



NUCLEAR SPECIAL

Nuclear 2.0 *a revival with bugs*

Nuclear power is undergoing a revival. Over the past years, governments all over the world have given the green light for new nuclear power plants, or have adopted legislation enabling new plants to be built. However, the financial crisis is causing delays, the waste storage problem remains unsolved and safety continues to be an issue.

| by *Stefan Nicola*

In the late 1980s and early 1990s, nuclear had a terrible image. This has changed. Volatile fossil fuel prices, energy insecurity, and the need to cut carbon dioxide emissions have given nuclear an unexpected boost. According to the

latest statistics from the OECD's Nuclear Energy Agency (NEA), 41 reactors are under construction all over the world, mainly in Asia and Russia. Countries in Europe, Latin America, the Middle East and Africa are also either building

or planning new nuclear power plants. Among those contemplating constructing their first ones are Turkey, the United Arab Emirates, Poland and Indonesia. 'I was always confident that nuclear would be coming back, given that two conditions



Photo by: Kai Senf

are met,' says Luis Echávarri, secretary-general of the Paris-based NEA 'One, if the performance of existing plants is good; and second, when nuclear enters into the realm of necessity. And this is what has happened.'

In 2006, nuclear energy supplied 16% of the world's electricity. The NEA projects, in its latest Nuclear Energy Outlook from November 2008, that by 2050, global nuclear capacity will increase by a factor between 1.5 (low scenario) and 3.8 (high scenario). The largest capacities will then be located in the US, France, Japan, Russia, China and South Korea. In the EU, the nuclear tide turned first in Finland, which in 2002 decided to build the first new European nuclear power plant in more than a decade. Finland broke ground on its Areva/Siemens-made European Pressurized Water Reactor (EPR) in September 2008.

More recently, other European countries have started to follow suit. Sweden in February 2009 decided to revive the controversial energy source by scrapping a national phase-out plan. Italy shut down its four nuclear power plants in the late 1980s, but has now decided to build new reactors. The UK in early 2008 urged

companies interested in building new reactors in the country to come forward. Switzerland may build two new reactors to replace aging plants. In Eastern Europe nuclear is also undergoing a strong revival. That doesn't mean everyone is jumping on the bandwagon. Belgium in 2005 extended the running times of its plants by another 20 years, but has said it will shut down all its reactors by 2025. Germany, the world's fifth-largest nuclear power producer, and Spain have also decided to phase out nuclear. At least for now.

Sentiment |

Even the anti-nuclear sentiment among the public seems to be fading. According to a poll by the European Commission last year, 44% of EU citizens now broadly support nuclear energy, up from 37% in 2005. Nearly half of Germans would now back extending the running times of the country's safest plants – quite remarkable for a country that used to have the world's strongest anti-nuclear lobby. German Chancellor Angela Merkel has been lobbying to have the nuclear phase-out scrapped, and this may very well happen if she emerges the big winner from this September's federal elections. The climate protection argument in particular has

given the nuclear industry a PR boost, with the NEA highlighting that without nuclear power, the world would emit roughly 33% more CO₂.

But critics are not convinced that the nuclear industry really has the climate in mind when calling for new reactors. 'The climate protection card is played only by a few industrialized nations in the West, while the rest of the world invests in nuclear because of energy security

'Nuclear power is a very long-term project'

and doesn't care much about saving the climate,' says Susanne Dröge, a climate policy expert at the German Institute for International and Security Affairs. 'New nuclear power plants can't solve the climate problem, because their share in the overall energy mix is way too small. And the risks nuclear carries – for example regarding nuclear proliferation and nuclear waste management – far outweigh its benefits.'

