FORATOM
THE VOICE OF THE EUROPEAN NUCLEAR INDUSTRY

# ENSURING AN AFFORDABLE AND STABLE ENERGY TRANSITION

## NUCLEAR

Is a low-carbon energy source

Ensures security of supply

Is environmentally, economically and socially sustainable

## EU NUCLEAR INDUSTRY IN NUMBERS

Accounts for **25%** of electricity

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

Supports around **1.1Mn** jobs

Turnover of **102bn** per year

March 2022

FORATOM fully supports the European Green Deal initiatives, but we are concerned about escalating energy prices. Therefore, within the context of the recent communication on energy prices, we believe that the contribution of nuclear should have been considered and valued. Particularly given that it accounts for around a quarter of electricity produced in the EU.

# Current context

- ## Energy prices and import dependence.

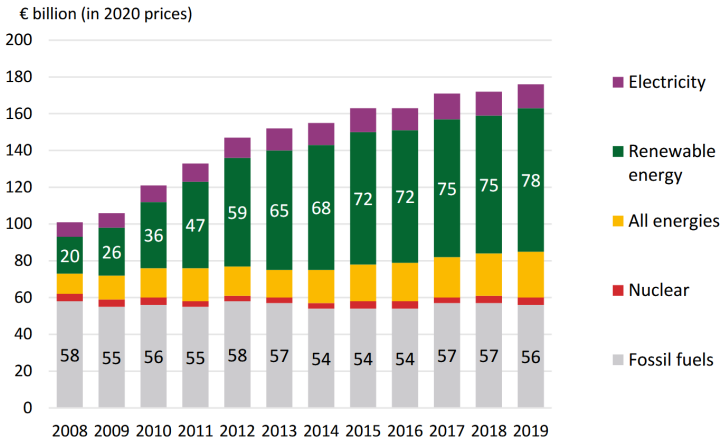
The current high energy prices are mainly being driven by high and volatile gas prices, strongly influenced by increasing global demand and mounting geopolitical tensions. The situation is even more complex for the EU as it is highly dependent on gas imports (currently accounting for around 90%[1] of the gas consumed in Europe).

Carbon prices can also have an impact on energy prices (albeit to a lesser extent). And yet energy produced from coal was ramped up due to a scarcity of gas reserves and a lower dark spark price compared to the clean spark price inspite of the significant difference in carbon prices.

The low availability of renewables in the first half of 2021 has also been partly responsible for high energy prices[2].

- ## EU energy market

The EU reformed its energy market under the "Clean Energy Package", fully adopted in 2019. During the negotiations at EU level, the focus remained on variable renewable deployment and energy efficiency measures. Furthermore, the short-term energy market was promoted. Unfortunately, the measures adopted run the risk of jeopardising perspectives for long-term investments in capital intensive, low-carbon technologies such as renewables and nuclear, with the former benefiting massively from subsidies[3].




Energy subsidies by category between 2008 and 2019[3]

- ## European Green Deal (EGD)

The EGD follows on from the Clean Energy Package. It sets new ambitious emission reduction targets and continues to promote the deployment of variable renewables as the main way of decarbonising the energy sector. Renewable hydrogen has also been presented as an important energy carrier.

Nevertheless, reality shows that the proposed setup might be challenging to take forward. Variable renewables

[1] European Commission, *EUROSTAT*

[2] European Commission(2021), *Tackling rising energy prices: a toolbox for action and support*

[3] European Court of Auditors (2022), *Energy taxation, carbon pricing and energy subsidies*

[4] Ibid.

can only be implemented if dispatchable sources are available to back them up. Whilst gas and coal can help in this respect, neither of these are in line with the EGD's decarbonisation targets. Hydropower can also prove useful, albeit to a limited extent. Energy storage and hydrogen are often put forward as a potential solution for the integration of variable renewables, but they may not be technologically mature in time. Or they could prove to be a costly solution, thus going against the principle of affordability.

**Nuclear remains, therefore, the only source of highly dispatchable, low-carbon energy which is non-weather dependent** as neither biomass nor renewable gases meet all these criteria.

