

## EU NUCLEAR RESEARCH & INNOVATION: IN COLLABORATION WITH HORIZON EUROPE MISSIONS

### NUCLEAR



Is a low-carbon energy source



Ensures security of supply



Is environmentally, economically and socially sustainable

### EU NUCLEAR INDUSTRY IN NUMBERS



Accounts for  
**26%**  
of electricity



Almost  
**50%**  
of low-carbon electricity



Supports around  
**1.1Mn**  
jobs



Turnover of  
**102bn**  
per year





## Key points

In line with the European Parliament deliberations on the *Euratom Research & Training (R&T) programme 2021-2025*<sup>1</sup>, FORATOM calls for the following:

- 1. Priority must be given to investing in the development of technologies which will help the EU achieve its decarbonisation goals.** These include both existing and innovative nuclear technologies.
- 2. More EU funding should be allocated to nuclear research & innovation (R&I)** to avoid underinvestment in nuclear innovation and ensure that the European nuclear industry holds **international technology leadership**.
- 3. R&I funding must be allocated towards advancing the performance and efficiency of existing fission reactors in Europe,** a major component of a reliable low carbon electricity supply. This will contribute towards security of supply and reduce dependence on energy imports.
- 4. Synergies between *Euratom R&T* and *Horizon Europe* must be delivered,** ensuring access to cross-sectorial innovation projects and missions, as well as vibrant education, training and mobility opportunities for scientists and engineers.

<sup>1</sup>[European Parliament legislative resolution of 16 January 2019 on the proposal for a Council regulation...Euratom R&T 2021-2025...](#)

## Background

- The Intergovernmental Panel on Climate Change (IPCC) report (Global Warming of 1.5°C, 8 October 2018) makes it clear that nuclear power is essential if the world is to keep global warming to below 1.5 degrees.
- According to the IEA (Nuclear Power in a Clean Energy System, 28 May 2019) a steep decline in nuclear power would threaten energy security and climate goals, and could result in billions of tonnes of additional carbon emissions.
- The European Commission’s “A Clean Planet for All” strategic vision recognises that nuclear, together with renewables, will form the backbone of a carbon-free power sector in 2050.
- Several Member States have highlighted the contribution of nuclear power to achieving the EU’s decarbonisation targets in their recently published draft National Energy and Climate Plans (NECPs)<sup>2</sup>.
- The R&I section of the Energy Union<sup>3</sup> states that **‘The EU should ensure that it maintains technological leadership in the nuclear domain (...) so as not to increase energy and technology dependence’**. This was developed furthermore in the Strategic Energy Technologies (SET) Plan, Action 10<sup>4</sup>, Nuclear. The implementation plan issued April 2019<sup>5</sup> states endorsement from 17 countries, many of which currently do not have operating nuclear power but agree on the importance of advancing nuclear innovation within the EU.
- Moreover, the Nuclear Illustrative Programme<sup>6</sup> (PINC), states that **‘research and development is instrumental to maintain the EU at the forefront of nuclear technology (...) This implies continued investment on research and training/education, as well as on nuclear research infrastructure’**
- Finally, in the European Parliament’s proposal of legislative resolution of 16 January 2019 concerning Euratom E&T 2021-2025 regulation: **‘Nuclear research makes an important contribution to environmental sustainability and the fight to combat climate change’**



<sup>2</sup>[National Energy and Climate Plans, Published in February 2019](#)

<sup>3</sup>[A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy, EC Communication of February 2015](#)

<sup>4</sup>[SET-Plan Declaration of Intent on Strategic Targets in the context of Action 10: “Nuclear”](#)

<sup>5</sup>[Implementation Plan of SET Plan Action 10 on Nuclear Safety published April 2019 by the EC](#)

<sup>6</sup>[Nuclear Illustrative Programme, Published by the EC in 2017](#)

## Euratom Research and Training and Horizon Europe programmes

The EU's new flagship R&I programme has a proposed budget of €100 Bn for 2021-2027 and includes *Horizon Europe*, *InvestEU* and the *Euratom R&T* programmes (Fig.1). *Horizon Europe* will be one of the most wide-reaching R&I programmes the EU has ever undertaken. Its budget is 25% higher than the current H2020 programme<sup>7</sup>, potentially attaining nearly €120Bn by the time it is finally agreed as part of the Multi-annual Financial Framework (MFF)<sup>8</sup>. It covers five mission areas (adaptation to climate change; cancer; healthy oceans; climate-neutral and smart cities; food and soil health). Its aim is **to ensure systemic, cross-disciplinary and cross-sectorial R&I** in order to tackle challenges and trigger competitiveness.

