Japanese quake: nuclear power

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Section Science and Environment Section

This note sets out official information from the International Atomic Energy Agency (IAEA) about the nuclear power plants in Japan following the earthquake and tsunami, 11 March 2011, with comments about what is happening and why.

It includes information up to the IAEA bulletin 14:30 Coordinated Universal Time (UTC) 12 April. Further bulletins will be published on the IAEA website, as necessary.

Tokyo Electric Power Company (TEPCO) which runs the Fukushima Daiichi nuclear plants issues technical press notices about the current state of each of the reactors on the site.

The Health Protection Agency, the official body charged with advising the UK government about the effects of radiation in humans, has information on its webpage dedicated to the Japanese nuclear power problem. It advises that there is no health risk to people living in the UK from the release of radioactive material from the Japanese nuclear power plant.

The note also sets out the effect of problems at the Fukushima plant on nuclear power policy in the UK and other countries.

Contents

1 The nuclear plants

Following the earthquake and tsunami, 11 March 2011, only the **Fukushima Daiichi** nuclear power plants are reported to be giving cause for concern. There are six Boiling Water Reactors (BWRs) at this site. The name refers to the method used to transport energy in the form of heat created by the nuclear reaction in the reactor core to the turbines which generate electricity. Other generating and research reactors in Japan are reported to be safe including those at the nearby Fukushima *Daini* nuclear power plant.

The **supply of off-site power** to the site was cut by the disaster, and diesel generators intended to provide back-up electricity to the plant's cooling system were disabled by tsunami flooding. Even after they are shut down, reactors need further cooling, and in the Fukushima reactors which are nearly 40 year-old, electricity is needed to operate the cooling systems. As this was not available, the build-up of heat led to pressure increases and officials vented this at times by controlled releases of vapour.

In addition, several **explosions** have occurred. These appear to have been caused by hydrogen gas generated at the high temperatures by reaction between the zirconium fuel cladding and steam. When hydrogen mixes with oxygen in air it explodes to produce water. Although visually spectacular, an explosion at a nuclear plant does not necessarily lead to a release of radioactivity. The buildings are only an external shell. The major protective barrier around a nuclear reactor is the primary containment vessel. Its integrity is key to preventing release of radioactive material from the core. These vessels are built to withstand major accidents.

Adequate cooling has also not been possible at **cooling ponds**, which are similar to large swimming pools, where spent fuel is housed. This has resulted in fires in these areas.

Many **new-build reactors** have safety systems that do not rely on electricity or mechanical movement to operate, but depend on 'passive' systems which operate, for example, under gravity. Thus, the problem experienced at Fukushima would not arise.

The Japanese authorities tried to cool the reactors to limit damage to the reactor core, using **sea water mixed with boron**. The sea water was a readily available coolant, and boron has a high cross-section for neutron absorption. A reduction in neutron flux within the reactor, which is necessary to sustain the nuclear reaction, would help to bring it under control and

hence reduce the temperature. Fresh water has replaced sea water for cooling as it became possible to supply it to the reactors. Sea water is a useful emergency supply but fresh water is preferable as it is less corrosive.

The Japanese authorities have classified the events at Fukushima Daiichi units at 7 on the **International Nuclear and Radiological Event Scale** (INES). The scale runs from 0 to 7 which is a major accident. See further information on ratings and INES scale.

Following releases of radioactive material, **weather forecasts** in the affected areas are crucial. Ideal conditions are where winds, which transport the radioactivity, are blowing away from land, particularly from agricultural or populated areas, and there is no rainfall or snow as this will bring radioactive material to ground.

The Japanese government asked the IAEA to provide **expert nuclear assistance** to the country. The IAEA can offer support in technical areas such as radiation surveys and environmental sampling, medical support, the recovery of missing or misplaced radioactive sources or advice on emergency response. In addition, the IAEA is coordinating assistance from Member States through the Response and Assistance Network (RANET). The network consists of nations that can offer specialized assistance after a radiation incident or emergency. Coordination by the IAEA takes place within the framework of the *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*.

