The Oil Drum
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The Japanese fuel crisis

Posted by Heading Out on March 21, 2011 - 11:01am

One consequence of the Japanese earthquake and tsunami that is not receiving as much press as the ongoing struggle to cool the damaged reactors, but which continues to influence more people, is the lack of fuel. Nine of the Japanese refineries were damaged and put out of action, and this dropped the amount of fuel being refined from 4,500,000 bd down to 3,100,000 bd. (Note that the Guardian report I quoted earlier was off by a factor of ten.) The lack of fuel for transportation affects not only those in the disaster area, but also those away from it, since food and fuel itself depend on transport to move it to customers around the country.

> "What we urgently need now is fuel, heavy and light oil, water and food. More than anything else, we need fuel because we can't do anything without it. We can't stay warm or work the water pumps," said Masao Hara, the mayor of Koriyama city, in Fukushima prefecture.

The refineries that remain in production are responding to the need. Idemitsi Kosan has raised production at its four refineries by 83,200 bd (from 87% to 100% production) and Cosmo Oil has raised production at its two operating refineries by an additional 80,000 bd but this does not match the size of the problem.

There are several different aspects to the problem; first the oil has to come ashore. With ports closed and unable to re-open for possibly months, shipments from the Middle East, which supplies 80% of Japan's need, have now been curtailed until the situation becomes clearer. Within the country, the Japanese Government has released around 8 million barrels of oil from their strategic reserve. It is also shipping 250,000 barrels of refined product to the area affected by sea (though this runs into the issue of how to get into the ports and distribution network). At Chiba some of the port has been able to re-open but not the terminal that fed to the Cosmo refinery (since that had burned).

Then the oil must be refined. There are 29 refineries in Japan, and Wikipedia lists them as follows. (I have modified the list to show which ones have had a status change).

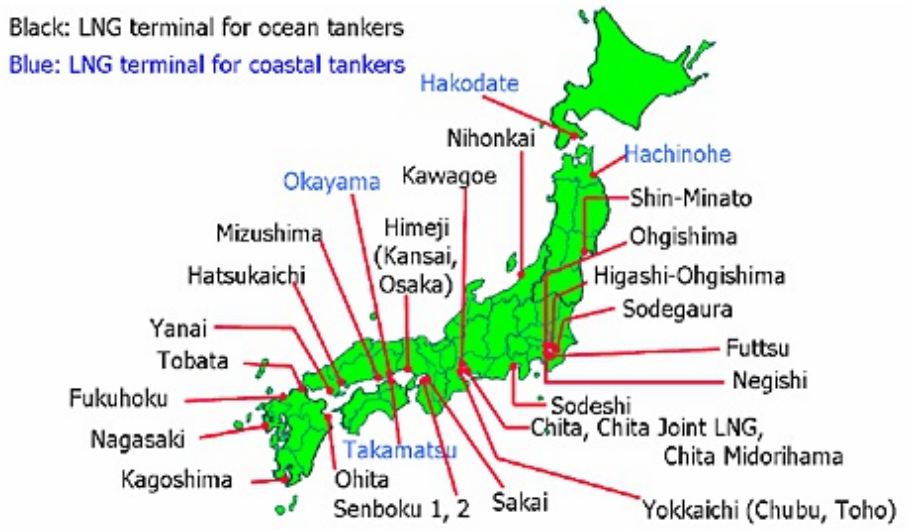
- Chiba Refinery (Cosmo Oil) (Cosmo Oil), 240,000 bbl/d (38,000 m3/d) CLOSED BY EARTHQUAKE & BURNING
- Yokkaichi Refinery (Cosmo Oil), 175,000 bbl/d (27,800 m3/d) INCREASING PRODUCTION
- Sakai Refinery (Cosmo Oil) (Cosmo Oil), 80,000 bbl/d (13,000 m3/d)
- Sakaide Refinery (Cosmo Oil), 140,000 bbl/d (22,000 m3/d) INCREASING PRODCTION
- Muroran Refinery (Nippon Oil Corporation (NOC)), 180,000 bbl/d (29,000 m3/d)
- Sendai Refinery (Nippon Oil Corporation (NOC)), 145,000 bbl/d (23,100 m3/d) CLOSED BY EARTHQUAKE
- Negishi Yokahama Refinery (Nippon Oil Corporation (NOC)), 340,000 bbl/d (54,000 m3/d) CLOSED BY EARTHQUAKE
- Osaka Refinery (Nippon Oil Corporation (NOC)) 115,000 bpd
- Mizushima Refinery (Nippon Oil Corporation (NOC)), 250,000 bbl/d (40,000 m3/d)

