

The road to a low carbon Europe is nuclear power

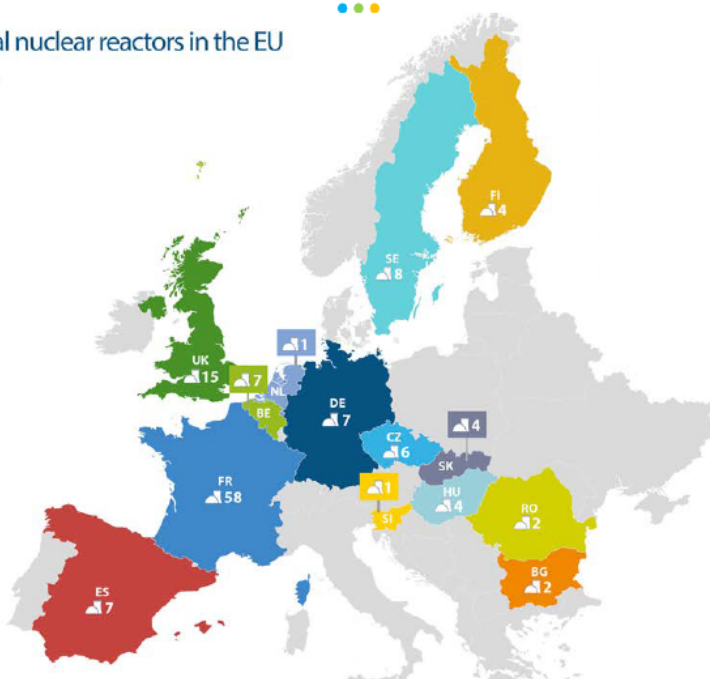
There are more nuclear plants in the European (EU) than anywhere else. Yet a broad range of nuclear policies across the European nations is having a large impact on its future. Currently there are 127 nuclear plants in operation in the EU (plus another 5 in Switzerland). Of the 14 EU countries with nuclear power, a quarter generate more than 50% of their electricity with nuclear power and more than half generate more than 30%. In total, nuclear in the EU, generates 27% of its electricity and accounts for fully half of the EU's low-carbon electricity.

Nuclear energy in the EU – current status

127 Operational nuclear reactors in the EU

Nuclear share of electricity

72% France	58 reactors - 63 130 MW
54% Slovakia	4 reactors - 1 814 MW
52% Belgium	7 reactors - 5 913 MW
51% Hungary	4 reactors - 1 889 MW
40% Sweden	8 reactors - 8 629 MW
35% Bulgaria	2 reactors - 1 926 MW
35% Slovenia	1 reactor - 688 MW
34% Finland	4 reactors - 2 764 MW
29% Czech Republic	6 reactors - 3 930 MW
21% Spain	7 reactors - 7 121 MW
19% UK	15 reactors - 8 918 MW
17% Romania	2 reactors - 1 300 MW
13% Germany	7 reactors - 9 515 MW
3% Netherlands	1 reactor - 482 MW



ELECTRICITY PRODUCTION

27%



LOW-CARBON ELECTRICITY

50%



Source: Foratom presentation “Keeping Europe lights on – a role for nuclear”, WNFC, Madrid April 2018

Nuclear power has provided decades of low carbon, reliable and very economic energy to the people of Europe playing an important role in fueling the European economy. It provides over 800,000 jobs at over 3,000 companies and provides

security of supply needed by a region that mostly imports its fossil fuels (although some countries are coal rich). Most gas and oil come from Russia and Norway. It is not by accident that the lowest carbon emitters are the largest users of nuclear power.

You would think that there is nowhere on earth where nuclear has a brighter future. But you would be wrong. There has always been a strong anti-nuclear presence in Europe, more in some countries than others. Countries like Austria and Italy are anti-nuclear to their core, while other nuclear power houses such as Sweden, Belgium, Spain and of course, Germany, have continuously had to address strong anti-nuclear sentiment. These anti-nuclear forces are primarily based on ideology. They are the greens that have since the 1970s simply believed that nuclear energy is dangerous and needs to be stopped. But there are also countries like the UK, Finland and Hungary that have relatively high support for nuclear and are either building new plants or are planning to.

