Working Paper Series L-2013-01

The European reaction to the Fukushima incident

International Conference „Nuclear Safety after Fukushima: From European and Japanese Perspectives“ Tokyo, 22 December 2011

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Introductory Note, March 2013

As more than a year has passed since the following paper was presented at the Tokyo conference, I would like to give a short update.

The paper depicts the European reaction to the Fukushima accident – both the reaction of the single EU Member States and of the EU as such. At the time of the conference, many developments were still ongoing. Even today, they are far from being completed. Of course, in the 15 months since the conference, some milestones have been reached and some activities have been brought to a close.

The political decisions of individual EU Member States concerning the use of nuclear energy have not fundamentally changed since. Germany is still pursuing the “energy turnaround” (“Energiewende”) but encounters growing difficulties to manage this huge task while maintaining grid stability and keeping the rise of electricity prices for consumers under control. A recent decision (27 February) by an administrative law court, pronouncing that the temporary shutdown order issued for the Biblis NPP a few days after the Fukushima event was illegal, has revived discussion about how the phase-out was implemented legally. However, there is still consensus among all political parties that the phase-out as such should be maintained.

In France, the presidential elections of May 2012 have brought the Socialist Francois Hollande to power. M. Hollande has announced a long-term goal of reducing the share of nuclear in electricity generation from 75% to 50% by around 2025. At the same time the decision was announced that the Fessenheim NPP (2 units) is to shut down at the end of 2016. Plans to construct a second EPR at Penly have been discontinued, if not abandoned.

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All other States with new build programmes have pursued their course. In the UK, EdF Energy was awarded the planning permission for Hinkley Point C in March 2013. Poland has pursued its nuclear energy programme. Licensing and procurement activities for new units have continued in Finland and in Czech Republic.

On the EU level, the Stress Test was finalised in the course of 2012. Deadline for submitting the national reports was 31 December 2011. In the subsequent months, a two-step peer review process was carried out, organised by ENSREG and the EU Commission. The first step, in February 2012, was a topical peer review in which the national answers to the three main topical areas of the Stress Test were analysed, in Luxemburg, by a team of experts from all regulators. The second step, in March and April 2013, were country reviews conducted in each country by expert missions. The results were published in an ENSREG Summary Report on 26 April.

ENSREG also organised follow-up activities. Each country committed to publish a National Action Plan by the end of 2012. The Action Plans will be discussed in the coming months.

The EU Commission published its own evaluation of the Stress Test on 4 October 2012, accompanied by a “Staff Working Document” with details and evaluations on the performance of individual Member States and their nuclear power plants. This caused some discussion and some regulators of Member States were quick to point out that the EU report and particularly the Staff Working Document had not been agreed with them.

In parallel, the EU Commission is working on a draft of a revised Nuclear Safety Directive which is to take into account the lessons learned from the Fukushima accident and the results of the Stress Test. An informal draft was circulated in March 2013 and it is expected that the legislation process will continue in the coming months. A major issue under discussion is whether the Directive should introduce binding safety requirements on EU level.

To summarise the developments on European level, the Stress Test is being considered, in spite of some discussions and disagreements in detail, to be a successful and powerful demonstration of cooperation within the EU. The expert activities within the Stress Test have been calculated to amount to about 500 man-years. Now, the focus is on political and regulatory consequences of the Stress Test. In all countries, backfitting programmes have been announced or started. No nuclear power plant has been shut down based on the outcome of the Stress Test; this, of course, has aroused objections by environmentalists and NGOs. Perhaps the main issue in 2013 is whether and in which shape a revised EU Nuclear Safety Directive will be adopted by the European Council. It remains to be seen whether the EU benefits from the momentum gathered through the Stress Tests to acquire enlarged powers in the field of nuclear safety or whether the individual Member States will prevent their competences from being partly taken over by the EU.

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1. Introduction: The EU and its Member States – Who does what in the nuclear field

Of the 27 Member States of the EU, 14 Member States operate nuclear power plants; some of them are building new plants or are planning to do so. The 13 Member States without nuclear power plants include two who have had nuclear reactors in the past: Italy and Lithuania, and one country which has no reactor but is developing a new build programme: Poland.

