistency with the State's declarations about its nuclear programme.2. Development of a Safeguards approach for a State (country) A Safeguards approach for a State includes those Safeguards measures to achieve the technical objectives for verifying the State's declarations.3. Planning, conducting and evaluating Safeguards activities Develops a plan specifying the Safeguards activities to be conducted both in the field and at the Agency's headquarters. Once an activity has taken place, IAEA evaluates the extent to which it has reached the technical objectives and identifies any inconsistencies that might need to be followed up.4. Drawing of Safeguards conclusions The Safeguards conclusions drawn by IAEA are based on its independent verification and findings. They are the final product of the annual Safeguards implementation cycle and provide credible assurances to the international community that States are abiding by their Safeguards obligations.^[2]	
NUCLEAR CO-OPERATION – SUPPLY CHAIN Essential to create a key agreement with Euratom early in the process, to keep the flow of goods, services and people around the European nuclear industry. A mapping exercise of trade routes to identify key NCAs would also be required. The NCAs can also include nuclear research, nuclear safety research. Timeframe This programme of work needs to be started urgently, following the triggering of Article 50.	<p>Euratom currently holds 12 NCAs^[3] however not all include safeguarding and it is not clear if the NCA signed with South Africa has been ratified and whether agreement to discuss an NCA with South Korea was given in 2013.</p> <p>The UK will need to negotiate new Nuclear Co-operation Agreements (NCAs) with countries that require them for trade; these could include:</p>	<p>Peaceful uses: Argentina China Japan South Africa Potentially South Korea</p> <p>Peaceful uses and Nuclear Safety: Euratom Australia Canada Kazakhstan Russia Ukraine USA Uzbekistan</p>

ACTIVITY	SUGGESTED PATHWAY
<p>RESEARCH, DEVELOPMENT AND COMMERCIALISATION</p> <p>Timeframe For option 1, negotiations to remain an associate must begin immediately following the triggering of Article 50.</p> <p>For option 2, we are a member of IAEA already and could join ITER as a separate nation.</p>	<p>There are two potential routes for research, development and commercialisation that are achievable within the two-year timeframe:</p> <ol style="list-style-type: none"> 1. Associate membership of Euratom and ITER There is precedent for this situation. Bespoke associate membership for Euratom in terms of research & development would allow the UK to continue its current activities with minimal impact. For this specific purpose the UK would need to accept the European Union Institutions' authority. JET is currently operated by UKAEA on behalf of the EU in Oxfordshire; with funding being renegotiated in 2018, taking the line of associate membership would secure this facility and our role in these activities and those at ITER. This would be the recommended and most effective and pragmatic route. 2. IAEA and ITER IAEA has a programme of shared research and technical knowledge transfer activities that the UK would be able to participate in, if the correct NCAs are in place. In Southern France at ITER, 35 nations are collaborating on Fusion energy advancements. Nations outside the EU include: China, Japan, Korea, Russia and the USA^[4]. The UK could join ITER as a non-EU nation to ensure involvement in this project continues. This will likely be at a greater cost to the UK, as the EU currently supplies 46.5% of construction costs with the other nations sharing the remainder. Currently, if the EU portion is split evenly the UK pays about 1.6%, and as an external nation the cost will be about 7.6% of the total, assuming the EU contribution remains the same.^[5]
<p>REGULATION</p> <p>Timeframe This is existing practice in the UK and should continue.</p>	<p>The Office for Nuclear Regulation (ONR) was formed under the 2013 Energy Act with the following aims:</p> <ul style="list-style-type: none"> • A nuclear industry that has a culture of continuous improvement and sustained excellence in operations • All of our stakeholders value our work • A nuclear industry that controls its hazards effectively <p>This is carried out by:</p> <ul style="list-style-type: none"> • ONR sets out site licence conditions that each licensee must comply with in different ways; such as, with a safety case to meet a stage in the plant's life, or with arrangements and procedures to meet a licence condition. The conditions set out the general safety requirements to deal with the risks on a nuclear site. • ONR seeks to maintain and improve safety standards for work with ionising radiations at licensed nuclear sites. It does so through its licensing powers by assessing safety cases and inspecting sites for licensing compliance. It sets national regulatory standards and helps to develop international nuclear safety standards.^[6] <p>There is no reason to assume these will not continue.</p> <p>Prior to the creation of the ONR, the nuclear industry was already actively regulated. First with the Nuclear Installations Act 1965, where today's Nuclear Site Licence finds its foundations. In addition, there are provisions for nuclear regulations to be made under the Energy Act 2013, as well as specific regulations under the Health and Safety at Work Act 1974 (HSWA) such as the Ionising Radiations Regulations 1999 (IRR99) and Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPPIR).^[7]</p>

