

Coal for Power Generation: Supply and Demand Following the Great East Japan Earthquake

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This June marks a year and three months since the Great East Japan Earthquake. The coal-fired thermal power stations located along the Pacific coast within the regions covered by Tohoku Electric Power Co. and Tokyo Electric Power Co. (TEPCO) were subject to extensive damage caused by the tsunami following the earthquake, and Tohoku Electric's Haramachi Thermal Power station remains offline. With fuller statistics for FY2011 now available, this report pulls together information related to coal supply and demand for power generation in FY2011.

1. Status of Operation of Coal-Fired Thermal Power Plants

There are coal-fired thermal power facilities (covering general power utilities and electricity wholesalers) with a total generating capacity of 10.15GW in the service areas of Tohoku Electric Power Co. and TEPCO. Five of these coal-fired thermal power stations (Hitachinaka and Hirono of TEPCO's, Haramachi of Tohoku Electric, Soma Kyodo Power Co. and Joban Joint Power Co., with a total capacity of 7.05GW) were no longer operational due to having suffered extensive damage in the tsunami following the earthquake, but with subsequent efforts to restore the facilities, four of the coal-fired thermal power stations have resumed operation by December 2011, with the exception of the Haramachi Thermal Power Station (1,000MW x 2). Although not shown in the table, the Nakoso IGCC Demonstration Unit (250MW) resumed operation on August 10.

Table: Status of Operation of Coal-Fired Thermal Power Stations in the
TEPCO and Tohoku Electric Power Co. Service Areas

Power Station Name	Power Generation Facilities		Power Generation Facilities Stopped due to the Earthquake	Restart of operations	After Earthquake		Schedule from July Onwards	
					Operating	Stopped	Operating	Stopped
Tohoku EPCO	3200 MW		2000 MW		1200 MW	2000 MW	1200 MW	2000 MW
Noshiro Thermal	Unit 1	600 MW	—		600 MW	—	600 MW	—
	Unit 2	600 MW	—		600 MW	—	600 MW	—
Haramachi Thermal	Unit 1	1000 MW	1000 MW	Scheduled for March 2012	—	1000 MW	—	1000 MW
	Unit 2	1000 MW	1000 MW		—	1000 MW	—	1000 MW
TEPCO	1600 MW		1600 MW		1000 MW	600 MW	1600 MW	00 MW
Hitachinaka Thermal	Unit 1	1000 MW	1000 MW	May 15, 2011	1000 MW	—	1000 MW	—
	Hirono Thermal	Unit 5	600 MW	600 MW	June 15, 2011	—	600 MW	600 MW
Soma Kyodo	2000 MW		2000 MW		00 MW	2000 MW	00 MW	2000 MW
Shinchi	Unit 1	1000 MW	1000 MW	December 27, 2011	—	1000 MW	—	1000 MW
	Unit 2	1000 MW	1000 MW	December 19, 2011	—	1000 MW	—	1000 MW
Joban Joint	1450 MW		1450 MW		00 MW	1450 MW	1200 MW	250 MW
Nakoso	Unit 7	250 MW	250 MW	December 21, 2011	—	250 MW	—	250 MW
	Unit 8	600 MW	600 MW	July 17, 2011	—	600 MW	600 MW	—
	Unit 9	600 MW	600 MW	June 30, 2011	—	600 MW	600 MW	—
Sakata Kyodo	700 MW		00 MW		700 MW	00 MW	700 MW	00 MW
Sakata Kyodo Thermal	Unit 1	350 MW	—		350 MW	—	350 MW	—
	Unit 2	350 MW	—		350 MW	—	350 MW	—
J-POWER	1200 MW		00 MW		1200 MW	00 MW	1200 MW	00 MW
Isogo Thermal	New Unit 1	600 MW	—		600 MW	—	600 MW	—
	New Unit 2	600 MW	—		600 MW	—	600 MW	—
Total	10150 MW		7050 MW		4100 MW	6050 MW	5900 MW	4250 MW