- Marifu Refinery (Nippon Oil Corporation (NOC)) 127,000 bpd
- Toyama Refinery (Nihonkai Oil/Nippon Oil Corporation (NOC)), 60,000 bbl/d (9,500 m3/d)
- Kubiki Refinery (Teikoku Oil), 4,410 bbl/d (701 m3/d)
- Chiba Refinery (Kyokuto) (Kyokuto Petroleum/ExxonMobil), 175,000 bbl/d (27,800 m3/d) CLOSED BUT RESTARTED
- Kawasaki Refinery (TonenGeneral Sekiyu/ExxonMobil), 335,000 bbl/d (53,300 m3/d) CLOSED BUT GETTING READY TO RESTART
- Wakayama Refinery (TonenGeneral Sekiyu/ExxonMobil), 170,000 bbl/d (27,000 m3/d)
- Sakai Refinery (TonenGeneral) (TonenGeneral Sekiyu/ExxonMobil), 156,000 bbl/d (24,800 m3/d)
- Nishihara Refinery (Nansei sekiyu/Petrobras), 100,000 bbl/d (16,000 m3/d)
- Keihin Refinery (Toa Oil/Shell), 185,000 bbl/d (29,400 m3/d)
- Showa Yokkaichi Refinery (Showa Yokkaichi/Shell), 210,000 bbl/d (33,000 m3/d) SENDING PRODUCT OVERLAND
- Yamaguchi Refinery (Seibu Oil/Shell), 120,000 bbl/d (19,000 m3/d)
- Sodegaura Refinery (Fuji Oil Campany), 192,000 bbl/d (30,500 m3/d) INCREASING PRODUCTION
- Kashima Refinery (Kashima Oil Campany/Japan Energy), 210,000 bbl/d (33,000 m3/d) CLOSED BY EARTHQUAKE
- Mizushima Refinery (Japan Energy) (Japan Energy), 205,200 bbl/d (32,620 m3/d)
- Shikoku Refinery (Taiyo Oil), 120,000 bbl/d (19,000 m3/d)
- Ohita Refinery (Kyusyu Oil), 160,000 bbl/d (25,000 m3/d)
- Hokkaido Refinery (Idemitsu Kosan), 140,000 bbl/d (22,000 m3/d) INCREASING PRODUCTION
- Chiba Refinery (Idemitsu) (Idemitsu Kosan), 220,000 bbl/d (35,000 m3/d) CLOSED BY EARTHQUAKE BUT BACK ON LINE AND INCREASING PRODUCTION
- Aichi Refinery (Idemitsu Kosan), 160,000 bbl/d (25,000 m3/d) INCREASING PRODUCTION
- Tokuyama Refinery (Idemitsu Kosan), 120,000 bbl/d (19,000 m3/d) INCREASING PRODUCTION

(The last four refinery increases in production will add another 83 kbd to the total.)

By the end of the month it is expected that the recovery will only be to 3.4 mbd, although this will still leave the country some 1 mbd short of the refined fuel it needs.

At present only one LNG terminal, at Shinminato, remains closed, but it is unlikely that this will reopen in the near term. The rest are operational, and LNG cargoes will be made available from a number of sources, if needed.