SAFEGUARDING

Current safeguarding activities in the UK have been carried out by the Euratom Safeguards Office under the Euratom Treaty, and have been a key part of ensuring that civil nuclear activities remain peaceful. In more recent years, continued use of a European nuclear fleet of reactors and the resultant waste fuel has meant increasing amounts of plutonium must be safeguarded. Each year the European Commission releases a report on the implementation of Euratom safeguards, ensuring that each State provides transparency to the others in the treaty.^[8]

Key issues for establishing a UK Safeguards regime in time are:

- Identifying and training personnel for inspection and accounting
- Clarifying the status of previously installed monitoring equipment in plants such as Sellafield
- Determining how the regime will be paid for
- Gaining IAEA agreement that the regime meets the requirements of the Non-Proliferation Treaty

There are a number of different types of facility, for example uranium enrichment, reprocessing and fuel fabrication, as well as waste storage facilities, that present particular safeguarding issues, and it is imperative that a new system is in place on point of exit from Euratom. This is also required to meet the obligations of NCAs, with a number of leading countries involved in civil nuclear programmes that will need to be met through new NCA development.

IAEA already works in collaboration with Euratom, and with the UK being part of IAEA, this will mean that it can still benefit from existing agreements with Euratom Safeguards. In fact, of the 1,234 inspections carried out by Euratom Safeguards in 2014, about half were done jointly with IAEA. IAEA is widening its State Level Concept (SLC), which would allow the UK to develop an SLC with IAEA.

All international safeguarding activities are faced with increasing demands on their resources, and the UK would have to ensure that it offers to do its fair share of international safeguarding activities. This will mean ensuring sufficient numbers of appropriately trained UK safeguarding experts.

NEW NUCLEAR CO-OPERATION AGREEMENTS – SUPPLY CHAIN

A Nuclear Co-operation Agreement (NCA) is an agreement between countries that aims to strengthen collaboration in the areas of civil nuclear goods and services (including materials and technical information), research and safety, with the intention of the continued peaceful development of civil nuclear energy resources. An NCA can be between two countries bi-laterally or between a group like Euratom and another country, multi-laterally.

The Euratom Treaty created a common nuclear market in the EU, including the free movement of workers, and it specifically includes provision for the free movement of those involved in the construction of new nuclear projects. The UK Government should ensure that similar provisions are secured in any future deal with the EU. Article 52 established the Euratom Supply Agency (ESA) to ensure regular and equitable supply of nuclear fuels to users.^[9] Enrichment services have seen an increase in demand, and this is expected to continue due to new developments in Asian and Middle Eastern nations. The UK is one of only a few countries with enrichment facilities that can continue to provide enriched uranium for European and wider markets.

The NCAs held by Euratom have allowed the UK to trade freely with non-EU nations that require an NCA to do business. Without the NCAs, the UK will no longer be able to carry out the supply of goods, services, technical information and materials, as well as conduct collaborative research. The main focus of the next two years must be on replacing existing NCAs between the UK (previously with Euratom) and countries who have a requirement for an NCA. This situation also presents the opportunity to clarify our relationship with the EU27, ie an NCA with Euratom.

Table 2 gives examples of the contents of two different types of NCA; some NCAs may be a combination of both types and have specific sections relevant to the parties involved.

The UK and Northern Ireland already have NCAs with a number of countries including the UAE and India, however the status of these is not clear, as they may be reliant on the UK being a member of Euratom's Safeguarding regime. Future NCAs will be crucial in ensuring the UK remains a global leader in the current and upcoming nuclear energy markets.

SPENT FUEL AND
RADIOACTIVE WASTE

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management was adopted in Vienna by IAEA in 1997. It is the first legal instrument to address the issue of spent fuel and radioactive waste management safety on a global scale.^[12]

Following this, the EU Council Directive 2011/70EURATOM requires Member States to put in place programmes that deliver their policies on the management of spent fuel and radioactive waste that fall within the Euratom Directive.^[13] In 2015 the UK Government released its Lead Document on the approach that it intended to take in order to achieve this Directive. The Lead Document draws together the multiple organisations, regulation and strategy, mostly covered by the Energy Act 2013 and regulated by the ONR, that make up the UK's comprehensive framework for managing spent fuel and radioactive waste. The UK has been reporting back to the European Commission on these activities in annual reports^[14]; the process undertaken to deliver this robust monitoring, regulation and safeguarding must continue, even without the requirement from the Commission.