GREAT EXPECTATIONS

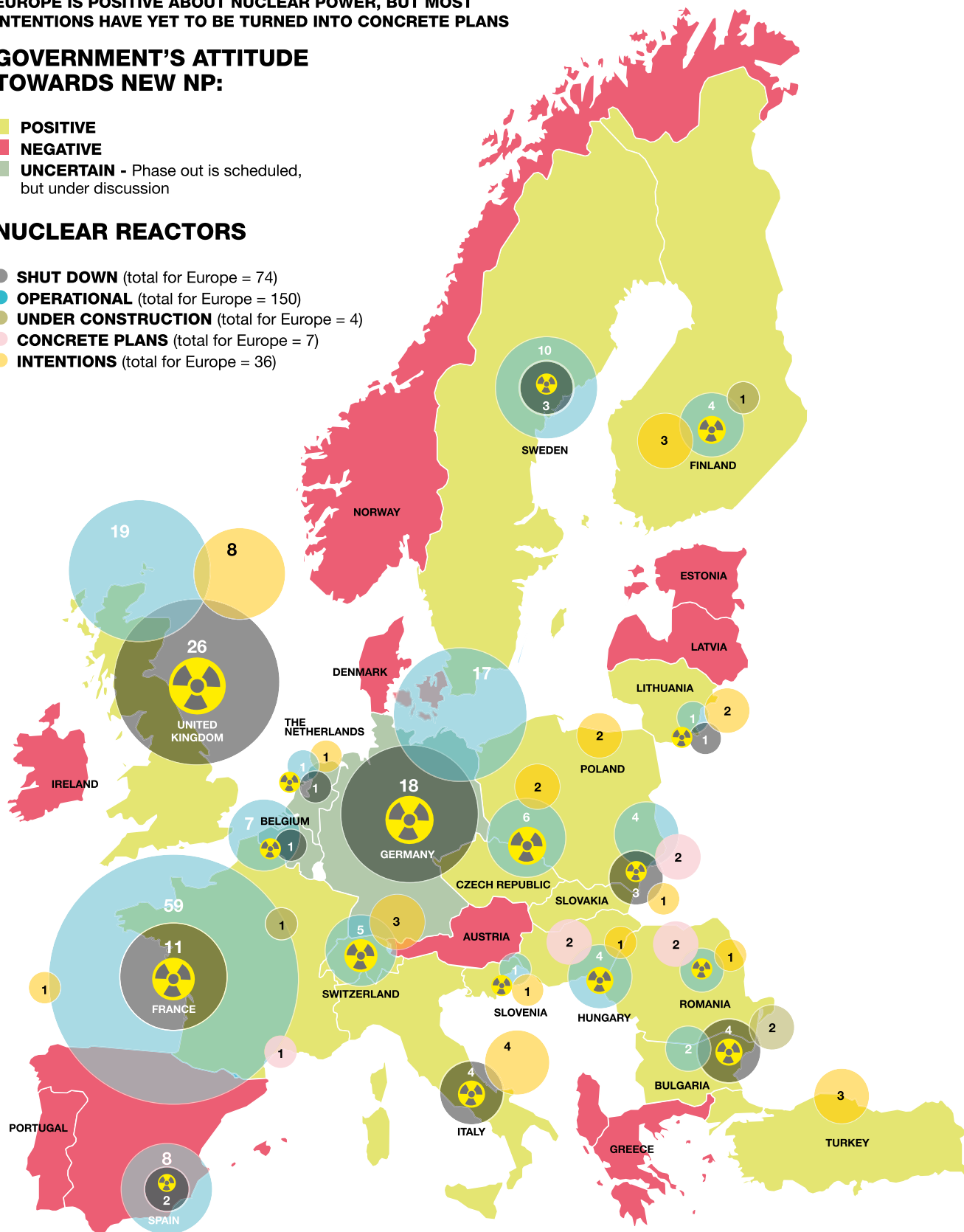
EUROPE IS POSITIVE ABOUT NUCLEAR POWER, BUT MOST INTENTIONS HAVE YET TO BE TURNED INTO CONCRETE PLANS

GOVERNMENT'S ATTITUDE TOWARDS NEW NP:

- POSITIVE
- NEGATIVE
- UNCERTAIN - Phase out is scheduled, but under discussion

NUCLEAR REACTORS

- SHUT DOWN (total for Europe = 74)
- OPERATIONAL (total for Europe = 150)
- UNDER CONSTRUCTION (total for Europe = 4)
- CONCRETE PLANS (total for Europe = 7)
- INTENTIONS (total for Europe = 36)





While people in Western Europe are increasingly backing to keep nuclear in the mix, they are not always in favour of building new plants. Only Finland and France, which is erecting a 1.6 GW EPR at its Flamanville location, are actually constructing new reactors. If the UK and Italy also succeed in launching construction of new plants, 'this is going

the appropriate engineering standards, and with concepts of recuperability, restrictability or reversibility, these repositories don't present any risk for the population. The best specialists in the world, which meet in our agency, are very clear on that. The problem is to get a site accepted by the population, and governments have difficulties with that.

not only more expensive. They are also slowing a necessary modernisation of the existing portfolio. Between 1990 and 2007, 62 reactors were taken off the grid, with only 73 new reactors connected. As a result, the average age of the world's 439 reactors is increasing.

