



# Economic Research Report

The following report is written by our in-house analysts to provide you greater insight into upcoming economic events.



15<sup>th</sup> March 2011

## The Situation at Fukushima and its possible affect

*First and foremost we at RANSquawk hope that the situation in Japan does not continue to deteriorate and our thoughts go out to any family and friends who have been affected by the incident. From a professional point of view the following report has been written to provide some background information so that you are prepared for market based reactions to any further developments.*

The reactors in question are located at the Fukushima I Nuclear Power Plant (also known as Fukushima Dai-ichi), on the eastern coast of Japan in the town of Okuma in the Futaba District of the Fukushima prefecture.

### What has happened so far?

The pumps which send water into the reactors to cool the nuclear fuel rods were damaged in the Tsunami which was caused by the earthquake on Friday. These fuel rods are Zirconium tubes which contain Uranium fuel pellets.

TEPCO (Tokyo Electric Power Company) have pumped sea water into the reactors to try to keep the fuel rods submerged with limited success. Exposure of these fuel rods has led to damage to the Zirconium tubes cracking and caused radioactive material to be released.

Explosions have occurred after exposed fuel rods reacted with steam to produce the flammable hydrogen gas which led to explosions. These explosions have damaged the outer buildings of the reactors.

Japanese Prime Minister Nanto Kan has warned the nation that radiation has spread from the reactors and there is a very high risk of further leakage. Meanwhile radiation levels around the plant have been seen significantly higher, whilst levels in Tokyo were reported to be 20 times higher than normal earlier this morning. French embassy in Tokyo has warned of low level radioactive winds could reach Tokyo by 1100 GMT.

However. The UN weather agency has said that currently winds are dispersing radioactive material over the ocean and there is no danger for Japan or the region for now.

### How much radiation is dangerous:

- Natural radiation is around 2 millisieverts a **year** (mSv)
- Exposure to 100 mSv a **year** has been shown to increase the chance of cancer.
- Levels at the Fukushima plant has reached 400 mSv an **hour**.
- Exposure for 75 minutes to 400 mSv a **hour** will lead to acute radiation sickness
- Exposure to a single 1,000 mSv dose has a 5% chance of causing cancer
- Exposure to a single 5,000 mSv dose has a 50% chance of causing death within a month

**NOTE:** This morning the Tokyo Metropolitan Government said that the radiation level in Central Tokyo has declined sharply from its earlier peak today, measured at 0.0682 microsevert an hour in Shinjuku.

### Possible Scenarios at Fukushima:

**An actual nuclear explosion is NOT possible, because the fuel is not sufficiently enriched.**

Experts say the situation is very different to what happened to the reactor at Chernobyl in 1986. The Chernobyl reactor was still generating power when it exploded, and the reactor at Fukushima is a completely different design and was shutdown on Friday after the earthquake.

#### Worst Case

**What happens:** The exposed fuel rods crack leading to the molten Uranium pellets to fall to the bottom of the reactor's pressure vessel and melt through it before breaking through the concrete and steel containment around it. The high temperatures and pressure could lead to strong conventional explosions.

**Effect:** Large amounts of radioactive material could be released into the environment, contaminating a large area of land.

**Note:** Many scientists have dismissed the likelihood of this occurring.



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## Middle Case

**What happens:** Sea water is able to be continued to be pumped into the reactor to stop the fuel rods from melting. Large amounts of steam containing radioactivity will be produced which will need to be released to prevent a possible explosion. This may need to continue on for months until the core of the reactor cools.

**Effect:** Although the steam may only have a level of radioactivity slightly over the natural background level, it may lead people and business to leave the Fukushima area.

## Best Case

**What happens:** Cooling is able to occur more rapidly and the release of steam can be stopped within days.

**Effect:** Authorities only need to clean-up and decontaminate the reactors. The sea water which has been pumped into the reactors to prevent the fuel rods from melting will have corroded the reactors enough to prevent them from being used again.

## Affect on the Equity Sectors:

### **Utilities (Which operate nuclear power plants):**

Shares in TEPCO in Japan have fallen dramatically since the quake while over in Germany, the government have put their previous plans to extend the life of nuclear power plants on hold, weighing heavily on E.ON and RWE.

**Shares to watch: E.ON, RWE, EDF, GDF Suez, Constellation Energy, Duke Power, Exelon, Entergy, PG & E**

### **Renewable Energy:**

Shares in companies which produce solar panels and operate other forms of alternate energy have benefited since Friday on the speculation demand will increase for 'safer' forms of power generation.

**Shares to watch: Q-Cells, Solarworld, First Solar**

### **Uranium Miners:**

Demand for Uranium, which is already a very over supplied market is expected to fall as the disaster suspends or cancels plans for further nuclear power plants around the world.

**Shares to watch: Cameco, Areva, Uranium One**

Note: Both Rio Tinto and BHP Billiton are large miners of Uranium, however they are very diversified and thus less exposed.

## Affect on Commodities:

### **Natural Gas:**

Analysts are expecting a large increase in demand for liquefied natural gas (LNG) from Japan in order for the country to produce electricity to replace the lost capacity from the reactors at the Fukushima complex.

*Sources: Financial Times, Reuters, NY Times, The Times*

Useful Weblinks:

<http://www.ft.com/cms/s/0/32025c2a-4e6a-11e0-98eb-00144feab49a.html>

<http://www.thetimes.co.uk/tto/news/world/asia/article2946555.ece>