MAG-MMAR-2012-04

MONTHLY MARKET ASSESSMENT REPORT

For the Billing Period 26 March to 25 April 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 March to 25 April 2012 and how the market performed compared with the previous billing period and the same billing period last year.

Supply and Demand Situation

A minimal increase in the monthly average system demand[1] (ex-ante) was noted during the covered period as it went up by only 0.2 percent to 7,032 MW from the previous billing month's 7,018 MW *(Table 1)*. However, it increased by 10 percent compared with the same billing period last year during which the average system demand was at 6,394 MW. It is also worthy to note that the maximum demand (9,306 MW), which occurred on 25 April 2012 at trading interval 1400H, was higher by 7 percent than the previous billing period's maximum demand of 8,695 MW. On the other hand, relatively low demand was observed during the long weekend from 05 April 2012 to 09 April 2012. It was also during this time that the lowest demand of 4,500 MW occurred, which fell on a Good Friday (06 April 2012 at 0700H).

While the average regional demand in Luzon remained practically the same as that of the previous billing period, it significantly increased by 10.3 percent from the same billing period last year. On the other hand, demand in Visayas increased by 1.4 percent from the previous billing period and by 8.2 percent from the same billing period last year.

The monthly average system supply[2] registered an increase of 1.4 percent (8, 818 MW to 8,945 MW) from the previous billing period and of 7 percent (8,361 MW to 8,945) from the same billing period last year *(Table 1).* The system supply during the billing period ranged from 7,498 MW to 9,630 MW. The average regional supply in Luzon increased by 0.9 percent (7,281 MW to 7,344 MW) from the previous billing period and by 6.5 percent (6,895 MW to 7,344 MW) from the same billing period last year. On the other hand, the average system supply in Visayas increased by 4.2 percent (1,537 MW to 1,601 MW) from the previous billing period and 9.2 percent (1,466 MW to 1,706 MW) from the same billing period last year.

During the billing period, the supply margin rose by 6.3 percent from the previous billing period (from 1,800 MW to 1,913 MW) despite the increase in the capacity gap. Although, this was still lower by 2.7 percent from the same billing period last year which recorded an average supply margin of 1,966 MW *(Table 1)*. Such increase in the supply margin in the billing period may be attributed to the dip in demand during the period 26 March to 09 April 2012, which accordingly pulled down the monthly average system demand.

[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.

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

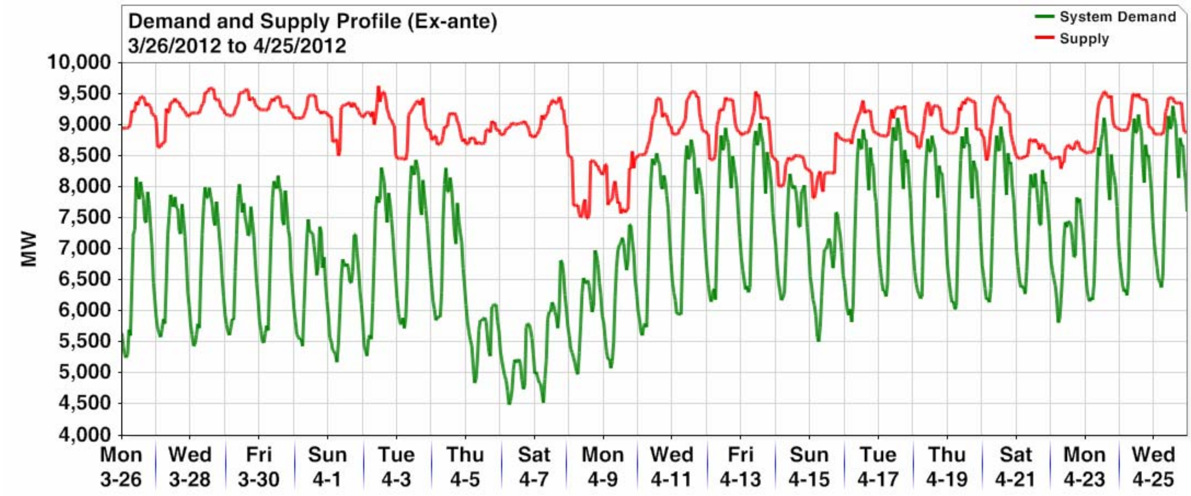


Table 1. Demand and Supply Summary (Ex-ante), April 2012, March 2012, and April 2011

	April 2012 (In MW)			March 2012 (In MW)			April 2011 (In MW)			% M-on-M Change (Mar - Apr 2012)			% Y-on-Y Change (Apr 2011 - Apr 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Demand	9,306	4,500	7,032	8,695	5,211	7,018	8,394	4,147	6,394	7.0	(13.6)	0.2	10.9	8.5	10.0
Supply	9,630	7,498	8,945	9,522	7,242	8,818	9,411	7,146	8,361	1.1	3.5	1.4	2.3	4.9	7.0
Supply/Demand Variance	4,563	134	1,913	3,647	35	1,800	4,097	468	1,966	25.1	285.3	6.3	11.4	(71.4)	(2.7)

Note: The derived values were non-coincident.

Table 2. Regional Temperature[3], April 2012, March 2012, and April 2011

Mean Temperature	April 2012 (°C)			March 2012 (°C)			April 2011 (°C)			% M-on-M Change (Mar - Apr 2012)			% Y-on-Y Change (Apr 2011 - Apr 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	31	26	29	31	27	28	30	26	28	0.0	(3.7)	4.3	3.3	0.0	3.8
Visayas	30	26	28	29	26	27	28	26	27	3.4	0.0	3.8	7.1	0.0	2.2

Table 3. Regional Demand Summary (Ex-ante), April 2012, March 2012, and April 2011

	April 2012 (In MW)			March 2012 (In MW)			April 2011 (In MW)			% M-on-M Change (Mar - Apr 2012)			% Y-on-Y Change (Apr 2011 - Apr 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	7,921	3,777	5,946	7,403	4,449	5,947	7,087	3,452	5,391	7.0	(15.1)	(0.0)	11.8	9.4	10.3
Visayas	1,416	709	1,086	1,370	762	1,070	1,371	686	1,003	3.4	(7.0)	1.4	3.3	3.3	8.2

Note: The derived values were non-coincident.

Table 4. Regional Supply Summary (Ex-ante), April 2012, March 2012, and April 2011

	April 2012 (In MW)			March 2012 (In MW)			April 2011 (In MW)			% M-on-M Change (Mar - Apr 2012)			% Y-on-Y Change (Apr 2011 - Apr 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	8,027	5,814	7,344	7,922	5,674	7,281	7,849	5,795	6,895	1.3	2.5	0.9	2.3	0.3	6.5
Visayas	1,723	1,443	1,601	1,706	1,369	1,537	1,716	1,207	1,466	1.0	5.4	4.2	0.4	19.5	9.2

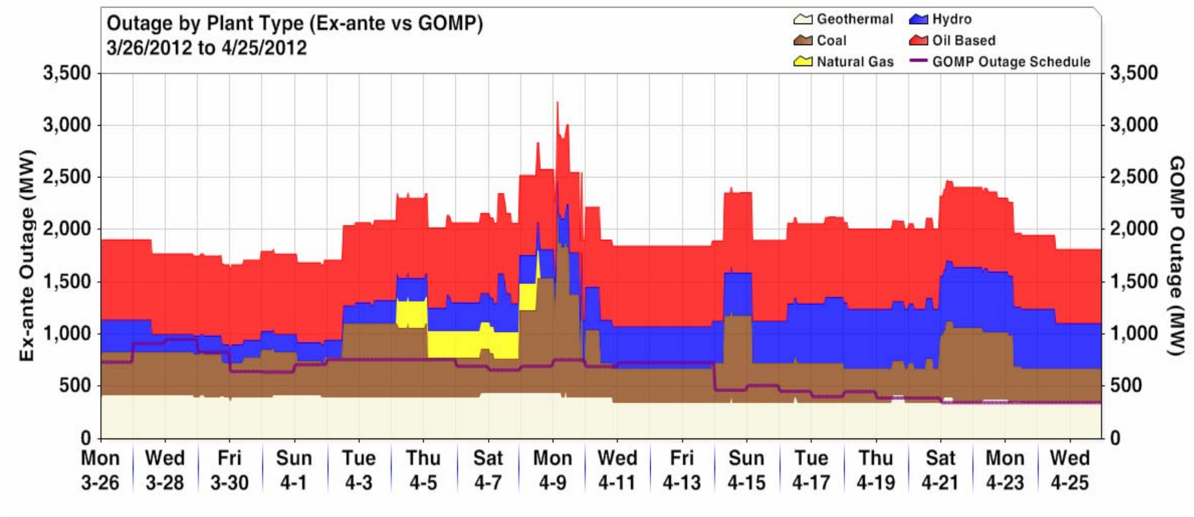
Note: The derived values were non-coincident.

[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.

Plant Outages

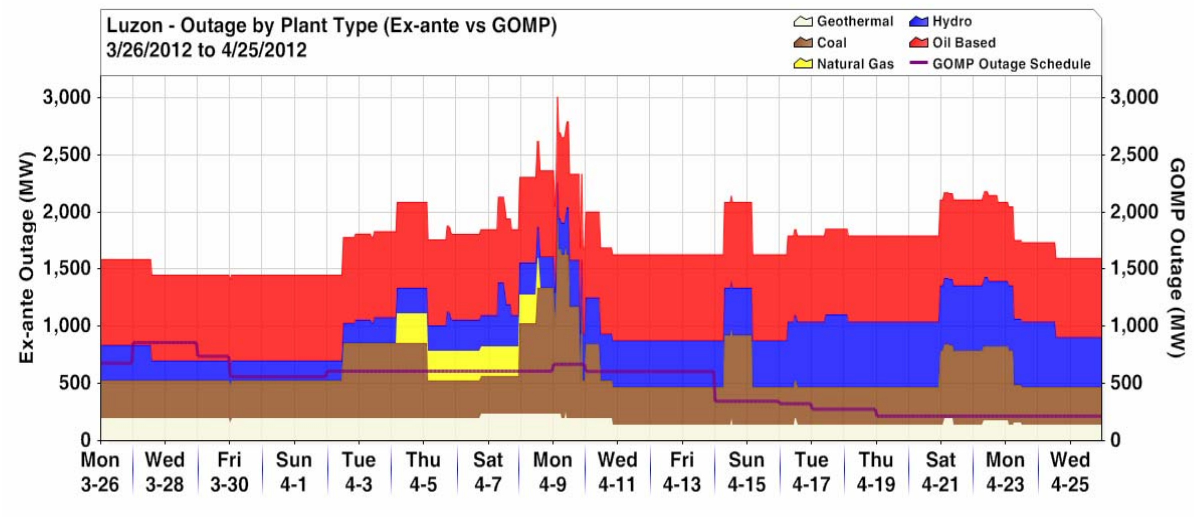
Figure 2 shows the system capacity on outage by plant type compared with the outage schedule indicated in NGCP-SO's CY2012 Grid Operating and Maintenance Program (GOMP). The maximum capacity on outage of 3,229 MW occurred on 09 April 2012 at trading interval 0400H. On the other hand, the minimum capacity on outage was registered at 1,628 MW at trading interval 0100H on 30 March 2012. The average capacity on outage was 2,024 MW.

Figure 2. Plant Capacity on Outage, April 2012



The monthly average capacity on outage in Luzon during the billing period was lower by 10.3 percent than the previous billing period *(Table 5)*. The capacity on outage posted an average of 1,773 MW, ranging from 1,413 MW to 3,014 MW. The highest capacity on outage in Luzon occurred on 09 April 2012 at trading interval 0400H which coincided with that of the highest system-wide outage capacity. Oil-based plants registered the highest outage capacity with an average of 746 MW followed by coal plants with 444 MW. Meanwhile, natural gas plants had the lowest average outage capacity with 37 MW.

Figure 3. Plant Outage Capacity, April 2012- Luzon



As shown in Figure 3 and detailed further in Tables 5 and 6, 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 493 MW. Such disparity is due to the forced and unplanned outages of several power plants.