'The climate protection card is played only by a few nations in the West'

to affect seriously the situation in both Germany and Spain,' predicts Echávarri. 'When the politicians of the main parties in these two countries defend nuclear as very important for the country, I think that public opinion will follow them.' But Dröge says this may not be good. 'It's true that Germany is nearly isolated in its decision to phase out nuclear energy. But that decision has kept up the pressure for greater energy efficiency and renewable energy.'

Reversibility |

In Germany and elsewhere, the main obstacle to the acceptance of nuclear power is radioactive waste. A 2008 EU poll showed that 4 out of 10 nuclear energy opponents would change their minds if a safe, permanent solution were found for waste management. Several countries have tried to find a storage site for high-level waste, which radiates for millions of years, but so far only Finland has successfully identified a repository in a geological formation, where it aims to store waste sealed in copper-clad containers starting in 2020. Waste storage projects in other countries have been delayed, mainly because of public opposition out of fear that these sites would eventually be leaking.

Echávarri says the public does not need to worry. 'Given that you have geological formations that have been stable for millions of years, and with

They are reluctant to discuss that issue with the population and as a result, they delay and delay.'

Outside of Europe, public opinion isn't the problem. Consulting agency Accenture says worldwide support for nuclear energy is growing. In a recent survey it conducted of more than 10,000 people in 20 nations, it found that pro-nuclear sentiment is strongest in India (67%), China (62%), and the United States (57%). Eastern Europe is also largely pro-nuclear power, with the population generally favouring it over importing more oil and gas from Russia.

Many reactors in Eastern Europe are from Soviet times and have been, or will be, shut down as part of EU accession agreements. Countries there are thus eager to build new ones.

One major obstacle is financing. An estimated 60% of the costs connected to a nuclear power plant are up-front financing, mainly for construction, and companies have more and more difficulties to secure cash from the world's embattled banks. Bulgaria's Belene project has run into trouble, for example, with French bank BNP Paribas failing to come up with loans for the project. Germany's RWE, a 49-percent stakeholder, is not willing to contribute more cash. Bulgaria is now seeking financial support from the Kremlin – it needs a staggering €3.8 billion. Delays are making plants

Modern reactors, observers say, are much safer than the ones in Three Mile Island or Chernobyl. But while there has been no second nuclear catastrophe, the industry is far from perfect. 'Over the past two decades, there have been several incidents at nuclear power plants, many of them rather critical', says Christoph Pistner, a nuclear safety expert at the Öko-Institut (Institute for Applied Ecology), a Freiburg, Germany-based clean energy research institute. 'Safety efforts in general have been boosted, but important issues remain that are responsible again and again for new incidents. New phenomena and unforeseen courses of events have been occurring that experts hadn't considered yet, and mistakes of the past have been repeated.' Pistner said recent incidents at Forsmark in Sweden, and in Brunsbüttel, Germany, could have been prevented if experts there had learned from similar incidents at other plants and adjusted their safety systems accordingly.

The industry points to efforts to constantly improve its reactors in a bid to make them safer. The new Generation III+ EPR reactor from Areva/Siemens, for example, includes four independent emergency cooling systems; leak-tight containment around the reactor; an extra space to contain molten core; and concrete outer walls designed to withstand airplane impacts and internal overpressure. 'They are based on a revolutionary improvement of proven technology, designed with the experience of four decades of reactor operation,' Echávarri says. That doesn't mean the nuclear industry can afford to be complacent, he adds. 'Safety is not something you reach a very high level of and that's it. You have to maintain that level every day, 24 hours a day.' ■