MAG-MMAR-2012-02

MONTHLY MARKET ASSESSMENT REPORT

For the Billing Period 26 January to 25 February 2012

PHILIPPINE ELECTRICITY MARKET CORPORATION

MARKET ASSESSMENT GROUP (MAG)

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List of Figures

List of Tables

Monthly Market Assessment Report

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

Supply and Demand Situation

The monthly average system demand[1] (ex-ante) increased significantly by 4.1 percent (262 MW) from the previous billing period and 5.3 percent (334 MW) from the same billing period last year. The hourly demand ranged from a minimum of 4,785 MW to a maximum of 8,500 MW *(Table 1)*. The maximum demand, which occurred on February 23, 2012 at trading interval 1400H, showed a modest increase of 2.3 percent from the previous billing period and significant growth of 5.2 percent from the same billing period last year. The increase in demand was the result of hotter weather among others. The average mean temperature in Luzon increased by 12.5 percent from the previous billing period and 3.8 percent from the same billing period last year *(Table 4)*. Examining the demand of Luzon and Visayas, the average demand of both regions increased compared with the previous billing period and same billing period last year *(Table 2)*.

Similarly, the monthly average system supply[2] showed an increase from the previous billing period by 6.9 percent (8,142 MW to 8,707 MW) and same billing period last year by 7.9 percent (8,072 MW to 8,707 MW) *(Table 1).* The system supply during the billing period ranged from 7,604 MW to 9,482 MW. With lower capacity on outage and higher capacity offers, the average regional supply in Luzon increased by 8.6 percent (6,616 MW to 7,187 MW) from the previous billing period *(Table 3)*. The average supply in Visayas declined slightly by 0.2 percent from the previous billing period's average supply of 1,526 MW *(Table 3).* Compared to last year, the average supply in Visayas went up by 22.5 percent as new coal plants PEDC and KSPC started joining the WESM in March 2011.

In general, there was an adequate supply margin during the billing period, averaging 2,034 MW with minimum of 188 MW and maximum of 4,187 MW. This was higher by about 17 percent (average of 300 MW) than the previous billing period and same billing period last year *(Table 1)*.

[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), February 2012

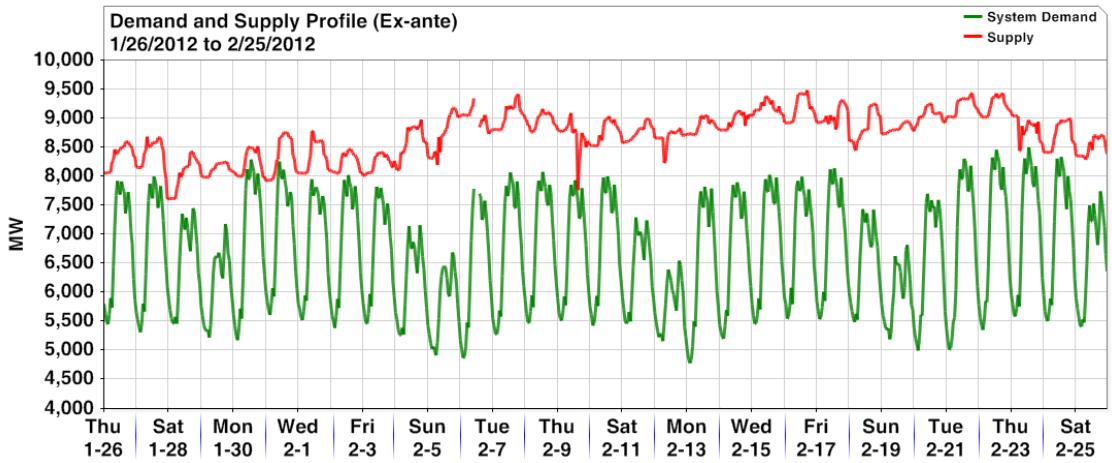


Table 1. Demand and Supply Summary (Ex-ante), February 2012, January 2012, and February 2011

	February 2012 (In MW)			January 2012 (In MW)			February 2011 (In MW)			% M-on-M Change (Jan - Feb 2012)			% Y-on-Y Change (Feb 2011 - Feb 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Demand	8,500	4,785	6,673	8,307	4,236	6,411	8,079	4,682	6,339	2.3	13.0	4.1	5.2	2.2	5.3
Supply	9,482	7,604	8,707	9,076	7,223	8,142	8,938	6,958	8,072	4.5	5.3	6.9	6.1	9.3	7.9
Supply/Demand Variance	4,187	188	2,034	3,689	116	1,732	3,159	142	1,734	13.5	61.2	17.5	32.5	31.8	17.4

Note: The derived values were non-coincident.