Table 5. Luzon Regional Outage Summary (Ex-ante), April 2012, March 2012, and April 2011

Resource Type	April 2012 (In MW)			March 2012 (In MW)			April 2011 (In MW)			% M-on-M Change (Mar - Apr 2012)			% Y-on-Y Change (Apr 2011 - Apr 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	1,751	330	444	1,436	330	661	1,622	0	531	21.9	0.0	(32.8)	8.0		(16.4)
Natural Gas	257	0	37	794	0	47	1,044	0	115	(67.6)		(21.7)	(75.3)		(68.1)
Geothermal	257	139	174	316	158	210	426	308	343	(18.7)	(12.0)	(17.2)	(39.7)	(54.9)	(49.2)
Hydro	635	173	373	664	179	342	493	95	228	(4.4)	(3.4)	8.8	28.8	81.9	63.7
Oil Based	752	692	746	872	692	716	342	242	321	(13.8)	0.0	4.2	119.9	186.0	132.3
TOTAL	3,014	1,413	1,773	2,825	1,454	1,976	2,619	842	1,537	6.7	(2.8)	(10.3)	15.1	67.8	15.3

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

Table 6. Luzon Regional Outage Summary (GOMP), April 2012, March 2012, and April 2011

Resource Type	April 2012 (In MW)			March 2012 (In MW)			April 2011 (In MW)			% M-on-M Change (Mar - Apr 2012)			% Y-on-Y Change (Apr 2011 - Apr 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	0	0	0	330	0	80	330	0	234	(100.0)		(100.0)	0.0		(66.0)
Natural Gas	0	0	0	0	0	0	220	0	14				(100.0)		(100.0)
Geothermal	147	64	108	204	121	156	196	176	191	(28.0)	(47.2)	(30.8)	4.1	(31.3)	(18.2)
Hydro	595	152	355	645	332	426	399	316	359	(7.8)	(54.2)	(16.9)	61.7	5.1	18.7
Oil Based	120	0	31	120	0	116	70	0	43	0.0		(73.3)	71.4		170.1
TOTAL	861	216	493	1,248	593	778	1,164	494	841	(31.0)	(63.6)	(36.6)	7.2	20.1	(7.5)

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

Table 7 lists the outages of hydro, geothermal and oil based plants in Luzon with outage duration of 3 or more consecutive days during the billing period. Hydro plants Caliraya 1 and 2, Angat M1 and M3 and Casecnan 1 and 2 went unavailable during the billing period. San Roque 1 which went on outage on 09 April 2012 due to maintenance outage went back online on 24 April 2012. On the other hand, San Roque 2 which became unavailable on 12 March 2012 due to annual turbine inspection went back online on 27 March 2012. The other hydro plants Angat M2, Botocan, Bakun 1 and 2 and Binga 1 which were already out prior to the billing period, remained on outage during the billing period.

In the case of oil-based plants, Limay 3 which experienced forced outage prior to the billing period went back online on 22 April 2012. Other oil-based plants Limay 2 and 4 and Malaya 1 remained on outage during the entire billing period. Further, natural gas plant Sta. Rita 1 went on outage from 04 to 08 April 2012. It was noted that Sta. Rita 1 was declared to be on planned outage by NGCP-SO, although it was not included in the GOMP.

While there was no scheduled outage for coal plants based on the GOMP, the same accounted to 25 percent of the average total capacity on outage *(Table 8 lists the major coal plants outages during the billing period)*. Calaca 2 and Masinloc 1 went on emergency shutdown for more than two days. Sual 2, with a capacity of 647 MW, experienced forced outage twice at close intervals on 09 April 2012.

Table 7. Major Plant Outages, April 2012 – Luzon

Plant/Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Remarks
Hydro Plants					
San Roque 1	137	4/9/2012 9:01	4/24/2012 12:15	15.1	Maintenance outage
San Roque 2	137	3/12/2012 8:51	3/27/2012 13:01	15.2	Annual turbine inspection
Angat M 1	50	4/5/2012 16:33			Tripped due to 122MVA-T1 trouble
Angat M 2	50	5/24/2011 00:01			APMT
Angat M 3	50	4/3/2012 9:10			APMT
Bakun 1	38	11/23/2011 0:01			Total plant shutdown due to tunnel rehabilitation
Bakun 2	38	11/23/2011 0:01			Total plant shutdown due to tunnel rehabilitation
Binga 1	26	1/6/2012 7:03			For refurbishment until August 1 2012
Casecnan 1	82.5	4/16/2012 5:01			Upgrading of PLC and DCS
Casecnan 2	82.5	4/16/2012 5:01			Upgrading of PLC and DCS
Botocan	20.8	10/22/2011 16:24			Defective 61CL4 test and check by NPC
Caliraya 1	14	4/2/2012 9:26			Tripped due to 69kV line trouble
Caliraya 2	14	4/2/2012 9:26			Tripped due to 69kV line trouble
Geothermal Plants					
Tiwi 1	59	4/3/2012 19:07	4/10/2012 19:01	7.0	Steam supply to unit 2
Tiwi 2	59	1/15/2012 14:08	4/3/2012 18:59	79.2	On scheduled outage
Nat Gas Plants					
Sta. Rita 1	257.3	4/4/2012 4:35	4/8/2012 13:24	4.4	Rectification of turbine shaft vibration
Oil based Plants					
Limay 3	60	3/23/2012 12:03	4/22/2012 17:13	30.22	Aborted start-up due to flue gas leak at diverted damper drain pipe
Limay 2	60	1/6/2012 16:01			Non-availability of programmable processor
Limay 4	90	4/15/2011 6:43			Generating bearing trouble
Malaya 1	300	8/15/2011 13:19			High furnace pressure

Table 8. Major Coal Plant Outages, April 2012 - Luzon

Plant/Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Remarks
Coal Plants					
Sual 2	647	4/9/2012 2:12	4/9/2012 19:48	0.7	Tripped due to loss of control fluid at governor valve
Sual 2	647	4/9/2012 20:01	4/9/2012 21:28	0.1	Tripped due to drum level low.
QPPL	459	4/7/2012 22:18	4/9/2012 11:03	1.5	Hydraulic oil leak at main stop valve
QPPL	459	4/14/2012 6:03	4/15/2012 3:11	0.9	Power block feed conveyor failure
Calaca 1	330	8/29/2011 22:15			Emergency shutdown due to suspected reheater leak.
Calaca 2	330	4/2/2012 10:16	4/5/2012 2:14	2.7	Emergency shutdown due to steam leak at HPH valve 7
Masinloc 1	315	4/20/2012 23:59	4/23/2012 6:35	2.3	Emergency shutdown due to boiler tube leak
Masinloc 2	315	4/7/2012 11:48	4/9/2012 5:32	1.7	Tripped by drum level low
Masinloc 2	315	4/9/2012 23:42	4/10/2012 12:04	0.5	Excessive leak at high pressure heater 6.

Visayas capacity on outage *(Figure 4)* was dominated by geothermal plants with an average capacity on outage of 204 MW followed by the coal plants with 32 MW. The average capacity on outage in Visayas during the billing period was lesser by 1 percent from the previous billing period but is greater by a staggering 251.6 percent from the same billing period last year. The highest capacity on outage was registered on 31 March 2012.

Figure 4. Plant Capacity on Outage, April 2012 - Visayas

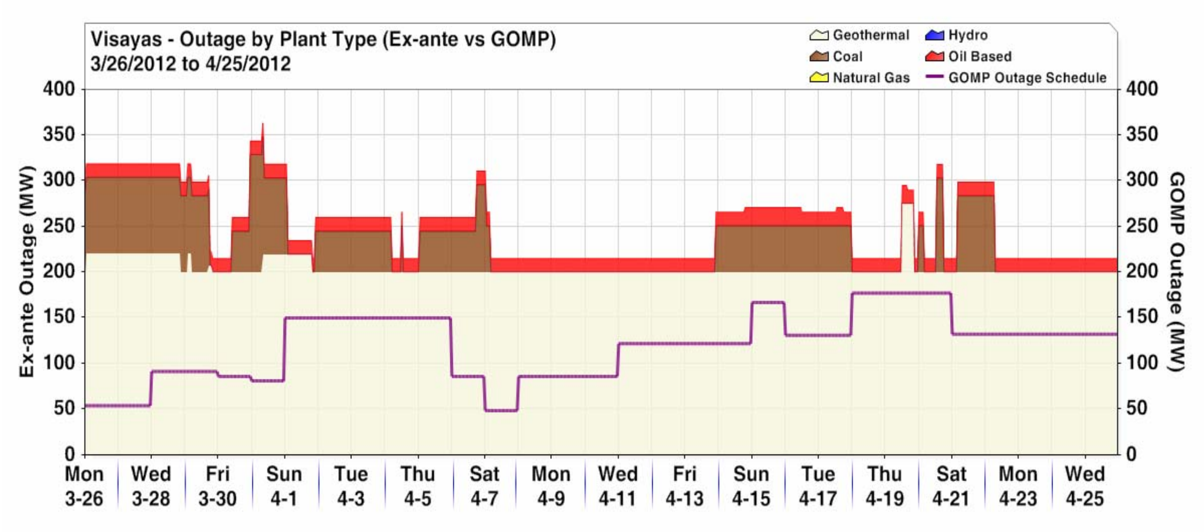


Table 9. Visayas Regional Outage Summary (Ex-ante), April 2012, March 2012, and April 2011

Resource Type	April 2012 (In MW)			March 2012 (In MW)			April 2011 (In MW)			% M-on-M Change (Mar - Apr 2012)			% Y-on-Y Change (Apr 2011 - Apr 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	129	0	32	185	0	102	96	0	33	(30.4)		(68.3)	34.3		(3.1)
Geothermal	275	200	204	220	125	137	84	0	20	25.1	60.0	48.6	229.3		903.6
Hydro	0	0	0	0	0	0	0	0	0						
Oil Based	20	15	15	20	15	15	23	17	18	0.0	0.0	1.3	(11.1)	(9.1)	(14.4)
TOTAL	363	215	251	325	140	254	162	17	71	11.8	53.6	(1.0)	124.5	1,203.0	251.6

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

Table 10. Visayas Regional Outage Summary (GOMP), April 2012, March 2012, and April 2011

Resource Type	April 2012 (In MW)			March 2012 (In MW)			April 2011 (In MW)			% M-on-M Change (Mar - Apr 2012)			% Y-on-Y Change (Apr 2011 - Apr 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	129	0	41	154	0	83	45	0	16	(16.3)		(51.2)	186.0		154.5
Geothermal	80	38	62	43	38	39	0	0	0	87.4	0.0	61.6			
Hydro	0	0	0	0	0	0	5	0	1				(100.0)		(100.0)
Oil Based	47	6	17	16	5	10	6	0	2	193.8	20.0	59.8	754.5		621.7
TOTAL	177	49	120	207	49	132	45	0	19	(14.5)	0.0	(9.6)	293.8		515.3

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

Table 11 shows the major plant outages in Visayas during the billing period. Coal plants Cebu TPP2 and PEDC 1 experienced forced outages, although they were able to synchronize back to the grid within the billing period. Geothermal plants, which went unavailable prior to the billing period, remained on outage in the entire billing period.

Table 11. Major Plant Outages, April 2012 - Visayas

Plant/Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Remarks
Geothermal Plants					
Mahanagdong B1	7	2/19/2012 3:01			Steam supply deficiency
Malitbog 2	75	3/22/2012 6:21			Generator Overcurrent
Upper Mahiao 3	37.5	2/13/2012 7:47			Steam supply deficiency
Leyte 1	31	1/27/2012 8:05			Due to high vibration
NNGPP	49.5	7/1/2011 0:11			To conduct plant rectification
Coal Plants					
Kepco Salcon 2	103	4/20/2012 11:26	4/20/2012 17:54	0.27	Tripped by SPS
PEDC 1	83.7	3/23/2012 9:59	3/29/2012 17:44	6.32	Tripped due to excessive pressure at boiler furnace
PEDC 2	83.7	3/30/2012 21:48	4/1/2012 1:44	1.16	Corrective maintenance
PEDC 2	83.7	4/21/2012 3:37	4/22/2012 6:38	1.13	Rectify drum level control valve
Cebu TPP2	50.8	4/4/2012 11:40	4/4/2012 12:36	0.04	Condenser vacuum low
Cebu TPP2	50.8	4/6/2012 17:18	4/7/2012 3:07	0.41	FDF instrumentation problem
Cebu TPP2	50.8	4/13/2012 21:33	4/17/2012 23:30	4.08	Emergency cut out due to suspected boiler tube leak
Cebu TPP2	50.8	4/19/2012 3:46	4/20/2012 2:59	0.97	Unit tripped. Under assessment
Cebu TPP1	45	3/30/2012 10:56	3/31/2012 7:56	0.88	
Cebu TPP1	45	4/1/2012 22:56	4/4/2012 3:55	2.21	Condenser tube leak
Cebu TPP1	45	4/5/2012 1:23	4/7/2012 0:45	1.97	Emergency cut out due to high chloride content

Market Price Outcome

There was a notable decrease of 17.5 percent in the monthly average market price[4] which went down from PhP4,498 MW/h to PhP3,710/MWh. In contrast, this was higher by 17.0 percent compared with the monthly average price of the same billing period last year. The maximum price during the billing period was registered at PhP21,814/MWh on 09 April 2012 at trading interval 1400H, which was significantly lower by 46.7 percent than the previous billing period and 59.3 percent than the same billing period last year when the maximum price reached PhP53,621/MWh. The minimum price of PhP0.00/MWh was recorded at various trading intervals from 06-07 April 2012, during which time relatively low demand was observed.