A detailed and readable up to date **summary of the conditions at each of the six reactor units** at the Fukushima Daiichi plant is online at the IAEA website. **The daily bulletins also contain information about radiation monitoring at the site and at sites throughout Japan, including food and water sources**. The Tokyo Electric Power Company (TEPCO) which runs the plant issues regular technical briefings about the reactors online.

On **19 April** the IAEA reported that the situation at the Fukushima Daiichi nuclear power plant remains very serious but there are early signs of recovery in some functions, such as electrical power and instrumentation .

On **12 April**, the IAEA confirmed that the Nuclear and Industrial Safety Agency (NISA) has submitted a provisional International Nuclear and Radiological Event Scale (INES) Level 7 rating for the accident at the Fukushima Daiichi nuclear power plant. This new provisional rating considers the accidents that occurred at Units 1, 2 and 3 as a single event on INES and uses estimated total release to the atmosphere as a justification. Previously, separate provisional INES Level 5 ratings had been applied for Units 1, 2 and 3.

The following definition of Level 7 is taken from the *INES User's Manual, 2008 Edition* [pdf]:

> "An event resulting in an environmental release corresponding to a quantity of radioactivity radiologically equivalent to a release to the atmosphere of more than several tens of thousands of terabequerels of I-131."

NISA estimates that the release of radioactive material to the atmosphere is approximately 10% of the Chernobyl accident, which is the only other accident to have an INES Level 7 rating.

On **11 April** the Japanese government began considering extending the evacuation area around Fukushima beyond 20km because of projected radiation doses that could be received by the public over time (see section 3).

On **6 April**, the IAEA reported that Japanese authorities had notified it that the leak of highly contaminated water from the pit at Unit 2 had stopped at 20:38 UTC on 5 April. This was achieved by injection of coagulation agents (liquid glass) into the holes drilled around the pits. Work continues to prevent further releases to the sea.

On **4 April** the IAEA reported that attempts to stop a leak of water containing raised levels of radioactivity from a cracked pit at Unit 2 into the sea are as follows:

> TEPCO has identified a possible leakage path from the Turbine Building of Unit 2 to the sea via a series of trenches/tunnels used to provide power to the sea water intake pumps and supply of service water to the reactor and turbine buildings. Initial attempts on **2 April** to stop the leak, by pouring concrete into the pit, were not successful. On **3 April**, the top of the trench was broken open and polymer was poured into the trench in an attempt to stop the leakage of water to the sea through the pit, but leakage has not stopped as of 00:00 UTC on 4 April.

The IAEA was informed that TEPCO:

> ... has been given permission by the Government of Japan to discharge 10,000 ton of low level contaminated water from their radioactive waste treatment facility to the sea. This is in order to have sufficient capacity to store highly contaminated water found in the basement of the Unit 2 Turbine Building.

Due to dilution of the contaminated seawater in the ocean, the potential additional annual dose to each member of the public would be small. TEPCO estimated it at approximately 0.6 millisieverts (mSv), and this assumes that they ate seaweed and seafood caught from near the plant every day for a year.

30 March the situation was reported as still serious. Accumulated contaminated water was found in trenches close to the turbine buildings of Units 1 to 3. Dose rates at the surface of this water were high for Unit 2 at 18:30 UTC on 26 March. The Nuclear Safety Commission of Japan suggests that this has been caused by the water being in contact with molten fuel rods for a time and then directly released into the turbine building via some, as yet unidentified path. An investigation is underway as to how the water accumulated in the trenches. On **29 March** plutonium was found in on-site soil samples, probably from the reactors, but at levels below background. On **27 March** electricity was restored to the plants, but due to damage, there was varying success in using it to power equipment. Water was being used to cool unit 1-4 reactors and cooling ponds. Units 5&6 remain in cold shutdown. Dose rates at the site are being monitored. Radioactive iodine and caesium (see section 2) were detected in water on the basement of the turbine hall of Unit 1 similar to that in Unit 3 which previously led to worker contamination (see section 3). On **21 March,** radiation monitoring up to 200km from the plant indicated measurable contamination. In brief, conditions at the six units on **20 March** was:

Unit 1: Coolant covering about half of fuel rods; authorities believed the reactor core is damaged; high pressure in reactor containment led to venting of gas from containment; explosion 12 March destroyed outer shell of reactor building; appears no breach of reactor pressure or containment vessel; efforts to pump sea water into core continuing; no information on spent fuel pond; 18 March assigned INES level 5.