## How can nuclear help address the challenges?

Nuclear accounted for around 25% of the electricity produced in the EU in 2020. This share will probably decrease as power demand rises and some nuclear reactors are shut down (i.e. 3 reactors in Germany which were shut down at the end of 2021 and the last 3 which are due to close by the end of 2022). Although the Fit for 55 package does not mention nuclear specifically, nuclear can provide an important solution for some of the challenges mentioned above whilst at the same time helping to achieve the 2030 goals[5] (and beyond).

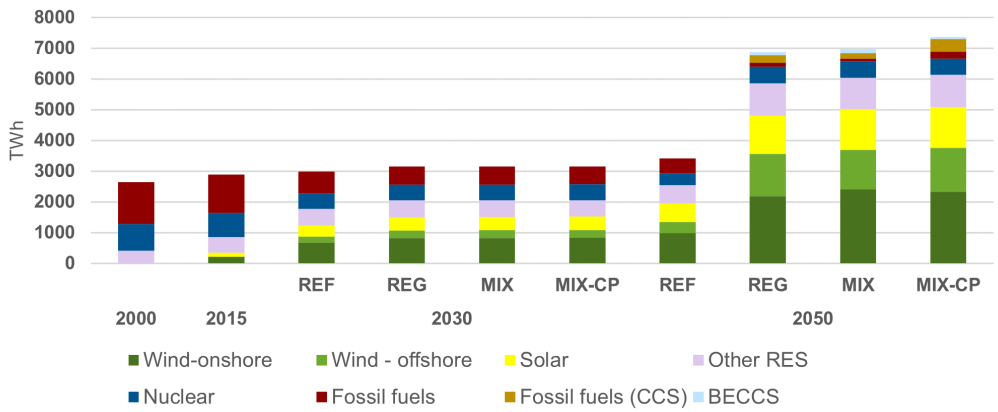
- ### Energy prices

Due to the low operating costs of nuclear and the low impact of potential variations in the price of uranium (given that it accounts for only around 15%[6] of total operating costs), overall nuclear production costs remain stable. Combined with the fact that nuclear reactors have a constant capacity factor of around 90%, this can ensure energy market stability both in terms of prices and grid operation.

In the case of nuclear fuel fabrication, most of the uranium needed for the EU's nuclear fleet is indeed imported. However, compared to fossil fuels the diversity of suppliers provides enough alternatives in cases where one supplier is unavailable, even if the market is rather limited. According to the Euratom Supply Agency's 2020 annual report "uranium inventories can fuel EU utilities' nuclear power reactors for 2.75 years on average". This feature of the nuclear sector provides an advantage compared to fossil fuels, especially in the current situation where gas reserves are at low levels.

- ### European Green Deal and the Fit for 55 package

Focusing on the 2030 targets, the Fit for 55 package proposes a series of measures that should lead to a 55% decrease in $CO_2$ emissions across the EU, compared to 1990 levels. The electricity sector is seen as one of the first to reach net zero emissions by 2040. According to the scenarios proposed in one of the impact assessments[7] of the package, the share of nuclear is expected to decrease from 106 GW currently in operation to around 94 GW in 2030 and around 50-70 GW in 2050.




[5] FORATOM position paper (2021), *Importance of long-term operation of the existing EU nuclear fleet*

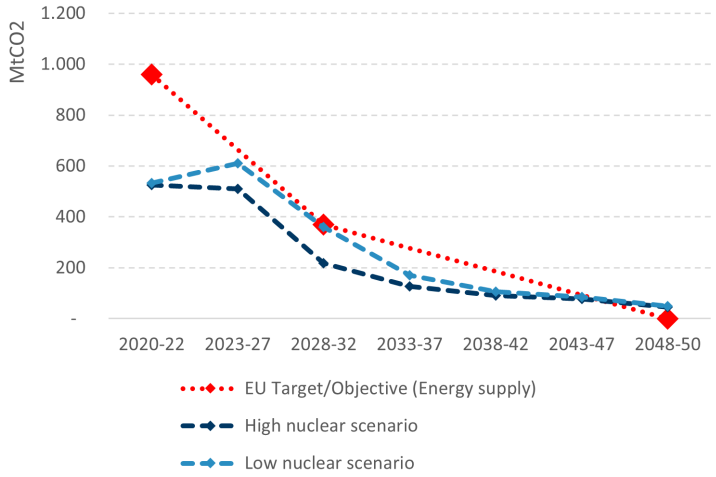
[6] Ibid.