During the earlier part of the billing period (26 March to 09 April 2012), it was observed that prices were relatively lower (except for certain trading intervals on 02-04, 08-09 April 2012) than the monthly average price which were coincident with the period when the demand and supply conditions were better. During the rest of the billing period, however, there was a notable increase in the prices, which may have been affected by the decrease in the supply margin resulting from the increase in the demand and slight decrease in the supply.

[4] 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 5. ***Market Price Trend, April 2012***

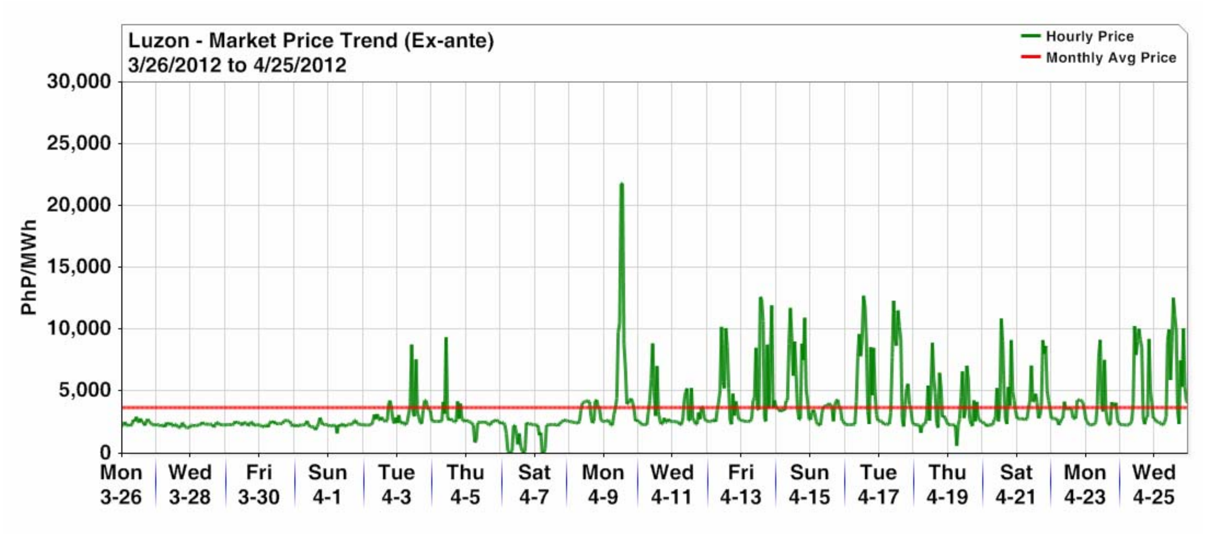


Figure 6. ***Market Price Trend - Luzon, April 2012***

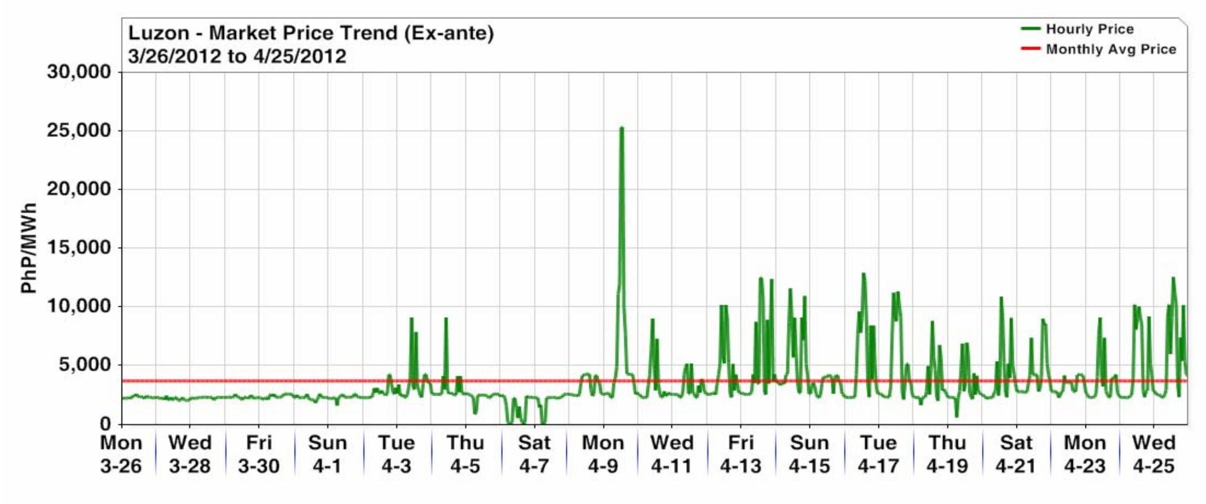
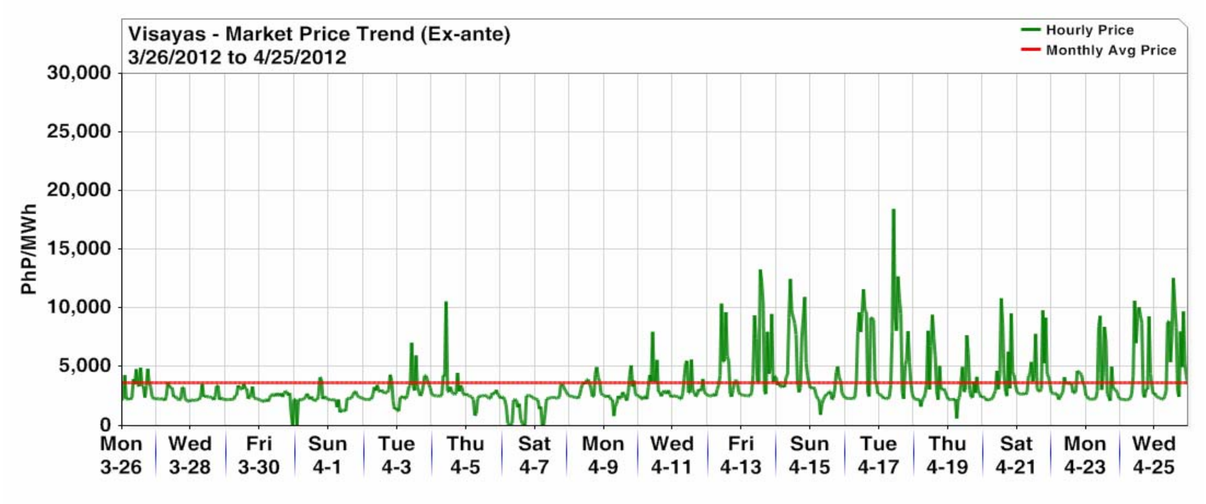


Figure 7. ***Market Price Trend - Visayas, April 2012***



Comparing the regional prices from the previous billing period, the average prices decreased by 16.9 percent (PhP4,476/MWh to PhP3,719/MWh) in Luzon and 20.9 percent (PhP4,625/MWh to PhP3,660/MWh) in Visayas *(Table 12)*.

Table 12. ***Market Price Summary, April 2012, March 2012, and April 2011***

	April 2012 (In PhP/MWh)			March 2012 (In PhP/MWh)			April 2011 (In PhP/MWh)			% M-on-M Change (Mar - Apr 2012)			% Y-on-Y Change (Apr 2011 - Apr 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luz-Vis	21,814	0	3,710	40,917	1,035	4,498	53,621	0	3,171	(46.7)	(100.0)	(17.5)	(59.3)		17.0
Luzon	25,337	0	3,719	40,917	1,035	4,476	62,257	0	3,261	(38.1)	(100.0)	(16.9)	(59.3)		14.1
Visayas	18,452	0	3,660	45,380	726	4,625	8,161	0	2,686	(59.3)	(100.0)	(20.9)	126.1		36.3

The price distribution in Figure 8 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 PhP2,000/MWh to PhP4,000/MWh is comparable with that of the previous billing period and same billing period last year. On the other hand, while the occurrence of prices within the range of PhP4,000/MWh to PhP6,000/MWh increased to 11.3 percent during the billing period from the previous billing period's 5.5 percent, there was a decrease in the frequency of prices above PhP6,000/MWh than the previous billing period *(Table 13)*.

Figure 8. ***Market Price Distribution, April 2012, March 2012, and April 2011***

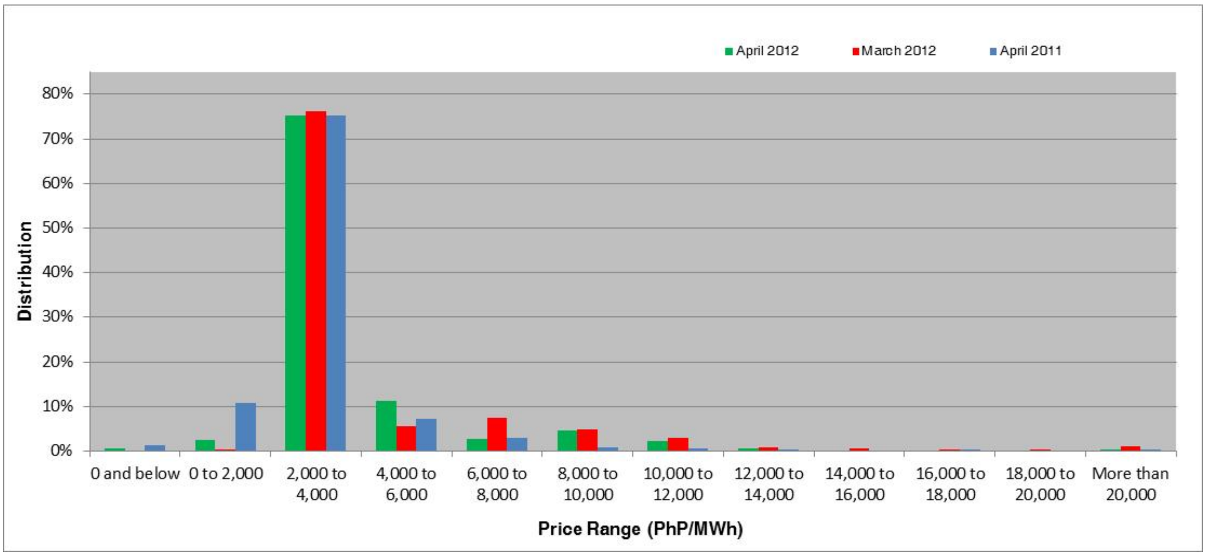


Table 13. ***Market Price Distribution, April 2012, March 2012, and April 2011***

Price Range (PhP/MWh)	% Distribution		
	April 2012	**March 2012**	**April 2011**
0 and below	0.7	0.0	1.3
0 to 2,000	2.4	0.3	10.9
2,000 to 4,000	75.3	76.1	75.1
4,000 to 6,000	11.3	5.5	7.3
6,000 to 8,000	2.7	7.3	3.0
8,000 to 10,000	4.6	4.8	0.9
10,000 to 12,000	2.2	2.9	0.5
12,000 to 14,000	0.7	0.9	0.3
14,000 to 16,000	0.0	0.6	0.1
16,000 to 18,000	0.0	0.3	0.3
18,000 to 20,000	0.0	0.4	0.0
More than 20,000	0.3	1.0	0.3

Comparing the regional prices, the maximum price in Luzon is significantly higher by 37.3% than the maximum price in Visayas during the billing period, which is in contrast with the previous billing period when the maximum price in Luzon was lower by 9.8 percent than the Visayas. Generally, average prices in Luzon and Visayas during the billing period are comparable with only 1.6 percent difference between them.

Table 14. Regional Price Summary, April 2012, March 2012, and April 2011

	Luzon (In PhP/MWh)			Visayas (In PhP/MWh)			% Difference		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
April 2012	25,337	0	3,719	18,452	0	3,660	37.3		1.6
March 2012	40,917	1,035	4,476	45,380	726	4,625	(9.8)	42.6	(3.2)
April 2011	62,257	0	3,261	8,161	0	2,686	662.8		21.4

Pricing Errors and Market Intervention

The summary of the issuance of PEN, PSM application, and market intervention events is shown in Table 15.

The occurrences of pricing errors in Luzon during the ex-ante process remained high at 77 percent (573 trading intervals) which is also higher than the previous billing period's 63.4 percent. This is due to the prevalent and continuous localized congestion at MERALCO interchange substations in Araneta and Zapote. The occurrence of the localized congestions in these interchange substations had worsened starting the previous billing period, affecting even the off-peak hours, following the outages of one of their 300 MVA transformers. Table 16 reveals that there has been a trend of increasing occurrences of pricing errors in Luzon since January.

In Visayas, pricing errors were issued in 18 trading intervals due to erratic prices resulting from congestions experienced in Luzon.

Meanwhile, system-wide pricing errors were issued in 28 trading intervals during the ex-ante process and 26 trading intervals during the ex-post process, which are both considerably higher than the previous billing period's 6 and 9 trading intervals, respectively. These occurrences of pricing errors were mostly due to input data concerns.