Source: Websites, newspapers and industry publications

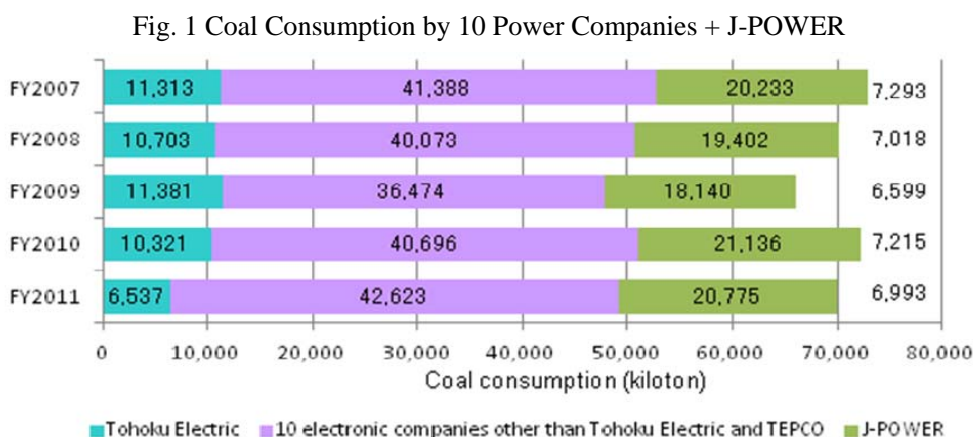
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2. Coal Demand

Coal consumed for power generation (10 power companies + J-POWER)¹ in FY2011 was 69.93 million tons, down 2.22 million tons from the previous fiscal year. When separating Tohoku Electric and TEPCO from other power companies, the amount of coal consumed by Tohoku Electric and TEPCO decreased by 3.78 million tons compared to the previous fiscal year because coal-fired thermal power stations on the Pacific coast were not operational due to the earthquake (tsunami). In particular, consumption by Tohoku Electric fell by 3.99 million tons due to the stoppage of the Haramachi Thermal Power Station (1GW x 2). While operations were suspended at TEPCO’s Hitachinaka and Hirono Thermal Power Stations, these resumed operation in May and June respectively, and with low coal consumption in FY2010, the amount consumed increased by 0.21 million tons year-on-year.

The amount of coal consumed by the 10 power companies and J-POWER other than Tohoku Electric and TEPCO rose by a total of 1.57 million tons year-on-year. While generalizations cannot be made about the amount of coal consumed by each power company due to fluctuations caused by factors such as changes in power demand, power generation at hydro and nuclear power stations, and stoppages caused by the timing of inspections and other problems with coal-fired thermal power, this increase can be seen as resulting from the power interchange to Tohoku Electric and TEPCO and the shutdown of various companies’ nuclear power stations for routine inspections.

The area covered by Tohoku Electric contains the Sakata, Soma Kyodo and Joban Joint thermal power stations, and of these the Soma Kyodo thermal power station was offline until December 2011, Nakoso Unit 9 of the Joban Joint thermal power station was offline until June 2011, Unit 8 until July and Unit 7 until December. Coal consumption at these plants during FY2011 has not been announced, but it is estimated that coal consumption was reduced by approximately 6 million tons due to the stoppages.



(Source) Created using data from the “Monthly Electric Power Research Statistics” of the Agency for Natural Resources and Energy