Unit 2: Coolant covering about half of fuel rods; authorities believed the reactor core is damaged; explosion 15 March, reactor containment vessel may not be fully intact; white smoke from reactor building on 19 March no longer visible on 20 March; efforts to pump sea

water into core continuing; no precise information on spent fuel pond, but 20 March workers began pumping 40 tonnes of seawater into the spent fuel pond; 18 March assigned INES level 5.

Unit 3: Coolant covering about half of fuel rods; authorities believed the reactor core is damaged; high pressure within reactor's containment led operators to vent gas from the containment; on 14 March an explosion destroyed the outer shell of the reactor building, and concern that the reactor's containment vessel may not be fully intact; white smoke emerging from the reactor, appeared to be less intense on 19 March; efforts to pump seawater into the reactor core continuing; concern about condition of the spent fuel pond, indications of inadequate cooling water level in the pond, and Japanese authorities have addressed this by dropping water from helicopters into the building and spraying water from trucks. Spraying from trucks continued on 20 March; 18 March, assigned INES rating of 5.

Unit 4: All fuel had been removed from the reactor core to the spent fuel pond for routine maintenance before the earthquake; building's outer shell damaged 14 March, and have been two reported fires - possibly including one in the area of the spent fuel pond on 15 March - that were extinguished spontaneously; concern about the condition of the spent fuel pond, and water spraying into the building began, 20 March; 18 March, assigned INES rating of 3.

Units 5&6: Both shut down for routine maintenance before earthquake; both reactors achieved cold shutdown, 20 March. Now in a safe mode, with cooling systems stable and under control, and with low temperature and pressure within the reactor; gradually increasing temperatures over the past few days at both spent fuel ponds. Two diesel generators established Unit 6 to enable power cooling and fresh-water replenishment systems in spent fuel ponds and reactor cores of both units. Temperatures in both ponds had decreased significantly on 20 March; workers have opened holes in roofs both buildings to prevent possible accumulation of hydrogen, suspected of causing explosions at other units.

Grid: Progress in restoring external power to the nuclear power plant, although it remains uncertain when full power will be available to all equipment.

2 Radioactivity in food, drink and the environment

Radioactive contamination is measured in becquerels (Bq). One Bq is a single radioactive disintegration from a nucleus per second. Ground contamination is usually expressed in Bq per square metre. The effective **radiation dose** to people is measured in sieverts (Sv). This is typically expressed in millisievert (mSv) or microsievert (µSv), which is one-thousandth or one millionth of a sievert. See further information about radiation.

It is important to be aware that naturally occurring radiation is all around us, it comes from rocks, building materials, food, drinks and air. That monitors can detect and measure it does not necessarily mean that it is in harmful concentrations, but is more an indication of the sensitivity of the monitor. In the UK a person's radiation exposure due to all natural sources amounts on average to about 2.7 millisievert (mSv) per year. One chest X-ray will give about 0.02 mSv. See a table of radiation doses from common sources of exposure. This is published by the Radiation Protection Division of the Health Protection Agency which is the official body charged with advising government on the health effects of radiation in the UK.

Bulletins about radiation monitoring of food, drink and the environment, headed 'Radiation Monitoring' are updated nearly every day on the IAEA website. For the most extensive and up-to-date information, check these.

In brief, on **18 and 15 April**, the Japanes authorities lifted restrictions on some foods and milk in some areas.