On the other hand, there was a system-wide application of PSM in 14 trading intervals during the ex-ante and 5 trading intervals during the ex-post. Likewise, PSM was applied in Luzon in 17 trading intervals during ex-ante. These were due to constraints experienced in several transmission lines (Table 17).

Likewise noteworthy is the absence of market intervention during the billing period.

Table 15. PEN, PSM and MI Summary, April 2012

	Luz-Vis		Luzon		Visayas		Total	
	Freq.	% of Time	Freq.	% of Time	Freq.	% of Time	Freq.	% of Time
PEN (RTD)	28	3.8	573	77.0	18	2.4	618	83.1
PEN (RTX)	26	3.5	6	0.8	3	0.4	35	4.7
PSM (RTD)	14	1.9	17	2.3		-	31	4.2
PSM (RTX)	5	0.7		-		-	5	0.7
MI		-		-		-		-

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

Table 16. Contingency Constraint Violation Summary_Luzon

MERALCO Transformer Constraints	January		February		March		April	
	Peak	Off-peak	Peak	Off-peak	Peak	Off-peak	Peak	Off-peak
Araneta	2	16			13	130		12
Balintawak			1			1		
Zapote	62	2	175	7	52	14	51	215
Zapote and Araneta	91		38		183	49	155	57
Zapote and Balintawak			9		10			
Zapote and Dolores							27	11
Zapote, Balintawak, and Araneta					20			
Zapote, Dolores, and Araneta							45	
Total	**155**	**18**	**223**	**7**	**278**	**194**	**278**	**295**

Table 17. List of Constraints Resulting to PSM Application, April 2012

Constraints	PSM Application	
	System	Luzon
Constraint on Negros - Panay line	5	
Constraint on Amadeo - Calaca line as a result of N-1 contingency applied on Calaca - Sta. Rosa line	1	
Constraint on Balintawak - San Jose 230 kV line as a result of N-1 contingency applied on Araneta - Sucat 230 kV line		1
Constraint on Sta. Rosa - Calaca 230 kV line as a result of N-1 contingency applied on Biñan - Dasmariñas 230 kV line	1	
Constraint on Calauan - Makban line as a result of N-1 contingency applied on San Jose - Tayabas 500 kv line 1	1	
Constraint on Calauan - Makban line as a result of N-1 contingency applied on Araneta - Sucat 230 kV line	4	16
Constraint on Bauang - BPPC line as a result of N-1 contingency applied on San Manuel 230 kV tie line	1	
Constraint on Bauang - BPPC line as a result of N-1 contingency applied on Araneta - Sucat 230 kV line		1
Constraint on Bauang - BPPC line as a result of N-1 contingency applied on San Jose transformer 5	1	
Constraint on Bauang - Kadampat line as a result of N-1 contingency applied on San Manuel 230 kV tie line		7

Figure 9 and Table 18 show the correlation of the hourly prices and demand during the billing period, the previous billing period and the same billing period last year. The current billing period's results showed a positive and relatively significant relationship between price and demand for all prices. In contrast, results showed a negative relationship between prices above PhP10,000/MWh and demand. Although such was the case, this does not necessarily imply a causal relationship between the two or does not automatically indicate that the high prices during the billing period were primarily driven by demand.

Figure 9. Market Price Distribution, April 2012, March 2012, and April 2011

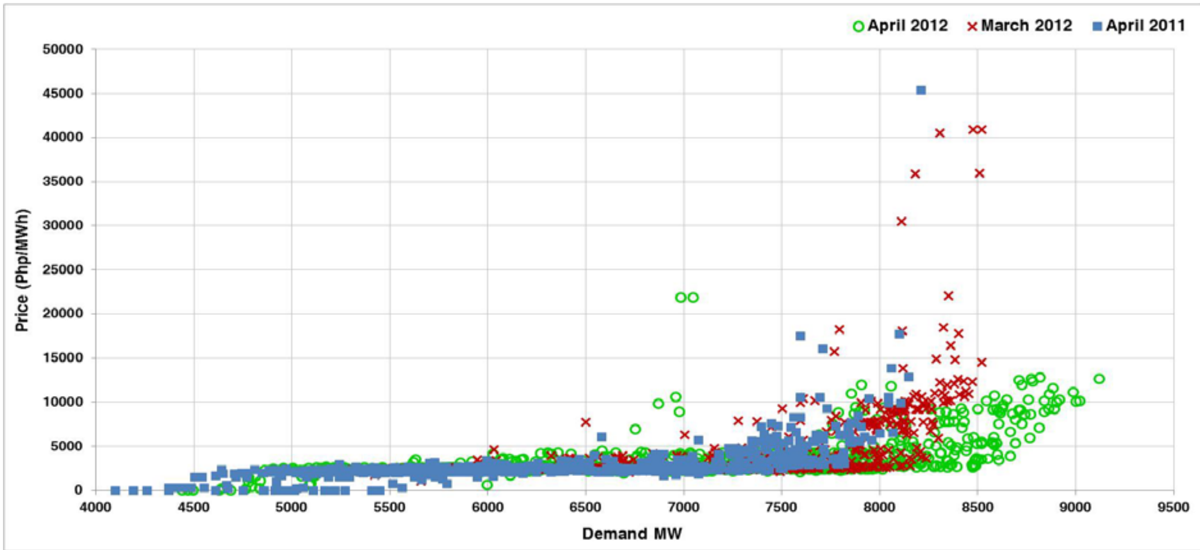


Table 18. Price and Demand Relationship, April 2012, March 2012, and April 2011

	April 2012	March 2012	April 2011	% M-on-M Change	% Y-on-Y Change
All Prices	0.5652	0.5227	0.4552	8.1	24.2
Prices >= PhP10,000	-0.6422	0.2173	0.5439	(395.5)	(218.1)

HVDC Scheduling

During the billing period, constraints in the HVDC occurred in 22 trading intervals for both ex-ante and ex-post runs when the transfer capability of the HVDC going to Luzon was set by NGCP-SO to 180 MW in trading intervals 0800H to 1800H of 09 and 15 April, 2012 due to the pre-arranged maintenance of the Tayabas-San Jose 500kV lines. Similarly, constraints in the HVDC occurred when the power transfer capability of the HVDC was set to zero on 30-31 March 2012 (3 trading intervals during ex-ante and 4 trading intervals during ex-post) due to maintenance activities at the converter transformer breaker.

Overall, constraints in the HVDC occurred 4 percent of both ex-ante and ex-post runs, which is higher than the previous billing period when said constraints occurred at about 0.4 percent and 0.7 percent of the ex-ante and ex-post runs, respectively. In contrast, a significant decrease in the occurrences of HVDC constraints was noted when compared to the same billing period last year when the same were recorded as having occurred 52 percent and 53 percent of the ex-ante and ex-post runs, respectively. During this period, it was still the NGCP-SO which managed the scheduling of the HVDC flow. It was only on 29 April 2011 when the free-flow of HVDC was implemented.

Table 19. Summary of HVDC Limits Imposed by NGCP-SO and Results of HVDC Schedules (Ex-ante and Ex-post), April 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	150/180	150/440	Total	0/0	150/180	150/440	Total
Visayas to Luzon		22	698	720		22	699	721
Limit Not Maximized			*698*	*698*			*698*	*698*
Limit Maximized 1		*22*		*22*		*22*	*1*	*23*
Luzon to Visayas			21	21			19	19
Limit Not Maximized			*19*	*19*			*19*	*19*
Limit Maximized 1			*2*	*2*				-
No Flow 1	3			3	4			4
TOTAL	3	22	719	744	4	22	718	744

Notes: 1\ with price separation

Table 20. Summary of HVDC Limits Imposed by NGCP-SO and Results of HVDC Schedules (Ex-ante and Ex-post), March 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)		
	100/100	150/440	Total	100/100	150/440	Total
Visayas to Luzon	**5**	**648**	**653**	**5**	**657**	**662**
Limit Not Maximized	2	648	*650*		657	*657*
Limit Maximized 1\	3		*3*	5		*5*
Luzon to Visayas		**41**	**41**		**32**	**32**
Limit Not Maximized		41	*41*		32	*32*
Limit Maximized 1\						
No Flow 1\						
TOTAL	**5**	**689**	**694**	**5**	**689**	**694**

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), April 2011

Results of HVDC Scheduling	Direction of HVDC Flow Imposed during Ex-ante (No. of Trading Intervals)					Direction of HVDC Flow Imposed during Ex-post (No. of Trading Intervals)				
	Vis to Luz	Luz to Vis	Zero Limit	No Limit	Total	Vis to Luz	Luz to Vis	Zero Limit	No Limit	Grand Total
HVDC Limit Not Maximized	336	15		1	352	328	15		1	344
HVDC Limit Maximized 1\	211	20			231	225	22			247
Zero HVDC Schedule 1\	76	70	7		153	70	65	7		142
TOTAL	***623***	***105***	***7***	***1***	***736***	***623***	***102***	***7***	***1***	***733***
Percent of Total Intervals	*85%*	*14%*	*1%*	*0%*		*85%*	*14%*	*1%*		

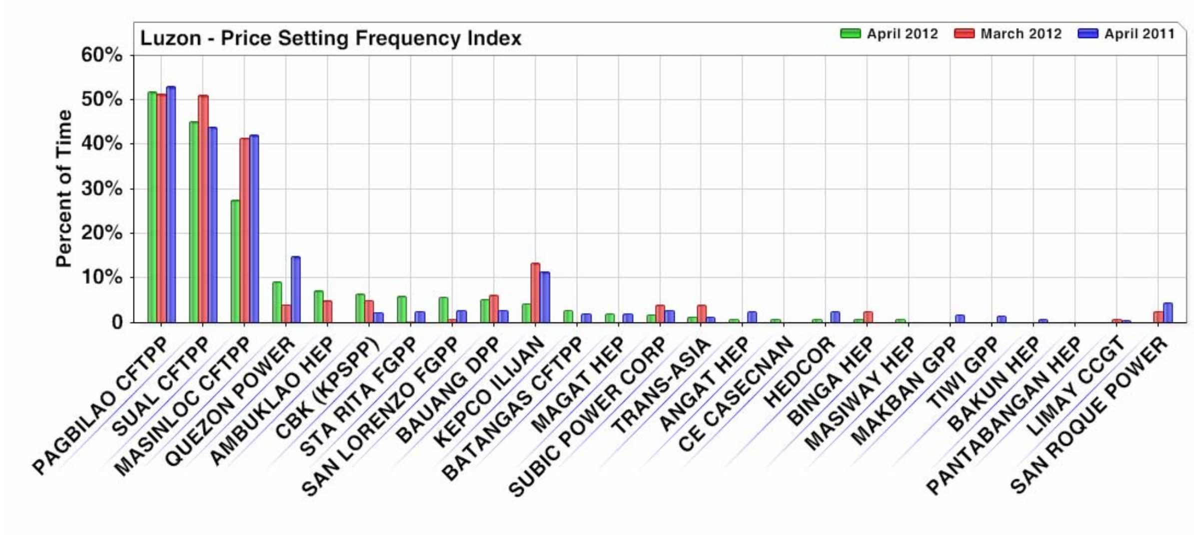
Notes: 1\ with price separation

Price Setting Plants[5]

As shown in Figure 10, 20 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 Pagbilao CFTPP (at 52%), Sual CFTPP (at 45%), and Masinloc CFTPP (at 27%) remained the top three frequent price setters. However, the forced outages of its units may have contributed to the decrease in the Price Setter Frequency Index (PSFI) of coal plant Masinloc, which posted a PSFI of 42% in the previous billing period. The PSFI of Pagbilao is comparable with its respective PSFIs of the previous billing period and same billing period last year.