Table 2. Regional Demand Summary (Ex-ante), February 2012, January 2012, and February 2011

	February 2012 (In MW)			January 2012 (In MW)			February 2011 (In MW)			% M-on-M Change (Jan - Feb 2012)			% Y-on-Y Change (Feb 2011 - Feb 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	7,198	4,077	5,652	7,007	3,503	5,392	6,855	3,977	5,370	2.7	16.4	4.8	5.0	2.5	5.3
Visayas	1,346	665	1,024	1,360	733	1,019	1,294	652	969	(1.0)	(9.3)	0.5	4.0	2.0	5.7

Note: The derived values were non-coincident.

Table 3. Regional Supply Summary (Ex-ante), February 2012, January 2012, and February 2011

	February 2012 (In MW)			January 2012 (In MW)			February 2011 (In MW)			% M-on-M Change (Jan - Feb 2012)			% Y-on-Y Change (Feb 2011 - Feb 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	7,945	6,028	7,187	7,436	5,747	6,616	7,647	5,956	6,829	6.8	4.9	8.6	3.9	1.2	5.2
Visayas	1,660	1,190	1,523	1,669	1,356	1,526	1,544	935	1,243	(0.5)	(12.3)	(0.2)	7.5	27.2	22.5

Note: The derived values were non-coincident.

Table 4. Regional Temperature[3] , February 2012, January 2012, and February 2011

Mean Temperature	February 2012 (°C)			January 2012 (°C)			February 2011 (°C)			% M-on-M Change (Jan. 2011 - Feb. 2011)			% Y-on-Y Change (Feb 2011 - Feb 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	30	26	27	28	27	24	29	27	26	7.1	(3.7)	12.5	3.4	(3.7)	3.8
Visayas	28	24	26	28	27	26	29	24	27	0.0	(11.1)	0.0	(3.4)	0.0	(3.7)

[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. Plant Capacity on Outage, February 2012

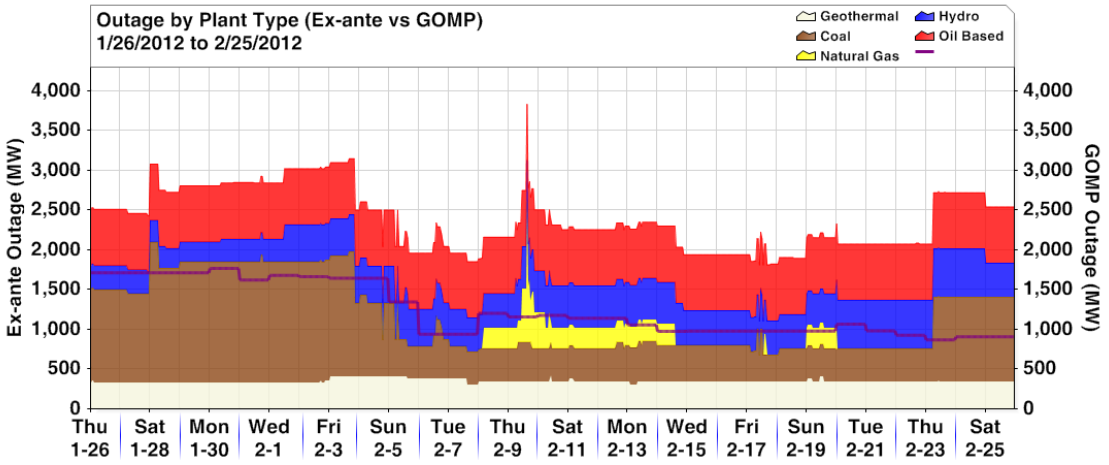
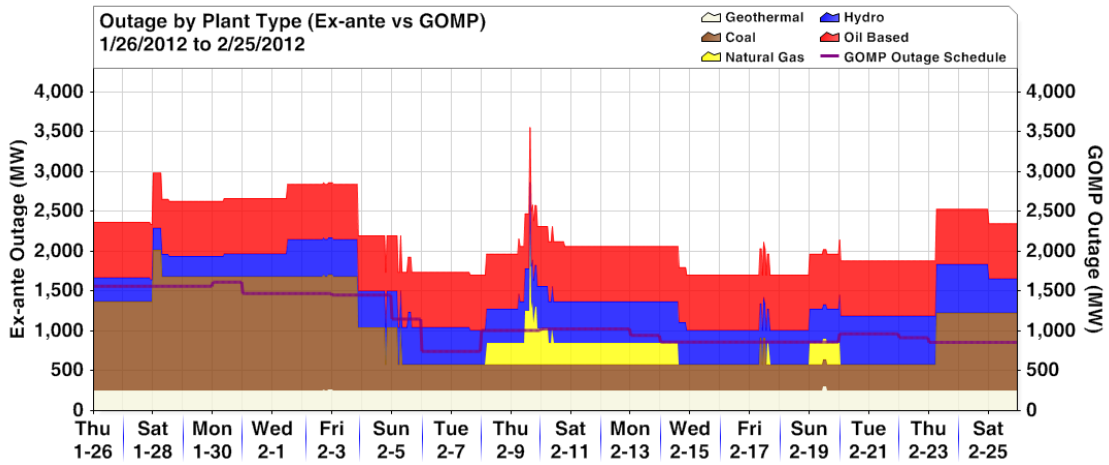