On **4 April** an overview of reported analytical results of 134 food and milk samples from a range of prefectures in Japan taken between 15 March and 2 April indicate that, in all bar one sample, radioactive iodine, ^{131}I, and radioactive caesium, ^{137} Cs and ^{134} Cs, were either not detected or were below the regulation values set by the Japanese authorities.

On **30 March** a comprehensive report of the spread of radioactivity to food, water and the environment was published in section 2 of the 16:30 UTC 29 March press release on the IAEA website.

On **27 March** radiation monitoring at various locations in Japan carried out on ground, air and sea samples showed significant radiation. Levels of ^{131}I in drinking water led to recommendations for infants not to drink water at six locations, and for adults and infants not to drink it a one location. Infants are more susceptible to the harmful effects of radiation than adults so exposure thresholds are lower for them.

Food samples taken in five prefectures between 23 and 25 March indicated levels of ^{131}I in raw milk well below the threshold set by Japanese authorities. ^{137} Cs was also detected in milk from one prefecture but below threshold. In samples taken 24-25 March no ^{137} Cs was detected in four other prefectures.

In samples of leafy vegetables taken 22, and 24-25 March in three prefectures, ^{131}I above threshold was detected, and ^{137} Cs below threshold was detected in two prefectures but above in one.

On **22 March** the Japanese authorities announced plans to monitor radioactivity in the marine environment.

On **20 March**, the Japanese officials informed the IAEA that ^{131}I has been detected in three milk samples tested in the town of Kawamata. The concentration is reported to be above allowed levels. ^{137} Caesium (Cs) was detected in one sample, though in concentration below allowed levels.

In the Ibaraki prefecture, ^{131}I and ^{137} Cs have been detected in leaf vegetables such as spring onions and spinach. Some of the samples are reported to be above the levels allowed by the Japanese food hygiene law for emergency monitoring criteria for intake of vegetables.

According to Japanese officials measurements of radioactive iodine and caesium, ^{131}I and ^{137} Cs, in tap water from 46 locations were below detectable limits. ^{131}I was detected in only six locations, though the concentration was reported to be below levels allowed by the Japanese food hygiene law for emergency monitoring criteria for drinking water.

Although radioactive iodine has a short half-life of about 8 days and decays naturally within a matter of weeks, there is a risk to human health if radioactive iodine in food is absorbed into the human body in the short-term (see section 3: **iodine**).

On **19 March**, the Japanese authorities confirmed the presence of radioactive iodine, ^{131}I, in food products from the Fukushima Prefecture, the area around the Fukushima Daiichi nuclear power plant. The products were measured from 16-18 March. The authorities requested an investigation into the possible stop of sales of food products from the Fukushima Prefecture.

3 Effect on people

The population within the 20-kilometre zone around Fukushima Daiichi was **evacuated**. Japanese authorities have also advised people living within 30 kilometres of the plant to remain indoors.

A 30-kilometre **no-fly zone** was established around the Daiichi plant. Normal civil aviation beyond this zone remains uninterrupted. The Japan **Coast Guard** established evacuation warnings within 10 kilometres of Fukushima Daiichi and 3 kilometres of Fukushima Daini.

Japanese authorities have reported some **casualties** amongst nuclear plant workers, which appear to be both physical and radiological. Three workers at Unit 3 were exposed to significant doses of radiation on 24 March. The skin on their legs was contaminated with radioactive liquid which led to them receiving localised doses of 2-6 sieverts. No medical treatment was required but they are under observation.

Elevated levels of radioactivity have been detected at the Fukushima Daiichi site at various times. Radiation measurements near Fukushima Daiichi and beyond have indicated elevated levels at times since the reactor damage began. Dose rates have been measured at 47 cities and town representing a comprehensive nationwide monitoring network

On 14 March Japanese officials reported that 230,000 units of stable **iodine** had been distributed to evacuation centres around the Fukushima nuclear power plants as a precautionary measure, but not administered to people. Such tablets are designed to increase the pool of non-radioactive iodine (I) in the body and hence reduce the uptake of any radioactive ^{131}I which would be expected to be discharged following a major nuclear accident. Iodine is taken up and concentrated in the thyroid, where there is an increased chance of the development of cancer if ^{131}I is present. Another radioactive element which is likely to be released following a major nuclear accident is ^{137}caesium (Cs).