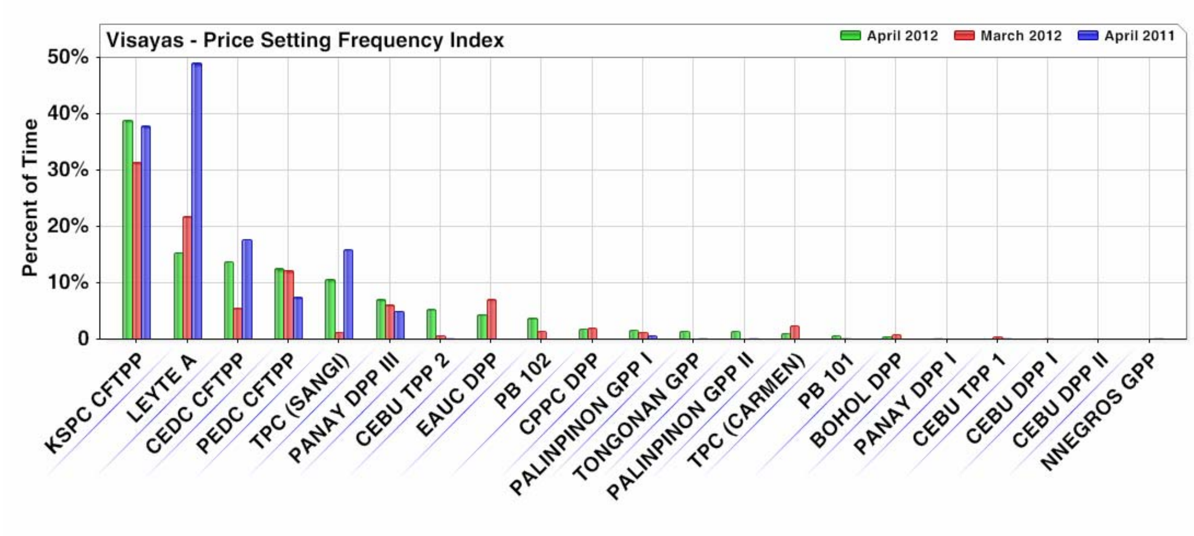
[5] A generator trading node is considered as a price setter when its last accepted offer price is between 95% to 100% of its nodal price. A generating plant is considered as price setter if at least one of its trading nodes was price setter in a given trading hour. The percentages stated in the price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

Figure 10. ***Price Setting Frequency Index (Luzon Plants), April 2012, March 2012, and April 2011***



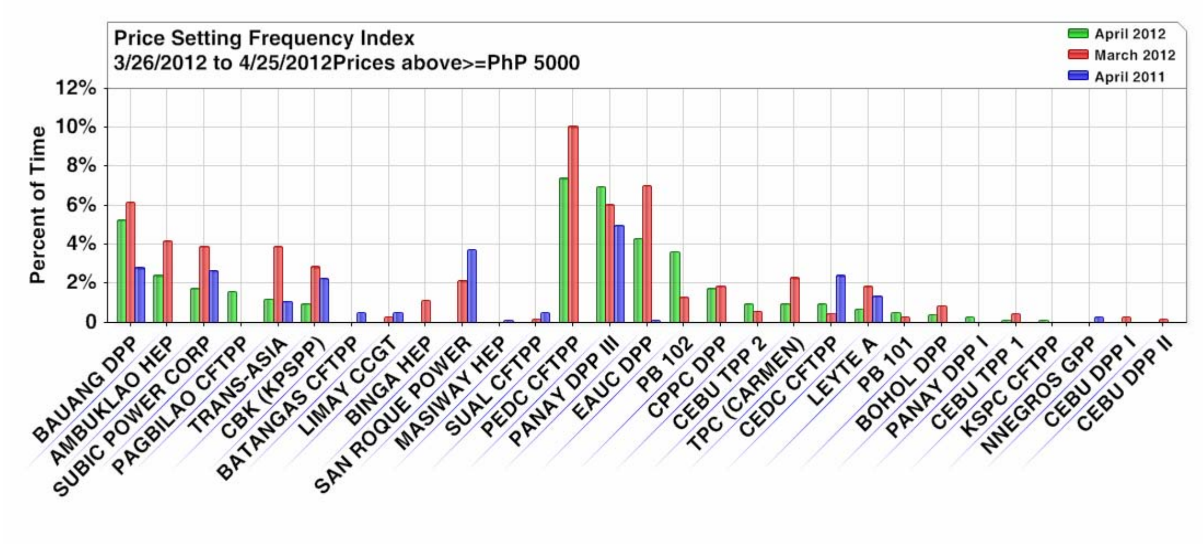
In Visayas *(Figure 11),* 18 plants have been considered as price setters across all price levels with coal plant KSPC CFTPP (at 39%), geothermal plant Leyte A (at 15%), and other coal plants CEDC CFTPP (at 14%), PEDC CFTPP (at 13%) and TPC Sangi (at 11%) as the most frequent price setters.

Figure 11. ***Price Setting Frequency Index (Visayas Plants), April 2012, March 2012, and April 2011***



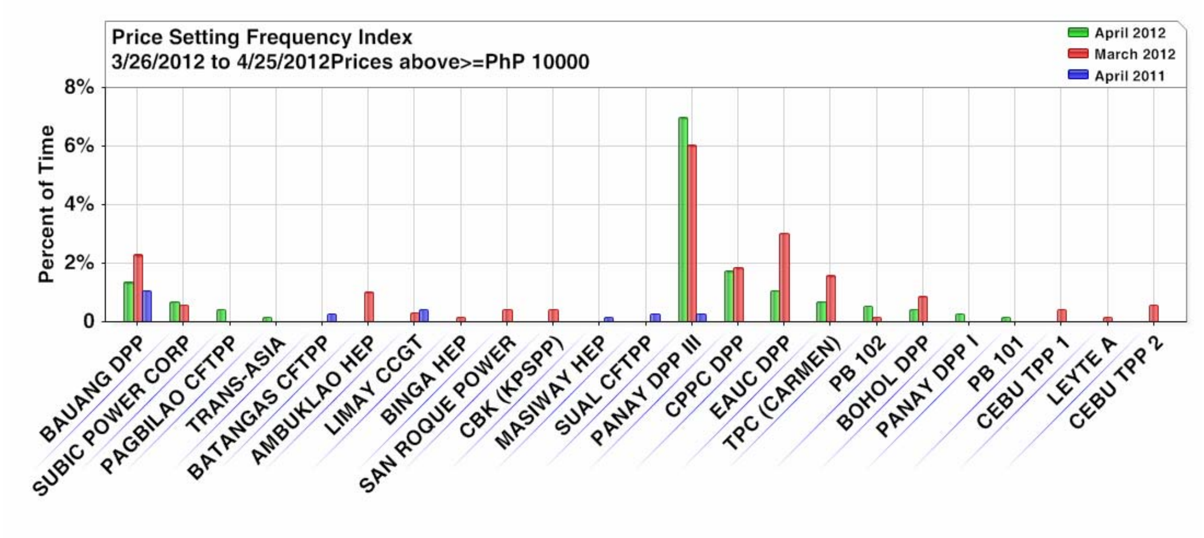
As shown in Figure 12, 20 plants have qualified as price setters at the price level of PhP5,000/MWh and above, with 6 of those plants coming from Luzon and 14 from Visayas. Coal plant PEDC CFTPP and oil plant Panay DPP III from Visayas topped the price setting plants with PSFI of 7%. These were followed by other oil plants Bauang DPP (at 5%), EAUC DPP (at 4%) and PB 102 (at 4%).

Figure 12. Price Setting Frequency Index (PhP5,000 and Above), April 2012, March 2012, and April 2011



During the billing period, there were 12 plants which set the price at PhP10,000/MWh and above, 4 of which came from Luzon and 8 came from Visayas. Oil plants Panay DPP III, CPPC DPP and Bauang DPP were the top 3 price setters.

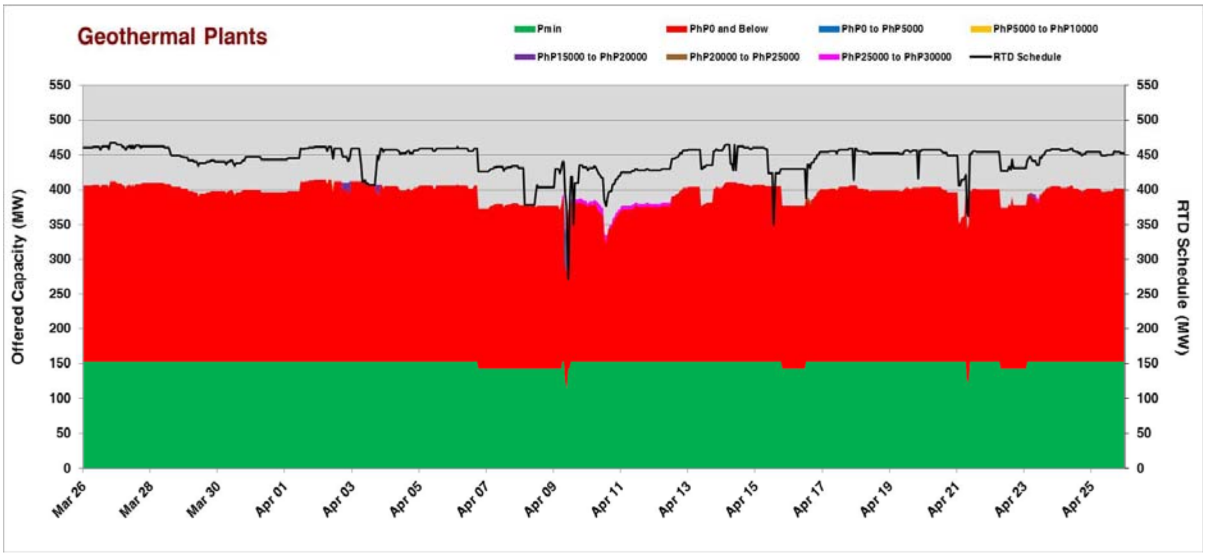
Figure 13. Price Setting Frequency Index (PhP10,000 and Above), April 2012, March 2012, and April 2011



Generator Offer Pattern

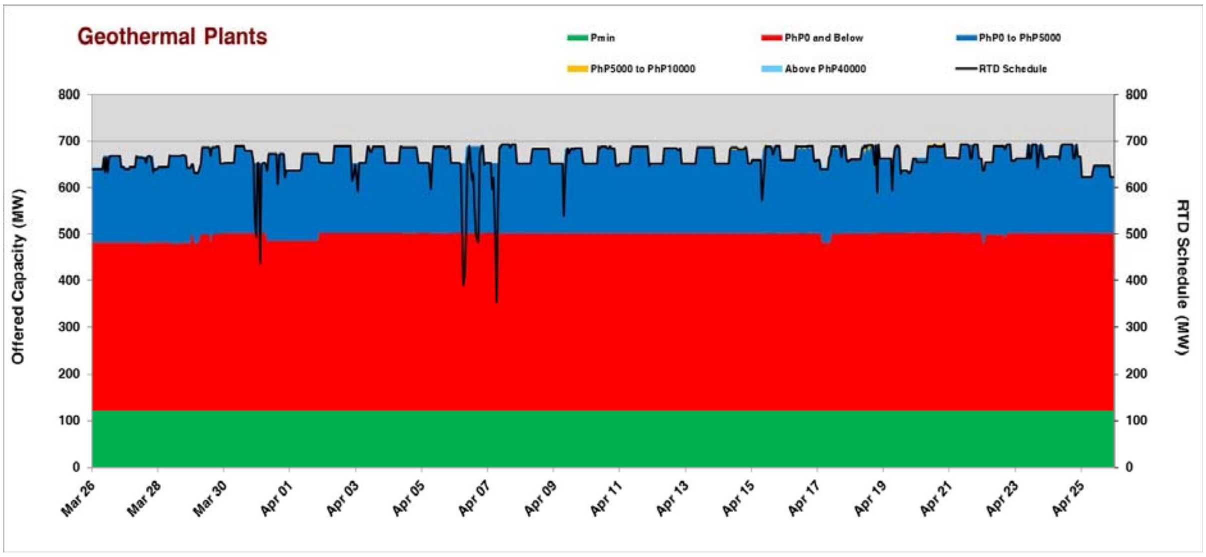
Geothermal plants in Luzon had the lowest price offer among the plant resources. It was noted that most of the time, the offered capacities were priced at PhP0.00/MW and below *(Figure 14)*. Consequently, about 99.8 percent of the offered capacity of the geothermal plants in Luzon was scheduled for dispatch. Likewise, it is important to note that the reason why the RTD schedule is greater than the offered capacity by an average of 47 MW may be attributed to the fact that during this period, the 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 14. Geothermal Plants Offer Pattern (Luzon), April 2012



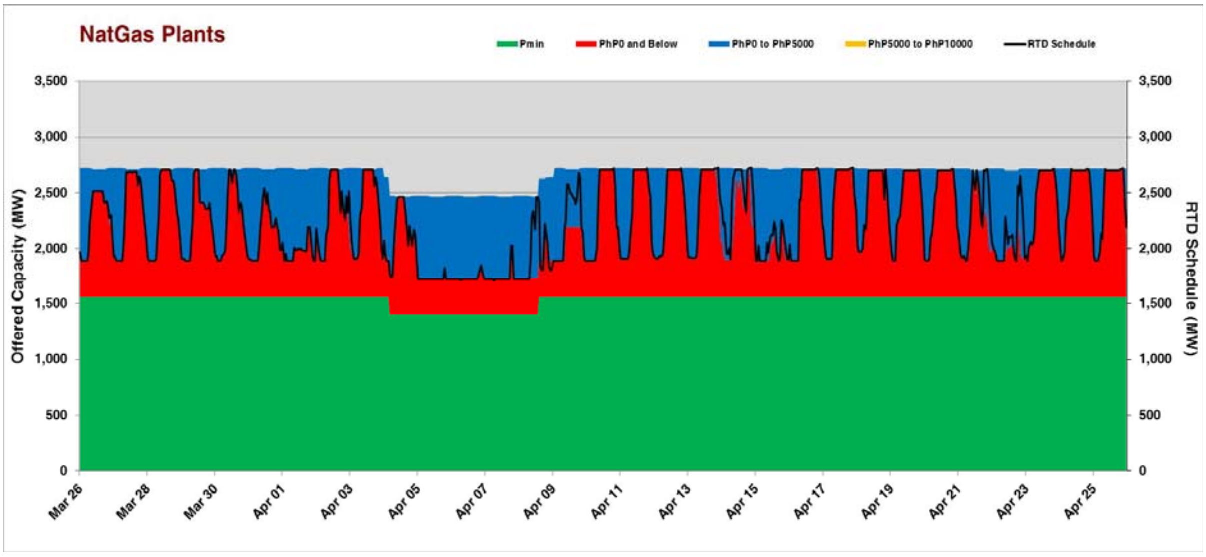
On the other hand, the offer prices of the geothermal plants in Visayas were mostly in the range of PhP0/MW to PhP5,000/MW *(Figure 15)*.

