

ASSESSMENT OF THE EUROPEAN UNION'S NUCLEAR RESEARCH, DEVELOPMENT, AND INNOVATION LANDSCAPE AND WORKFORCE READINESS FOR DECARBONIZATION



PREPARED FOR

SNETP (Sustainable Nuclear Energy Technology Platform)
Avenue des Arts 58
1000 Brussels, BELGIUM

Date: January 22, 2025

PREPARED BY

Claudia Gasparrini (Rev. 0 – Rev. 3)

REVIEWED BY

Pekka Nurmilaukas (Rev.0)
Davide Mercurio (Rev.1 - Rev.3)

Jensen Hughes Finland Oy
Runeberginkatu 5 B
00100 Helsinki, FINLAND



JENSEN HUGHES

Executive Summary

The envisaged new nuclear power development worldwide and in particular the new nuclear landscape in the EU will need to be supported by a strong nuclear R&D&I workforce. The past decades of continuous reduction in funding and public support towards nuclear fission technologies have led the EU to a gradual reduction in nuclear technical innovation, a loss of infrastructures, opportunities, technical competences and skills. It has been reported that, while funding for general R&D&I at the EU level increased – up to 30% – the funding related to nuclear fission decreased and in particular the funding at the EU level in nuclear fission accounts only for 1% of the total budget.

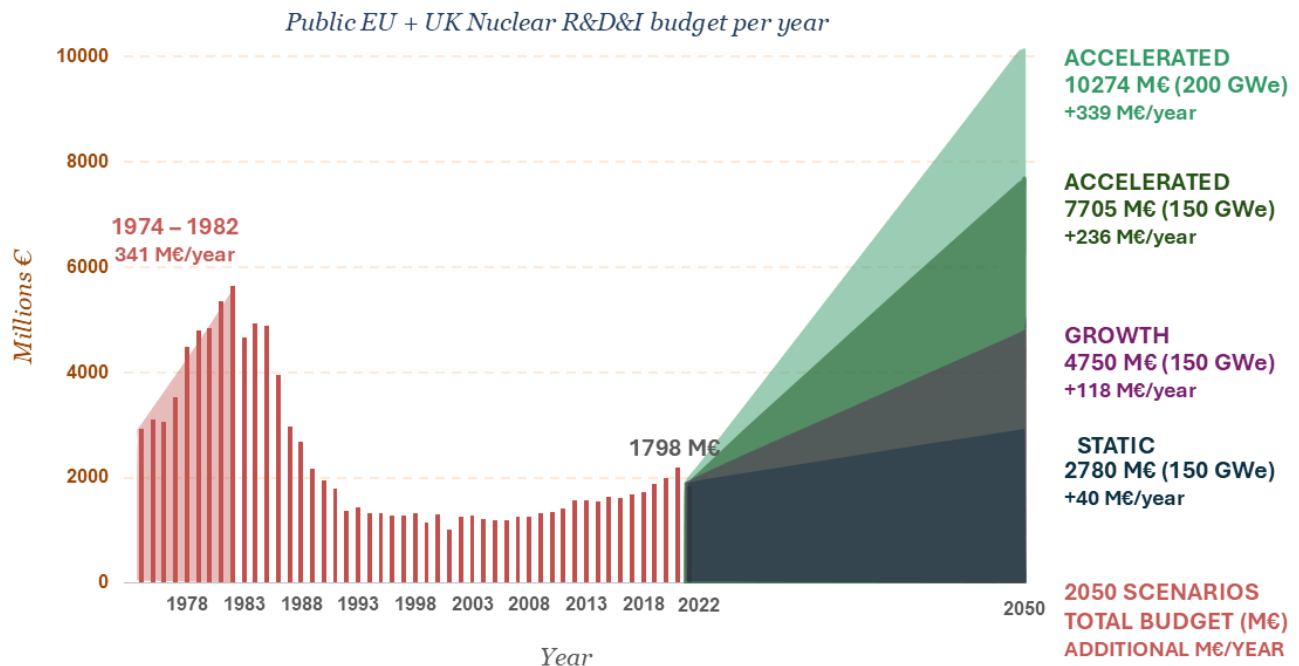
The aim of this study was to survey the current nuclear fission EU R&D&I workforce in terms of its size, its current specialty and the support received from public and private investments. The aim was to understand its current status to provide a credible strategy for its development from now until 2050 to support the nuclear energy aspirations of the continent.