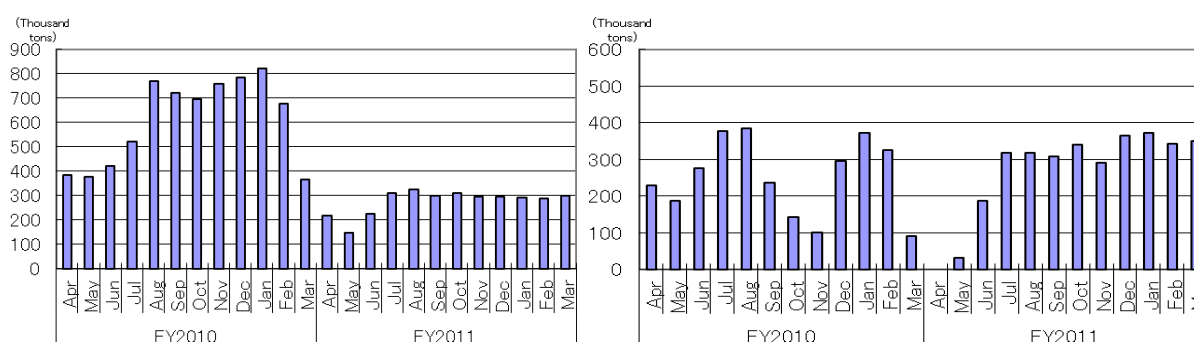
¹ The amount of coal consumed by 10 power companies + J-POWER was used because the coal consumption of wholesale power companies stopped being published in FY2010.

Table 1 Coal Consumption by 10 Power Companies + J-POWER

	Tohoku Electric/TEPCO			Power companies other than Tohoku Electric/TEPCO+J-POWER										Total	Reference	
	Tohoku	Tokyo	Subtotal	Hokkaido	Chubu	Hokuriku	Kansai	Chugoku	Shikoku	Kyushu	Okinawa	J-POWER	Subtotal		Joint Thermo	Total
FY2007	785	346	1,131	505	1,019	719	175	703	304	533	181	2,023	6,162	7,293	944	8,237
FY2008	760	310	1,070	567	966	610	234	588	287	556	198	1,940	5,948	7,018	911	7,929
FY2009	784	354	1,138	473	941	516	155	540	261	579	182	1,814	5,461	6,599	921	7,521
FY2010	730	302	1,032	389	1,120	529	400	627	252	562	190	2,114	6,183	7,215	n.a.	-
FY2011	331	322	654	513	976	681	406	554	324	610	198	2,077	6,340	6,993	n.a.	-

(Source) Created using data from the “Monthly Electric Power Research Statistics” of the Agency for Natural Resources and Energy

Fig. 2 Coal Consumption by Tohoku Electric and TEPCO Viewed by Month

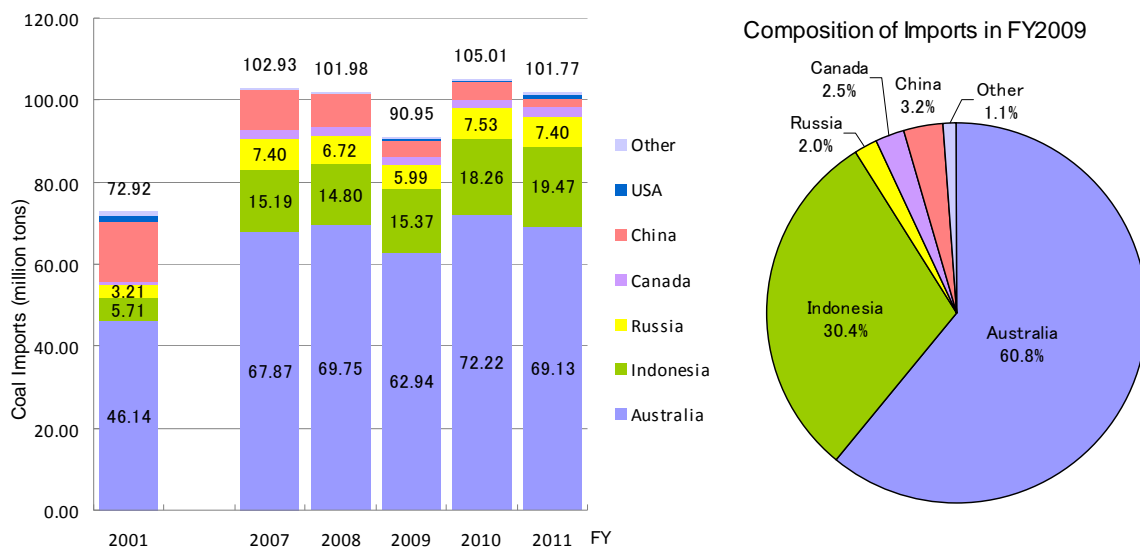


(Source) Created using data from the “Monthly Electric Power Research Statistics” of the Agency for Natural Resources and Energy