Greens have been successful in convincing the public that if you support the environment, then you must be against nuclear power. This belief was re-enforced by the Chernobyl accident in the Ukraine 30 years ago, and then again following the Fukushima nuclear accident in Japan in 2011. Couple this with a strong belief that renewables, primarily in the form of solar and wind energy can simply replace nuclear, then the solution seems simple – who would say they don't like sun and wind?

Some European nuclear countries, where greens have had influence in government, have been fighting to sustain their programs for decades. Anti-nuclear supporters have succeeded in getting government to impose special taxes on nuclear to make it costlier while at the same time subsidizing renewables. Under pressure from the Greens, some governments have agreed to long term nuclear phase outs. These deals were made (Sweden, Germany, Belgium) at the time as a compromise to

enable continued operations in the short term, with nuclear supporters maintaining hope that in the long term it would become obvious that the phase out would not be practical. Unfortunately, as the time for these phase outs is now approaching, the opposite rings true. These policies have been in place for a long time and the public have simply accepted that new renewable technology will be there to replace the aging nuclear fleet when its time comes.

With nuclear closures on the horizon, governments have had to take action with mixed results. Sweden has made progress to maintain their fleet having allowed plants to run longer and eliminating its nuclear tax, while Belgium has confirmed its phase out for 2025, and Spain is still working on its plan going forward.

Even France, Europe's largest nuclear country, has not been immune to anti-nuclear thinking. Its previous government mandated a maximum nuclear capacity to ensure the share of nuclear does not increase and then a planned reduction of the nuclear share from about 75% down to 50% within 15 years. In the short term this means that for the soon to be completed new plant at Flamanville to come into service, an existing plant has to be shutdown; the country's oldest at Fessenheim. The new government has taken a more pragmatic stance and has deferred the target date while undertaking a review of its nuclear reduction plan. Let's face it, it is literally crazy to shut down an excellent operating asset at Fessenheim for no reason other than it is politically mandated. The French regulator has said that these plants are safe to operate for another decade. This is an expensive political give –and needs to be seen for what it is, a plan by those opposed to nuclear to exert pressure to close plants, demonstrate there are viable alternatives, and over time push for a complete phase out.

Of course, the biggest change has been in Germany, Europe's technology powerhouse. After finally starting to reconsider

the timing of its planned nuclear phase out, the Fukushima accident happened, and the Greens pushed for immediate closure, even sooner than was originally planned. And they succeeded. As part of its Energiewende, nuclear plants have started to close, and the share of nuclear energy has dropped significantly with a total shutdown only a few years away. In December of last year, one of Germany's top economists, Prof. Dr. Hans-Werner Sinn, made news when he published a paper stating it is unrealistic to believe that Germany can power itself with only wind and sun due to their immense supply volatility. He concludes that 30% renewable is a viable target although this can increase through cooperation with neighbouring countries.

To those of us outside of Germany, their strong commitment to quickly removing nuclear from the mix is a complete mystery. Fear of nuclear in Germany has put the shutdown of nuclear ahead of reducing carbon emissions. No German has ever been hurt by a nuclear plant and German industry has benefited from abundant economic nuclear energy for a generation. With the highest energy carbon intensity in Europe, Germany recently accepted that it cannot meet its 2020 commitments as carbon emissions reductions have ground to a halt in the few years since nuclear started shutting down. Shutting coal plants instead of nuclear would have shown Germany as a carbon reduction leader, but for some reason they chose to continue to damage the environment by opening new coal mines and building new coal plants, as they prioritize nuclear shutdowns over carbon reductions. The German Energiewende is a good albeit expensive experiment, and the results to date should make others think twice about going down this path.

The fight for nuclear power in Europe has been long and hard. In some countries nuclear supporters have been worn down and sometimes wonder if they are fighting a losing battle. But they must always remember that European anti-nuclear sentiment is rooted in an ideology that is out of step with the current

need to combat climate change. In reality, nuclear power has made Europe better in every way by delivering economic reliable electricity, while providing energy security of supply and preserving the environment by reducing the use of fossil fuels.

Even with the new build plans currently in place, Europe will need another 80 GW of nuclear by 2050 just to maintain the status quo. And that is not good enough. Rather than accept the political views of those that oppose; bold new plans should be made to increase the nuclear footprint in Europe including the very challenging task of changing views in anti-nuclear countries. If decarbonization is a goal, then there must be a realization that nuclear has been a great success in Europe and represents the best path forward to secure a low carbon economic energy future for all Europeans. A strong Europe needs nuclear power.