MAG-MMAR-2012-06

MONTHLY MARKET ASSESSMENT REPORT

For the Billing Period 26 May to 25 June 2012

PHILIPPINE ELECTRICITY MARKET CORPORATION

MARKET ASSESSMENT GROUP (MAG)

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Monthly Market Assessment Report

This report assesses the results of the integrated Luzon and Visayas market operation for the period 26 May to 25 June 2012 and how the market performed compared with the previous billing period and the same billing period last year.

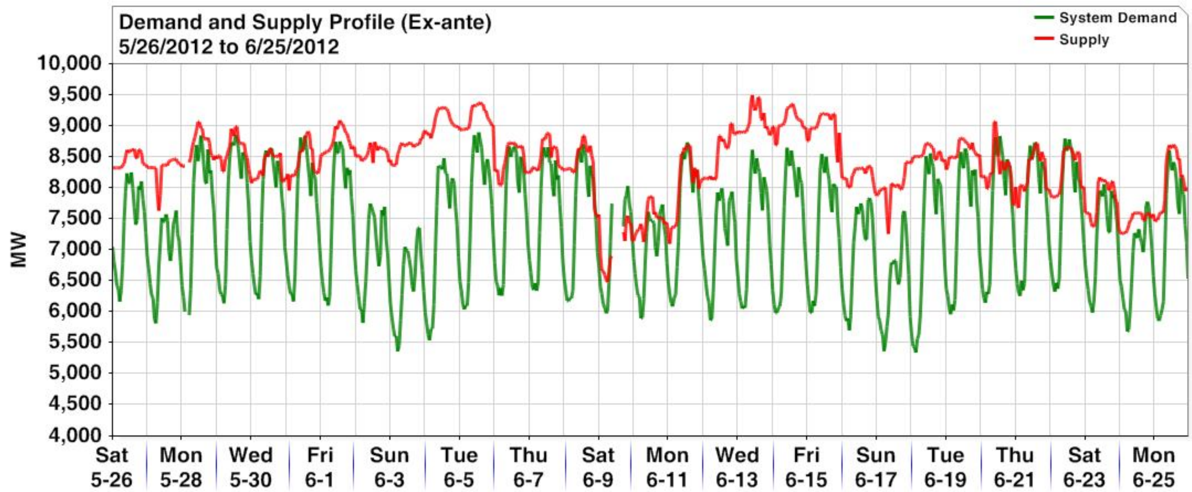
I. Supply and Demand Situation

The monthly average system demand[1] (ex-ante) decreased by 3.9 percent to 7,342 MW from the previous billing month's 7,642 MW but increased by 6.2 percent from last year's 6,913 MW *(Table 1)*. Also, the maximum demand of 8,896 MW, which occurred on 5 June 2012 at trading interval 1400H, was lesser by 4.1 percent than the previous billing month's 9,277 MW. Meanwhile, the average regional demand in Luzon (7,614 MW) was lower by 4.1 percent than the previous billing period but higher by 6.7 percent from the same billing period last year. Similarly, demand in Visayas decreased by 3 percent from the previous billing period but increased by 5 percent from the same billing period last year. The decrease in demand of both regions from the previous billing periods may be attributed to the 3.3 and 0.7 percent decrease in the average mean temperature of Luzon and Visayas, respectively. Although other factors, such as economic growth, may have likewise influenced the demand increase for the year-on-year growth.

Likewise, the monthly average system supply[2] posted a decrease of 3.9 percent (8,749 MW to 8,407 MW) from the previous billing period and by 0.1 percent (8,419 MW to 8,407) from the same billing period last year *(Table 1).* The system supply during the billing period ranged from 6,485 MW to 9,497 MW. The average regional supply in Luzon decreased by 5.1 percent (7,151 MW to 6,790 MW) while Visayas had a modest increase of 1.2 percent (1,598 MW to 1,617 MW), from the previous billing period.

An average of 1,065 MW supply margin was recorded during the billing period, which is slightly lower by 3.8 percent from the previous billing period. Such decrease is attributed to the decrease in the system supply brought about by the plant outages.

Figure 1. Demand and Supply (Ex-ante), June 2012



[1] The system demand is equal to the total scheduled MW of all load resources in Luzon and Visayas plus losses.
[2] The supply is equal to the total offered capacity of all generator resources in Luzon and Visayas adjusted for any security limit provided by the System Operator. Other constraints considered during MMS simulation such as generator offered ramp rates may result to lower supply.

Table 1. Demand and Supply Summary (Ex-ante), June 2012, May 2012, and June 2011

	June 2012 (In MW)			May 2012 (In MW)			June 2011 (In MW)			% M-on-M Change (May - Jun 2012)			% Y-on-Y Change (Jun 2011 - Jun 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Demand	8,896	5,348	7,342	9,277	5,626	7,642	8,819	4,578	6,913	(4.1)	(4.9)	(3.9)	0.9	16.8	6.2
Supply	9,497	6,485	8,407	9,705	7,662	8,749	9,748	7,163	8,419	(2.1)	(15.4)	(3.9)	(2.6)	(9.5)	(0.1)
Supply/Demand Variance	3,332	-846	1,065	2,952	-258	1,107	3,703	72	1,506	12.9	228.0	(3.8)	(10.0)	(1,273.2)	(29.3)

Note: The derived values were non-coincident.

Table 2. Regional Temperature[3], June 2012, May 2012, and June 2011

Mean Temperature	June 2012 (^oC)			May 2012 (^oC)			June 2011 (^oC)			% M-on-M Change (May - Jun 2012)			% Y-on-Y Change (Jun 2011 - Jun 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	30	27	29	32	28	30	31	26	29	(6.3)	(3.6)	(3.3)	(3.2)	3.8	0.0
Visayas	30	26	29	30	28	29	30	26	28	0.0	(7.1)	(0.7)	0.0	0.0	2.5

Table 3. Regional Demand Summary (Ex-ante), June 2012, May 2012, and June 2011

	June 2012 (In MW)			May 2012 (In MW)			June 2011 (In MW)			% M-on-M Change (May - Jun 2012)			% Y-on-Y Change (Jun 2011 - Jun 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	7,614	4,506	6,225	7,872	4,759	6,489	7,458	3,750	5,836	(3.3)	(5.3)	(4.1)	2.1	20.2	6.7
Visayas	1,403	753	1,119	1,436	823	1,154	1,363	689	1,066	(2.3)	(8.5)	(3.0)	2.9	9.4	5.0

Note: The derived values were non-coincident.

Table 4. Regional Supply Summary (Ex-ante), June 2012, May 2012, and June 2011

	June 2012 (In MW)			May 2012 (In MW)			June 2011 (In MW)			% M-on-M Change (May - Jun 2012)			% Y-on-Y Change (Jun 2011 - Jun 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	7,801	4,993	6,790	8,091	6,026	7,151	8,129	5,784	6,895	(3.6)	(17.1)	(5.1)	(4.0)	(13.7)	(1.5)
Visayas	1,736	1,198	1,617	1,699	1,473	1,598	1,693	1,310	1,522	2.2	(18.7)	1.2	2.6	(8.6)	6.2

Note: The derived values were non-coincident.

II. Plant Outages

Figure 2 shows the system capacity on outage by plant type vis-a-vis the outage schedule indicated in NGCP-SO's CY 2012 Grid Operating and Maintenance Program (GOMP). The capacity on outage reached a maximum of 4,212 MW on 09 June 2012 for 3 consecutive hours (1000H-1200H) due to the outages of Sual Unit 1, Sta. Rita 3 and San Lorenzo 2, as well as the shutdown of 1 gas turbine of each Ilijan block A and B brought about by the fuel gas supply restriction from Malampaya onshore gas plant. The minimum capacity on outage of 1,686 MW occurred on June 13-14, 2012. The average capacity on outage was 2,516 MW.

[3] Regional temperature (Average Mean Temperature) is based on Weather Underground website. Luzon temperature is based on Manila station while Visayas temperature is based on Cebu station.

Figure 2. ***Plant Capacity on Outage, June 2012***

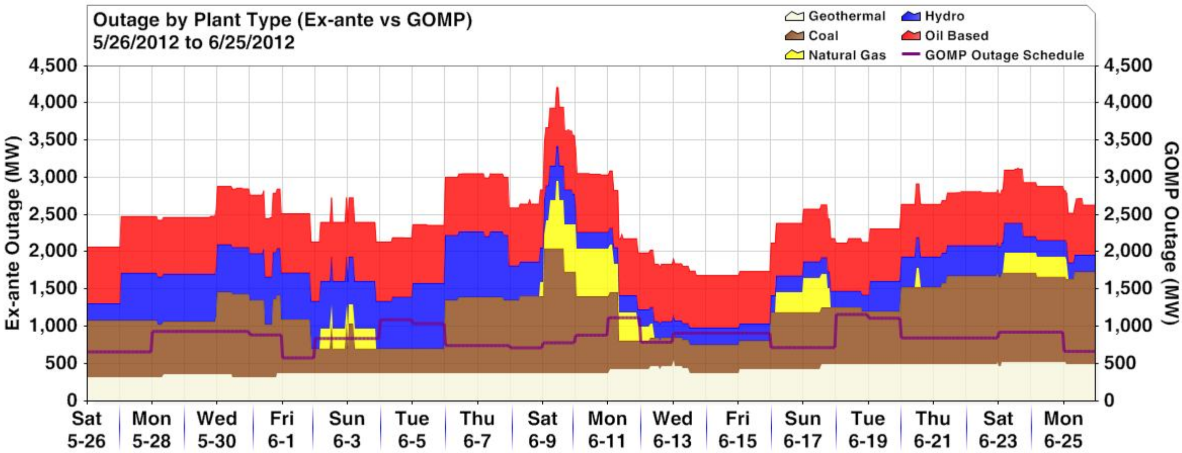


Figure 3 shows increases in the outage factor[4] of all plant type in June 2012 billing period relative to the previous month and same month last year, except for geothermal plant (*Figure 3*). It was noted that geothermal plants' outage factor improved to 23 percent from last year's 43 percent, which was attributed to the completion of the rehabilitation of the 110 MW Bacman G01, as well as fewer occurrences of outages of Makban GPP and Tiwi GPP units.

Figure 3. ***Total Outage Factor, June 2012, May 2012, and June 2011***

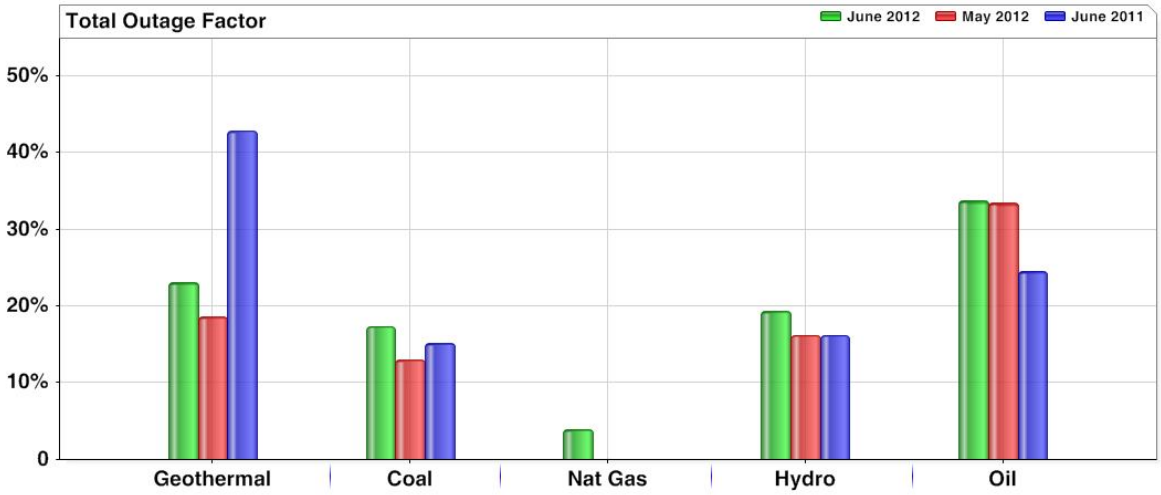


Table 5. ***Total Outage Factor, June 2012, May 2012, and June 2011***

Plant Type	Total Outage Factor			Forced Outage Factor			Scheduled Outage Factor		
	June 2012	May 2012	June 2011	June 2012	May 2012	June 2011	June 2012	May 2012	June 2011*
Geothermal	23.0%	18.6%	42.9%	7.5%	4.9%	19.3%	6.9%	4.9%	9.9%
Coal	17.4%	13.0%	15.1%	14.0%	11.2%	8.7%	3.0%	1.8%	6.7%
Nat Gas	3.9%	0.1%	0.0%	0.1%	0.0%	0.0%	2.4%	0.0%	0.0%
Hydro	19.3%	16.2%	16.2%	0.0%	0.3%	1.2%	14.7%	11.8%	9.4%
Oil	33.7%	33.4%	24.5%	20.2%	21.2%	10.9%	0.7%	0.5%	0.0%

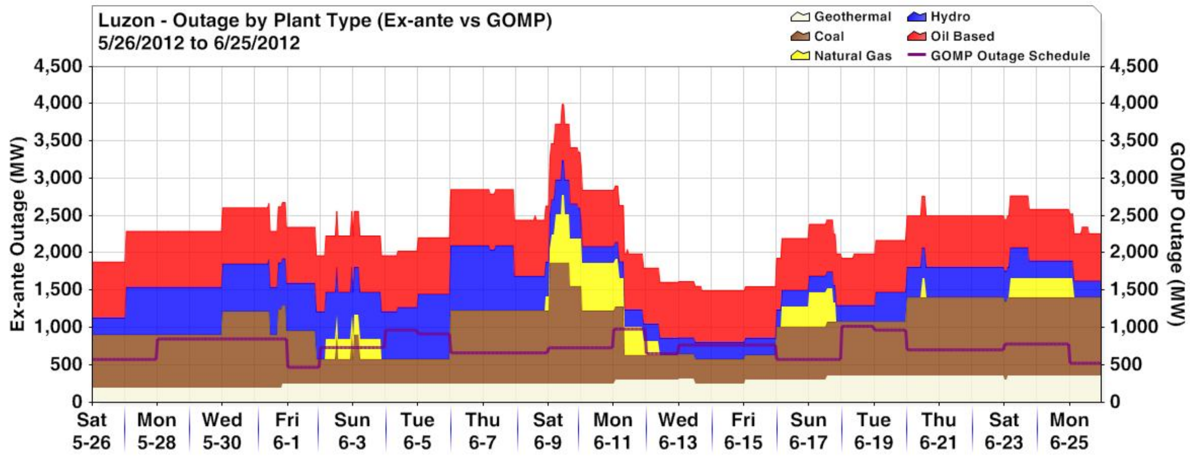
** Calculation was based from SO's old outage classification (Scheduled Outage = Planned Outage + Maintenance Outage)*

[4] Outage factor is the ratio of the product of the capacity on outage and total outage days of plant type to the product of total capacity and period days covered, expressed in percent.

Among the plant type, oil-based plants registered the highest outage factor of 33.7 percent in June 2012. This was followed by geothermal plants with 23 percent, hydro plants with 19.3 percent, and coal plants with 17.4 percent. The natural gas plant qualified as the most efficient plant with a low outage factor of 3.9 percent.

On a per region basis, the monthly average capacity on outage in Luzon during the billing period increased significantly by 23.2 percent to 2,312 MW from the previous billing period *(Table 6)*, ranging from 1,496 MW to 3,997 MW. Coal plants posted the highest average outage capacity with 750 MW followed by oil-based plants with 726 MW.

Figure 4. Plant Outage Capacity, June 2012 - Luzon



As shown in Figure 4 and detailed further in Tables 6 and 7, the current billing period showed a higher level of capacity on outage in Luzon vis-a-vis the planned capacity on outage based on the NGCP-SO's CY2012 GOMP, which registered an average of 747 MW.