3. Coal Supply

According to trade statistics published by the Ministry of Finance, Japan imported 101.77 million tons of coal in FY2011, down 3.24 million tons from the previous fiscal year. Power generation accounts for almost 80% of coal imports. The volume of imports by power companies has not been published for each country since 2010, and with the exception of the decline in imports from China, the makeup of the source of imports can be deemed to be almost identical to that in FY2009, with 60% of coal for power generation being sourced from Australia and 30% being sourced from Indonesia. From the perspective of resource distribution, along with the decline in coal imports from China, there is a trend of increased imports from Russia, Canada and the United States, but the composition of imports centered on Australia and Indonesia will remain unchanged moving forward.

Fig. 3 Steaming Coal Imports by Japan and the Composition of Import Sources for Electric Power in FY2009

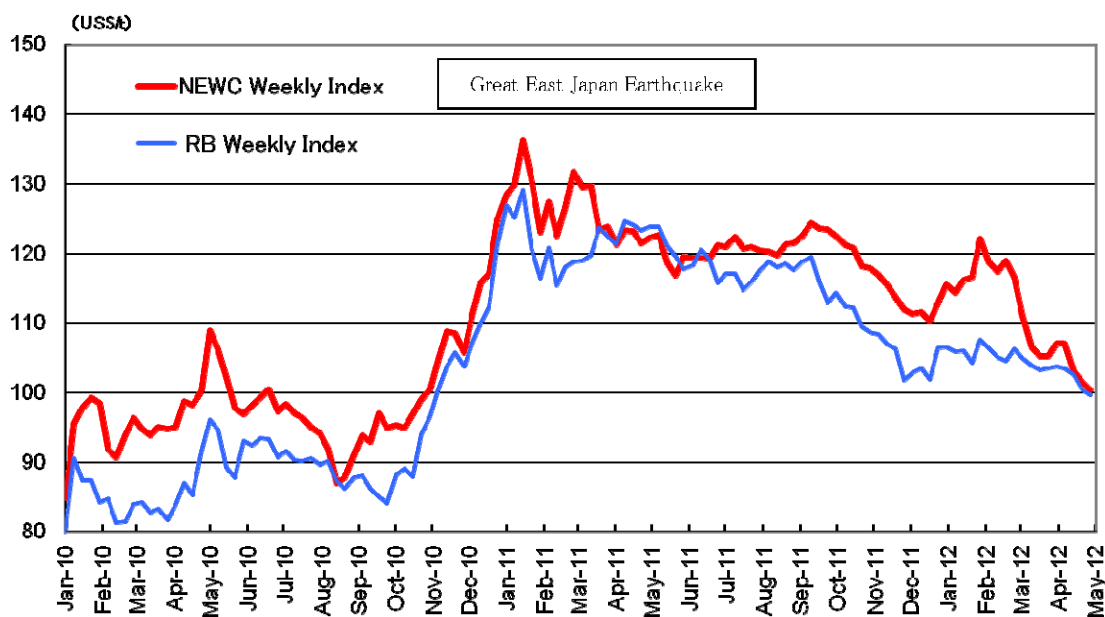


(Source) Created using the “Trade Statistics of Japan” of the Ministry of Finance, and the “Overview of Electric Power Supply and Demand in FY2010” of the Agency for Natural Resources and Energy

4. Coal Prices

The spot price of steaming coal shipped from the port of Newcastle in Australia was approximately \$130/ ton at the beginning of 2011, but this fell by \$6/ton after the Great East Japan Earthquake. It is believed that this was due to an expected decline in demand resulting from the stoppage of coal-fired thermal power stations on the Pacific Coast due to the tsunami. The spot price of coal later settled approximately \$120/ ton but it has been in decline since autumn. This is believed to be caused by a number of factors, including demand not being as strong as expected due to sluggish demand in Europe and little increase in imports by China, and the price of futures falling due to a slowdown in economic growth in China and India. Another factor in the price drop is said to be that coal producers in the United States have turned their eyes to the export market as coal consumption for power generation has declined due to the lower gas prices resulting from increased production of shale gas. The spot price for coal fell below \$90/ ton as of June. The spot price is expected to increase due to increased procurement prior to the summer coal demand period, but the key point will be how much import demand increases in China and India moving toward summer.