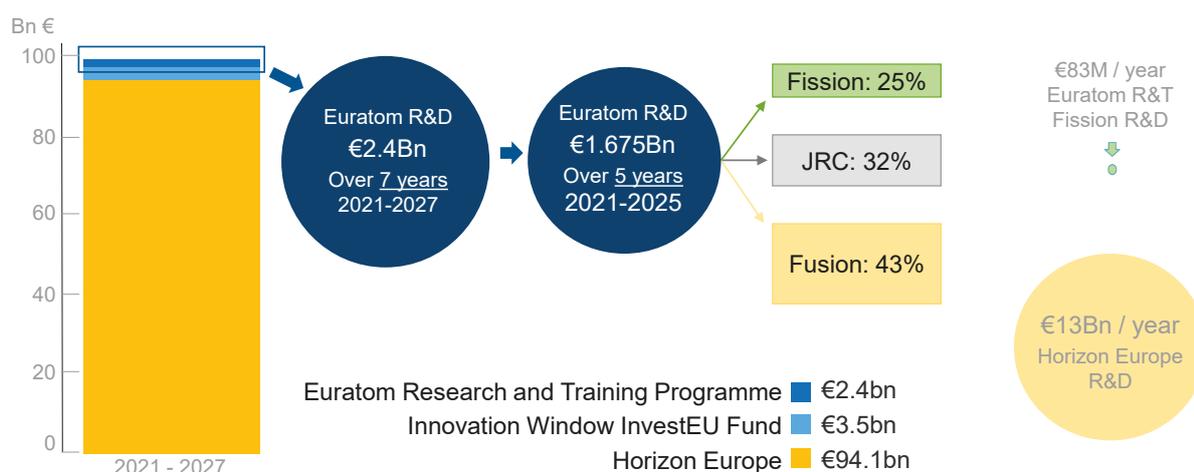


Fig 1. Information sourced from European Commission<sup>9</sup> and EP Proposal<sup>10</sup>

The bulk of EU funding for nuclear R&D is essentially constrained to the Euratom R&T programme. This can be resolved by making use of requirements for cohesion under the new Euratom 2021-2025 and the Horizon Europe programmes. Synergies must be found in order to fulfil R&I themes and missions.

*'Synergies with other future EU programmes and policies are still subject to further discussions depending on the progress made with other sectoral proposals within the EU's long-term budget'*<sup>11</sup>

There are many challenges that can benefit from a truly integrated EU R&I approach. The EU must ensure that R&I funding leads to improvements in **key areas such as: security of energy supply, competitiveness, decarbonisation and environmental sustainability** across the EU. Nuclear R&I has an important role to play within all these areas. Moreover, the Euratom R&T programme includes new aspects such as increased focus on **non-power applications** (eg healthcare, medical equipment and space technologies), all of which are common to *Horizon Europe*.

The European Parliament has recommended increasing funding for **fission R&D to 25%** of the total budget for *Euratom R&T* (compared to the Commission's proposal of 20%), showing a willingness for greater investment in this field. Furthermore, and in relation to the *Euratom Research* agenda, it has underlined the fact that nuclear technology is key to delivering **decarbonised energy** and has emphasised **the need for synergies** between EU funding programmes.

<sup>7</sup>Horizon 2020 Budget Overview

<sup>8</sup>European research priorities for 2021-2027 agreed with member states, [Europarl March 2019](#)

<sup>9</sup>EU Funding for Research and Innovation 2021-2027, June 2018

<sup>10</sup>European Parliament legislative resolution of 16 January 2019 on the proposal for a Council regulation ...Euratom R&T 2021-2025...

<sup>11</sup>European Commission, 20 March 2019

FORATOM welcomes the EU's aim to make use of crossover R&I and provide the best value for investment to its citizens. **However, the current amount allocated to nuclear fission R&D** (covering existing nuclear reactors and near-term advanced technologies) **is far too little compared to what is really needed to meet the EU's decarbonisation, sustainability, energy security and competitiveness goals.**

Based on the calls under the Euratom 2019-2020 Work Programme (WP)<sup>12</sup>, only about half of the 'Fission' budget - €40 million on average per year - focusses on R&D in fission energy generation. The other half mostly covers R&D in other areas such as waste management or radioprotection. While these are also important topics, more **support needs to be given to fission R&D relating to innovation in power generation.**

## The EU is falling behind within the international context

The EU is lagging behind other parts of the world as far as investment in nuclear R&I is concerned. The EU budget allocation is considerably lower, and the scope of nuclear R&D programmes are significantly less ambitious compared with international counterparts.