Currently there are 143 reactors in operation in the EU. In 2009, nuclear contributed some 28% to the overall electricity generation in the EU.

When talking about the reaction of the EU Member States and of the EU itself to the Fukushima incident, it is important to know something about the competences of both sides. As is well known, the EU is a Union with some competences which the Member States have conferred upon it. However, there are also many competences which the Member States have kept for themselves.

In the nuclear field, the distribution of competences between the EU and its Member States is based on the EU Treaty and the EURATOM Treaty:

- The choice of nuclear as part of the energy mix lies with Member States. Each Member State can decide whether it wants nuclear or not. The EU has no competence whatsoever. The fact that all EU Member States are at the same time parties to the EURATOM Treaty does not mean that a Member State is obliged to allow or to support nuclear energy in its jurisdiction.
- The regulation of nuclear safety lies with Member States. Each Member State has its nuclear regulatory authority which performs all regulatory functions: rulemaking, licensing, supervision, enforcement. There is no EU nuclear regulatory agency.
- By contrast, the EU has some legislative competence in selected fields; these also comprise nuclear safety (see the Directive on Nuclear Safety, 2009). EU legal acts have to be implemented by Member States into their national legislation.

Resulting from this distribution of competences, the reactions in Europe to Fukushima can be attributed to two distinct levels.

First, there is the reaction of each individual Member State with nuclear power plants. In all these states, governments ordered their regulators to make a short-term safety assessment and to check whether immediate measures had to be implemented. Further, each government had to decide whether to make any political decision concerning the role of nuclear in its national energy policy.

On the second level, there is the reaction of all Member States together and of the EU. The Member States and the EU decided to conduct the so-called "Stress Test" checking the safety of European nuclear power plants against the lessons learned from Fukushima. This Stress Test was developed both by the associations of national regulators (WENRA and ENSREG) and by the EU as such, represented by the Commission.

The EU, besides the Stress Test, has a second point on its agenda: it intends to amend its legislation or to enact new legislation. This is a process which will take longer than the Stress Test and may have important consequences for the competences of the EU and its future role for nuclear safety.

On EU level, there are several actors in nuclear matters:

- The European Commission is the "government" of the EU. It can propose legislation to the Council, which is composed of representatives of the Member States.
- ENSREG, European Nuclear Safety Regulator Group, is a group comprising the regulators of all 27 EU member states. It was created by Decision of the Commission. It is not an EU entity but it advises the Commission.
- WENRA, Western European Nuclear Regulators Association, is a "club" of the 14 regulators of countries with nuclear power plants. It was formed by the regulators themselves, independent of the EU.

2. Reaction of EU Member States to the Fukushima incident

As stated above, each Member State with nuclear installations initiated a national assessment of its nuclear power plants and possibly other nuclear installations. These assessments, which are partly still ongoing, led to (preliminary) evaluations and consequences of diverging scope. The assessments had to be aligned with the EU-wide "Stress

Test" (see below). Sometimes they are more comprehensive than the Stress Test. For example, France made the assessment mandatory for 150 nuclear installations of all kinds, not only nuclear power plants.

Besides, there was a political issue: each Member State had to decide how to deal with nuclear energy in the future.

Germany

By far the most substantial impact of the Fukushima incident on the nuclear policy in any country was in Germany.

The German reaction to Fukushima incident cannot be understood without the previous history. Almost ten years ago, in 2002, construction of new nuclear power plants was banned and the lifetime of German NPPs was limited to approximately 32 years by phase-out legislation. The government at that time was anti-nuclear. At the end of 2009, a new government was elected which was basically pro-nuclear (Chancellor Angela Merkel). After a year of negotiations and discussion, in December 2010 the German Parliament passed new legislation. The lifetime of the 17 remaining German nuclear power plants was extended by 8 years (for older NPPs) and 14 years (for newer ones). This meant that the German nuclear power plants would be in operation until between 2018 and approx. 2036. It is important to note that even with this new legislation, the German Nuclear Energy Act still was based on a phase-out of nuclear energy; this phase-out had only been extended. New build remained forbidden. Further, heavy taxes were imposed on operators as a compensation for the lifetime extension. In the German nuclear industry, a discussion started whether some nuclear power plants were still economically viable.