Table 6. Luzon Regional Outage Summary (Ex-ante), June 2012, May 2012, and June 2011

Resource Type	June 2012 (In MW)			May 2012 (In MW)			June 2011 (In MW)			% M-on-M Change (May - Jun 2012)			% Y-on-Y Change (Jun 2011 - Jun 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	1,624	330	750	977	330	582	712	0	335	66.2	0	29.0	128.1		123.8
Natural Gas	907	0	107	265	0	3	870	0	76	242.6		4,067.1	4.3		41.6
Geothermal	365	196	280	259	196	197	428	308	372	41.0	0	42.2	(14.7)	(36.4)	(24.7)
Hydro	874	223	448	682	223	374	952	76	375	28.1	0	19.6	(8.2)	193.2	19.5
Oil Based	812	632	726	812	692	721	682	332	464	0	(8.7)	0.7	19.1	90.4	56.6
TOTAL	**3,997**	**1,496**	**2,312**	**2,485**	**1,561**	**1,877**	**2,057**	**959**	**1,622**	**60.8**	**(4.2)**	**23.2**	**94.3**	**56.0**	**42.6**

Note: The derived values by resource type were non-coincident. The total values were derived based on aggregate hourly outage.

Table 7. Luzon Regional Outage Summary (GOMP), June 2012, May 2012, and June 2011

Resource Type	June 2012 (In MW)			May 2012 (In MW)			June 2011 (In MW)			% M-on-M Change (May - Jun 2012)			% Y-on-Y Change (Jun 2011 - Jun 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	712	0	394	382	0	306	382	0	185	86.4		28.9	0.0		65.3
Natural Gas	266	0	101	0	0	0	270	0	43				(100.0)		(100.0)
Geothermal	119	64	94	119	64	73	174	119	149	0.0	0.0	28.8	(31.7)	(46.3)	(51.1)
Hydro	320	26	158	312	76	220	607	230	413	2.6	(65.8)	(28.2)	(48.6)	(67.0)	(46.8)
Oil Based	0	0	0	50	0	3	70	0	61	(100.0)		(100.0)	(28.6)		(94.5)
TOTAL	**1,021**	**470**	**747**	**765**	**216**	**602**	**1,118**	**587**	**850**	**33.5**	**117.8**	**24.1**	**(31.6)**	**(63.2)**	**(29.2)**

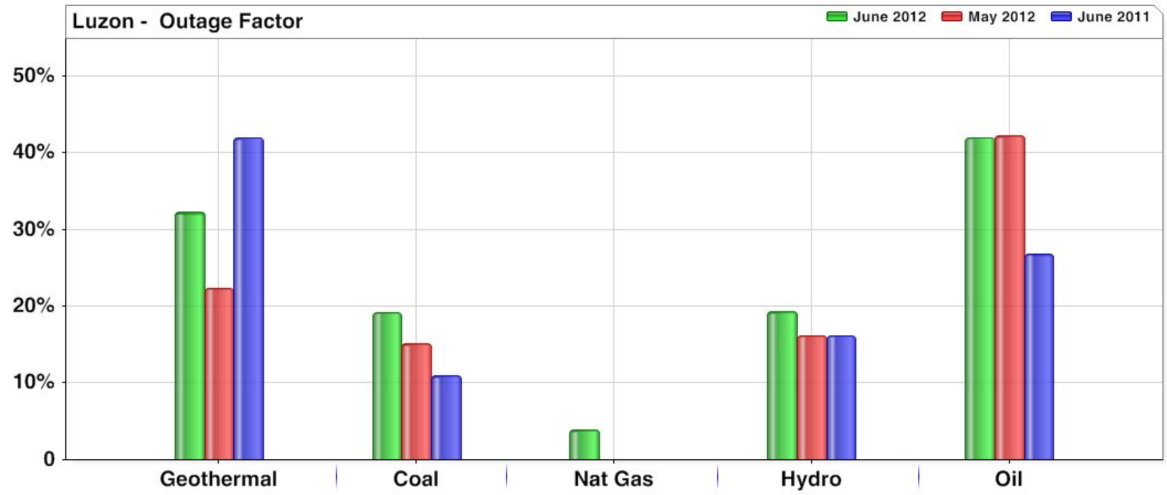
Note: The derived values by resource type were non-coincident. The total values were derived based on aggregate hourly outage.

The geothermal plants in Luzon registered a higher outage factor of 32.3 percent than the Visayas due to the outages of Tiwi B (43.7 MW), Bacman G02 (40MW) and Makban 6 (55

MW). It should be noted that Tiwi B and Bacman G02 have been on outage since the start of WESM commercial operation.

A month-on-month comparison shows increases in the outage factor of all plant type in Luzon, except for oil-based plants which registered the same outage factor. The increase in geothermal plant's outage factor in June 2012 was due to the planned outage of Makban 5 to facilitate maintenance of its hotwell pump, and the forced outages of Bacman 2, and Tiwi 1 and 2. The maintenance outage of Kalayaan 2 and 4 and the shutdown of San Roque HEP from 27 May to 07 June 2012 pushed up the outage factor of hydro plants. Coal plants' higher outage factor was attributed to the forced outages of Masinloc 2, Pagbilao 1, Sual 1 and 2, and Calaca 2. Meanwhile, the outage factor of natural gas plants went up to 3.9 percent from a mere 0.1 percent in the previous month brought about by the gas supply restriction from 8 to 11 June 2012.

Figure 5. ***Total Outage Factor (Luzon Plants), June 2012, May 2012, and June 2011***



Figures 6 and 7 show the planned and forced outage factors per plant type in Luzon, 2 of the 4 components of outage factor. The other 2 are the unplanned outage and other outage. Planned outages drove up the outage factor of geothermal plants, natural gas plants, and hydro plants while forced outages swayed the entire factor up of coal plants and hydro plants. Shutdowns of Ilijan 1 Unit 1 (GT1-1) and Ilijan 2 Unit 1 (GT2-1) during the Malampaya gas restriction were all classified by NGCP-SO as other outages.

Oil-based plant Duracom's capacity on outage of 242 MW (other outages) also contributed to the outage factor. The plant was placed on outage on 13 July 2006.

Figure 6. ***Planned Outage Factor[5] (Luzon Plants), June 2012, May 2012, and June 2011***

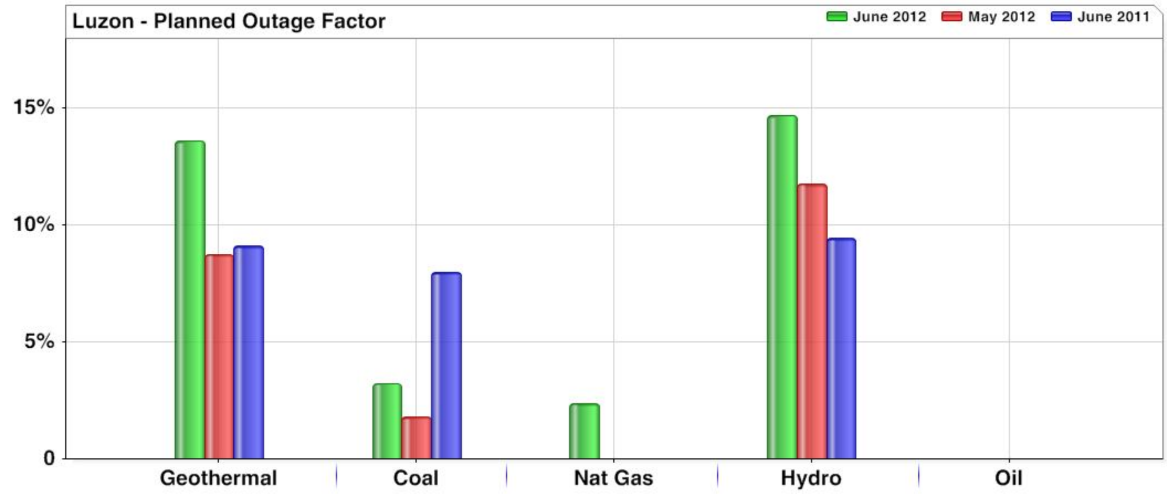


Figure 7. ***Forced Outage Factor[6] (Luzon Plants), June 2012, May 2012, and June 2011***

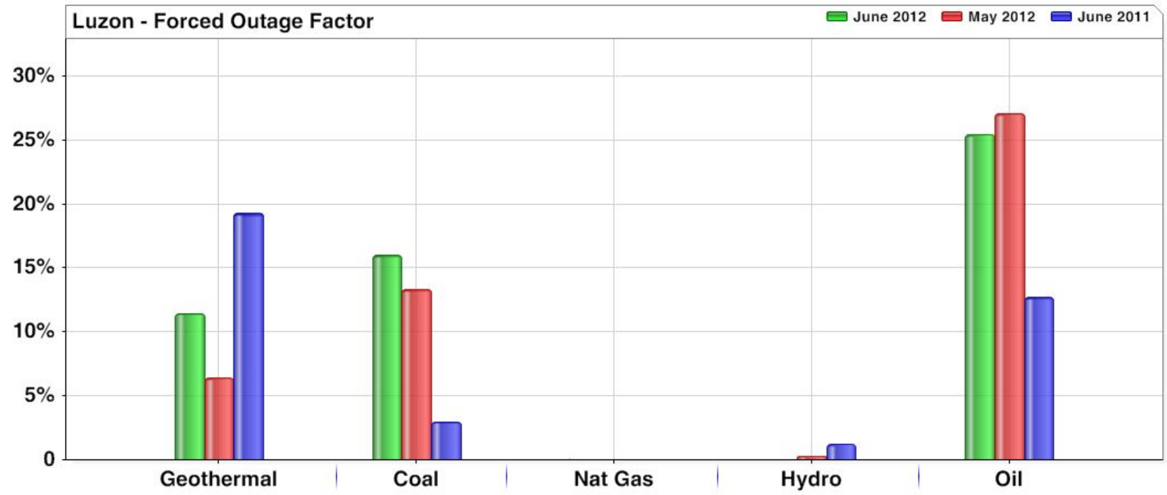


Table 8. ***Outage Factor (Luzon Plants), June 2012, May 2012, and June 2011***

Plant Type	Luzon Total Outage Factor			Luzon Planned Outage Factor			Luzon Forced Outage Factor		
	June 2012	May 2012	June 2011	June 2012	May 2012	June 2011	June 2012	May 2012	June 2011
Geothermal	32.3%	22.4%	42.0%	13.6%	8.8%	9.1%	11.5%	6.4%	19.3%
Coal	19.3%	15.1%	10.9%	3.2%	1.8%	8.0%	16.0%	13.3%	3.0%
Nat Gas	3.9%	0.1%	0.0%	2.4%	0%	0%	0.1%	0%	0%
Hydro	19.3%	16.2%	16.2%	14.7%	11.8%	9.4%	0%	0.3%	1.2%
Oil	42.0%	42.2%	26.9%	0%	0%	0%	25.5%	27.1%	12.7%

Table 9 lists the outages of coal, natural gas, hydro, geothermal, and oil based plants in Luzon with outage duration of 3 or more consecutive days during the billing period. It is important to note that there were simultaneous occurrences of outages of several plants at separate trading intervals on 09 June 2012, though tight demand and supply condition was

[5] Planned Outage factor is the ratio of the product of the capacity on outage and total planned outage days of plant type to the product of total capacity and period days covered, expressed in percent.
[6] Forced Outage factor is the ratio of the product of the capacity on outage and total forced outage days of plant type to the product of total capacity and period days covered, expressed in percent.

already observed prior to said date due to significant outages of other plants along with the derated capability of natural gas plants.

On 09 June 2012, Ilijan 1 Unit 1 (GT1-1) was placed on shutdown at 0157H due to Malampaya gas restriction. Meanwhile, Sta. Rita 3, while in fuel oil operation, encountered problem and was placed on shutdown. San Lorenzo 2 was likewise placed on shutdown for compressor offline washing. On the other hand, coal plant Sual 1 went on forced outage twice on separate occassions (0019H to 1417H and 1442H to 1517H) during the trading day while another coal plant Calaca 2 went on outage from 1501H to 2356H due to drum level low.

Other plant outages that contributed to the tightness of supply and demand during the billing month are: coal plants Calaca 2, Pagbilao 1 and 2, and Sual 2; hydro plants San Roque HEP, Kalayaan 2 and 4, and Pantabangan 1; and oil-based plants Limay 3 and 5. Also, natural gas plant Ilijan 2 Unit 1 (GT2-1) was placed on shutdown due to Malampaya gas restriction on 08 to 11 June 2012.

Table 9. Major Plant Outages, June 2012 – Luzon

Plant/Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Remarks
Coal					
Masinloc 2	315	5/30/2012 0:48	5/31/2012 12:33	1.5	Boiler tube leak
Pagbilao 1	382	5/19/2012 0:23	6/1/2012 20:28	13.8	Emergency shutdown due to boiler tube leak
Sual 2	647	6/6/2012 0:08	6/11/2012 7:03	5.3	Boiler tube leak
Sual 1	647	6/9/2012 0:19	6/9/2012 14:17	0.6	Drum level low
Sual 1	647	6/9/2012 14:42	6/9/2012 15:17	0.0	Low condenser vacuum
Calaca 2	330	6/9/2012 15:01	6/9/2012 23:56	0.4	Drum level low
Calaca 2	330	6/20/2012 0:56			Boiler tube leak
Pagbilao 2	382	6/16/2012 0:07			On scheduled outage
Nat Gas					
Sta. Rita 3	265.5	6/9/2012 9:01	6/9/2012 11:39	0.1	Trouble at fuel oil pump
San Lorenzo 2	261.8	6/9/2012 4:44	6/11/2012 3:54	2.0	Offline compressor washing
Ilijan A1	190	6/9/2012 1:57	6/12/2012 10:04	3.3	Malampaya gas limitation
Ilijan B1	190	6/8/2012 21:07	6/11/2012 21:09	3.0	Malampaya gas limitation
Sta. Rita 3	265.5	6/23/2012 4:44	6/25/2012 2:24	1.9	Offline GT compressor washing
Hydro					
San Roque 1	137	5/27/2012 0:01	6/7/2012 22:01	11.9	Total planned shutdown due to power tunnel inspection
San Roque 2	137	5/27/2012 0:01	6/7/2012 22:01	11.9	
San Roque 3	137	5/27/2012 0:01	6/7/2012 22:01	11.9	
Kalayaan 2	180	6/5/2012 0:01	6/9/2012 23:10	5.0	Maintenance outage
Kalayaan 4	180	6/19/2012 0:01	6/23/2012 17:51	4.7	Maintenance outage
Pantabangan 1	60	6/7/2012 8:01	6/9/2012 21:01	2.5	Maintenance outage
Geothermal					
Tiwi 2	59	6/17/2012 12:48	6/24/2012 15:21	7.1	Low steam supply
Bacman 2	55	5/31/2012 19:13			Bearing no. 1 vibration
Makban 5	55	6/11/2012 0:08			Hotwell pump maintenance
Tiwi 1	59	6/24/2012 15:38			Low steam supply
Oil					
Limay 3	60	5/7/2012 16:27	6/18/2012 0:01	41.3	Emergency shutdown due to main oil pump excessive leak
Limay 5	60	5/17/2012 15:55	6/13/2012 16:01	27.0	On maintenance
Limay 6	60	6/20/2012 10:52			Servo valve trouble

Visayas capacity on outage shown in figure 8 is mainly attributed to geothermal plants with an average capacity on outage of 131 MW followed by the coal plants with 48 MW. The average capacity on outage in Visayas during the billing period was higher by 18.3 percent from the previous billing period by 138 percent from the same billing period last year. The highest capacity on outage was registered on 25 June 2012.