Figure 2 shows the system capacity on outage by plant type, averaging 2,385 MW for the month of February 2012. The maximum capacity on outage of 3,834 MW occurred on February 9, 2012 at trading interval 1600H. On the other hand, the minimum capacity on outage was registered at 1,812 MW on February 17, 2012 trading intervals 1100H, 1400H, and 1700H to 1900H.

The monthly average capacity on outage in Luzon during the billing period was lower by 11.7 percent than the previous billing period *(Table 5)*. The capacity on outage posted an average of 2,181 MW, ranging from 1,704 MW to 3,558 MW. The highest capacity on outage in Luzon coincided with the highest system-wide outage capacity. Coal plants registered the highest outage capacity with an average of 708 MW followed by oil based plants with 694 MW. Meanwhile, natural gas plants had the lowest average outage capacity with 74 MW.

Figure 3. Plant Outage Capacity, February 2012 - Luzon



The current billing period showed a higher level of capacity on outage in Luzon vis-a-vis the capacity on outage based on the NGCP-SOs CY2012 Grid Operating and Maintenance Program (GOMP) (shown in Table 6) due to the occurrence of forced and unplanned outages. It was also observed that several power plants such as Sual 2 and Kalayaan 4, although not included in the GOMP, were declared to be on planned outage by NGCP-SO.

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

Resource Type	February 2012 (In MW)			January 2012 (In MW)			February 2011 (In MW)			% M-on-M Change (Jan - Feb 2012)			% Y-on-Y Change (Feb 2011 - Feb 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	1,766	330	708	1,818	712	969	1,307	0	542	(2.9)	(53.7)	(26.9)	35.1		30.6
Natural Gas	1,759	0	74	516	0	216	600	0	89	241.1		(65.7)	193.2		(17.0)
Geothermal	312	253	253	371	253	270	430	304	328	(15.9)	0.0	(6.1)	(27.5)	(16.8)	(23.0)
Hydro	654	249	451	498	197	300	296	95	122	31.3	26.4	50.4	121.0	161.9	270.0
Oil Based	752	692	694	752	692	716	452	382	402	0.0	0.0	(3.1)	66.4	81.2	72.7
TOTAL	3,558	1,704	2,181	3,547	1,880	2,471	2,348	844	1,484	0.3	(9.4)	(11.7)	51.5	101.9	47.0

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), February 2012, January 2012, and February 2011

Resource Type	February 2012 (In MW)			January 2012 (In MW)			February 2011 (In MW)			% M-on-M Change (Jan - Feb 2012)			% Y-on-Y Change (Feb 2011 - Feb 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	789	330	493	1,292	645	1,028	0	0	0	(38.9)	(48.8)	(52.1)			
Natural Gas	529	0	178	263	0	104	637	0	397	101.0		71.2	(58.7)		(73.8)
Geothermal	196	84	139	119	64	77	237	119	197	64.9	31.4	81.6	(49.9)	(46.3)	(61.1)
Hydro	415	185	284	349	159	199	349	266	307	18.8	16.0	42.6	0.1	(40.2)	(35.1)
Oil Based	360	0	154	60	0	10	70	0	11	500.0		1,441.9	(14.3)		(11.4)
TOTAL	2,091	745	1,248	1,790	1,131	1,418	1,222	448	912	16.8	(34.1)	(12.0)	46.5	152.6	55.5

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, coal, and oil based plants in Luzon with outage duration of 3 or more consecutive days during the billing period. A number of hydro plants such as Binga 3 and 4, Ambuklao 3, and Kalayaan 2 and 4 had their shares of unavailability to the market during the billing period due to outages. Meanwhile, hydro plants Bakun 1 and 2, Binga 1 and 2 and Angat Main 1 and 2 remain on outage during the billing period.

For coal plants, QPPL was placed on maintenance outage consistent with the GOMP. Sual 2 was also placed on (planned) maintenance outage on January 28 to February 3 and further encountered forced outage on February 23. Calaca 1 was still unavailable during the billing period.

On the other hand, oil based plants Limay 4 and Malaya 1 have been on outage since last year while Limay 2 has been on outage since the start of the year.