[7] European Commission (2021), Impact Assessment of the revised Renewable Energy Directive, SWD 1/2

As a result, the whole transition to 2030 and beyond might be at risk due to potential security of energy supply issues and affordability, without forgetting the challenge of achieving the decarbonisation targets.

### * Decarbonisation targets

A recent report by Compass Lexecon[8] clearly highlights the positive contribution of nuclear to the decarbonisation of the power system. The modelling used focuses on a low nuclear scenario and a high nuclear scenario. Whilst both scenarios reach the 2030 and 2050 targets, under the low nuclear scenario (which entails no new build and no long-term operation of the existing fleet) there is an increase in emissions in the short-term (2023-2027). This would have an important impact on the overall carbon budget as every tonne of $CO_2$ emitted adds to global warming.




### * Security of energy supply

While the 2030 scenarios for the power sector within the Fit for 55 package are based on the National Energy and Climate Plans (NECPs) submitted by the Member States, they do raise some questions regarding the potential scarcity of dispatchable technologies. Indeed, the current energy crisis has revealed some of the EGD's weakness in terms of security of energy of supply. With nuclear capacity expected to decrease and coal being phased out, the only technology left to support the massive deployment of renewables is gas. But gas also emits Greenhouse Gases (both $CO_2$ and methane) making it more difficult to achieve the decarbonisation targets. Hydrogen is also expected to help ensure energy independence. But in order to enable a competitive hydrogen economy, large amounts of low-carbon hydrogen will be needed. Low-carbon hydrogen produced through electrolysis from nuclear power is key[9] for the creation of such a hydrogen economy in the short and medium term, for the following reasons:

- It is low-carbon.
- The long-term operation of existing nuclear power plants enables the most competitive power prices.
- Nuclear has a high capacity factor of over 90%.

### * Affordability

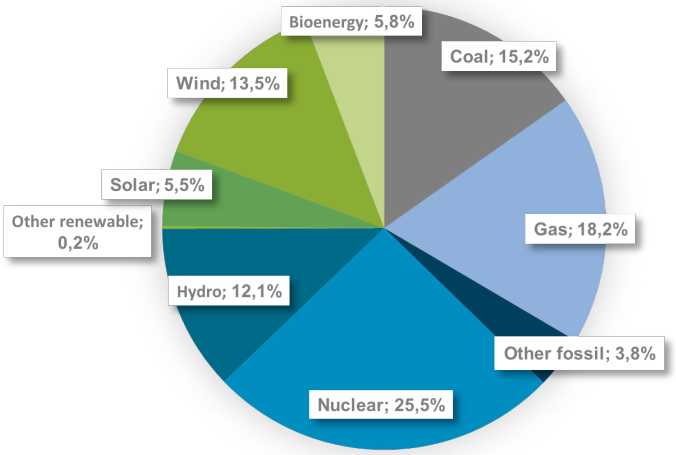
Affordability is key to the EGD. But even here the way in which the current system is designed shows weaknesses. The massive deployment of renewables will trigger high power system costs. Even if in recent years renewable developers have been claiming that projects can be implemented without subsidies, the reality shows that government support (particularly in terms of grid connections) is still needed. Furthermore, potential raw material scarcity could lead to a flattening of the renewables cost curve or even an increase in costs, particularly in the case of solar PV. But the biggest issue afflicting almost all deployed renewables is their variability. And this

[8] Compass-Lexecon (2021), *Pathways to 2050: role of nuclear in a low-carbon Europe*

[9] FORATOM (2021), *Background Paper: Nuclear Hydrogen Production – a key low-carbon technology for a decarbonised Europe*

needs to be resolved. Storage, hydrogen or other proposed solutions aren't mature enough yet and therefore dispatchable technologies are still very much needed. Given this context, customer costs are increasing, and one of the biggest impacts of this will be felt by the EU's industry, potentially affecting its competitiveness.

