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Nuclear stress tests

What are nuclear stress tests?

The "stress tests" are a set of **additional safety criteria** drawn up in the light of the **nuclear accident in Fukushima**. These **EU wide tests** will be in addition to safety standards already in place at national level. Their aim is to assess whether the safety margins used in the licensing of nuclear power plants were sufficient to cover unexpected events.

The aim is to learn from what happened in Japan and help **prevent that a similar accident can happen in Europe**. One of the most important lessons to be drawn is that the unthinkable can happen – that **two natural disasters can hit at the same time and knock out the electrical power supply system completely**. In Japan, the power plant withstood the earthquake but the tsunami interrupted the power supply which is necessary to cool down fuel elements. If they are not cooled down, there is a risk of a core meltdown with leakage of radioactivity and radiation getting into the soil and the water.

What will be assessed in the stress tests?

It will be assessed whether the nuclear power plant can withstand the effects of the following events:

1. Natural disasters: earthquakes, flooding, extreme cold, extreme heat, snow, ice, storms, tornados, heavy rain and other extreme natural conditions.

2. All man-made failures and actions. These accidents can be: air plan crashes and explosions close to nuclear power plants, whether caused by a gas container or an oil tanker approaching the plant, fire. Comparable damaging effects from terrorist attacks (air plan crash, explosives) are also covered.

3. Preventive and other terrorist and malevolent acts:

Preventive measures for terrorist attacks – meaning **all measures which should stop an attack from happening in the first place - will be dealt with separately**, involving experts such as anti-terrorism experts, officials of ministries for national security. The reason is that these concerns are issues of **national security**. Measures taken to counter terroristic acts cannot be made public – while the stress tests will be published. On these issues, the Commission will work together with Member States.

An example of preventive measures which have been mentioned in the public are fog systems which produce fog when an airplane is getting close to the nuclear power plant. The fog impairs the view of pilot thus making it virtually impossible to target the nuclear power plant.

What about the power cuts?

Irrespective of the cause (natural disaster or whatever), power plants have to prove that they have **enough back-up power systems** in place in case the power supply is interrupted. They should assume that power is completely lost **for several days**. They also have to describe what happens when the first back-up-system – the battery - does not work, the second, thus describing a chain reaction.

What will be assessed in detail? How do you assess natural disasters?

Earthquakes already reviewed in the past: Each and every nuclear power plant in the EU has undergone an extensive **authorisation process before starting to operate**. If a nuclear power plant is operating in a region where there is a risk of earthquakes, operators needed to prove that the **specific design of a power plant can withstand the magnitude of an earthquake that could be expected in the region. To assess the risk of an earthquake, past experiences are normally taken into account**. If in a given region, earthquakes of a magnitude of Richter scale 6 took place, it was assumed that such an earthquake could happen again. Power plants constructed in this area therefore need to be built in a way that they can operate or shut down automatically if an earthquake of this scale occurs. The same is true for floods and other disasters. **Higher safety margin in stress test:** As Fukushima has taught us that the magnitudes of earthquakes can be much higher than what we experienced in a region in the past, the **stress tests include a higher safety margin**. If a power plant was built to withstand a magnitude of Richter scale 6, it needs now to prove that it **can withstand a higher magnitude**. In practice, this means that at this magnitude all the safety functions are working – that the reactor can be shut down safely, that there is still supply of electricity and that radioactive materials are confined to prevent releases. The same is with floods and other natural disasters.

Is there an EU definition of this "higher safety margin"?

No. It would not make sense to say that all 143 nuclear power plants have to withstand an earthquake of Richter Scale 8 or so, as this would put an unnecessary burden to those plants which are not in a zone with earthquake risks or where risk are much lower. For this reasons, it is the national regulator which has to define this additional safety margin.

How do you assess airplane crash? And terrorist attacks? Explosions?

From the way a power plant is constructed, it is possible to say whether a crash will seriously damage the containment of the nuclear power plant or not. Engineers take the following data to make their calculations: the materials used (concrete, steel), the thickness of the walls and the data of the airplane – the weight of the plane and the speed with which the plane approaches the plant. As the **effect on the plant is measured** – whether it damages the containment and/or sets it on fire – it does not make a difference whether it was an accident or a deliberate act by terrorists.