Figure 8. Plant Capacity on Outage, June 2012 - Visayas

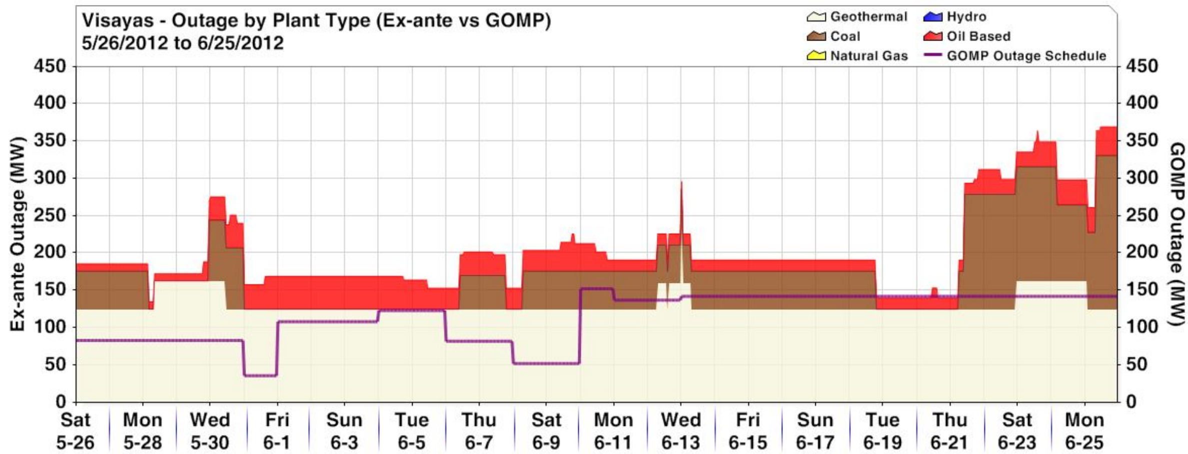


Table 10. Visayas Regional Outage Summary (Ex-ante), June 2012, May 2012, and June 2011

Resource Type	June 2012 (In MW)			May 2012 (In MW)			June 2011 (In MW)			% M-on-M Change (May - Jun 2012)			% Y-on-Y Change (Jun 2011 - Jun 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	206	0	48	167	0	18	148	0	43	23.1		167.0	39.2		11.7
Geothermal	235	125	131	200	125	139	117	0	30	17.5	0.0	(5.6)	101.4		331
Hydro	0	0	0	0	0	0	0	0	0						
Oil Based	50	10	25	37	10	15	24	11	12	35.1	0.0	60.8	108.3	(9.1)	99.3
TOTAL	369	135	204	327	135	172	204	11	86	12.9	0.0	18.3	81.0	1,127.3	138.0

Note: The derived values by resource type were non-coincident. The total values were derived based on aggregate hourly outage.

Table 11. Visayas Regional Outage Summary (GOMP), June 2012, May 2012, and June 2011

Resource Type	June 2012 (In MW)			May 2012 (In MW)			June 2011 (In MW)			% M-on-M Change (May - Jun 2012)			% Y-on-Y Change (Jun 2011 - Jun 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	51	0	26	84	0	36	0	0	0	(39.3)		(27.7)	#DIV/0!		
Geothermal	81	0	62	38	0	22	38	0	30	114.7		178.3	114.7		106.2
Hydro	0	0	0	0	0	0	0	0	0						
Oil Based	56	6	26	44	5	27	11	0	6	28.4	20.0	(0.3)	409.1		339.0
TOTAL	152	36	115	150	29	85	49	0	36	1.4	24.1	35.0	214.0		217.2

Note: The derived values by resource type were non-coincident. The total values were derived based on aggregate hourly outage.

Visayas region which primarily consists of geothermal, coal, and oil based plants showed a smaller monthly outage factor (*Figure 9*). It was noted that geothermal plants had a consistent outage factor of above 10 percent in June and May 2012 billing periods compared with last year's billing period. This is attributable to the Northern Negros Geothermal Power Plant (NNGP) which was placed on outage since 01 July 2011 for the conduct of plant rectification program. An increase in outage factor of coal plants and oil-based plants was caused by forced outages.

Similar to figures 6 and 7, figures 10 and 11 are the 2 main component of total outage factor which considerably comprised the Visayas total outage factor. Total outage factor of coal plants was largely influenced by forced outages (with 4.1 percent forced outage factor) while oil-based plants' factor came from both planned and forced outage with outage factor of 3 percent and 2 percent, respectively.

Figure 9. Total Outage Factor (Visayas Plants), June 2012, May 2012, and June 2011

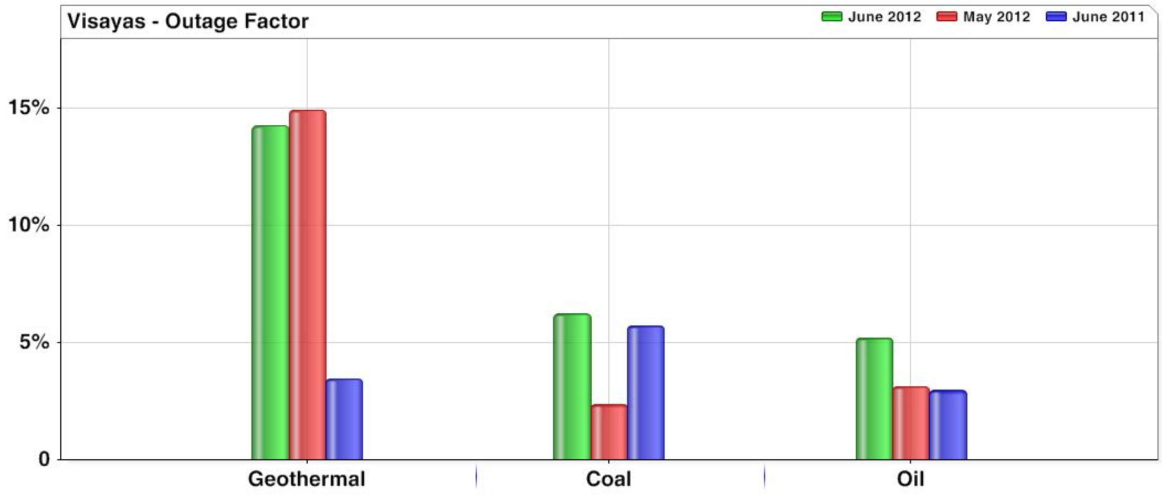


Figure 10. Planned Outage Factor (Visayas Plants), June 2012, May 2012, and June 2011

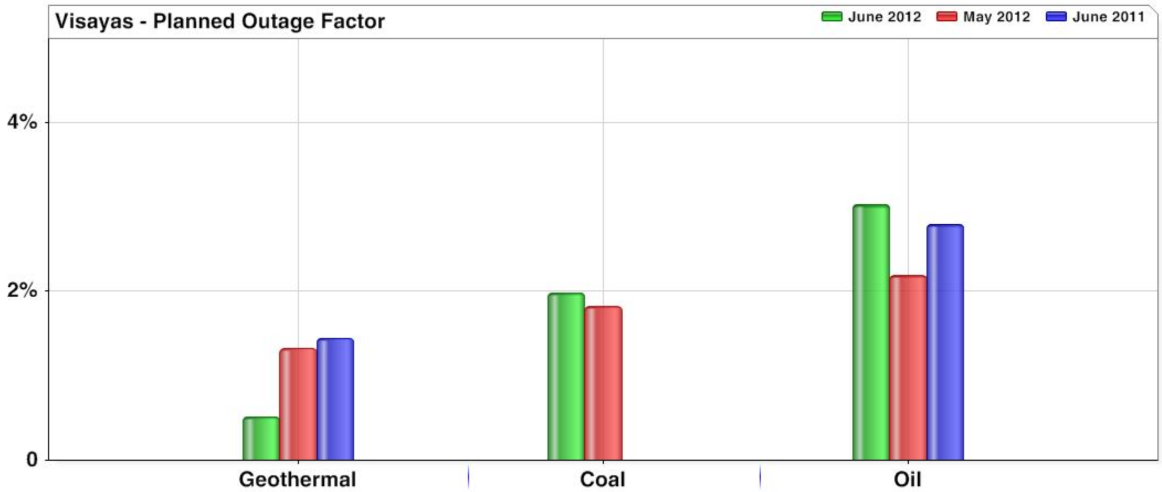
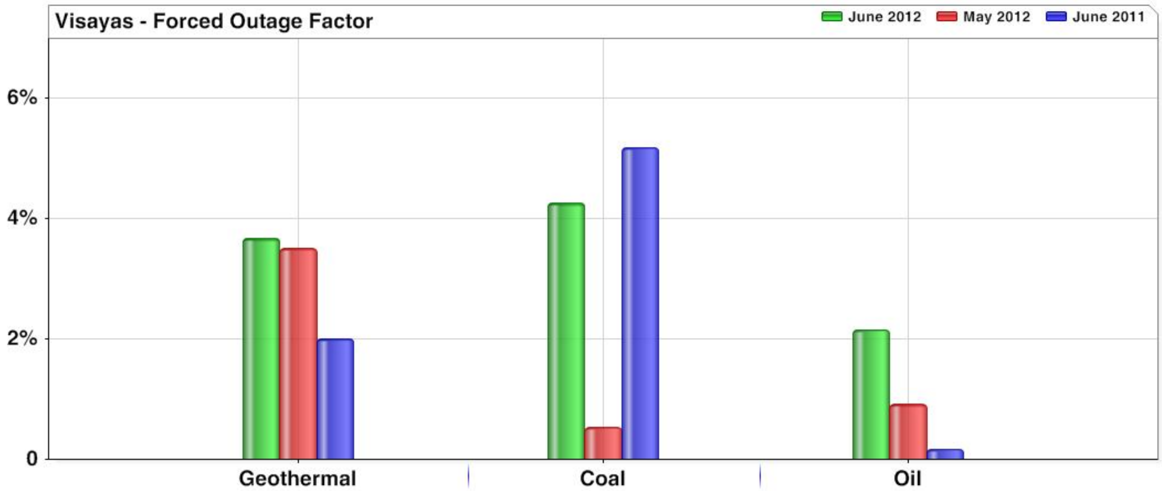


Figure 11. Forced Outage Factor (Visayas Plants), June 2012, May 2012, and June 2011



Several coal plants and oil based plants in Visayas went on outage during the period *(Table 12)*. Coal plants Cebu TPP1 and TPP2 showed significant instances of outages. Meanwhile, Kepco Salcon 1 was placed on shutdown due to forced outage while Kepco Salcon 2 was placed on planned outage due to annual Preventive Maintemance Schedule (PMS).

Table 12. Major Plant Outages, June 2012 - Visayas

Plant/Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Remarks
Coal					
Cebu TPP1	45	6/6/2012 9:15	6/7/2012 17:58	1.4	Fuel control problem
Cebu TPP2	50.8	6/21/2012 5:07	6/24/2012 3:25	2.9	Emergency cut out due to boiler tube leak
Cebu TPP2	50.8	6/8/2012 5:59	6/18/2012 18:02	10.5	Boiler tube leak. Declared unit under PMS
Kepco Salcon 1	103	6/25/2012 7:01			Emergency shutdown due to boiler tube leak
Kepco Salcon 2	103	6/21/2012 9:06			Annual PMS
Oil					
PDPP3 G	13	5/30/2012 13:41	6/6/2012 9:27	6.8	Knocking sound at cyl A2
PDPP3 D	11	6/9/2012 16:51	6/10/2012 10:43	0.7	PLC malfunctioned
PDPP3 C	13.3	6/21/2012 19:27	6/22/2012 11:26	0.7	Extreme exhaust gas leak at maifold
PB102 Unit 2	5	6/21/2012 16:31			Low pressure on lube oil
PB103 Unit 4	5	6/25/2012 10:52			For internal inspection

III. Market Price Outcome

The resulting market prices[7] throughout the billing period were relatively higher than the previous billing period. The average price of PhP9,145/MWh was significantly higher by 33.8 percent (increased by PhP2,308/MWh) than the previous billing period's PhP6,837/MWh and by 135.1 percent than last year's PhP3,890/MWh *(Table 13)*. The highest price recorded was PhP56,979/MWh on May 30 at trading interval 1200H and the lowest was PhP951/MWh on 05 June 2012 at interval 0400H.

The increase in market prices is attributed to the tight supply situations that were observed during the period. In particular, as shown in figure 12, high market prices occurred at the start of the billing period (28 May – 01 June), in the middle part (06 June – 11 June) and in the latter part (20 June - 25 June). It was noted that higher market prices occurred when the system capacity on outage reached 2,500 MW and above due to the outage of coal plants and the effect of Malampaya gas restriction. Moreover, with lower available capacity from coal, natural gas (on 09 June – 11 June) and hydro power plants, the more expensive oil-based plants were scheduled for dispatch and accordingly set the price, particularly during the peak hours.

[7] The market prices were represented by the following: (i) ex-ante load weighted average price (LWAP) for trading intervals without pricing error during ex-ante, (ii) ex-post LWAP for trading intervals with pricing error during ex-ante but without pricing error during ex-post, (iii) LWAP based on the market re-run result for trading intervals with pricing error both during ex-ante and ex-post, (iv) administered price for loads for trading intervals under market intervention, and (v) estimated load reference price (ELRP) for trading intervals where the ERC-approved Price Substitution Mechanism (PSM) was applied.