As we look to a future framework for the nuclear industry, it is vital that all policy, regulation and strategy take into account the whole life cycle of the facilities and fuels. Ensuring that the UK continues on its programme of safe management and geological disposal facilities (GDFs) must become part of the planning process for the current civil nuclear programme, as well as any future new-build programmes. Progress in delivering a GDF for UK radioactive waste has been slow and fractured over the last 30 years, leaving us behind other nations working on this problem. This is an intergenerational responsibility that this generation must deliver a solution for, that guides and protects those who come after us.

Table 2: Examples of Nuclear Co-operation Agreements

NCA IN THE FIELD OF NUCLEAR SAFETY	NCA IN THE FIELD OF PEACEFUL USES OF NUCLEAR ENERGY
Parties endeavour to promote co-operation in the following areas: <ul style="list-style-type: none">• Reactor safety research• Radiation protection• Nuclear waste management• Decommissioning, decontamination and dismantling of nuclear installations• Research & development on Safeguards of nuclear material• Prevention of illicit trafficking of nuclear material^[10]	Parties co-operate in the promotion and development of peaceful non-explosive uses of nuclear energy in the following areas: <ul style="list-style-type: none">• The implementation of projects for the generation of electricity and water desalination• Research & development, including design and application of nuclear energy• Health, nuclear safety, emergency planning and response, environmental protection• Nuclear security• Nuclear Safeguards• The supply of nuclear material, equipment and technology• Technical training and education related to peaceful uses of nuclear energy• The provision of technical assistance and services• The exploration for and development of nuclear materials• Nuclear spend fuel and management^[11]

WHAT NEXT FOR UK GOVERNMENT CIVIL NUCLEAR POLICY?

The UK Government made it clear in 2016, that a new programme of nuclear power station building would begin with the approval of EDF's Hinkley Point C. In addition to this, steady progress is being made at Horizon's Wylfa Newydd and Hitachi's Moorside sites, making the importance of a reliable supply chain of goods and services ever more pressing for the UK's civil nuclear industry. The UK Government must support a steady investment framework for new nuclear build that provides options for Government investment in low carbon electricity generation.

Furthermore, prior to the UK Referendum 2016 to leave the European Union, the then Chancellor opened a competition to look for new and efficient designs for SMRs. This competition aimed to give £250 million for nuclear R&D including SMRs to develop successful technologies further.

The idea of creating opportunities for SMR development, was a key recommendation made by the Institution of Mechanical Engineers' 2014 SMR Statement^[15] as well as suggesting opening up sites for demonstration. The Institution is calling for the UK Government to include within the UK's nuclear sector strategy, a pathway for developing Small Modular Reactors. This should be achieved through the SMR competition, followed by opportunities for demonstration and commercialisation. The UK Government, in collaboration with the Welsh Government, should support making the existing nuclear licensed site at Trawsfynydd in North Wales available as a location for the building and demonstration testing of an SMR. This should be constructed in co-operation with UK companies, and incorporating modules engineered and manufactured within the UK by the nation's nuclear industry.

In this way it will provide an opportunity for the UK to return to the international nuclear reactor supply arena, and position the sector to benefit from emerging markets for SMRs and engage with the wider related commercial export opportunities.

With the programmes and policy changes needed to secure the future of the UK nuclear industry, a key concern is the need for a long-term consistent policy for civil nuclear energy. This includes the management and long-term safe disposal of radioactive waste. For too long consecutive Governments of both parties have been unable to create and deliver consistent policy translating into investment, skills, innovation and technological advancement. Business and academia cannot create a world-leading sector alone. In its recent report on Small Modular Reactors, the ETI identified the ideal conditions for a credible integrated programme as:

- A policy framework that supports economics
- Investor confidence to progress stage-gated investments
- Capable and credible designer
- Capable and credible vendor
- Commitment to UK Generic Design Assessment (GDA) to ensure process of licensing
- A credible site to develop a First of a Kind power station^[16] (see IMechE recommendations above)

None of this will be possible without the delivery of new Nuclear Co-operation Agreements and a new State System of Accountancy and Control.

RECOMMENDATIONS

The Institution of Mechanical Engineers recommends:

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**Institution of
Mechanical Engineers**

1 Birdcage Walk
Westminster
London SW1H 9JJ

T +44 (0)20 7973 1293
F +44 (0)20 7222 8553

media@imeche.org
imeche.org/energy

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