The same is true for explosions or fire. Experts can tell from the design of the plant whether a power plant can withstand a fire or an explosion happening close to the plant. Whether it was caused by accident by a gas container or an oil tanker, or whether terrorists did use explosives, does not make a difference.

How will the test be carried out?

Tests will be carried out at **three levels**:

1. Pre-Assessment: The plant operators have to answer all the questions in the stress tests questionnaire and describe how the plant would react in different situations. To support what they say, they have to submit engineering studies.

2. National Report: In the second step, the **national regulator** will look at the pre-assessments and check whether the assumptions are credible. As they know the particular design of the plants and have made controls on the spot, they are best placed to do that.

3. Peer Reviews: In a third step, the national report of the regulator will be reviewed by other regulators within European Nuclear Safety Regulators' Group (ENSREG), which represents the 27 independent national authorities responsible for nuclear safety in their country. This will be done by **peer teams consisting of seven people including:**

- one European Commission representative
- two permanent ENSREG members. They will be part of all the peer review teams cross-checking the 14 national reports of all the Member states having nuclear power). This is to guarantee the consistency of the tests.
- four non-permanent ENSREG members.

The composition of each of the teams will be decided together by the EU Commission and ENSREG.

Are you also going inside the plants to make controls?

Yes. Peer Reviews teams are **explicitly allowed** to go into the plants. Member States have to give them access to power plants and help them in any way to do their controls on the spot.

Are their independent experts in the teams? National regulators are by definition **independent from their governments and industry**. Scientists, NGOs and experts from nuclear fields will be able to discuss the results of the stress tests as they will be made public and also discussed in seminars.

Is this credible, if the national regulators check what they already have checked?

New criteria: They are not checking again what they have checked in the past. The stress tests will be a set of questions and **criteria which are new**. They include a higher safety margin for natural disasters, air plane crashes and back-up systems for power supply.

Peer Reviews: The **peer-reviews** guarantee the credibility and accountability of the whole process. This is even more so the case, as out of the 27 national regulators only 14 have nuclear power and 13 have not.

Transparency: All national reports and the results of the peer reviews will be made public. Results should be discussed both in seminars where independent experts, non governmental organizations and experts from the field should be invited.

When will the tests start?

On 1 June at the latest.

When will we have the final results of the peer reviews?

By the end of April 2012.

Some Member States already conducted their national stress tests. Does this mean they do are not taking part in the EU tests?

Some Member States have started early on the basis of what was discussed in ENSREG. We expect that any addition made in the course of the definition of the EU wide process will be taken into account.

Will all the nuclear power plants be tested?

Yes. All existing and planned plants in the EU will need to be reassessed using the agreed common criteria and methodology.

What will happen if a plant fails the tests?

On the basis of the national reports and the peer reviews' outcome, Member States will take decisions **on how to follow up the outcome of the assessments**. Decisions on individual installations remain a national responsibility. In case an upgrade is technically or economically not feasible, we believe reactors shall be shut down and decommissioned.

What happens, if a country does not shut down a plant which fails the tests?

The Commission will publish the report of the national authority and also the peer review. This means that the **results are known to the public and a government has to explain to its public** why it has taken a decision or failed to act.

Given that disasters know no borders will the EU neighbours also implement these tests?

The Commission is working to extend the assessments to other countries, in particular those neighbours operating nuclear installations: **Switzerland, the Russian Federation, Ukraine and Armenia**. The initial reactions have been positive. Russia has already made concrete proposals for improving the international nuclear safety framework.

The Commission is also ready to provide expertise to the IAEA and to third countries, both for carrying out safety reviews and for further developing the international legal framework and regulatory capacities in specific countries. It can also consider providing additional financial assistance to third countries.

What happens after the report is made?

The European Council called on the Commission to review the existing EU nuclear safety framework. The Commission's proposals will take fully into account the results of the stress tests. The **existing nuclear safety directive (25/06/2009)** gives legal force to some safety principles drawn up by the International Atomic Energy Agency (IAEA). It leaves the competence for enforcement of nuclear safety to Member States.