Figure 15. Geothermal Plants Offer Pattern (Visayas), April 2012



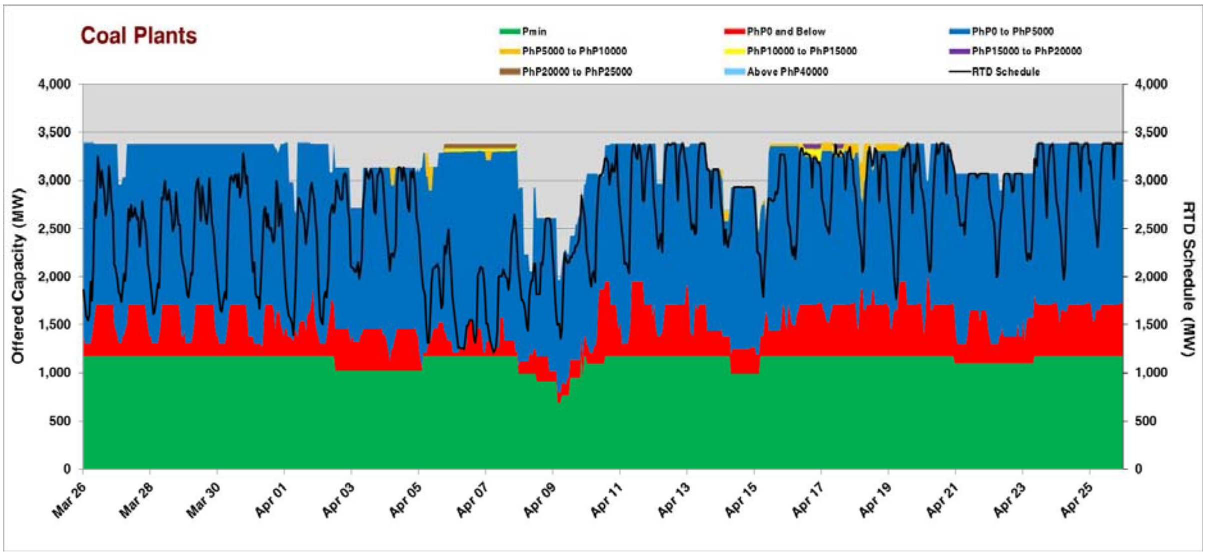
In the case of natural gas plants, the offered capacities (average of 2,675 MW) were priced at PhP5,000/MW and below during the billing period. Attention is drawn to the decline in the offered capacity from 04 to 08 April 2012 which coincides with the outage of Sta. Rita 1.

Figure 16. Natural Gas Plants Offer Pattern (Luzon), April 2012



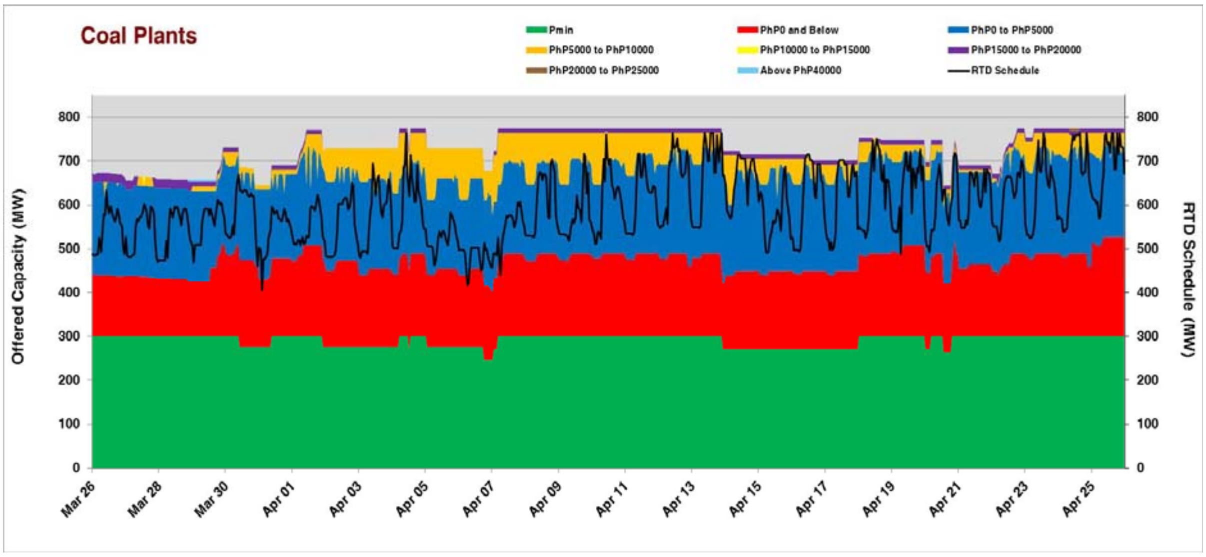
About 99.3 percent of the offered capacities of coal plants in Luzon (average of 3,200 MW) were priced at PhP5,000/MW and below *(Figure 17)*. The remaining 0.7 percent of the offered capacities (average of 22 MW) were priced above PhP5,000/MW. The average outage capacity of coal plants significantly decreased by 32.8 percent from the previous billing period, which correspondingly augmented the total offered capacity by an average of 221 MW during the billing period.

Figure 17. Coal Plants Offer Pattern (Luzon), April 2012



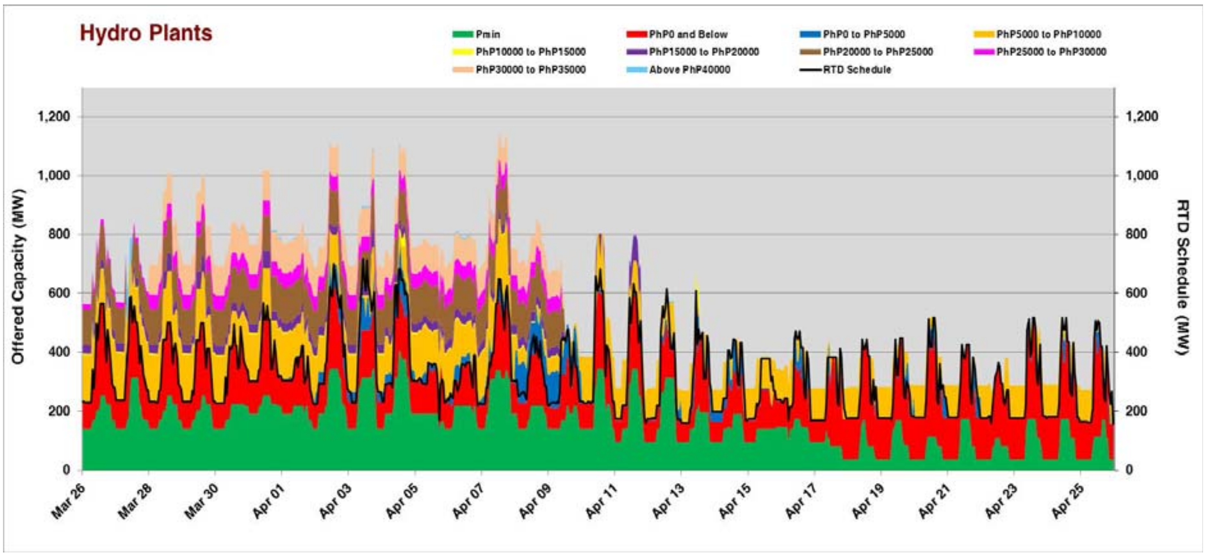
In Visayas, about 93 percent of the offered capacity of coal plants (average of 677 MW) were priced at PhP5,000/MW and below. The other 7 percent of the offered capacities (average of 53 MW) were priced above PhP5,000/MW *(Figure 18)*. As in the case of Luzon, the average total offered capacity of coal plants in Visayas was up by 80 MW from the previous billing period likewise due to the decline in the capacity on outage of coal plants during the billing period.

Figure 18. Coal Plants Offer Pattern (Visayas), April 2012



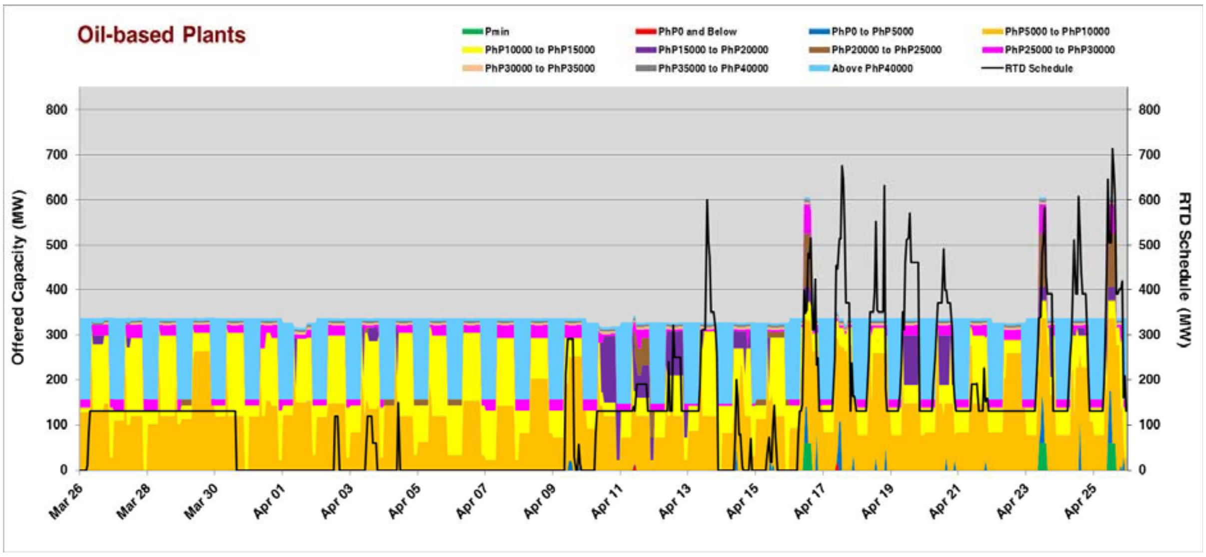
As shown in Figure 19, the capacity and price offers of hydro plants in Luzon during the billing period remained volatile, with 62.5 percent of the capacities offered below PhP5,000/MW, 20.3 percent at PhP5,000/MW to PhP10,000/MW, and the remaining 17.2 percent at various price levels above PhP10,000/MW. A decline in the offered capacity of the hydro plants was observed starting 09 April 2012, attributed to, among others, the maintenance outage of one of the units of San Roque as well as the limited offer of the plant due to water elevation concerns (below rule curve). During the billing period, the hydro plants accounted to 55 percent of the capacity gap in Luzon.