Figure 12. Market Price Trend, June 2012

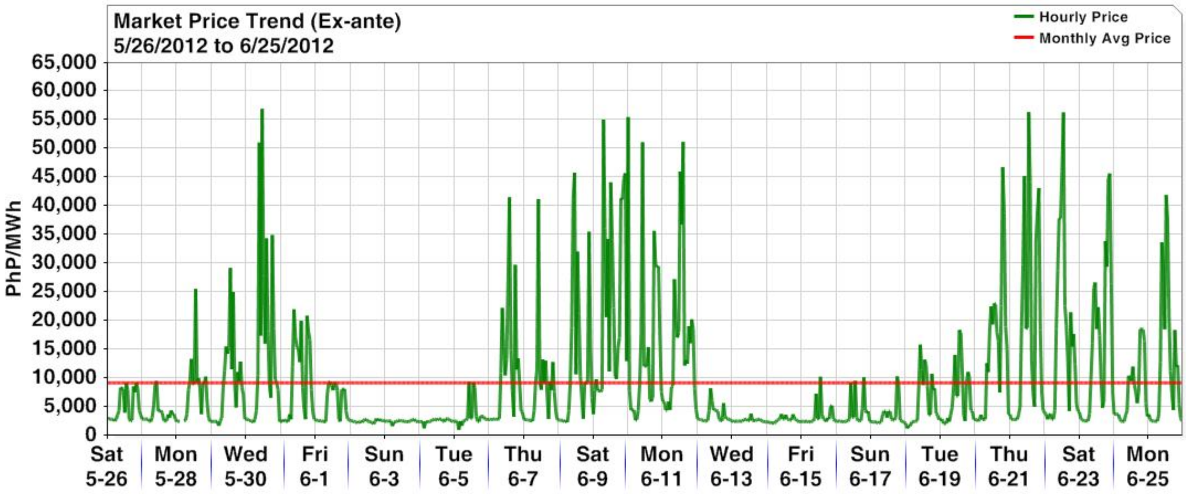


Figure 13. Market Price Trend - Luzon, June 2012

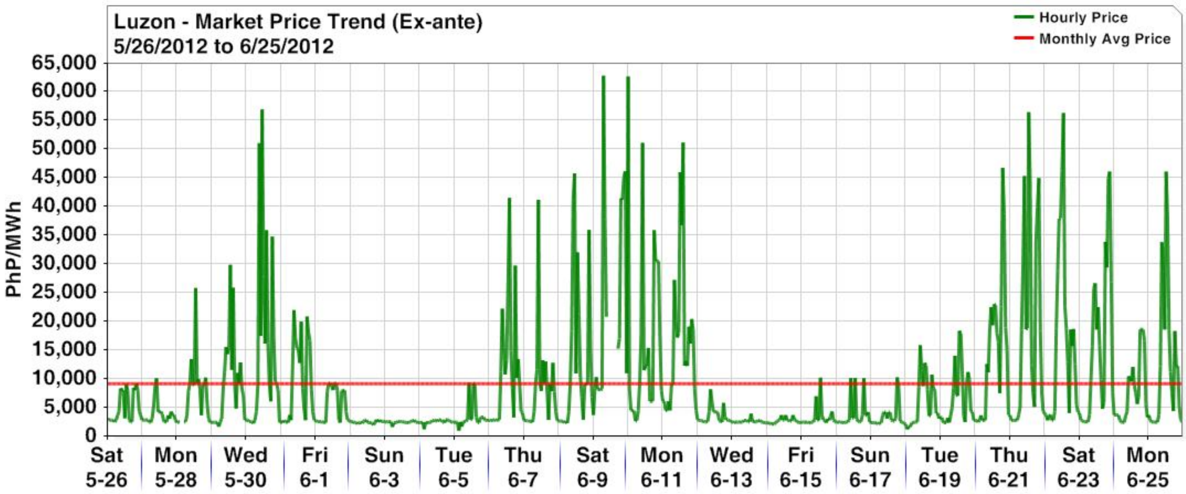
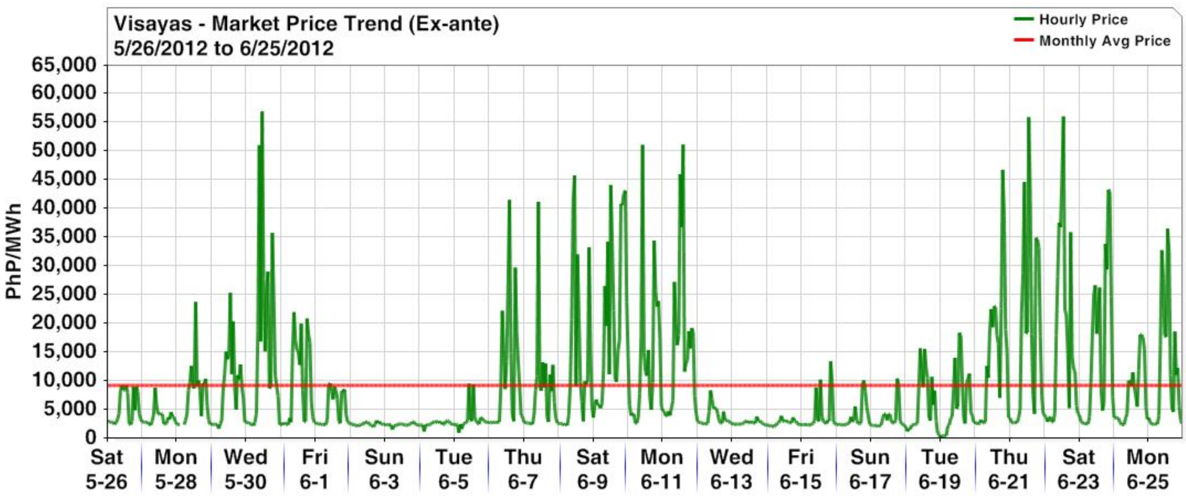


Figure 14. Market Price Trend - Visayas, June 2012



Comparing the regional prices from the previous billing period, the average prices significantly increased by 33.7 percent (PhP6,835/MWh to PhP9,141/MWh) in Luzon and 34 percent (PhP6,845/MWh to PhP9,171/MWh) in Visayas *(Table 13)*.

Table 13. Market Price Summary, June 2012, May 2012, and June 2011

	June 2012 (In PhP/MWh)			May 2012 (In PhP/MWh)			June 2011 (In PhP/MWh)			% M-on-M Change (May - Jun 2012)			% Y-on-Y Change (Jun 2011 - Jun 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luz-Vis	56,979	951	9,145	63,092	1	6,837	25,866	0	3,890	(9.7)	92,660.6	33.8	120.3		135.1
Luzon	62,859	954	9,141	63,092	1	6,835	25,866	0	3,895	(0.4)	93,194.6	33.7	143.0		134.7
Visayas	56,979	0	9,171	63,092	1	6,845	25,866	0	3,864	(9.7)	(100.0)	34.0	120.3	(100.0)	137.3

The price distribution in figure 12 shows the price movements during the billing period compared with previous billing period and same billing period last year. The frequency of prices falling within the price range of above PhP20,000/MWh notably increased from 3.3 percent in May to 10.2 percent in June. Correspondingly, prices falling within the price level of PhP2,000/MWh to PhP4,000/MWh and above PhP12,000/MWh to PhP20,000/MWh increased modestly *(Table 14).* These increase in higher market price levels against the previous billing period caused the increase in the average market price.

Likewise, the year-on-year comparison shows higher occurrences of prices above Php8,000/MWh in the current billing period.

Figure 15. Market Price Distribution, June 2012, May 2012, and June 2011

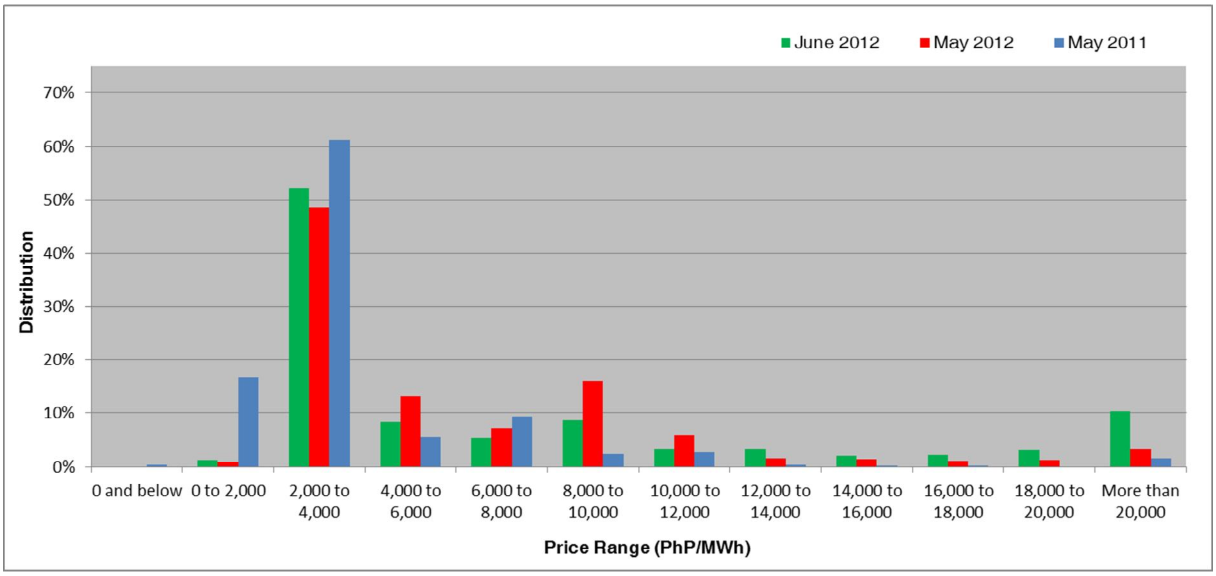


Table 14. Market Price Distribution, June 2012, May 2012, and June 2011

Price Range (PhP/MWh)	% Distribution		
	June 2012	May 2012	May 2011
0 and below	0.0	0.0	0.3
0 to 2,000	1.2	0.8	16.7
2,000 to 4,000	52.2	48.6	61.2
4,000 to 6,000	8.4	13.2	5.6
6,000 to 8,000	5.4	7.2	9.3
8,000 to 10,000	8.6	16.0	2.3
10,000 to 12,000	3.4	6.0	2.7
12,000 to 14,000	3.4	1.5	0.3
14,000 to 16,000	2.0	1.3	0.1
16,000 to 18,000	2.2	1.0	0.1
18,000 to 20,000	3.1	1.1	0.0
More than 20,000	10.2	3.3	1.5

The average price in Luzon was 0.3 percent lower than the average price in Visayas.

Table 15. Regional Price Summary, June 2012, May 2012, and June 2011

	Luzon (In PhP/MWh)			Visayas (In PhP/MWh)			% Difference		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
June 2012	62,859	954	9,141	56,979	0	9,171	10.3		(0.3)
May 2012	63,092	1	6,835	63,092	1	6,845	0.0	(1.5)	(0.1)
June 2011	25,866	0	3,895	25,866	0	3,864	0.0		0.8

IV. Pricing Errors and Market Intervention

The frequency of the issuance of PEN, PSM application, and market intervention events is shown in Table 16.

The total pricing errors in ex-ante dropped to 44.6 percent (332 trading intervals) from previous month's 55.3 percent (398 trading intervals). Although the occurrences of pricing errors in Luzon during ex-ante process considerably dropped from last month's 53.5 percent to 29.6 percent, the system wide pricing errors significantly went up to 14.1 percent (from 1.8 percent in the previous month) due to more occurrences of undergeneration (*generation deficiency)* condition, MMS input data concerns, and artificial load shedding (Value of Loss Load) at Meralco loads in Araneta and Zapote substations. Undergenerations were primarily brought about by insufficient supply due to outages and non-submission of offers from other generators.

Luzon PENs were mainly due to the violation of the contingency N-1 requirement at MERALCO interchange substations in Araneta, Balintawak, Dolores and Zapote. Lower average demand may have prevented possible occurrences of contingency constraints violations in MERALCO interchange substations which helped to reduce the Luzon PENs.

The ex-post market results, on the other hand, indicated system-wide pricing errors in 79 trading intervals due to undergeneration conditions and MMS input data concerns.

System-wide application of the PSM was noted in 45 trading intervals during ex-ante. The same was mainly due to the constraints at Bauang-BPP, Naga-Quiot, and Naga-Cebu lines, Sta. Rosa-Calaca line, and constraint in Dasmariñas EHV transformer 3S.

During the billing month, system wide market intervention was declared on 28 May 2012 affecting trading intervals 0400H and 0500H. The said market intervention was due to MMS workflow stoppage caused by failure of SO Visayas to send snapshot data resulting from SCADA-EMS failure triggered by tripping of Cebu substation 100 MVA transformer which cut-off AC power supply to SO Visayas building.

Meanwhile, NGCP-SO initiated market intervention in Luzon on 09 June 2012 affecting 7 trading intervals 1100H to 1700H. As earlier discussed, prevalent tight supply and demand condition, particularly during peak period, was already evident prior to June 9, with the outage of Sual 2 since 06 June 2012 and Ilijan 2 Unit 1 (GT2-1) on June 8 due to Malampaya gas restriction. Supply further decreased during the trading date (June 9) when another gas turbine (Ilijan 1 Unit 1 or GT1-1) was placed on shutdown in light of the gas restriction. The supply condition was severed by the tripping of Sual 1 at 0019H which thereafter synchronized back to the grid at 1417H. The coal plant tripped again at 1442H due to low condenser vacuum. Sta. Rita 3 and San Lorenzo 2 also contributed to the worsening of supply condition along with the tripping of Calaca at 1500H. The generation deficiency (outages) which resulted in the implementation of manual load dropping caused the market intervention.

Table 16. PEN, PSM and MI Summary, June 2012

	Luz-Vis		Luzon		Visayas		Total	
	Freq.	**% of Time**	**Freq.**	**% of Time**	**Freq.**	**% of Time**	**Freq.**	**% of Time**
PEN (RTD)	105	14.1	220	29.6	24	3.2	332	44.6
PEN (RTX)	79	10.6	2	0.3	15	2.0	96	12.9
PSM (RTD)	45	6.0	3	0.4	3	0.4	51	6.9
PSM (RTX)	35	4.7		0	1	0.1	36	4.8
MI	2	0.3	7	0.9		0	9	1.2

Note: The column "Total" refers to the total number of trading intervals with PEN, PSM or MI (system-wide or regional)

Figure 16 and Table 17 show the correlation of the hourly prices and demand during the billing period, the previous billing period and the same billing period last year. Results of the correlation between the demand and hourly prices for the current billing period show a positive relationship between the two; however, this billing period's correlation value of about 34 percent is lower than the previous month. On the other hand, results show weak or no significant relationship between prices above PhP10,000/MWh and demand (-3.97 percent). It was observed that there were occurrences of high market prices even during off peak period (when demand is lower) as seen in figure 16, which goes to show that the increase in market prices in the billing period was greatly influenced by supply conditions. During this period, the oil-based plants, which do not normally offer most of their capacity, traded and competed in the market and, in fact, offered their capacities at higher price. With the outages of coal and natural gas plants, the much more expensive oil-based plants were scheduled for dispatch and set the market price on certain occasions even during periods of low demand (off-peak).

Figure 16. Price and Demand Relationship, June 2012, May 2012, and June 2011

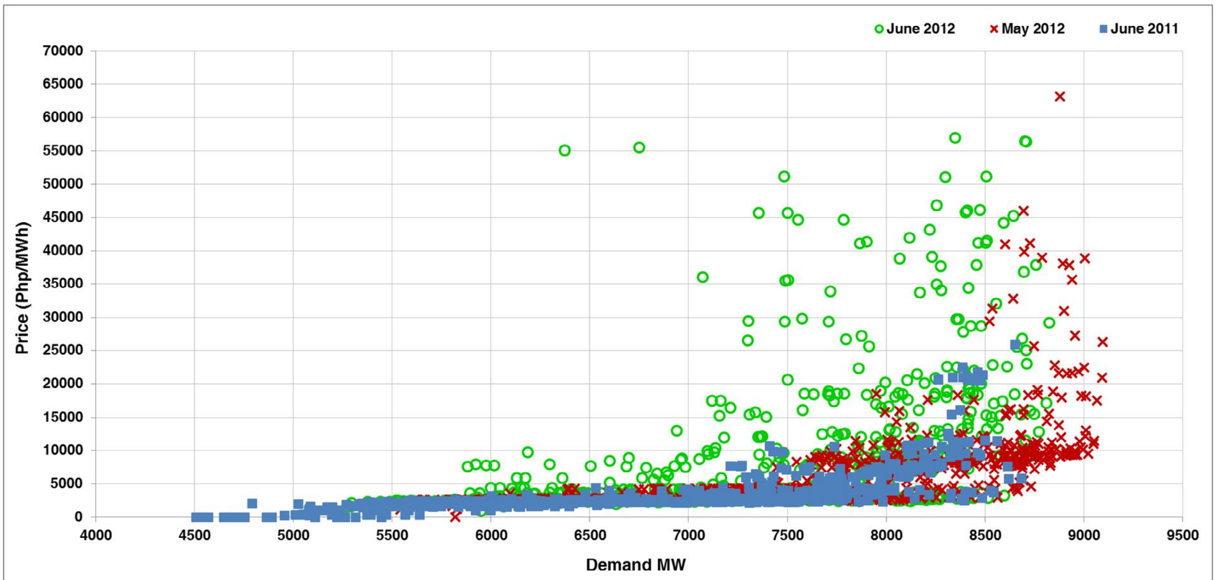


Table 17. Price and Demand Relationship, June 2012, May 2012, and June 2011

	June 2012	May 2012	June 2011	% M-on-M Change	% Y-on-Y Change
All Prices	0.3408	0.6093	0.664	(44.1)	(48.7)
Prices >= PhP10,000	-0.0397	0.3021	0.4411	(113.1)	(109.0)

V. High Price Analysis – Month-on-Month Comparison

The June 2012 billing period had a total of 180 trading intervals with market prices above PhP10,000/MWh, which is higher than the previous billing period's 102 trading intervals. Obtaining the average of these trading intervals' Reserve Margin Index (RMI) yields to lower value. It was noted in Table 18 that the higher the price range (PhP20,000/MWh to PhP30,000/MWh and up to above PhP40,000/MWh), the lower the resulting average RMI and the supply/demand variance (residual supply) are. Worthy to note is the negative average RMIs for trading intervals with prices above PhP20,000/MWh which indicates offer insufficiency in the market during these times. However, the imposition of security limits (designation of Must Run Units and other security limit setting on top of the offered capacity) by the NGCP-SO helped alleviate the supply condition as manifested by the positive average residual supply.