In the German public, this lifetime extension was very controversially debated. Even within the government, there were opposed views.

Only three months later, on 11 March 2011, the earthquake and the tsunami struck Japan and the Fukushima incident started. Within a few days, it led to a complete turnaround in German nuclear politics. Government took immediate measures:

- Already on 14 March, in a so-called "Moratorium", government ordered the shutdown of the 8 oldest NPPs "for three months" to allow for safety checks. All experts agreed there was no real legal basis for this.

- A safety assessment of the design of German nuclear power plants was ordered to be done by RSK (Reactor Safety Commission), the advisory body to the federal regulator BMU.
- An "Ethics Commission" was created, with representatives of civil society, churches etc., to reflect on whether it "can be justified" to use nuclear power in Germany.

The RSK assessment, which was published on 16 May, was altogether positive: German NPPs have high levels of robustness. Both external events and the robustness of the electric power supply were taken into account in the design to a higher extent that for the Fukushima plant. Some backfitting measures were preliminarily recommended by the RSK, pending further investigations.

The "Ethics Commission" in its report (released on 30 May) recommended a phase-out within the next 10 years and a transition to a new era of renewable energy.

On 31 July 2011, new legislation was passed, repealing the lifetime extension of December 2010 and even accelerating the phase-out:

- The 8 oldest NPPs remain offline for good.
- The shutdown date of the remaining 9 NPPs is fixed in the Act, ranging from end 2015 to end 2022.

The government announced a new energy policy ("Energiewende"), basically relying on renewables (offshore and onshore wind, solar, biogas) and energy efficiency to replace nuclear in the long-term.

The German operators accepted the accelerated phase-out as a political decision, but they have announced to claim compensation from government by appealing to law courts. It remains to be seen how the courts will decide.

If I may give my private views on the phase-out, its reasons and its consequences:

Nuclear has been very controversial in Germany since the 1980s. In the media, there is a firm majority of antinuclear views, and in the population most Germans tend to feel uncomfortable about nuclear. The Government elected in 2009 had pledged to extend the lifetimes of German reactors, but this legislation project, which lasted until December 2010, was done in an extremely awkward way, with a very bad communications policy. As a result, there was massive opposition and the Government was not happy with its own decision. Then three months later the Fukushima incident occurred and immediately became the top news

in Germany. I am ashamed to say that the earthquake and the tsunami and the 20.000 people who perished in the natural disaster quickly passed out of the focus of German media. The events of 11 March were reduced to the reactor accident.

The Government saw itself in a critical situation because important regional elections were two weeks ahead. It is commonly believed in Germany that this was the main reason for Chancellor Merkel to react as she did, in a quest to appease public opinion. (This did not work out, her party lost the regional elections.)

The new energy policy is still not very well defined and it seems adventurous for one of the largest industrial countries in the world to rely on renewables. The consequences of this decision are still not very well understood. Prices have risen and there is a huge impact on the European electricity market. We will see how this develops.

Switzerland

In Switzerland, there are five nuclear power plants in operation. From about 2006, the major utilities worked on plans to eventually replace those units by two or three large new build projects; the government was supportive. The Fukushima incident changed this. On 7 June 2011, the Swiss Federal Council (Parliament) enacted a law not to replace the existing nuclear power plants, putting an end to the new build plans. The 5 existing nuclear power plants may continue operation until the end of their planned lifetime.

Italy

Much like in Switzerland, in Italy the Fukushima incident led to the cancellation of new build. Italy had phased out its nuclear programme in the 1990s after Chernobyl. This policy was revised by the Berlusconi government and new build plans started in 2008. New legislation enabling new build was enacted, and the Italian national utility ENEL entered into a partnership with France's EDF to build several nuclear power plants. However, in June 2011 a referendum stopped new build plans by cancelling the new legislation with a huge majority. Even though the new build programme was discussed controversially from the start, this outcome of the referendum was a clear impact of the Fukushima incident. Besides, the general loss of popularity of the Berlusconi government certainly was not helpful for nuclear.