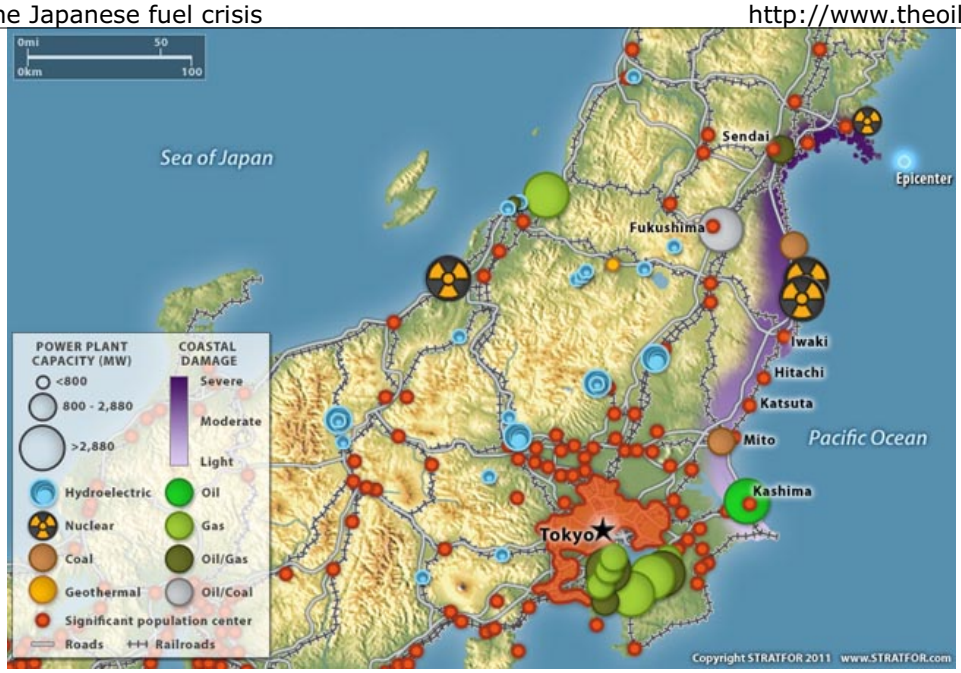
Japanese LNG ports

> The northeast coast ports of Hachinohe, Sendai, Ishinomaki and Onahama are so severely damaged that they are not expected to return to normal operations for months.

Looking at a map (from Stratfor) showing the power plants, and the road layout, the damage to the distribution network with the destruction at Sendai illustrates the problem in gaining access to the damaged area and in sending in new fuel. Food to parts of Ishinomaki has had to be delivered by helicopter, and for a town of 160,000 this is not nearly enough.

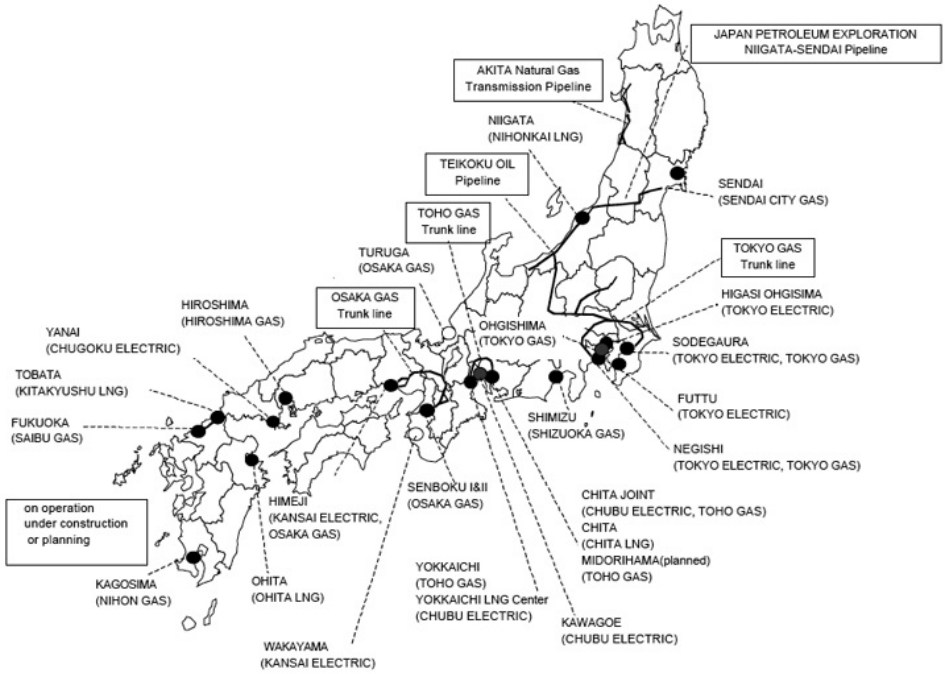
As the Independent reports

> On the drive north out of Sendai city in northeast Japan, a slip-road takes you to a motorway that would normally be filled with traffic, but was this week a scene of destruction to rival the most far-fetched Hollywood disaster movie. A thick coating of mud had been deposited at the toll booth, along with smashed vehicles, motorbikes and heavy machinery from a nearby factory. Beyond the booth, the road rose up to meet the highway and a panoramic view of the blitzed landscape below, where a jumble of hundreds of cars, trucks, and splintered debris stretched as far as the eye could see. In the background, thick black smoke billowed from fires burning at a damaged oil refinery near the city bay.



Japanese infrastructure (Stratfor)

There are trunk pipelines running from the main LNG terminals, to assist in distribution.



Japanese trunk pipelines and LNG terminals

Fuel needs are not just gasoline and diesel for vehicles. With the bitter cold that remains over much of the north of Japan, and no electric power, kerosene is also needed for heating. For domestic heating many homes rely on kerosene stoves to heat individual rooms in use, rather than using central heating. Stocks had been falling before the earthquake, due to the severe winter this year. And with stocks being sent to help refugees, there are now shortages in other parts of Japan.

While there are some indications that the nuclear problems may be being brought under control,

the problems of fuel shortage and the cascading problem of food, fuel, and other resource distribution that it brings with it are likely to remain in Japan for several weeks as the crisis continues.