Market price above PhP40,000/MWh occurred twice during off-peak period (low system demand): first on 09 June 2012 at trading interval 0800H (PhP55,076/MWh) and on 10 June 2012 at 0100H (PhP55,520/MWh). During these trading intervals, prevalent tightness of supply and demand and the non-submission of offers of several oil-based and hydro plants, as well as the pump operation of at least 1 Kalayaan Pump Storage Power Pump (KPSPP) contributed to the said high prices. Similarly, HVDC transfer flow from Visayas to Luzon of 440 MW was reached.

On a different note, the previous billing period showed an average residual supply of -0.56 MW for those ex-ante trading intervals with price range of PhP30,000/MWh to PhP40,000/MWh. During these intervals, particularly the trading intervals 1100H to 1500H of 10 May 2012, demand was much higher than the supply which resulted in pricing errors. The occurrences of these pricing errors were brought about by the undergeneration (*generation deficiency*) and Value of Loss Load (artificial load dropping). Meanwhile, during ex-post run, deficiencies in supply was addressed by the additional generation coming from must run units Malaya 2 and Kalayaan 2 which resulted in an average residual supply of 27.05 MW.

Table 18. Market Outcome - High Market Price Distribution, June 2012 and May 2012

	June 2012							May 2012						
	Frequency	Average RMI (%)		Average Supply/Demand Variance (MW)		Average Oil-based Plant Dispatch Schedule (MW)		Frequency	Average RMI (%)		Average Supply/Demand Variance (MW)		Average Oil-based Plant Dispatch Schedule (MW)	
		Ex-Ante	Ex-post	Ex-Ante	Ex-post	Ex-Ante	Ex-post		Ex-Ante	Ex-post	Ex-Ante	Ex-post	Ex-Ante	Ex-post
PhP10,000/MWh to PhP20,000/MWh	104	1.07	0.78	174.59	165.98	630.84	615.28	78	1.12	0.62	269.70	242.66	674.93	704.88
PhP20,000/MWh to PhP30,000/MWh	33	-0.16	-0.31	55.95	49.07	793.52	784.92	11	-0.40	-0.27	169.70	199.16	851.55	832.52
PhP30,000/MWh to PhP40,000/MWh	17	-0.23	-0.18	34.85	38.21	838.43	831.60	9	-2.34	-2.76	-0.56	27.05	1,005.12	1,012.73
Above PhP40,000/MWh	26	-0.87	-0.96	4.08	13.05	840.47	839.27	4	-2.47	-3.42	28.80	10.92	1,052.10	1,035.88

As discussed in the preceding section, higher level of prices in the billing period was attributed to the dispatch of the more expensive oil-based plants. As shown in Table 18, the level of dispatch schedule for oil-based plants is higher during those intervals with higher price range.

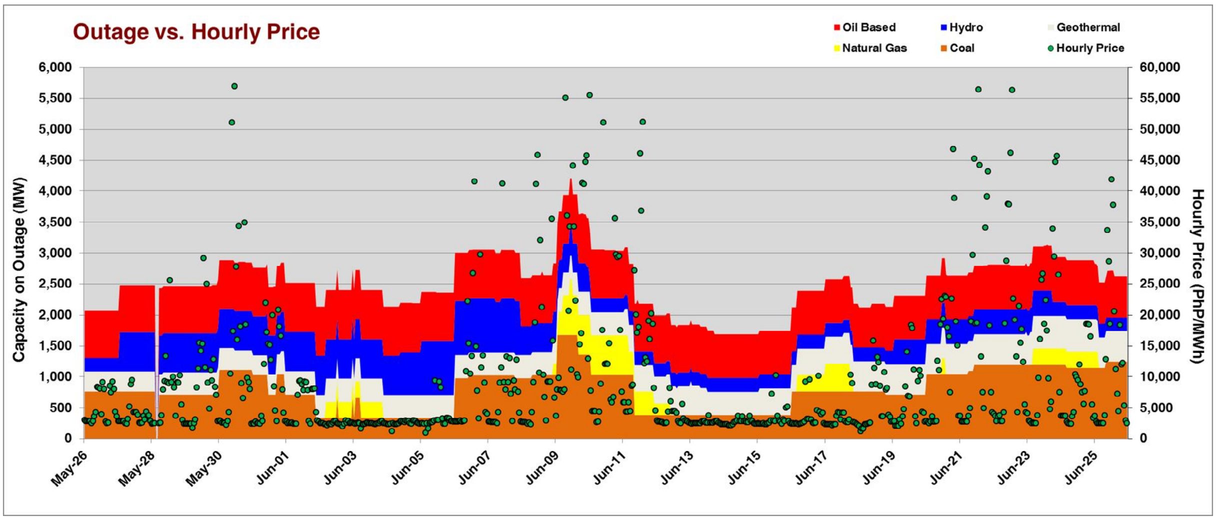
Notwithstanding the above, the month-on-month comparison shows that the oil-based plants' average dispatch schedule is lower in the current billing period than the previous billing period. The lower minimum values obtained for the current billing period have pulled down the overall average dispatch schedule. Note that the maximum values obtained for both the current and previous billing period are almost on par with one another.

Table 19. ***Market High Price and Oil-based Plants Average Dispatch Schedule, June 2012 and May 2012***

Oil-based Plants Dispatch Schedule	June 2012				May 2012			
	PhP30,000/MWh to PhP40,000/MWh		Above 40,000/MWh		PhP30,000/MWh to PhP40,000/MWh		Above 40,000/MWh	
	Ex-Ante	Ex-post	Ex-Ante	Ex-post	Ex-Ante	Ex-post	Ex-Ante	Ex-post
Maximum (MW)	1,004.6	1,073.9	959.1	1,022.1	1078.7	1169.1	1078.7	1080.6
Minimum (MW)	632.5	624.4	361.5	255.4	843.9	858.5	1014.7	954.9
Average (MW)	838.4	831.6	840.5	839.3	1,005.1	1,012.7	1,052.1	1,035.9

Another significant observation is that high prices during the current billing period were likewise triggered by the capacity on outage. It was observed that when the capacity on outage reached above 2,500 MW, the price went above PhP25,000/MWh (*Figure 17*) most of the time.

Figure 17. Capcity on Outage vs. High Market Price, June 2012



VI. HVDC Scheduling

The 100 MW and 150 MW transfer capability of the HVDC going to Luzon, which was set by NGCP-SO at separate trading intervals, were both reached on 18 and 19 June 2012 resulting in regional application of pricing errors and price disparity between Luzon and Visayas. Consequently, the 440 MW maximum limit was reached 4 times during low supply condition in Luzon in certain intervals on 09 to 11 June 2012. In addition, due to maintenance activities, HVDC was de-energized and thus no power flow transpired starting from 18 June at trading interval 2300H to 0100H of 19 June 2012.

On the other hand, the maximum transfer capability of the HVDC going to Visayas of 150 MW was reached during 2 consecutive trading intervals on 15 June 2012. During those intervals, Leyte A had no offers in the market.

Table 20. ***Summary of HVDC Limits Imposed by NGCP-SO and Results of HVDC Schedules (Ex-ante and Ex-post), June 2012***

Results of HVDC Scheduling	HVDC Limit during Ex-ante (Visayas/Luzon) (No. of Trading Intervals)						HVDC Limit during Ex-post (Visayas/Luzon) (No. of Trading Intervals)					
	0/0	150/100	150/150	150/440	440/440	Total	0/0	150/100	150/150	150/440	440/440	Total
Visayas to Luzon	**-**	**4**	**1**	**721**	**2**	**728**	**-**	**4**	**1**	**722**	**1**	**728**
Limit Not Maximized				717	2	719				715	1	**716**
Limit Maximized 1\		4	1	4		9		4	1	7		**12**
Luzon to Visayas	**-**			**4**		**4**				**3**		**3**
Limit Not Maximized				2		2				3		**3**
Limit Maximized 1\				2		2						**-**
No Flow 1\	**3**					**3**	3					**3**
TOTAL	**3**	**4**	**1**	**725**	**2**	**735**	**3**	**4**	**1**	**725**	**1**	**734**

Notes: 1\ with price separation

Table 21. ***Summary of HVDC Limits Imposed by NGCP-SO and Results of HVDC Schedules (Ex-ante and Ex-post), May 2012***

Results of HVDC Scheduling	HVDC Limit during Ex-ante (Visayas/Luzon) (No. of Trading Intervals)					HVDC Limit during Ex-post (Visayas/Luzon) (No. of Trading Intervals)			
	150/200	150/210	150/440	440/440	Total	150/200	150/440	440/440	Total
Visayas to Luzon	**10**	**1**	**682**	**8**	**701**	**12**	**682**	**8**	**702**
Limit Not Maximized	*10*	*1*	*682*	*8*	*701*	*12*	*682*	*8*	*702*
Limit Maximized 1\					-				-
Luzon to Visayas	**1**		**18**		**19**		**18**		**18**
Limit Not Maximized	*1*		*18*		*19*		*18*		*18*
Limit Maximized 1\					-				-
TOTAL	**11**	**1**	**700**	**8**	**720**	**12**	**700**	**8**	**720**

Notes: 1\ with price separation

Table 22. ***Summary of HVDC Limits Imposed by NGCP-SO and Results of HVDC Schedules (Ex-ante and Ex-post), June 2011***

Results of HVDC Scheduling	HVDC Limit during Ex-ante (Visayas/Luzon) (No. of Trading Intervals)					HVDC Limit during Ex-post (Visayas/Luzon) (No. of Trading Intervals)					
	100/100	150/100	150/143	150/440	Total	100/100	150/100	150/143	150/440	440/440	Total
Visayas to Luzon		**56**	**3**	**620**	**679**		**56**	**2**	**620**		**678**
Limit Not Maximized		14	3	620	637		18	2	620		640
Limit Maximized 1\		42			42		38				38
Luzon to Visayas	**3**	**18**	**1**	**43**	**65**	**3**	**17**	**2**	**43**	**1**	**66**
Limit Not Maximized	1	16	1	40	58	1	17	2	40	1	61
Limit Maximized 1\	2	2		3	7	2			3		5
TOTAL	**3**	**74**	**4**	**663**	**744**	**3**	**73**	**4**	**663**	**1**	**744**

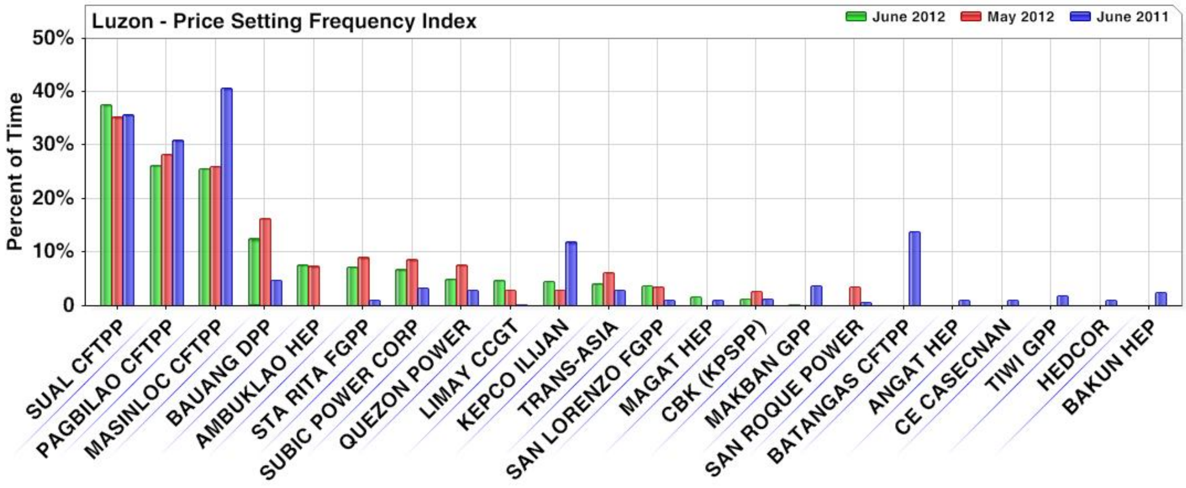
Notes: 1\ with price separation

VII. Price Setting Plants[8]

As shown in Figure 18, 16 plants from Luzon have been considered as price setters across all price levels during the billing period. As with the previous billing period and same billing period last year, the coal plants Sual CFTPP (at 38%), Pagbilao CFTPP (at 26%) and Masinloc FTPP (at 26%) remained the top three frequent price setters. In general, almost all the plants had lower PSFI when compared with the previous billing period which is associated with the higher level of market prices during the period.

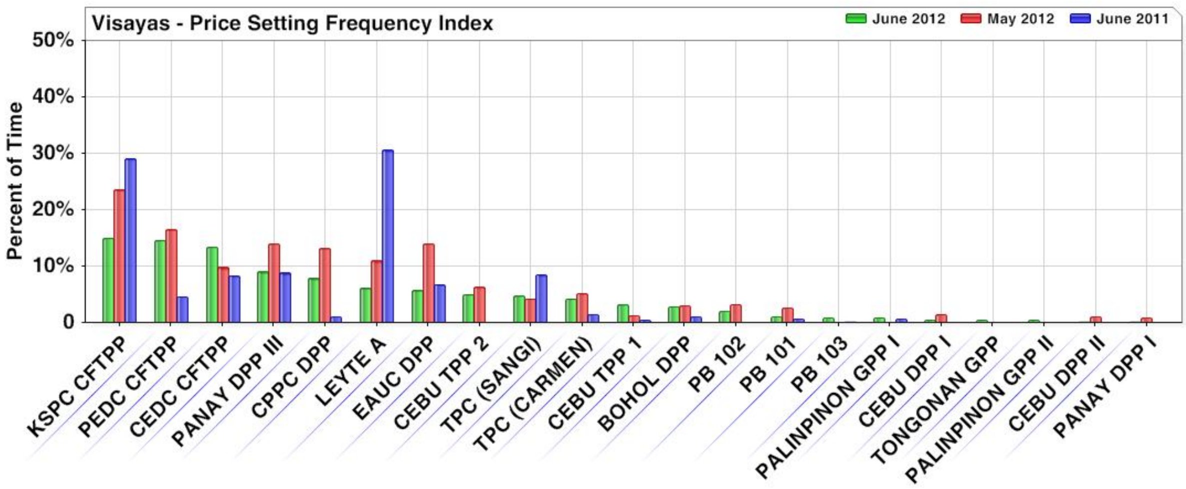
[8] A generator trading node is considered as a price setter when its last accepted offer price is between 95% to 100% of its nodal price. A generating plant is considered as price setter if at least one of its trading nodes was price setter in a given trading hour. The percentages stated in the price setting discussion represent the percent of time that a given plant was considered as price setter during the billing month.