France

France is the stronghold of nuclear in Europe, with 58 nuclear power plants in operation and one under construction. The share of nuclear power in the overall electricity generation in France is around 75%, by far the largest of any EU country. There is a huge and powerful nuclear industry.

After the Fukushima incident, on 5 May, the French regulator ASN ordered nuclear licensees in France to do a safety review according to a defined set of criteria. This French safety review is aligned with the EU "Stress Test" (see below). It seems that as a result of the safety evaluation EDF is required to perform substantial upgrading measures for its nuclear power plant, for example completely new Emergency Diesel Generator systems, to the tune of several billions of Euros.

On the political level, there are growing uncertainties. Concerning new build, the construction of Flamanville 3, the first EPR (European Pressurized Water Reactor) in France, will continue. However, the future of the second EPR project in Penly, which has not started yet, is uncertain. The lifetime extension of the 58 existing NPPs beyond 40 years is also under discussion. Very much depends on presidential elections in 2012, with president Sarkozy and the socialist candidate Hollande as competitors. If Hollande wins, it seems there will be no additional new build and some of the oldest plants might be closed down successively.

The Fukushima incident may not have been the only cause of this decline of prospects of nuclear in France, but it certainly played a big role in this.

United Kingdom

The UK is an example for a Member State with a very moderate reaction to Fukushima and where there were no substantial changes in energy policy.

After the Fukushima incident, the government asked the head of the regulatory authority, Chief Inspector Mike Weightman, to do an assessment of the safety of the existing nuclear power plants. This report – published in its final version on 11 October – suggested 38 areas for applying lessons learned from Fukushima and proposed some reasonable improvements, mainly organisational measures for making equipment available in the case of an emergency. All in all, however, the report concluded that UK nuclear facilities have "no fundamental safety weaknesses".

Starting in 2006, the UK has embarked on a policy of new nuclear build and has in the last

years implemented a number of legal and regulatory measures to make this possible. This intention was not changed by the Fukushima incident. In July 2011, Parliament voted the National Policy Statement on nuclear, which is the basis for constructing new nuclear power plants. The Statement designates eight sites for new nuclear power plants and introduces facilitated planning processes.

Chris Huhne, Secretary of State for Energy and Climate Change, is quoted with saying "Nuclear energy has risks, but we face the greater risk of accelerating climate change if we do not embark on another generation of nuclear power".

Reaction of other Member States relying on nuclear

Other countries with new build programmes also decided to pursue this goal even after Fukushima. Finland will go on with planning and construction of two nuclear power plants. Poland, which does not have any NPPs, will continue its new build programme, aiming at two nuclear power plants with 3 GW each, to go in operation between 2020 and 2030. The government of the Czech Republic wants to increase the share of nuclear from 30% up to 60% by 2050.

Part 3: Actions on EU level after the Fukushima incident

Before March 2011, the EU policy was that nuclear is an important part of the energy mix of the EU, contributing to security of supply, to affordable electricity prices and to the fight against climate change. This has not changed since. However, the EU is taking the Fukushima incident as an incentive to enhance nuclear safety and also to strengthen its role in the nuclear field, arguing that the issues of nuclear safety in the wake of Fukushima are best addressed jointly on EU level and not separately in each Member State.

Immediately after the Fukushima incident, the Commission took the initiative and convened a meeting of the regulators and competent ministers of the Member States to decide about a common reaction. A few days later, on 24/25 March, the European Council (Heads of Government) made a declaration that shows the two tracks of EU response to the Fukushima incident. The European Council declared that

- "the safety of all EU nuclear plants should be reviewed on the basis of a comprehensive and transparent risk assessment (**"stress test"**)... in the light of the lessons learned from the accident in Japan..."
- the Commission should "**review the existing regulatory and legal framework** for the safety of nuclear installations..."

These two aspects – the "Stress Test" and new legislation – will now be explained in more detail.