On 16 March, Japan's Nuclear Safety Commission recommended local authorities to instruct evacuees leaving the 20-kilometre area to ingest the stable iodine preparations. This is available at evacuation centres as pills and syrup for children. The order recommended taking a single dose, with an amount dependent on age as follows:

Baby, 12.5mg; 1 month-3years, 25 mg; 3-13 years, 38 mg; 13-40years, 76 mg; 40+years, not necessary.

Authorities have waited before giving stable iodine tablets to the population because they have to weigh the benefit against any side effects. Thus it is unwise to administer it until radiation levels reach a level where benefit outweighs risk. The dosage increases with body weight up to age 40 years. The carcinogenic effects of radiation take many decades to be expressed, thus from age 40 years there is little point in taking stable iodine as people are likely to have died from other causes before radiation-induced cancer occurs.

On 11 April the Japanese government announced that it had decided to establish **'Planned Evacuation Areas'** and **'Evacuation prepared Area'** in the areas beyond the 20km radius from the Fukushima Daiichi nuclear power plant.

The 'Planned Evacuation Areas' were initiated because people in the areas beyond 20 km radius could be exposed to over 20mSv during the course of the next one year, approximately until next March. The government will be consulting with the local communities about planned evacuations, and hope that will be carried out during the next month.

The 'Evacuation Prepared Area' includes the area previously defined as the 'Indoor Evacuation Area' between 20 and 30 km from Fukushima Daiichi, but excludes those areas designated above as 'Planned Evacuation Areas'.

Within the 'Evacuation Prepared Area' people should be prepared for indoor evacuation or evacuation (outside of this area) in case of emergency. Voluntary evacuation is recommended within this area. Children, pregnant women, people who require nursing care and those who are hospitalized should not enter this area. Kindergartens, pre-schools, elementary schools, junior-high schools and high school will be closed within this area.

4 Europe

4.1 UK policy

Chris Huhne, Secretary of State for Energy and Climate Change, published the following statement on 14 March:

> "We take this incident extremely seriously even though there is no reason to expect a similar scale of seismic activity in the UK. I have called on the Chief Nuclear Inspector, Dr. Mike Weightman for a thorough report on the implications of the situation in Japan and the lessons to be learned. This will be prepared in close cooperation internationally with other nuclear regulators.
>
> "It is essential that we understand the full facts and their implications, both for existing nuclear reactors and any new programme, as safety is always our number one concern."[1]

Dr Weightman has been asked to provide an interim report by mid May 2011, with a final report in September 2011.[2]

On 24 March 2011, in response to a question in the Commons, Chris Huhne explained the very substantial differences between the Japanese situation and that in the UK which is not subject to severe earthquakes and tsunamis. However:

> We do have extreme weather events, and Dr Weightman has asked all our existing nuclear sites to check that they can withstand the extreme weather events that we experience.[3]

Regarding safety, he said:

> We refused to authorise the boiling-water reactor type used in Japan when that was proposed for use in the UK.[4]

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1 http://www.decc.gov.uk/
2 HC Deb 5 April 2011 c885-6W
3 HC Deb 24 March 2011 c1074

He said that the government believes new nuclear has an important role to play in the UK. He added “unless Dr Weightman's report gives us any particular reason to reassess that, I see no reason why that should not remain our view”.