Figure 18. Price Setting Frequency Index (Luzon Plants), June 2012, May 2012, and June 2011



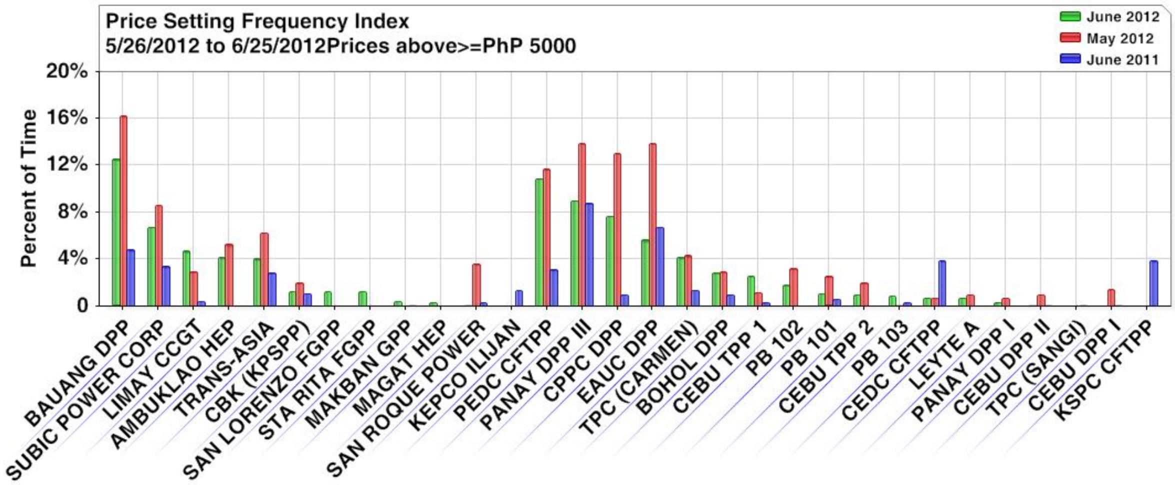
In Visayas *(Figure 19),* 21 plants have been considered as price setters across all price levels with coal plants KSPC CFTPP (at 15%), PEDC CFTPP (at 15%), and CEDC CFTPP (at 13%) as the most frequent price setters.

Figure 19. Price Setting Frequency Index (Visayas Plants), June 2012, May 2012, and June 2011



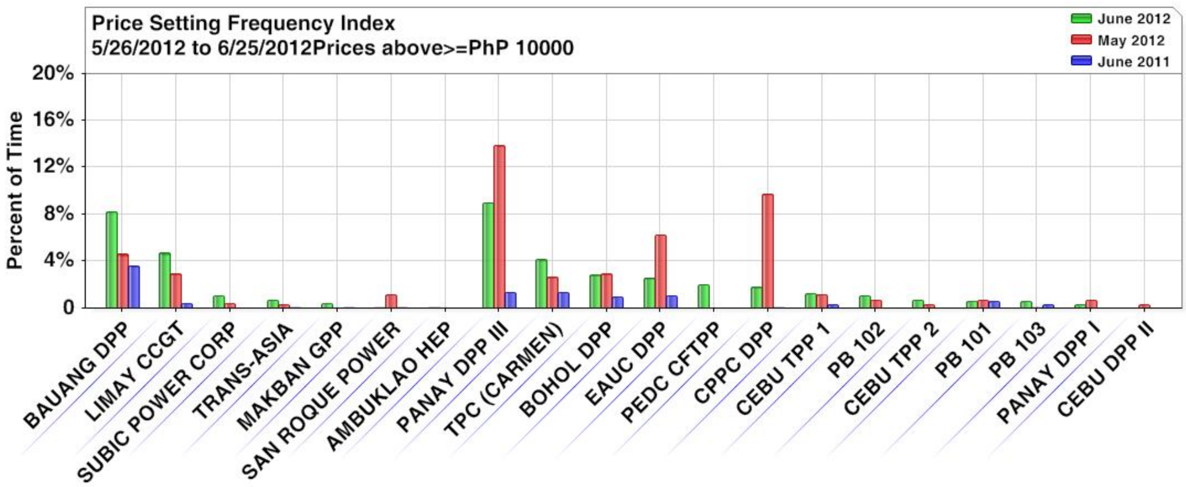
For prices above PhP5,000/MWh, the number of price setters increased to 26 plants, composed of 11 plants from Luzon and 15 plants from Visayas *(Figure 20).* The oil-based plants Bauang DPP (at 12%), Subic Power (at 7%) and Limay CCGT (at 5%) topped the price setting plants from Luzon. The coal plant PEDC CFTPP (at 11%), and oil-based plants PANAY DPP III (at 9%), CPPC DPP (at 8%), and EAUC DPP (at 6%) were the top price setting plants from Visayas.

Figure 20. ***Price Setting Frequency Index (PhP5,000 and Above), June 2012, May 2012, and June 2011***



During the billing period, the number of price setters at the price level of PhP10,000/MWh and above increased to 19 plants, with 7 plants coming from Luzon and 12 plants coming from Visayas. Oil-based plants PANAY DPP III, Bauang DPP, and Limay CCGT were the top 3 price setters.

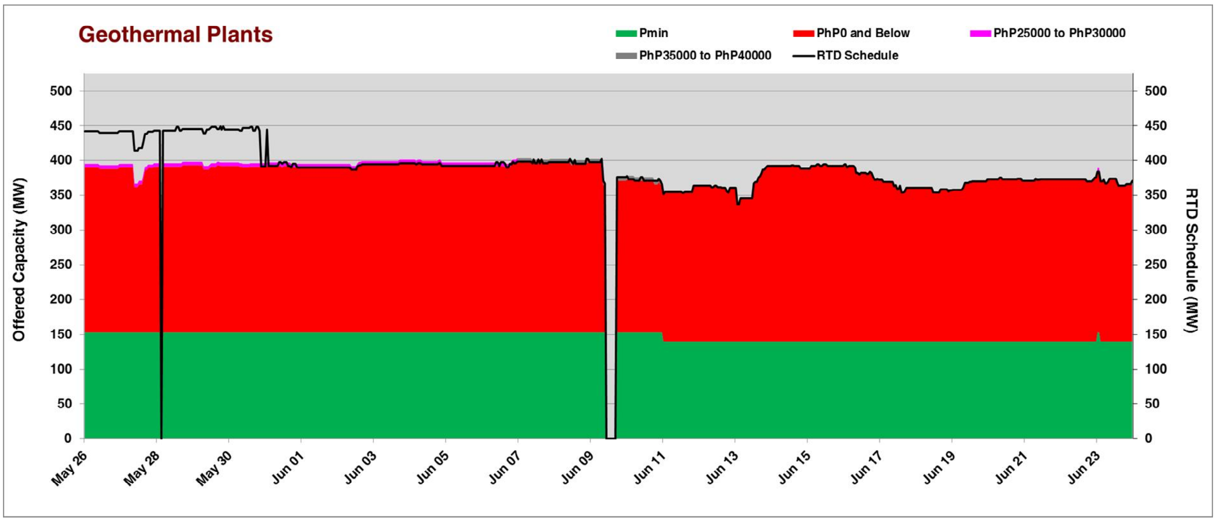
Figure 21. ***Price Setting Frequency Index (PhP10,000 and Above), June 2012, May 2012, and June 2011***



VIII. Generator Offer Pattern

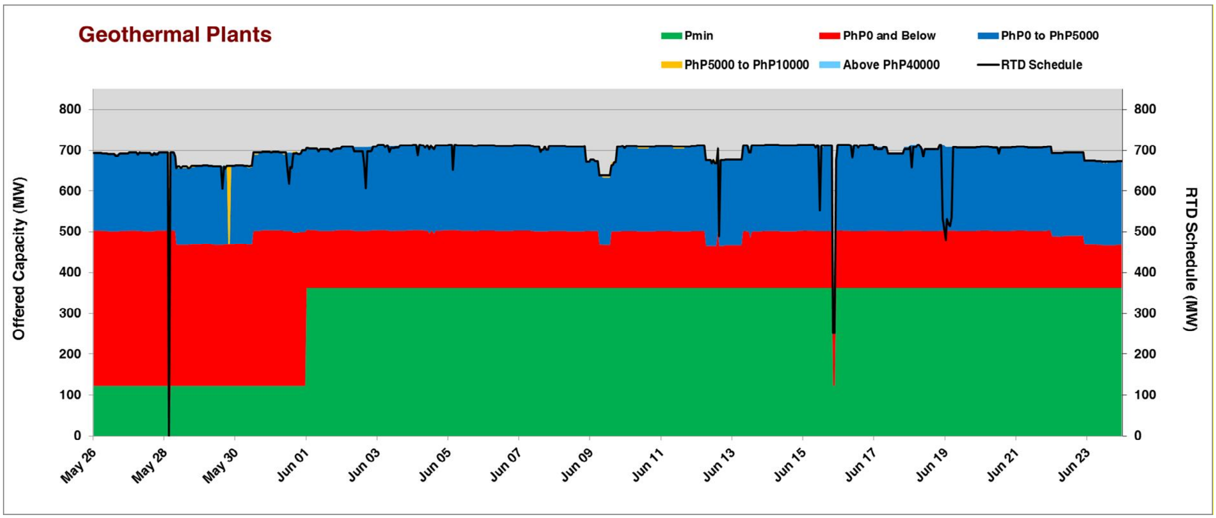
Geothermal plants in Luzon had the lowest price offer among the plant resources except for a few instances when the 5 MW offered block was priced at PhP25,000 to PhP30,000 and in some cases at PhP35,000 to PhP40,000. It was noted that about 99.4 percent of the offered capacity of the geothermal plants in Luzon was priced at PhP0.00/MW and below *(Figure 22)*. Likewise, it is important to note that the reason why the RTD schedule is greater than the offered capacity by an average of 51 MW until 30 May 2012 is that during this period, Bacman G01 was scheduled for dispatch through the imposition of security limits by NGCP-SO in compliance with the commercial operation requirements (commissioning test).

Figure 22. Geothermal Plants Offer Pattern (Luzon), June 2012



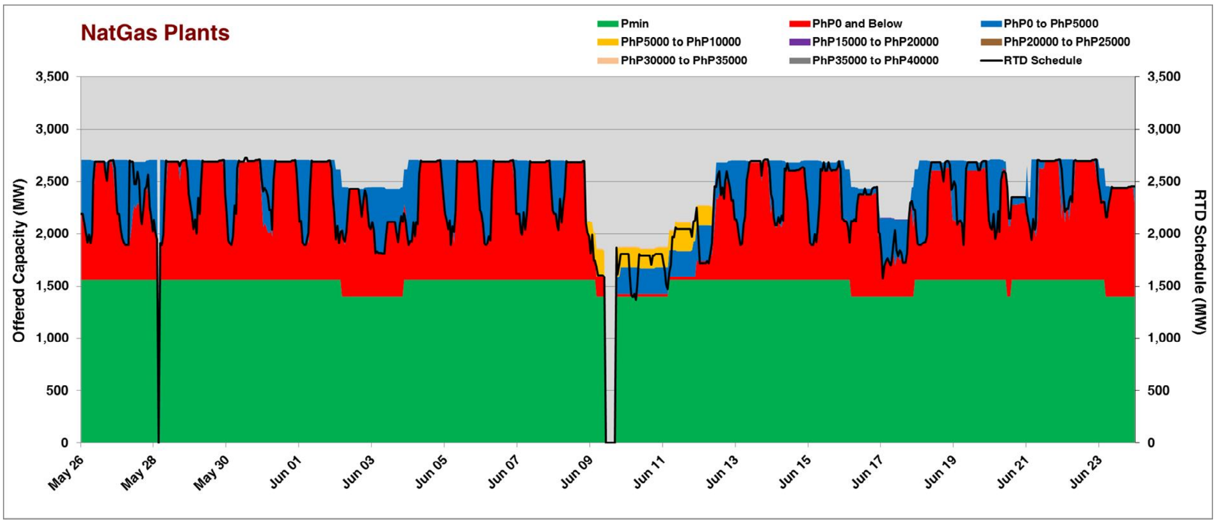
On the other hand, the offer prices of the geothermal plants in Visayas were mostly in the range of PhP0/MW to PhP5,000/MW *(Figure 23)*. 99.86 percent of the offered capacity was priced at PhP5,000/MW and below.

Figure 23. Geothermal Plants Offer Pattern (Visayas), June 2012



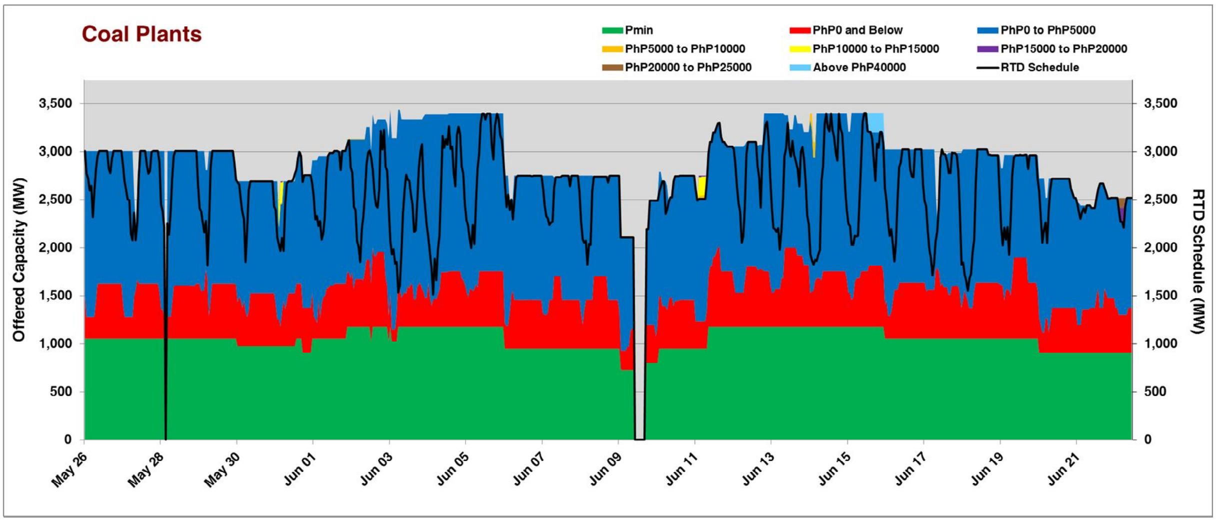
The Offer prices of natural gas plants in Luzon remained at below PhP5,000/MW most of the time *(Figure 24)*. However, when the gas supply was restricted from Malampaya Onshore plant, there was a noticeable change in the offer pattern of the natural gas plants, where price offers escalated up to PhP40,000/MW.

Figure 24. Natural Gas Plants Offer Pattern (Luzon), June 2012



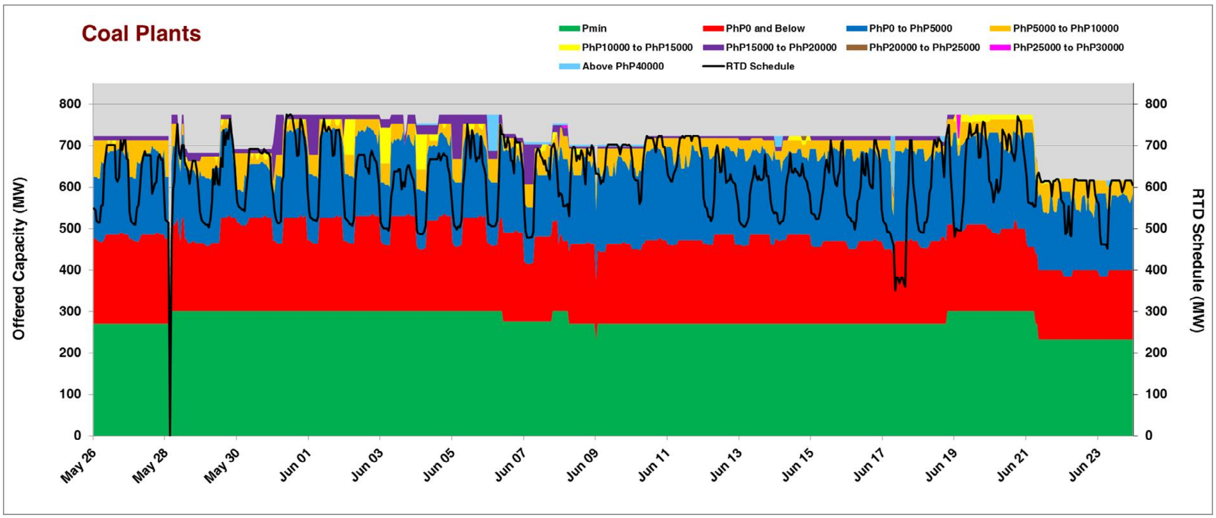
About 99.8 percent of the offered capacities of coal plants in Luzon (average of 2,915 MW) were priced at PhP5,000/MW and below *(Figure 25)*. The remaining 0.2 percent of the offered capacities (offered capacity ranging from 5 MW to 214 MW) were priced above PhP5,000/MW. The capacity offer of the coal plants notably decreased during 30 May, 06-11 June, and 20-25 June of the billing month due to the unit outages of Masinloc 2 (30 May 2012), Sual 2 (06 June), Sual 1 (09 June), Calaca 2 (on June 9 and June 20), and planned outage of Pagbilao 2.