Figure 19. Hydro Plants Offer Pattern (Luzon), April 2012



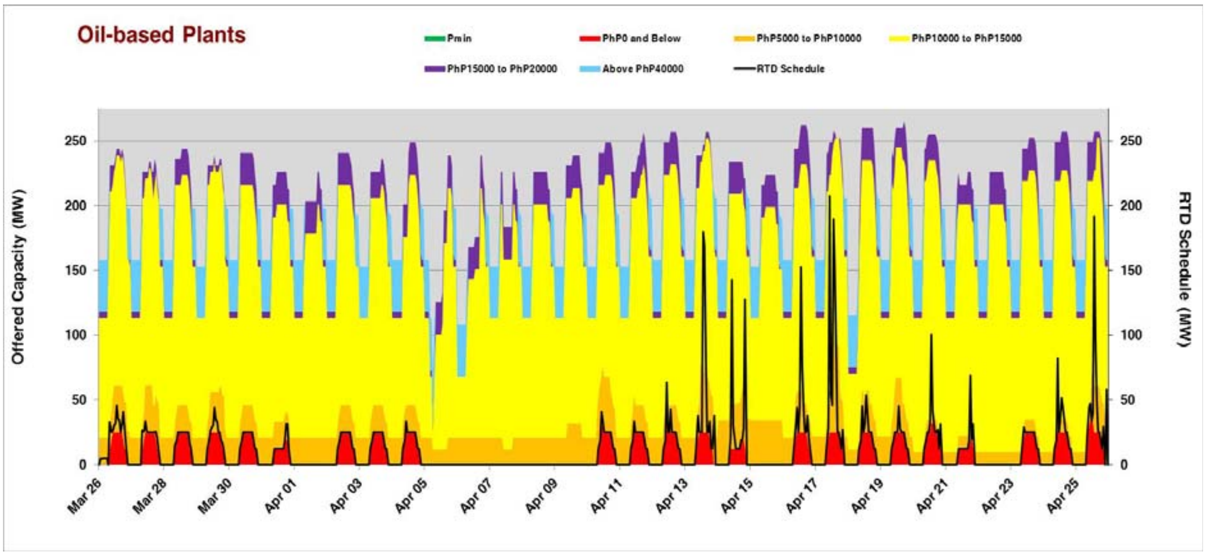
Luzon oil-based plants had high offer prices with only 0.7 percent of the offered capacities priced below PhP5,000/MW, 73.9 percent at PhP5,000/MW to PhP40,000/MW, and the rest of the 25.3 percent at above PhP40,000/MW *(Figure 20)*. With an average total offered capacity of only 340 MW, Luzon oil-based plants accounted to 27 percent of the capacity gap in Luzon.

Figure 20. Oil-based Plants Offer Pattern (Luzon), April 2012



On the other hand, 68 percent of the offered capacities of the Visayas oil-based plants were priced at PhP10,000/MW to PhP15,000/MW *(Figure 21)*. With an average total offered capacity of 203 MW, the Visayas oil-based plants accounted to 74 percent of the capacity gap in the Visayas.

Figure 21. Oil-based Plants Offer Pattern (Visayas), April 2012



Capacity Factor

During the current billing period, geothermal plants in Luzon showed more than 100 percent capacity factor based on offered capacity *(Table 22)*. The same was 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 for the conduct of commissioning tests likewise contributed to such capacity factor. By contrast, calculations indicate that the capacity factor of geothermal plants based on registered capacity and net of outages decreased from the previous billing month.

Natural gas plants consistently have high capacity factors above 80 percent, although lesser than the previous billing month's capacity factors. For hydro plants, it was observed that there was a decrease in their capacity factors based on registered capacity and net of outages, which may have been influenced by the increase in the outage capacity during the billing period. Month-on-month comparison for coal plants indicated that the capacity factors of the same were comparable. In the case of oil-based plants, calculations showed that their capacity factors significantly increased when compared to the previous billing period and same billing period last year.

Figure 22. Capacity Factor (Luzon Plants), April 2012

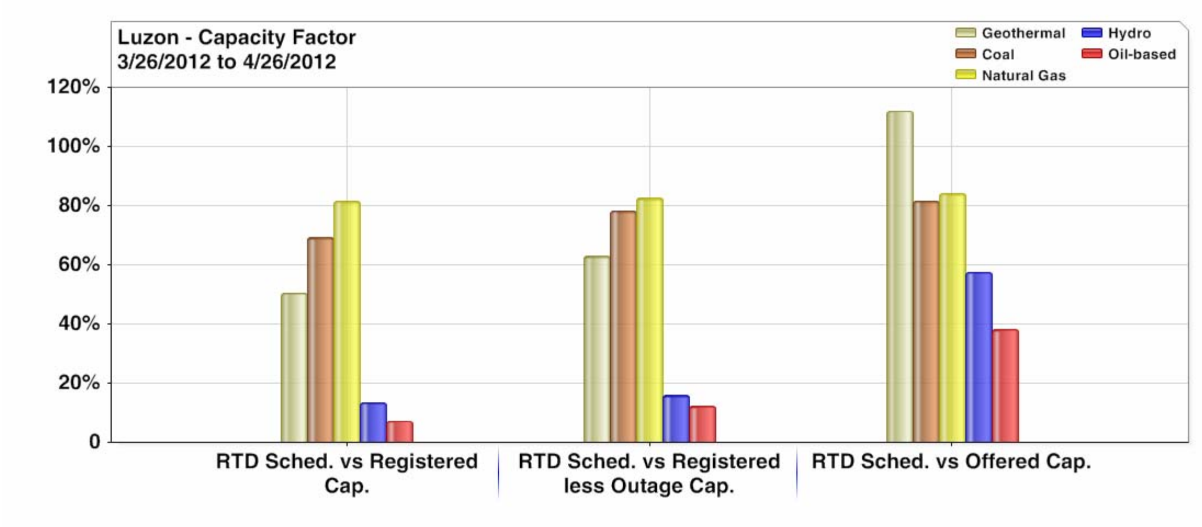


Table 22. Summary of Capacity Factor by Plant Type in Luzon, April 2012, March 2012, and April 2011

Plant Type	RTD Sched. vs Registered Cap.				
	April 2012	March 2012	April 2011	%M-on-M Change	%Y-on-Y Change
Coal	69%	65%	59%	6.0	9.4
Natural Gas	81%	86%	84%	(5.2)	2.6
Geothermal	50%	52%	46%	(2.7)	12.0
Hydro	13%	16%	12%	(15.4)	31.3
Oil-based	7%	5%	2%	40.8	208.7

Plant Type	RTD Sched. vs Registered less Outage Cap.				
	April 2012	March 2012	April 2011	%M-on-M Change	%Y-on-Y Change
Coal	78%	78%	69%	(0.8)	14.1
Natural Gas	82%	87%	87%	(5.6)	0.0
Geothermal	63%	68%	72%	(7.7)	(5.3)
Hydro	16%	18%	13%	(14.2)	37.8
Oil-based	12%	8%	2%	43.4	326.5

Plant Type	RTD Sched. vs Offered Cap.				
	April 2012	March 2012	April 2011	%M-on-M Change	%Y-on-Y Change
Coal	81%	82%	72%	(1.3)	14.7
Natural Gas	84%	89%	89%	(5.5)	0.4
Geothermal	112%	109%	99%	3.1	10.0
Hydro	57%	51%	58%	12.1	(12.5)
Oil-based	37%	24%	12%	51.1	102.1

Table 23. Capacity Factor by Plant Type in Luzon, April 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	1,946,779	2,832,408	2,502,315	2,397,644	69%	78%	81%
Natural Gas	1,674,309	2,060,210	2,032,937	1,992,515	81%	82%	84%
Geothermal	329,999	654,497	524,997	294,702	50%	63%	112%
Hydro	243,298	1,814,765	1,537,592	426,048	13%	16%	57%
Oil-based	92,864	1,351,968	797,160	252,627	7%	12%	37%

Table 24 showed that the capacity factors of coal plants in Visayas significantly decreased from same billing period last year. It may be recalled that last year's capacity factor was influenced by the imposition of security limits on PEDC, CEDC, and KEPCO-SPC Unit 2. The significant increase in the geothermal plants' outage capacity may have factored in the increase of the geothermal plants' capacity factor based on net of outages during the billing period.

Figure 23. Capacity Factor (Visayas Plants), April 2012

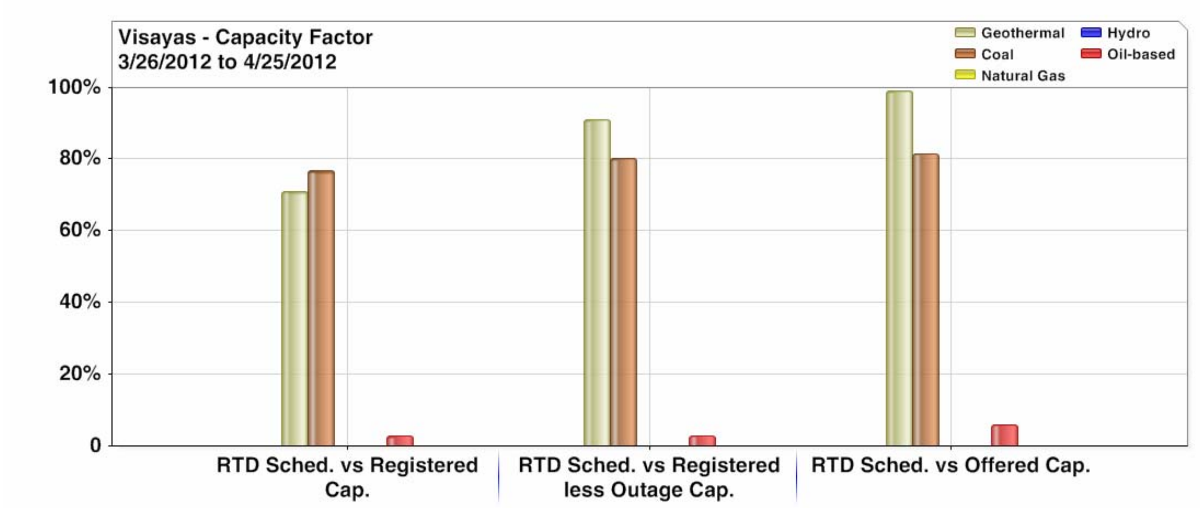


Table 24. Summary of Capacity Factor by Plant Type in Visayas, April 2012, March 2012, and April 2011

Plant Type	RTD Sched. vs Registered Cap.				
	April 2012	March 2012	April 2011	%M-on-M Change	%Y-on-Y Change
Coal	77%	72%	92%	6.7	(21.4)
Geothermal	71%	72%	65%	(1.2)	10.2
Oil-based	3%	4%	2%	(35.3)	78.9
Plant Type	**RTD Sched. vs Registered less Outage Cap.**				
	April 2012	**March 2012**	**April 2011**	**%M-on-M Change**	**%Y-on-Y Change**
Coal	80%	83%	98%	(3.2)	(17.9)
Geothermal	91%	84%	67%	7.8	36.3
Oil-based	3%	4%	3%	(35.3)	4.1
Plant Type	**RTD Sched. vs Offered Cap.**				
	April 2012	**March 2012**	**April 2011**	**%M-on-M Change**	**%Y-on-Y Change**
Coal	82%	85%	99%	(3.7)	(14.4)
Geothermal	99%	100%	91%	(0.6)	9.7
Oil-based	6%	9%	6%	(37.1)	56.2

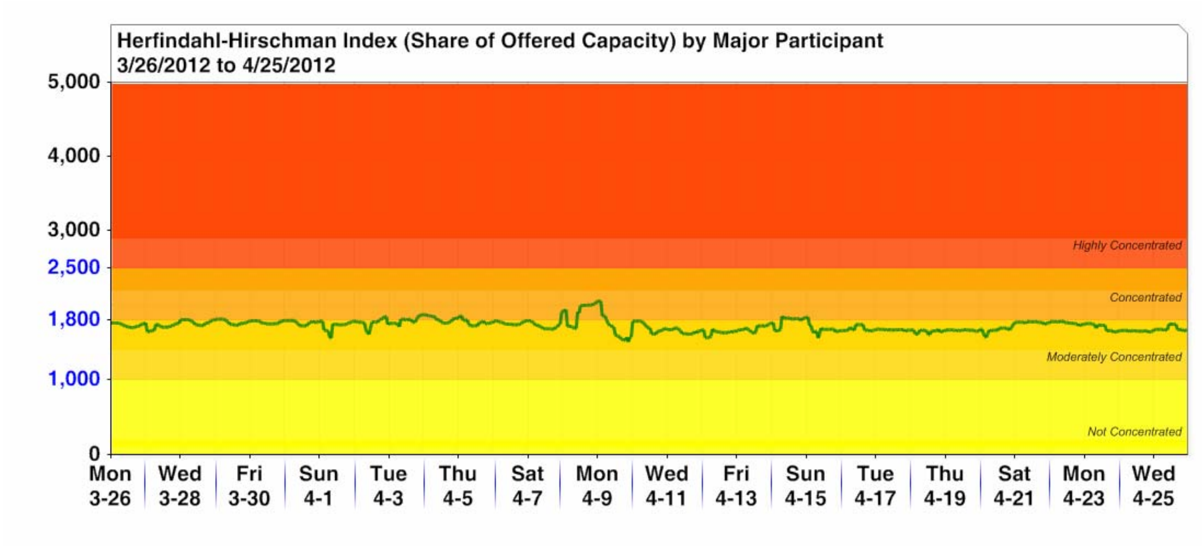
Table 25. Capacity Factor by Plant Type in Visayas, April 2012

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	442,971	576,749	552,771	543,071	77%	80%	82%
Geothermal	492,748	693,259	541,639	497,715	71%	91%	99%
Oil-based	8,867	331,229	319,819	150,730	3%	3%	6%

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 24)*.