A key point in support of the current nuclear R&D&I workforce potential is the understanding, from most recent published data on the subject, that competence is not solely related to the age of the personnel or to a specific technical skill and knowledge, but it is a mix of strong technical knowledge, interpersonal skills, values and capability to enable team work to succeed. In this respect, the envisaged reduction in nuclear workforce due to the ageing of the workforce can be bridged with initiatives tailored to attract excellent personnels in the field.

It was observed that a huge disparity in terms of number of personnel, their field of expertise and public budget invested exist within the EU countries, though several initiatives are underpinning this point by enhancing cooperation across countries to share best knowledge and practices.

An accurate and detailed description of the EU nuclear fission R&D&I workforce is not a trivial task given the lack of currently published data on the subject. The most accurate data are related to Governmental initiatives aimed at surveying their current workforce in an effort to provide strategic advice for its development over the next decades. In this study, data from open literature were collected; when feasible, unpublished data collected were reported in an effort to provide a better representation of the total workforce. Based on the data collected on personnel and publicly funded budget from IEA database it was possible to estimate the current EU nuclear R&D&I workforce and to provide forecasts for its development in the next decades. The estimated current nuclear EU R&D&I workforce is approximately comprised of 36 000 personnel (fission and fusion), supported by 1 798 M€ publicly invested. The envisaged nuclear EU R&D&I workforce in 2050 could develop in 3 ways:

- + “Static” scenario: a strengthening of the current nuclear workforce to match 150 GWe nuclear power: R&D&I workforce at 2050 would be comprised of 55 608 personnel supported by 2 780 M€/y budget at 2050.
- + “Growth” scenario: advanced technologies being deployed within additional 115 GWe to be installed, the EU nuclear R&D&I workforce in 2050 would be comprised of 95 000 personnel, supported by 4 750 M€/y at 2050.
- + “Accelerated” scenario: advanced technologies are strongly supported, EU nuclear R&D&I workforce in 2050 would be comprised of 154 114 personnel, supported by 7 705 M€/y (150 GWe scenario), or 205 486 personnel supported by 10 274 M€/y (200 GWe scenario) at 2050.



The EU R&D&I nuclear workforce growth, assuming a linear trend over the next 25 years, would require an additional investment (to the one already allocated of 1798 M€ in 2022) of both budget and personnel. The three scenarios developed in this study will require different financial incentives:

- + 40 M€/y and 786 personnel/y in the “Static” scenario
- + 118 M€/y and 2362 personnel/y in the “Growth” scenario
- + 236 M€/y and 4726 personnel/y (150 GWe) or 339 M€/y and 6781 personnel/y (200 GWe) in the “Accelerated” Scenario.

The budget growth between 1974 and 1982 (a 8 years period) was 341 M€/year, higher than the proposed Accelerated Scenario targeting 150 GWe at 2050 (in a 25 years period), it is of similar degree to the proposed Accelerated Scenario targeting 200 GWe (in a 25 years period).

The number of personnel/y to be recruited was calculated from the budget/y forecasted. The relationship used was derived by available public data on the subject (by considering approximately 20 nuclear R&D&I personnel/million € public budget investment on average).

The data presented in this work are not definitive as no accurate data of the entire nuclear R&D&I EU + UK nuclear workforce could be gathered. The forecasts presented were based on publicly available data from the IEA Energy Technology RD&D Budgets Data Explorer, the total workforce was estimated using relationship from open source data. Unpublished data were gathered and presented when received by the EU + UK nuclear institutions and association point of contacts considered.