Figure 25. Coal Plants Offer Pattern (Luzon), June 2012



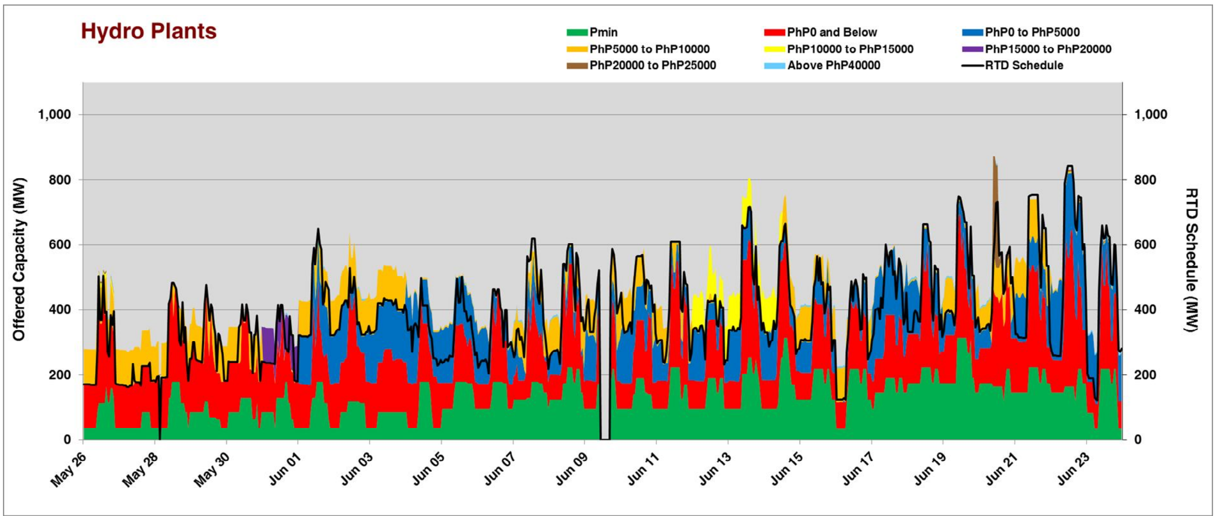
In Visayas, about 92 percent of the offered capacity of coal plants (average of 660 MW) were priced at PhP5,000/MW and below. The other 8 percent of the offered capacities (average of 58 MW) were priced above PhP5,000/MW, reaching as high as PhP60,000/MW *(Figure 26)*.

Figure 26. Coal Plants Offer Pattern (Visayas), June 2012



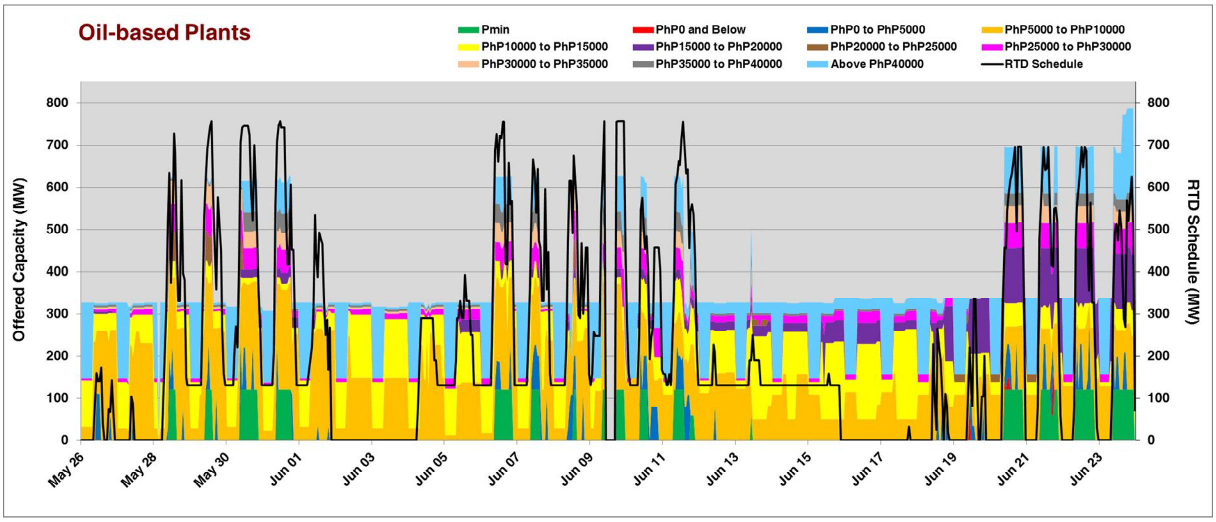
The aggregate hourly offer pattern of hydro plants in Luzon remained highly volatile in terms of capacity and price *(Figure 27).* The capacity offers range from 226 MW to 873 MW while the offer prices ranged from negative PhP250/MW to PhP62,000/MW. The limited or non-submission of offers from hydro plants still comprised about 56 percent of the capacity gap in Luzon.

Figure 27. Hydro Plants Offer Pattern (Luzon), June 2012



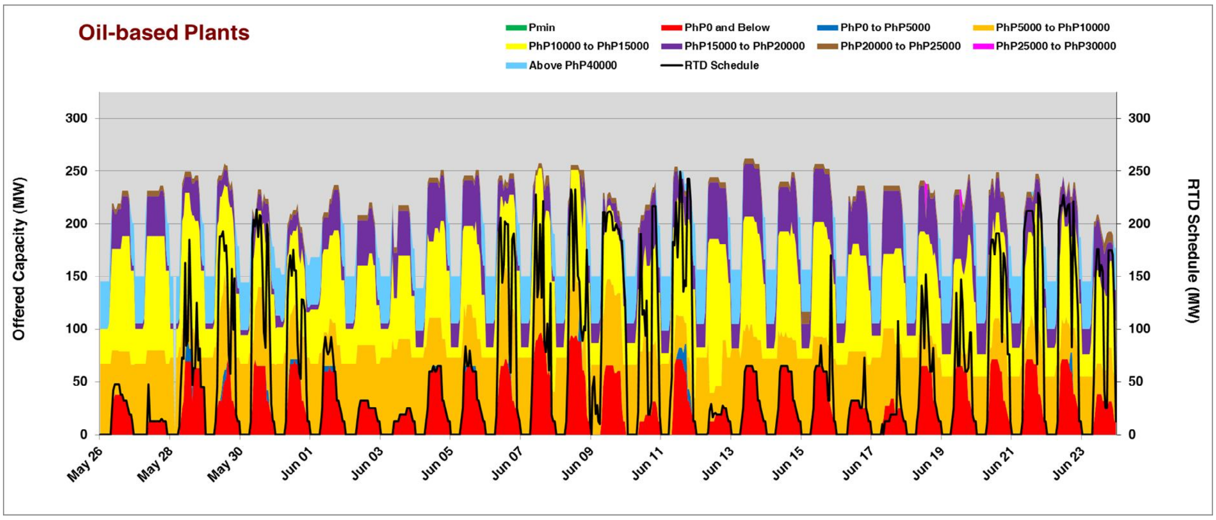
The oil-based plants accounted for 27 percent of the capacity gap in the region due to the limited or non-submission of offers. It was noted that the average capacity gap decreased due to offers submitted especially during periods of tight supply and demand conditions. Limay A and B submitted offers during peak hours only while Malaya did not submit any offer for the entire period. Notwithstanding Malaya's non-submission of offers, there were certain intervals when it was called to run as MRU by the NGCP-SO. Thus, it can be noted that there were certain trading intervals during the covered period where the RTD schedule is greater than the offered capacity.

Figure 28. Oil-based Plants Offer Pattern (Luzon), June 2012



The capacity and price offers from oil-based plants in Visayas ranged from 139 MW to 262 MW and PhP0.00/MW to PhP62,000/MW, respectively. The Visayas oil-based plants accounted for 68 percent of the capacity gap in the Visayas.

Figure 29. Oil-based Plants Offer Pattern (Visayas), June 2012



IX. Capacity Factor

During the current billing period, geothermal plants in Luzon showed more than 100 percent capacity factor based on offered capacity *(Table 23)*. The same is attributed to the fact that the Luzon geothermal plants' offered capacities were scheduled for dispatch most of the time, as earlier discussed in the preceding sections. The dispatch of Bacman G01 as must-run unit until May 31, 2012 for the conduct of commissioning tests likewise contributed to such capacity factor.

Figure 30. Capacity Factor (Luzon Plants), June 2012

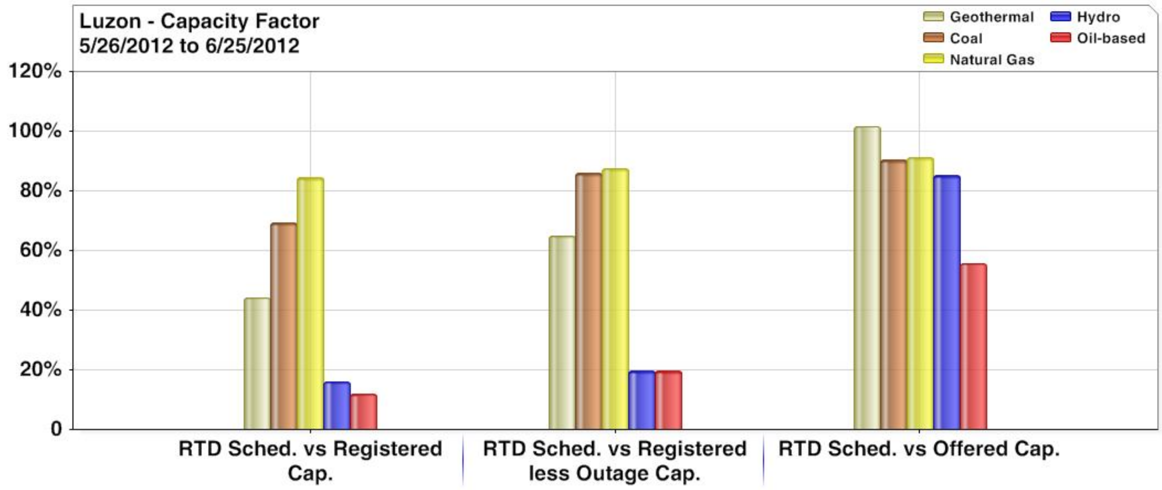


Table 23. Summary of Capacity Factor by Plant Type in Luzon, June 2012, May 2012, and June 2011

Plant Type	RTD Sched. vs Registered Cap.				
	June 2012	May 2012	June 2011	%M-on-M Change	%Y-on-Y Change
Coal	69%	75%	66%	(7.3)	13.3
Natural Gas	84%	88%	88%	(4.4)	0.0
Geothermal	44%	51%	45%	(12.9)	12.3
Hydro	16%	13%	13%	20.5	3.4
Oil-based	12%	14%	3%	(13.6)	353.3
Plant Type	**RTD Sched. vs Registered less Outage Cap.**				
	June 2012	May 2012	June 2011	%M-on-M Change	%Y-on-Y Change
Coal	86%	88%	72%	(2.4)	21.9
Natural Gas	88%	88%	91%	(0.8)	(2.6)
Geothermal	65%	60%	78%	7.5	(22.9)
Hydro	20%	16%	15%	24.1	3.4
Oil-based	19%	22%	4%	(13.2)	455.9
Plant Type	**RTD Sched. vs Offered Cap.**				
	June 2012	May 2012	June 2011	%M-on-M Change	%Y-on-Y Change
Coal	90%	92%	77%	(1.4)	18.4
Natural Gas	91%	90%	92%	0.9	(2.0)
Geothermal	101%	113%	98%	(10.1)	15.8
Hydro	85%	83%	94%	2.7	(11.5)
Oil-based	56%	66%	20%	(16.0)	228.9

Table 24. Capacity Factor by Plant Type in Luzon, June 2012

Plant Type	Total RTD Sched. (MW-Hr)	Total Registered Cap. (MW-Hr)	Total Registered less Outage Cap. (MW-Hr)	Total Offered Cap. (MW-Hr)	Capacity Factors		
					Registered Cap.	Registered less Outage Cap.	Offered Cap.
	(A)	(B)	(C)	(D)	(A / B)	(A / C)	(A / D)
Coal	1,863,716	2,832,408	2,582,930	2,410,977	66%	72%	77%
Natural Gas	1,822,148	2,067,204	2,011,096	1,974,325	88%	91%	92%
Geothermal	295,928	654,497	377,725	303,450	45%	78%	98%
Hydro	223,715	1,749,658	1,470,894	239,040	13%	15%	94%
Oil-based	41,052	1,363,368	1,012,320	203,592	3%	4%	20%

The calculation showed improvement in the capacity factors of the oil-based and coal plants in Visayas. On the other hand, calculations showed a decrease in the capacity factor of geothermal plants *(Figure 31 and Table 25).*

Figure 31. Capacity Factor (Visayas Plants), June 2012

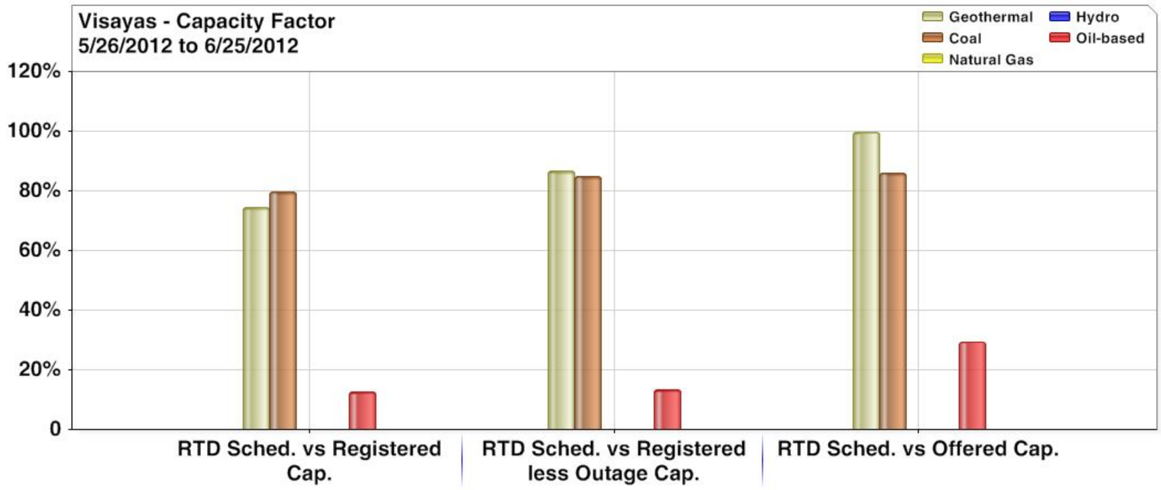


Table 25. Summary of Capacity Factor by Plant Type in Visayas, June 2012, May 2012, and June 2011