**In 2019 alone, US Congress<sup>13</sup> devoted over  $\approx$  €1.1bn for nuclear energy R&D.** It is structured to deliver on strategic areas linked to existing and future fission related technologies, such as Small Modular Reactors (SMRs) and Accident Tolerant Fuel (ATF) for short, medium and longer-term innovation.

**The Chinese Government<sup>14</sup> invested heavily in nuclear R&D<sup>15</sup>,** ranging from SMRs, advanced materials manufacturing, digitalization, large nuclear systems and component testing facilities to advanced fuel R&D.

**The Russian Federation's investment in nuclear energy R&D** is around  $\approx$  €1bn/year<sup>16</sup>, with remarkable recent successes in terms of its floating nuclear reactor technology and advanced fuel cycle programme. The key focus for long-term innovation is full recycling of nuclear fuel: balancing thermal and fast reactors, with much of the fuel being recycled and reused<sup>17</sup>.

**International counterparts are spending 10 times more, year on year, on nuclear R&I compared to the EU.** In terms of fission power generation R&I, some countries are spending up to 20-30 times more on specific topics.

The EU cannot continue to hold '**technology leadership**' without a fundamental change to - and significant increase in - the amount devoted to EU nuclear R&I programmes and the priority focus areas. Cohesion and synergies in R&I funding among programmes could be one way of increasing **the level of investment and bringing it more in line with that of international counterparts.** While individual EU Member States and the private sector have vast funding and co-ordinated nuclear R&I programs, the EU also has to play its part to enable the strategic growth and innovation that is needed to support the EU's objectives.

<sup>12</sup> [Financing of indirect actions \(Euratom\) No 2018/1563 and on the adoption of the work programme for 2019-2020](#)

<sup>13</sup> ["US" Congress increases funding for nuclear R&D in 2019](#)

<sup>14</sup> [China's first high-security ATF lab settles in CGN, June 2018](#)

<sup>15</sup> [IAEA Country Nuclear Power Profiles: CHINA, 2018 Edition](#)

<sup>16</sup> ["Russia Invests in Nuclear", 2013](#)

<sup>17</sup> [IAEA Country Nuclear power Profiles: RUSSIA, 2018 Edition](#)

## FORATOM Policy Recommendations

1. **The Euratom 2021-2025 funding envelope for fission R&D should be increased** to enable greater parity at an international level.
2. **Horizon Europe and Euratom 2021-2025 should truly complement each other.** This means linking common themes and cross-cutting aspects across each programme to allow stakeholders to innovate in areas under Horizon Europe “missions” without bias or exclusion. Joint calls, where possible, should be set up for clusters in **health, security, digital, industry and space, energy, climate and mobility.**
3. **Cohesion with R&I in the SET Plan Action 10 ‘Nuclear’** must also be considered and support provided to shared benefits across R&I programmes.
4. **The scope of the Euratom R&T 2021-2025 programme should reflect the actions being undertaken by the Member States, industry and academia.** Areas such as the following should be considered for EU R&I funds (including, where possible, in collaboration with Horizon Europe missions):
  - Improvement in the performance and efficiency of existing Light Water Reactors (LWR) reactors
  - R&D to support the long-term operation (LTO) of existing nuclear power plants
  - Cross-cutting and sectorial R&D
  - Innovative reactors and systems
  - Industrial applications of nuclear energy covering both existing and future technologies
  - Advanced fuel programmes
  - Fast reactors
  - Nuclear R&D infrastructure, networks and demonstration projects
  - Innovation in decommissioning

## Closing remarks

Nuclear R&I needs to receive an adequate level of support if it is to play the key role required to meet the EU’s decarbonisation, sustainability, energy security and competitiveness goals. EU funding for nuclear R&I should be increased in areas which provide the most added value. The Euratom R&T 2021-2025 and Horizon Europe programmes must be structured to deliver on key areas in collaboration with industry and academia.

## About us

The European Atomic Forum (FORATOM) is the Brussels-based trade association for the nuclear energy industry in Europe. The membership of FORATOM is made up of 15 national nuclear associations and through these associations, FORATOM represents nearly 3,000 European companies working in the industry and supporting around 1.1 million jobs.



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