The government is considering implications for the nuclear National Policy Statement in the light of the nuclear problems in Japan before proceeding with the ratification of all the energy NPSs.[5]

4.2 UK Government’s response to Japan quake

On 30 March, the Minister of State Foreign and Commonwealth Office, Jeremy Browne, issued a written ministerial statement. This included information regarding the nuclear position, specifically help given to Japan, and advice for British nationals in Japan:

> (...) We have also offered other forms of support to the Japanese Government including nuclear expertise. Through the Department for Energy and Climate Change the British nuclear industry has also provided radiological equipment to assist the Japanese as they work to bring the situation at the Fukushima nuclear plant under control.
>
> Events at the Fukushima Dai-Ichi nuclear plant have been of serious concern. On Thursday 17 March, we advised British nationals currently in Tokyo and north-east Japan to consider leaving the area. We also joined the US in advising nationals to remain outside a broader 80 km zone around Fukushima. As a precautionary measure, we also began issuing iodine tablets to British nationals from locations in Sendai, Niigata and Tokyo. We are now distributing iodine tablets solely from our embassy in Tokyo. We have explained the circumstances in which people should take this medicine, who are the priority recipients (children and pregnant and breastfeeding women), and how we will advise people further on this if the situation changes.
>
> The Government chief scientific advisor (CSA) and the Scientific Advisory Group in Emergencies (SAGE) have been engaged in detailed scenario planning for dealing with the ongoing events and we have contingency plans in place. The CSA has briefed the British community in Japan three times by telephone conference. Even in a worst case scenario, SAGE's advice is that the risks to human health beyond the exclusion zone set by the Japanese authorities could be managed by precautionary measures, in particular, staying indoors to avoid exposure.[6]

4.3 EC and other countries

On 15 March the European energy commissioner, Guenther Oettinger, held an emergency meeting with member state, industry and national regulatory officials in Brussels. It is reported that:

> EU member states have agreed to a series of Europe-wide 'stress tests' on the region's nuclear power plants.(...)
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> The tests are likely to assess the risks that earthquakes, tsunamis, terror attacks and power cuts pose to European nuclear plants. Other variables are set to include the suitability of cooling systems and operational activities, the requirements for back-up systems, and overall plant design.

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4 HC Deb 24 March 2011 c1074
5 HC Deb 28 March 2011 c166W
6 HC Deb 30 March 2011 c19WS

> EU examinations will be carried out before the end of this year.[7]

Further comments by Gunther Oettinger that some European reactors would fail stress tests, and that Japan was facing an "apocalypse" which was in the "hands of God",[8] were denounced as sensational by other European leaders.[9]

Following an Extraordinary European Energy Council on 21 March 2011, called partly to discuss the Japanese situation, Chris Huhne issued a written ministerial statement on the outcome:

> The Commissioner ... noted the right of member states to decide upon their own energy mix and that nuclear would continue to play a large role in the EU for the foreseeable future. He proposed that member states should work together to develop and approve an EU safety check for nuclear plants. The UK agreed on the importance of a measured response based on the evidence...
>
> The Council concluded that the EU response to the situation in Japan should involve comprehensive risk and safety assessments ("stress tests") of nuclear power plants in Europe with full involvement of member states in determining how this should be done. EU neighbouring countries should also be involved in the assessment, as well as international bodies such as the G20 and the International Atomic Energy Agency.[10]

Angela Merkel is reported to have put government plans to prolong the lifespan of Germany's nuclear power plants installed before 1980 on hold for three months pending the outcome of an inquiry into reactor safety.[11] She has been criticised by nuclear officials and the German opposition for her about-turn on nuclear policy, which is seen as driven by regional elections. She is reported to have called for the implementation of common safety standards at Europe's nuclear power plants, but EC Directive 2009/71/Euratom already calls on member states to implement IAEA safety standards by summer 2011.[12]

It is reported that on 1 April 2011, RWE, one of Germany's nuclear operators, filed a lawsuit against the three-month moratorium, arguing that nothing had changed at the nuclear plants since 2010 when Merkel agreed to prolong the country's nuclear phase-out from 2022 to 2036.[13]

Johannes Teyssen, CEO of E.ON, said that a moratorium did not make sense on a Europe-wide basis.

Other countries including France, Spain and Italy have said they are unlikely to reduce their reliance on nuclear energy.[14]

> Decisions on whether to use nuclear power lie with EU member states, although in a "2050 Roadmap" published earlier this month by the commission said nuclear energy should play an important role in the bloc's transition to a low-carbon economy.