Plant Type	RTD Sched. vs Registered Cap.				
	June 2012	May 2012	June 2011	%M-on-M Change	%Y-on-Y Change
Coal	80%	84%	81%	(5.8)	4.4
Geothermal	74%	70%	67%	6.9	4.3
Oil-based	12%	8%	4%	50.6	107.8
Plant Type	**RTD Sched. vs Registered less Outage Cap.**				
	June 2012	May 2012	June 2011	%M-on-M Change	%Y-on-Y Change
Coal	85%	86%	86%	(1.8)	(1.8)
Geothermal	87%	90%	69%	(4.2)	25.5
Oil-based	13%	9%	4%	53.5	221.9
Plant Type	**RTD Sched. vs Offered Cap.**				
	June 2012	May 2012	June 2011	%M-on-M Change	%Y-on-Y Change
Coal	86%	88%	91%	(2.5)	(3.6)
Geothermal	99%	100%	96%	(0.3)	4.1
Oil-based	29%	18%	10%	59.5	86.5

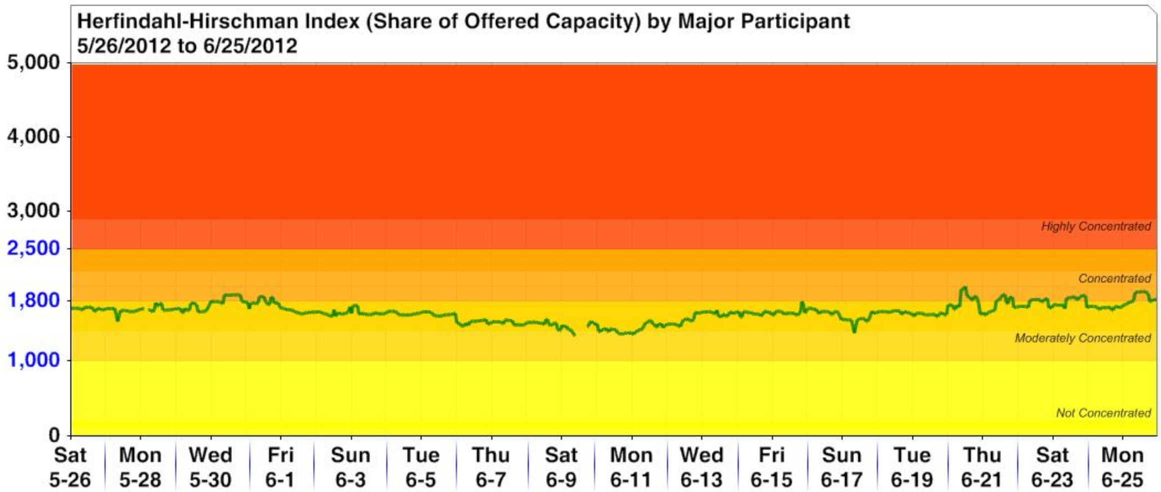
Table 26. Capacity Factor by Plant Type in Visayas, May 2012

Plant Type	Total RTD Sched. (MW-Hr)	Total Registered Cap. (MW-Hr)	Total Registered less Outage Cap. (MW-Hr)	Total Offered Cap. (MW-Hr)	Capacity Factors		
					Registered Cap.	Registered less Outage Cap.	Offered Cap.
	(A)	(B)	(C)	(D)	(A / B)	(A / C)	(A / D)
Coal	457,918	575,198	539,737	532,687	80%	85%	86%
Geothermal	514,290	691,396	593,965	517,068	74%	87%	99%
Oil-based	44,090	353,563	335,170	149,766	12%	13%	29%

X. **Market Concentration**

The Herfindahl-Hirschman Index (HHI) calculated based on offered capacity by major participants' grouping indicated a moderately concentrated market condition during the billing period *(Figure 32)*.

Figure 32. Hourly HHI based on Offered Capacity by Major Participant Grouping, June 2012



XI. Compliance Monitoring

<u>Compliance to Must Offer Rule</u>

Continued failure by generator trading participants to submit their maximum available capacity was observed throughout the covered billing period. About 60 percent and 53 percent of the total generator-trading intervals[9] in Luzon and Visayas, respectively, had capacity gap[10] during the billing period. Figure 33 and Table 27 show the breakdown of generator-trading intervals with capacity gap by resource type. In Luzon, hydro plants had the most capacity gap occurrences at 40 percent, consistent with the data on capacity gap (in MW) in Table 24 which shows that hydro plants had the highest level of capacity gap during the billing period. In Visayas, oil-based plants had the highest share at 61.8 percent followed by geothermal plants at 28.2 percent.

[9] Total generator resource-trading intervals - calculated as the number of registered generator resource nodes multiplied by the total trading intervals in the billing month.

[10] Capacity gap - registered capacity less outage capacity less offered capacity, calculated for each generator resource node per trading interval.

Figure 33. Generator-Trading Intervals with Capacity Gap by Resource, June 2012

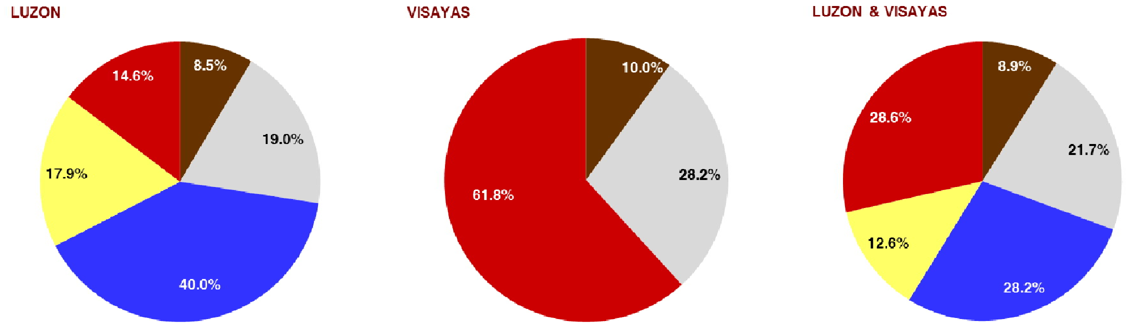
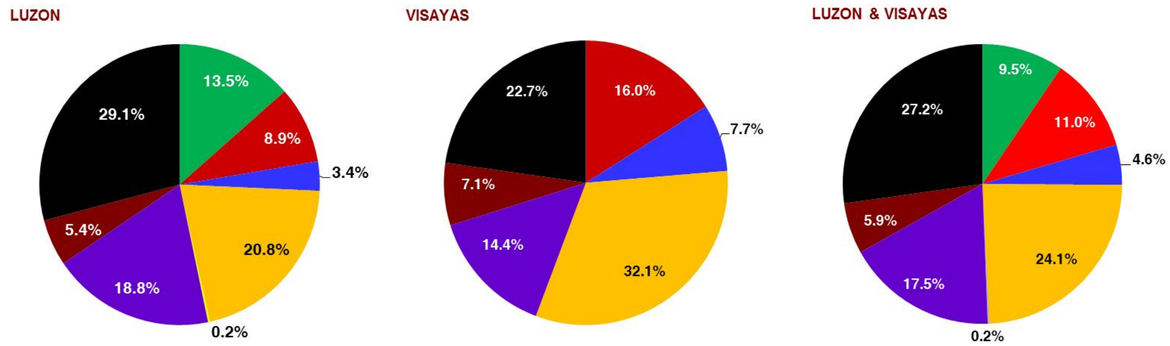


Table 27. Generator-Trading Intervals with Capacity Gap by Resource, June 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Coal	2063	8.5%	1020	10%	3083	8.9%
Geothermal	4598	19%	2876	28.2%	7474	21.7%
Hydro	9704	40%			9704	28.2%
Natural Gas	4346	17.9%			4346	12.6%
Oil-based	3552	14.6%	6298	61.8%	9850	28.6%
Total	**24263**	**100%**	**10194**	**100%**	**34457**	**100%**

Figure 34 and Table 28 show the breakdown of the generator-trading intervals with capacity gap based on the category of reasons[11] provided by the generator trading participants as part of their offer submission. It was observed that 27.2 percent topped the share for reasons provided by the generator trading participants. Meanwhile, equipment-related concerns followed at 24.1 percent, then, by steam supply concerns at 17.5 percent, and ancillary services at 11 percent.

Figure 34. Generator-Trading Intervals with Capacity Gap by Reason, June 2012



[11] Gathered from the reasons provided in the generator trading participants' offers.

Table 28. Generator-Trading Intervals with Capacity Gap by Reason, June 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Limitation on Water Elevation	3266	13.5%			3266	9.5%
Ancillary Services	2154	8.9%	1630	16.0%	3784	11.0%
Start-up/Shutdown	819	3.4%	782	7.7%	1601	4.6%
Equipment-related Failure	5050	20.8%	3269	32.1%	8319	24.1%
Commercial Test	53	0.2%			53	0.2%
Steam Supply	4556	18.8%	1472	14.4%	6028	17.5%
Others	1302	5.4%	724	7.1%	2026	5.9%
No Reason	7063	29.1%	2317	22.7%	9380	27.2%
Total	**24263**	**100%**	**10194**	**100%**	**34457**	**100%**

Table 29 compares the system capacity gap in June 2012 with the previous month and same month of the previous year. During the three billing periods, hydro and oil-based plants consistently had the highest level of capacity gap. On the average, the current billing period saw a decrease of 5.8 percent in the capacity gap from the previous month's 3,300 MW and is lower by 11.1 percent compared to the previous year's 3,710 MW. The decrease in the capacity gap during the June billing period unfortunately did not translate to lower prices.

Table 29. Summary of Capacity Gap by Plant Type (MW), June 2012, May 2012 and June 2011

Resource Type	June 2012 (In MW)			May 2012 (In MW)			June 2011 (In MW)			% M-on-M Change (May - Jun 2012)			% Y-on-Y Change (Jun 2011 - Jun 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	850	11	158	968	33	140	759	32	266	(12.2)	(66.6)	13.0	27.6	1.5	(47.3)
Natural Gas	564	47	109	144	43	67	544	26	49	291.5	7.6	62.7	(73.5)	68.5	36.9
Geothermal	736	237	319	505	362	429	463	274	352	45.6	(34.5)	(25.7)	9.1	31.9	21.9
Hydro	1,997	993	1,542	2,047	1,321	1,683	2,172	857	1,660	(2.4)	(24.8)	(8.3)	(5.8)	54.1	1.4
Oil Based	1,186	629	979	1,136	598	980	1,755	806	1,383	4.4	5.3	(0.1)	(35.3)	(25.8)	(29.1)
TOTAL	**4,091**	**2,167**	**3,109**	**4,167**	**2,538**	**3,300**	**4,947**	**2,856**	**3,710**	(1.8)	(14.6)	(5.8)	(15.8)	(11.1)	(11.1)

Compliance to RTD Schedule

During the billing period, about 15 percent and 8 percent of the total generator-trading intervals in Luzon and Visayas, respectively, have observed deviations between the real time ex-ante dispatch (RTD) schedule[12] and actual dispatch[13], exceeding the +/-3% tolerance limit[14]. As indicated in Figure 35 and Table 30, the hydro and coal plants recorded the highest occurrences of deviations at 41.4 percent and 21.5 percent in Luzon, respectively. Likewise, coal plants registered the highest occurrences of deviations at 50.3 percent in Visayas.

[12] RTD schedule – target loading level of each generator resource node at the end of the trading interval.
[13] Actual dispatch – actual loading of each generator resource node at the end of the trading interval (based on minute 59 snapshot data).
[14] +/-3% tolerance limit – initial dispatch tolerance limits adopted per PEM Board Resolution No. 2005-15.

Figure 35. Generator-Trading Intervals with RTD Deviation by Resource, June 2012

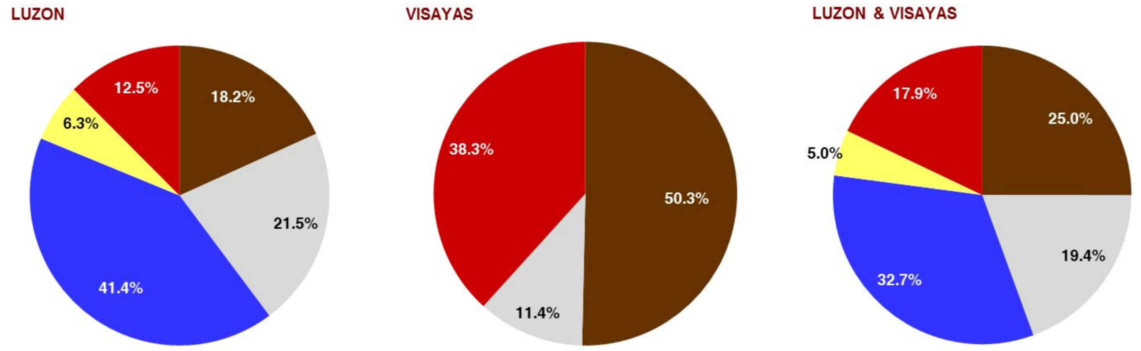


Table 30. Generator-Trading Intervals with RTD Deviation by Resource, June 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Coal	1081	18.2%	801	50.3%	1882	25%
Geothermal	1276	21.5%	181	11.4%	1457	19.4%
Hydro	2455	41.4%			2455	32.7%
Natural Gas	374	6.3%			374	5%
Oil-based	739	12.5%	609	38.3%	1348	17.9%
Total	**5925**	**100%**	**1591**	**100%**	**7516**	**100%**

Illustrated in Figure 36 and Table 31 are the summary of the generator-trading intervals with deviations classified according to the reasons provided by NGCP-SO. In Luzon, 20.7 percent and 14.2 percent of the total generator-trading intervals with deviations were due to reserve utilization and intra-hour variation in demand, respectively. In the case of Visayas, intra-hour variation topped the list at 8.8 percent, followed by non-compliance to dispatch instruction at 4.8 percent. However, reasons for the observed deviations in 50.4 percent and 72.5 percent of the total generator-trading intervals in Luzon and Visayas, respectively, have not been accounted for.

Figure 36. Generator-Trading Intervals with RTD Deviation by Reason, June 2012

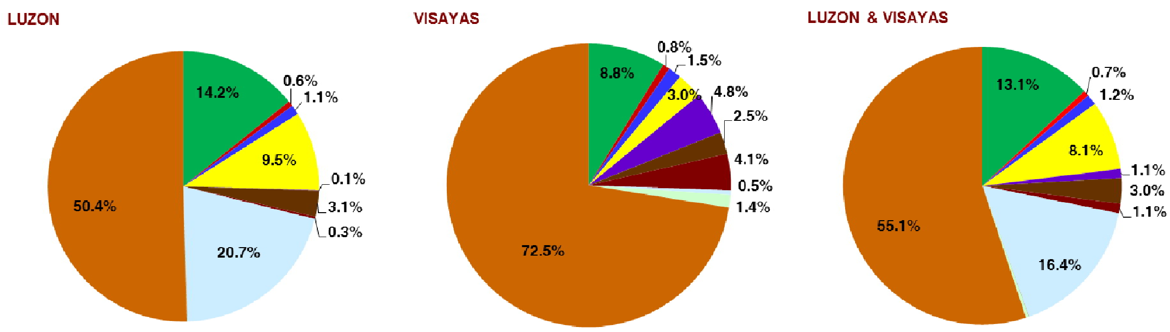


Table 31. Generator-Trading Intervals with RTD Deviation by Reason, June 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Intra-hour Variation	842	14.2%	140	8.8%	982	13.1%
Affected by Non-Compliance of Other Generators	38	0.6%	13	0.8%	51	0.7%
Start-up/Shutdown, Generator/Load Tripping	68	1.1%	24	1.5%	92	1.2%
Generator Problem	560	9.5%	47	3%	607	8.1%
Non-Compliance to Dispatch Instruction	3	0.1%	77	4.8%	80	1.1%
Must Run Units	183	3.1%	40	2.5%	223	3%
Line Limitation	17	0.3%	66	4.1%	83	1.1%
Reserve Utilization	1224	20.7%	8	0.5%	1232	16.4%
RTD Discrepancy	3	0.1%		0%	3	0%
Island Grid	1	0%	23	1.4%	24	0.3%
No Category	2986	50.4%	1153	72.5%	4139	55.1%
Total	**5925**	**100%**	**1591**	**100%**	**7516**	**100%**