Figure 24. Hourly HHI based on Offered Capacity by Major Participant Grouping, April 2012



Compliance Monitoring

Compliance to Must Offer Rule

Continued non-compliance to the must-offer rule by generator trading participants in Luzon and Visayas was observed throughout the covered billing period. The same is manifested in the results of the computation, which show that about 62 percent and 47 percent of the total generator-trading intervals[6] in Luzon and Visayas, respectively, had capacity gap[7] during the billing period. Figure 25 and Table 26 show the breakdown of generator-trading intervals with capacity gap by resource type. In Luzon, hydro plants had the most capacity gap occurrences at 40.1 percent, consistent with the data on capacity gap (in MW) in Table 28 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 76.9 percent followed by geothermal plants at 19.4 percent.

[6] Total generator resource-trading intervals - calculated as the number of registered generator resource nodes multiplied by the total trading intervals in the billing month.
[7] Capacity gap - registered capacity less outage capacity less offered capacity, calculated for each generator resource node per trading interval.

Figure 25. Generator-Trading Intervals with Capacity Gap by Resource, April 2012

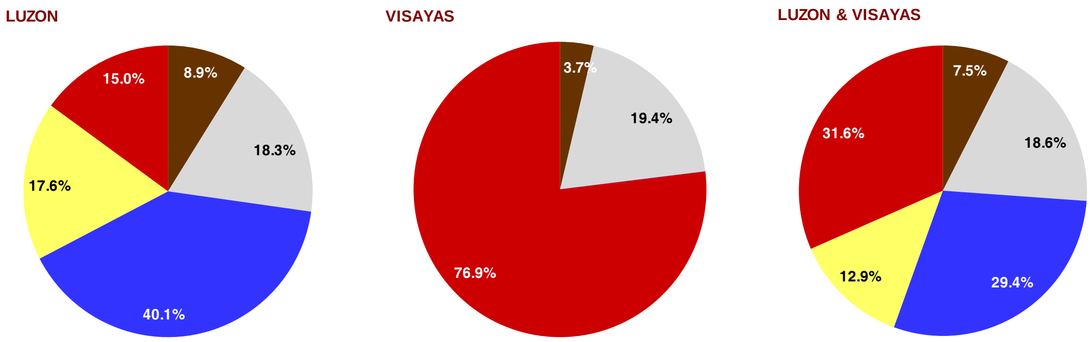
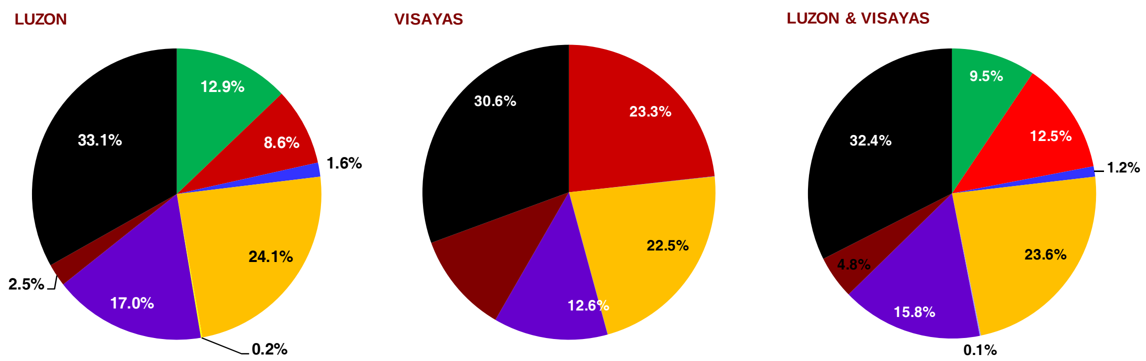


Table 26. Generator-Trading Intervals with Capacity Gap by Resource, April 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Coal	2,203	8.9%	334	3.7%	2,537	7.5%
Geothermal	4,528	18.3%	1,746	19.4%	6,274	18.6%
Hydro	9,920	40.1%	-	-	9,920	29.4%
Natural Gas	4,358	17.6%	-	-	4,358	12.9%
Oil-based	3,707	15.0%	6,939	76.9%	10,646	31.6%
Total	**24,716**	**100.0%**	**9,019**	**100.0%**	**33,735**	**100.0%**

Figure 26 and Table 27 show the breakdown of the generator-trading intervals with capacity gap based on the category of reasons[8] provided by the generator trading participants as part of their offer submission. It was observed that equipment-related concerns topped the list of reasons for the occurrences of capacity gap at 23.6 percent, followed by steam supply concerns at 15.8 percent. It is important to note, however, that about 32.4 percent of these occurrences, reasons for the same were not provided by the generator trading participants.

Figure 26. Generator-Trading Intervals with Capacity Gap by Reason, April 2012



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

Table 27. Generator-Trading Intervals with Capacity Gap by Reason, April 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	3,190	12.9%			3,190	9.5%
Ancillary Services	2,128	8.6%	2,098	23.3%	4,226	12.5%
Start-up/Shutdown	390	1.6%	2	0.0%	392	1.2%
Equipment-related Failure	5,947	24.1%	2,026	22.5%	7,973	23.6%
Commercial Test	43	0.2%			43	0.1%
Steam Supply	4,205	17.0%	1,137	12.6%	5,342	15.8%
Others	626	2.5%	998	11.1%	1,624	4.8%
No Reason	8,187	33.1%	2,758	30.6%	10,945	32.4%
Total	**24,716**	**100.0%**	**9,019**	**100.0%**	**33,735**	**100.0%**

Table 28 compares the system capacity gap of the April 2012 billing period, the previous billing period and the same billing period last year. During the three billing periods, hydro and oil-based plants consistently had the highest level of capacity gap. In general, the current billing period saw an increase in the capacity gap by an average of 152 MW from the previous billing period's 2,881 MW.

Table 28. Summary of Capacity Gap by Plant Type (MW), April 2012

Resource Type	April 2012 (In MW)			March 2012 (In MW)			April 2011 (In MW)			% M-on-M Change (Mar - Apr 2012)			% Y-on-Y Change (Apr 2011 - Apr 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	967	16	154	942	18	161	928	12	142	2.7	(13.7)	(4.5)	1.5	47.6	13.3
Natural Gas	141	39	54	391	19	52	321	9	42	(63.9)	106.4	3.8	22.0	108.9	23.9
Geothermal	452	296	364	438	293	371	457	236	362	3.2	1.0	(1.9)	(4.1)	24.3	2.5
Hydro	1,772	830	1,501	1,639	950	1,346	1,924	1,231	1,611	8.1	(12.6)	11.5	(14.8)	(22.9)	(16.4)
Oil Based	1,088	655	959	1,086	572	950	1,782	1,034	1,592	0.2	14.5	1.0	(39.0)	(44.7)	(40.3)
TOTAL	**4,034**	**2,223**	**3,032**	**3,732**	**2,189**	**2,881**	**4,765**	**0**	**3,708**	8.1	1.6	5.3	(21.7)		(22.3)

Compliance to RTD Schedule

During the billing period, about 18 percent and 9 percent of the total generator-trading intervals in Luzon and Visayas, respectively, have observed deviations between the real time ex-ante dispatch (RTD) schedule[9] and actual dispatch[10], exceeding the +/-3% tolerance limit[11]. As indicated in Figure 27 and Table 29, the hydro and geothermal plants have the most occurrences of deviations at 42.6 percent and 27.1 percent in Luzon, respectively. In Visayas, coal and oil-based plants tied at 39.5 percent.

[9] RTD schedule – target loading level of each generator resource node at the end of the trading interval.
[10] Actual dispatch – actual loading of each generator resource node at the end of the trading interval (based on minute 59 snapshot data).
[11] +/-3% tolerance limit – initial dispatch tolerance limits adopted per PEM Board Resolution No. 2005-15.

Figure 27. Generator-Trading Intervals with RTD Deviation by Resource, April 2012

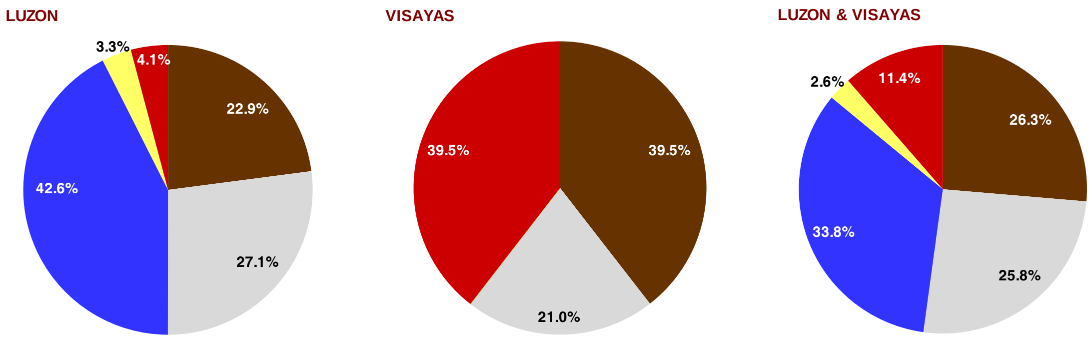


Table 29. Generator-Trading Intervals with RTD Deviation by Resource, April 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Coal	1,626	22.9%	725	39.5%	2,351	26.3%
Geothermal	1,919	27.1%	386	21.0%	2,305	25.8%
Hydro	3,016	42.6%	-	-	3,016	33.8%
Natural Gas	233	3.3%	-	-	233	2.6%
Oil-based	294	4.1%	726	39.5%	1,020	11.4%
Total	**7,088**	**100.0%**	**1,837**	**100.0%**	**8,925**	**100.0%**

Illustrated in Figure 28 and Table 30 are the summary of the generator-trading intervals with deviations classified according to the reasons provided by NGCP-SO. In Luzon, 17.0 percent and 15.3 percent of the total generator-trading intervals with deviations were caused by reserve utilization and intra-hour variation in demand, respectively. In the case of Visayas, intra-hour variation topped the list at 18.9 percent, followed by must run unit at 10.7 percent. However, reasons for the observed deviations in 61.5 percent and 57.7 percent of the total generator-trading intervals in Luzon and Visayas, respectively, have not been accounted for.

Figure 28. Generator-Trading Intervals with RTD Deviation by Reason, April 2012

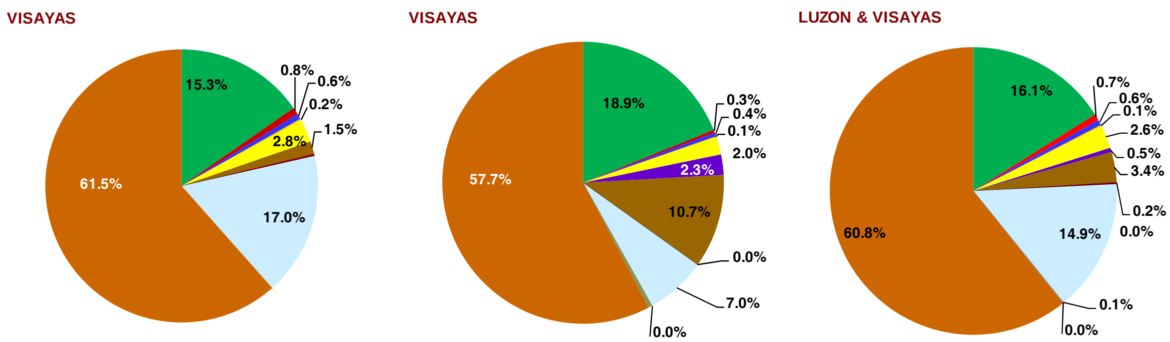


Table 30. Generator-Trading Intervals with RTD Deviation by Reason, April 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Intra-hour Variation	1,087	15.3%	347	18.9%	1,434	16.1%
Affected by Non-Compliance of Other Generators	59	0.8%	6	0.3%	65	0.7%
Start-up/Shutdown, Generator/Load Tripping	46	0.6%	8	0.4%	54	0.6%
Island Grid	11	0.2%	2	0.1%	13	0.1%
Generator Problem	195	2.8%	37	2.0%	232	2.6%
Non-Compliance to Dispatch Instruction	1	0.0%	43	2.3%	44	0.5%
Must Run Units	103	1.5%	197	10.7%	300	3.4%
Line Limitation	20	0.3%	1	0.1%	21	0.2%
Import/Export						
Reserve Utilization	1,204	17.0%	128	7.0%	1,332	14.9%
RTD Discrepancy		0.0%		0.0%	0	0.0%
Visayas Requirement		0.0%	8	0.4%	8	0.1%
No Category	4,362	61.5%	1,060	57.7%	5,422	60.8%
Total	**7,088**	**100.0%**	**1,837**	**100.0%**	**8,925**	**100.0%**