Fig. 4 Spot Price of Steaming Coal



(Source) The global COAL website

5. Outlook for 2012

What will happen with coal consumption in FY2012?

Based on the total capacity (36.16GW) of coal-fired thermal power facilities owned by electric power companies and wholesale power companies, and assuming an average utilization rate of either 80% or 85% excluding the Haramachi Thermal Power Station of Tohoku Electric (2,000MW) scheduled to start operation in March 2013, the amount of coal used in FY2012 is estimated to be 84 million tons or 89 million tons, respectively. Coal-fired thermal power is used as a base power supply, and has operated at a utilization rate of over 75% since 2005. Because of this, comparing the estimated results with FY2007, when coal consumption was at its peak, shows that a utilization rate of 80% is nearly the same, while a utilization rate of 85% would require an increase of 5 million tons. However, when compared with the amount consumed in FY2011, an increase of between 8 and 13 million tons is calculated. Furthermore, if the Haramachi Thermal Power Station goes back online and Hirono Unit No. 6 (600MW) and Hitachinaka Unit No. 2 (1,000MW), which are currently under construction, go online as scheduled in FY2013, an additional 9 million tons of coal per year will be required.

Table 2 Estimated Coal Consumption in FY2012

	(million tons)								
	Actual Figures					Actual + Estimate*		Estimated Results	
	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012	
Utilization rate	-	-	-	-	-	-	-	80%	85%
Power compaines	50.57	50.60	52.69	50.78	47.86	51.02	49.16	50.20	53.40
Wholesales	30.89	27.77	31.50	30.22	28.95	31.94	26.94	33.70	35.80
J-POWER	20.89	18.57	20.23	19.40	18.14	21.14	20.77	21.80	23.20
Joint thermal	10.01	9.19	11.27	10.82	10.81	10.81	6.16	11.90	12.60
Total	81.46	78.37	84.20	80.99	76.80	82.96	76.10	83.90	89.20

(Note) As the amount of coal consumed in joint thermal power plants (the Soma Kyodo Power, Joban Joint Power, Sakata Kyodo Power, Sumitomo Joint Electric Power, and Tobata Co-operative Thermal Power) has not been published since FY2010, the amount of coal consumed in joint thermal power plants in FY2010 and FY2011 has been estimated as follows:

FY2010: Actual figures from FY2009

FY2011: The stoppage period was considered and applied to the actual figures from FY2009 for the Soma Kyodo Power and Joban Joint Power

The actual figures from FY2009 were used for Sakata Kyodo Power, Sumitomo Joint Electric Power, and Tobata Co-operative Thermal Power

(Source) Actual figures are from the "Monthly Electric Power Research Statistics" of the Agency for Natural Resources and Energy

Finally, we will look at the Asian market for fuel coal.

On the demand side, China and India are increasing coal imports as demand grows, and although South Korea will see increases over the next few years, it is expected to plateau. Taiwan will increase imports due to the opening of new coal-fired thermal power stations, and Vietnam will become a coal importer, while other Southeast Asian countries increase imports.

Meanwhile, on the supply side, while coal exports from Indonesia are expected to plateau due to increased domestic demand, exports from Russia, Mongolia, Canada and the United States are expected to increase. Australia will continue to play a central role in the supply of coal to the Asian market. Because supply will increase to meet demand, there are not expected to be any constraints on supply. However, the price of coal has fluctuated seasonally and due to unexpected increases in demand and supply stoppages, and will continue to do so. There are numerous plans to build coal terminals for exporting coal from the Powder River Basin in the United States, and if these are realized, it will provide a new supply source for the Asian coal market, and may serve to constrain increases in the price of coal.

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