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#### **“Research & innovation benefits for a low-carbon and climate neutral economy, industrial competitiveness and sustainable development”**

Nuclear power in Europe today remains a complicated topic. It is true that popularity of this technology is increasing within many Member States, particularly among young citizens. Recent surveys suggest that in Finland and Sweden nuclear technology has reached record levels of support.<sup>1</sup> Even in countries with a strong historical opposition, such as Germany, there is a growing understanding that nuclear should play a complementary role to renewables instead of highly GHG emitting fossil fuels.<sup>2</sup> This change in perception is largely due to external contingencies. Climate change, rising energy prices and the conflict in Ukraine have forced policymakers to critically re-examine the energy transition.

Nevertheless, some political actors have not changed their position on nuclear energy. I firmly believe that no matter how much scientific evidence you present to them, they will remain fundamentally opposed. As an engineer who is also deeply involved in European politics, this is incredibly frustrating. Time after time, with every legislative proposal that is presented, I know that there will be an array of actors who are actively trying to exclude nuclear from benefits that are afforded to other low carbon energy sources.

The most relevant of these legislative proposals for today relate to research and innovation funds, which are key for all sectors. These funds would allow the nuclear industry to develop new technologies, as well as enhance existing ones. It also presents an opportunity to scientifically demonstrate – as has already been done many times – that nuclear is clean, safe and sustainable.

To be clear – without securing sufficient funding for research in the nuclear sector, be it for safety or commercial purposes, the European Union will fall behind its competitors. We only have to look as far as our former fellow Member State, the United Kingdom, to see ambitious

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<sup>1</sup> <https://www.euractiv.com/section/energy-environment/news/record-number-of-finns-now-favour-nuclear-to-go-green/>. <https://www.nucnet.org/news/support-for-nuclear-power-reaches-record-levels-survey-suggests-4-1-2022>

<sup>2</sup> <https://www.nucnet.org/news/half-of-germans-see-role-for-nuclear-in-new-europe-wide-survey-12-1-2021>

plans being implemented in support of its nuclear industry.<sup>3</sup> This is to say nothing of other countries, such as China, Russia and the United States.

Policymakers must open their eyes and face reality. The European Union is constraining its industries from reaching their full potential. We are running a real risk of losing our position as an industry leader. This will have serious consequences on EU targets related to climate, energy prices, and security of energy supplies.

But we as the industry must also share some responsibility. It is up to us to clearly communicate what these funds would be used for. Logically we should start with what has long been the Achilles heel of our industry, radioactive waste (or rather, the back end of the fuel cycle). Waste has long been a controversial talking point, but the development of both waste treatment and further commercial use also hold enormous potential. Well planned, focused research can present a sustainable solution to European citizens in different ways. From the safe and permanent underground storage of high-level waste, to the development of new reactor technologies that can use the spent fuel produced by current reactors to generate even more power.

Regarding the final repositories, Finland is the first country in the world to start building a Deep Geological Repository. So, once it is completed, I will personally be indebted to the scientists who will finally give me a tangible point to fire back at the predictable “what about the waste” questions from anti-nuclear campaigners. In addition to Finland, Sweden and France are also well advanced in terms of developing their own deep geological repositories. And we expect other Member States to follow suit.

Regarding new reactor technologies, a number of companies around the world, including some start-ups, are developing breeder reactors. These reactors produce more fuel than they consume. Not only is this a fantastic technical feat, but it seems particularly relevant when considering the big talking point of recent times: how can Europe ensure a secure supply of energy. Now imagine what would be possible if the Commission were to properly fund nuclear research and industrial capabilities.

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<sup>3</sup> <https://www.world-nuclear-news.org/Articles/UK-launches-funding-to-encourage-nuclear-new-build>

Research on the front end of the fuel cycle also holds a lot of potential. New forms of fuel delivery are taking shape, accompanying new reactor technologies. TRISO fuel for instance will significantly increase resistance to a core meltdown. If you follow the European Taxonomy saga, you may be familiar with Accident Tolerant Fuels. There are already several fuels in use today which can be considered as “Accident-Tolerant”. These are fuels which have been developed with the primary goal of providing additional protection against accidents. Furthermore, research and testing of ‘Enhanced Accident-Tolerant Fuels’ is also ongoing in different parts of the world, including in Europe. All of these developments, however, require research. And as the famous saying goes, “research does not grow on trees”. No, research requires funding. In practice this means laboratories need to be set up, testing facilities must be built and researchers and technicians need to be paid.

Regarding the operation of the existing nuclear fleet, average capacity factors are some of the highest we’ve ever seen (if we don’t account for some recent corrosion problems). The average nuclear capacity factor in Europe is around 82%. This is much higher than any other low-carbon source of energy. Technologies that are currently under development will bring even greater improvements, bringing the capacity factor closer to 100%.

Nevertheless, regardless of this impressive performance, nuclear power is still not properly valued and rewarded by the Commission for its role in climate change mitigation and ensuring security of supply. Euratom research funds have decreased. Of the Euratom 2021-2027 budget for R&D only around 20% goes to fission research, and of this 20% only half is allocated to fission power projects. This results in a meagre 40 million euros per year. By comparison, the US spend more than 1 billion.

Technologies like Small Modular Reactors (also known as SMRs) or Gen IV reactors are triggering an increased interest in new nuclear technologies globally. Our industries should not be prevented from jumping on the enormous potential of these technologies. For SMRs, lower financing costs will allow for more streamlined and phased investments, greatly decreasing risks. Their flexibility and operability can strengthen the national and regional transmission network, balancing the high share of variable renewables. Their small size and autonomy means they can be deployed to answer specific use cases in locations where the nuclear industry could not previously operate.

Moving forward, it is clear that investment in nuclear R&D must increase. To allocate funding, the Commission must abide by the principle of technological neutrality. Decisions for funding must be based on science and not driven by ideology. Ultimately, this means that nuclear energy deserves equal access to the same research, innovation and industrial development funds as all other low carbon technologies such as renewables. The JRC report on taxonomy is clear, nuclear power does not cause more significant harm to populations and the environment than other low carbon technologies.

Let me conclude by saying that yes, it is true that renewables will be crucial to our energy systems going forward. However, flexible technologies require backups. Renewables alone cannot adequately address the following three crises: climate change, rising energy prices and security of energy supplies in Europe. We are currently presented with two options, do we go with dirty fossil fuels such as gas or even coal (which emit large volumes of CO<sub>2</sub>), or do we choose nuclear? We are fortunate enough to have two case studies in Europe. We can follow the French example, or we can follow the German *Energiewende* model, based on a nuclear phaseout and partially to blame for Europe's precarious situation today.

If the Commission is serious about these crises, we will see an abandonment of ideological prejudices towards nuclear. Let's be clear – Europe is lagging behind much of the rest of the world when it comes the industrial competitiveness of our nuclear sector. China and even the US have recently invested significant resources into various nuclear technologies, both for internal use and export. It's not too late for Europe to do the same. Let me remind you, nuclear is part of our shared European heritage. The Euratom treaty has remained unchanged since its adoption in 1957 and distinctly calls for “promoting research and disseminating technical information.”<sup>4</sup> It is up to us to live up to the spirit of this treaty, it is time for the Commission to support the only dispatchable, low-carbon and nonweather dependent technology. Only nuclear can support the energy system transition under secure conditions. It is time for Europe to rethink its position as a serious player in the nuclear sector.

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<sup>4</sup> <https://www.europarl.europa.eu/about-parliament/en/in-the-past/the-parliament-and-the-treaties/euratom-treaty>