The "Stress Test"

The Stress Test is an evaluation on the robustness of nuclear reactors against external events and concerning a postulated loss of safety functions. The assessments are basically done by the operators (licensees) because they have the prime responsibility for safety. They make a report (first an interim report, the so-called Progress Report, and then a final report) and submit it to their regulators. These review the operators' reports and combine them into a national report.

The final national reports – and this is a very important step – will be submitted to a peer review. This means they will be checked by a group consisting of experts nominated by other regulators. This is supposed to guarantee consistency and to make sure that deficiencies are addressed. It is also seen as a vital element of convincing the European citizens that the Stress Test is meaningful and not just an exercise of self-indulgence by each regulator.

The EU Commission will receive the national reports and will communicate its own conclusions to the Council.

A timetable has been agreed as follows:

June 1, 2011	Criteria ready, start of assessment
August 15	Progress report by licensees
September 15	Progress report by regulators (national reports)
October 31	Final report by licensees
December 9	Progress report by the Commission to the Council
December 31	Final national report
Jan. to April 2012	Peer Reviews of the national reports
28/29 June 2012	Consolidated report of the Commission to the Council.

A scope for the Stress Test was first suggested by WENRA. On 12/13 May, WENRA, ENSREG and the Commission agreed on the following scope:

- Initiating events
    - Earthquake
    - Flooding
- Consequence of loss of safety functions (from any initiating event)
    - Loss of electrical power, incl. station blackout
    - Loss of ultimate heat sink
    - Combination of both
- Severe accident management issues
    - Loss of core cooling function
    - Loss of cooling function in fuel storage pool
    - Loss of containment integrity

It is important to note that the method of assessment is left to the Member States. Besides, as stated above, the Stress Test is actually performed by the licensees and the regulators of the Member States, not by the Commission. This may lead to divergences in details, but the general outline of the reviews should be the same. The Commission is urging the regulators of the Member States to follow approaches compatible with each other.

It is up to the Member States to decide about any consequences of the Stress Test. Therefore, it is difficult to predict what will happen. Will some nuclear power plants, the oldest and least refurbished ones, "not pass" the test? Will there be substantial requirements for upgrading and backfitting? Will some plants be shut down for good if upgrading is too costly? This will have to be seen.

Participation is "voluntary" but in practice no Member State could afford to stay outside. The Commission has also asked neighbouring states to join. Switzerland and the Ukraine have directly joined the EU Stress Test. Russia, Belarus, Croatia, Armenia and Turkey are doing comparable assessments, but are using different timescales.

There is a huge emphasis on transparency. The reports are published. One of the aims is to recover the confidence of the EU public.

In political terms, the Stress Test is a huge success for the Commission – it is closely involved in the safety assessment and regulation of NPPs, an area where the regulators of the Member States normally guard their sovereignty and competence.

EU Legislation – new initiatives

The Commission has announced new legislation in the fields where the EU is competent:

- Introducing EU safety standards for siting, design, construction and operation
- Reinforcing effective independence of national regulators
- Enhancing emergency preparedness and response
- "Reinforcing the EU nuclear liability regime".

Conclusion: EU reaction to Fukushima

The reaction of Member States to the Fukushima incident was divergent. On the level of nuclear safety, all Member States initiated national safety assessments and pledged to incorporate "lessons learned" from Fukushima into their regulatory activities. They also quickly agreed to work together within the EU to perform the Stress Test. On a political level, some Member States cancelled new build programmes and are even accelerating the phase-out of existing installations. Others did not fundamentally change their nuclear policy and want to maintain or even enhance nuclear as part of their energy mix.

The EU has maintained its overall positive approach to nuclear energy (acknowledging that each Member State takes a sovereign decision on whether to use nuclear power). The Commission has taken the initiative to promote an EU-wide common approach to safety assessment and to safety upgrades of nuclear installations in the wake of the Fukushima incident. It is involved in the Stress Tests conducted by licensees and regulators in the Member States, and it is preparing new EU legislation. Thus, the Fukushima incident may lead to enlarged competences being given to the EU.