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7 http://euobserver.com/9/31992/?rk=1
8 http://euobserver.com/9/32011/?rk=1
9 http://euobserver.com/9/32031/?rk=1
10 HC Deb 28 March 2011 4WS
11 http://euobserver.com/9/31985/?rk=1
12 http://euobserver.com/9/32027/?rk=1
13 http://euobserver.com/9/32114/?rk=1
14 http://euobserver.com/9/31992/?rk=1

> Brussels also has responsibility for monitoring the implementation of the EU's nuclear safety directive which makes International Atomic Energy (IAEA) standards partially legally binding under EU law.
>
> Member states have until the middle of this year to implement the 2009 directive, with large divergences between EU members at present.[15]

It is reported that the Swiss federal government does not intend to take part in stress tests.[16]

China is reported on 16 March to have suspended approval of its new nuclear power stations, and plans to carry out checks on existing reactors and those under construction. To fuel its economic development, China is currently building 27 new reactors, which is about 40% of the total under construction worldwide.[17] The decison is reported to have been announced by the State Council in a 'vague statement'. It is thought unlikely, however, that China will abandon nuclear power in the long term as it is an important element in its policy to provide rapidly expanding energy supplies for its developing economy. It is reported that Beijing could restart approvals as soon as next year after new safety codes and a new Atomic Energy Law are completed.[18]

On 28 March the IAEA called for a high-level conference in Vienna before the summer to carry out:

- an initial assessment of the Fukushima accident, its impact and consequences;
- considering the lessons that need to be learned;
- launching the process of strengthening nuclear safety;
- and strengthening the response to nuclear accidents and emergencies.[19]

It is reported that EU member states are likely to agree on 8 April to lower permissible thresholds on imported food and animal feed imports to bring it into line with tougher domestic limits in Japan. Europe's current thresholds were agreed following Ukraine's 1986 nuclear accident at Chernobyl. The proposed new limits are described as "purely precautionary", and it is stressed that measurements to date demonstrate negligible levels of radioactivity which are significantly below current Japanese and European standards. EU-27 sources over 99 percent of its seafood imports from other countries.

> The tougher limits would see caesium-134 and caesium-137 thresholds reduced from 1,250 becquerels per kilogramme at present to 500 becquerels per kilogramme.
>
> The new limit for iodine-131 would be 2,000 becquerels per kilogramme and for strontium-90 it would be 750 becquerels per kilogramme, a spokesman for European consumer affairs commissioner John Dalli told AFP.[20]

On 20 April it was reported that Italian government appears to have shelved plans for a new nuclear power programme;

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15 http://euobserver.com/9/31985/?rk=1
16 http://euobserver.com/9/32027/?rk=1
17 http://euobserver.com/9/32011/?rk=1
18 "Beijing's freeze will hit sector rebirth", F*inancial Times,* 16 March 2011
19 http://www.iaea.org/newscenter/news/tsunamiupdate01.html
20 http://euobserver.com/9/32129/?rk=1

> Italian Prime Minister Silvio Berlusconi made a return to nuclear power a key campaign proposal during 2008 elections, but on Tuesday (19 April) legislators in the Italian Senate tabled a bill that would scrap legislation on the building of new nuclear power plants.
>
> Analysts said the move was designed to avoid a damaging negative referendum this June on the government's nuclear power plans, with some environmental organisations voicing scepticism over Rome's real intentions. [21]

Further Information

Further official information is available from the International Atomic Energy Agency website where bulletins are being issued as events unfold.

Tokyo Electric Power Company (TEPCO) which runs the Fukushima Daiichi nuclear plants issues technical press notices about the current state of each of the reactors on the site.

The Health Protection Agency, the official body charged with advising the UK government about the effects of radiation in humans, has information on its webpage dedicated to the Japanese nuclear power problem

[21] http://euobserver.com/9/32215/?rk=1