Nuclear – mainly the existing fleet of reactors – can at least partially respond positively to all three of the above-mentioned challenges. A source of clean energy, **nuclear is the absolute champion in terms of power production in 2021** (as well as in 2020), as it was the biggest single source of electricity in the EU27.




EU27 power mix in 2021[10]

- Energy market

As mentioned above, the EGD may prove challenging, not only from a decarbonisation point of view but also in terms of security of supply and affordability. In this context, Europe is currently facing a dramatic surge in energy prices, as highlighted above. In order to tackle this, the EU proposes to accelerate the deployment of the renewables with the goal of pushing out fossil fuels (mainly gas) via the "merit order effect"[11]. Whilst this may look like the ideal solution, as it also helps reach the decarbonisation targets, in reality it is not.

The goal is to ensure security of supply at an affordable price. Such a measure would require the implementation of, for example, hydrogen, storage and additional grid connections, and if this does not receive significant support from the Member State it will trigger an unprecedented increase in customer costs.

## Policy recommendations

In order to tackle high energy prices and ensure a smooth and affordable transition to a decarbonised economy in 2050, FORATOM proposes the following:

1. The existing nuclear fleet can be a very valuable asset in the event of high energy prices. Therefore, Member States should be encouraged to prolong the operation[12] of the existing fleet. This is by far the most affordable solution for 2030 as it also ensures security of supply and grid stability.

2. Maintaining most of the current nuclear fleet in operation will also help meet the proposed targets included in the EGD and Fit for 55 package in an affordable way.

3. Consider revising the energy market, taking into account the recommendations put forward by FORATOM in reaction to the "Clean Energy for All Europeans" package – see annex 1. Such measures will incentivise investments in the low-carbon technologies needed to decarbonise the power sector by 2040.

4. Avoid any measures that might negatively impact existing low-carbon capacity or which would put at risk future investments in such technologies.

[10] EMBER (2022) *European Electricity Review 2022. Gas crisis interrupts EU coal exit*

[11] More information about the Merit Order Effect can be found here

[12] FORATOM position papers on: Importance of long-term operation of the existing EU nuclear fleet

# Annex 1

Electricity Market Design

- Low-carbon technologies are characterized by high upfront and low operating costs. To attract financing, market participants need to be certain that low-carbon generators will receive sufficient revenues to cover the large up-front capital costs. Policies should improve investment certainty in liberalized markets to keep financing costs low.
- In FORATOM's opinion, the European Commission proposals – if not amended – will most likely not create an effective market conducive to investments in carbon free generation.
- FORATOM welcomes the fact that the European Commission introduces the point that "long-term hedging opportunities allow to hedge against price volatility risks" as one of the core principles of the electricity market, but calls for a robust set of implementing measures going beyond the current proposal.
- FORATOM recalls the European Parliament's own initiative report which calls for the following:
  - "to ensure the EU provides an enabling framework for those Member States that wish to pursue new nuclear power projects to do so, within EU internal market and competition rules;"
  - …the Commission to submit proposals to allow instruments to mitigate the revenue risk over 20 to 30 years, so that investments in new low-carbon generation are actually driven by the market, such as co-investments with contractual sharing of risks between large consumers and electricity producers, or a market for long-term contracts based on average cost pricing".

In achieving such targets, attention must be paid to providing revenue predictability and visibility for clean energy during the energy transition. For example:

- A properly reformed carbon pricing capable of delivering a robust price signal to incentivise the deployment of low-carbon technologies.
- Auctions for new capacities (competition for entry into the market).
- Other kinds of long-term arrangements.
- Value for security of supply.

## 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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