Table 7. Major Plant Outages, February 2012 - Luzon

Plant/Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Remarks
Hydro Plants					
Ambuklao 3	34.85	1/30/2012 8:01	2/7/2012 14:44	8.28	Shaft seal replacement until 2400H.
Binga 3	26	1/9/2012 0:03	1/27/2012 21:37	18.90	Planned outage
Binga 4	26	1/9/2012 0:03	1/28/2012 12:08	19.50	Planned outage
Magat 1	95	2/9/2012 5:58	2/14/2012 20:20	5.60	Tripped by stator fault
Kalayaan 4	180	2/20/2012 0:01	2/24/2012 0:01	4.00	Planned Outage
Angat M 1	50	10/7/2011 0:01			Repair of concrete foundation at lower bracket
Angat M 2	50	5/24/2011 0:01			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
Binga 2	26	1/6/2012 7:08			Replcament of Main Transformer
Kalayaan 2	180	2/1/2012 9:48			Tripped as generator due to upper guide bearing high meal temperature
Coal Plants					
QPPL	459	1/20/2012 23:34	2/4/2012 19:08	14.82	Maintenance
Sual 2	647	1/28/2012 0:01	2/3/2012 20:44	6.86	Maintenance outage
Calaca 2	330	1/21/2012 0:40	1/28/2012 6:44	7.25	Boiler tube leak along 101R sootblower side.
Calaca 1	330	8/29/2011 22:15			Emergency shutdown due to suspected reheater leak.
Sual 2	647	2/23/2012 5:07			Tripped due to sudden closure of governor valve number 3.
Oil based Plants					
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

Visayas capacity on outage *(Figure 4)* was dominated by geothermal plants followed by the coal plants. The average capacity on outage in Visayas during the billing period was lower by 11.1 percent than the previous billing period but was higher by 23.4 percent than the same billing period last year. The highest capacity on outage was posted on February 6, 2012 at trading interval 1500H.

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

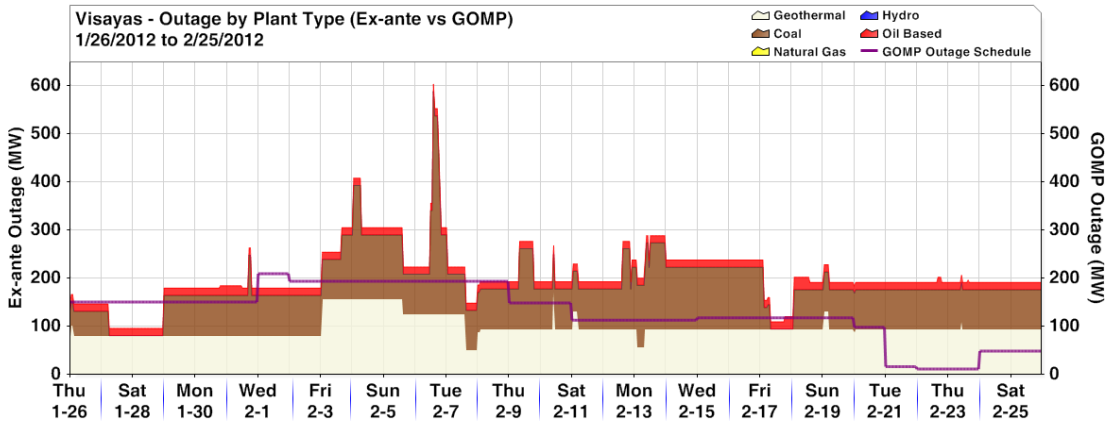


Table 8. Visayas Regional Outage Summary (Ex-ante), February 2012, January 2012, and February 2011

Resource Type	February 2012 (In MW)			January 2012 (In MW)			February 2011 (In MW)			% M-on-M Change (Jan - Feb 2012)			% Y-on-Y Change (Feb 2011 - Feb 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	464	0	91	333	0	113	164	0	27	39.4		(19.2)	183.0		239.1
Geothermal	169	50	97	122	86	87	125	50	55	39.0	(42.8)	12.4	35.7	0.0	78.0
Hydro	0	0	0	0	0	0	0	0	0						
Oil Based	26	15	15	56	10	30	95	77	84	(53.6)	50.0	(48.5)	(72.5)	(80.5)	(81.6)
TOTAL	604	96	204	433	112	230	301	127	165	39.4	(15.1)	(11.1)	100.9	(24.5)	23.4

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

Table 9. Visayas Regional Outage Summary (GOMP), February 2012, January 2012, and February 2011

Resource Type	February 2012 (In MW)			January 2012 (In MW)			February 2011 (In MW)			% M-on-M Change (Jan - Feb 2012)			% Y-on-Y Change (Feb 2011 - Feb 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	127	0	86	51	0	27	51	0	24	150.0		216.0	150.0		256.4
Geothermal	38	0	22	0	0	0	0	0	0						
Hydro	0	0	0	0	0	0	0	0	0						
Oil Based	47	6	23	10	5	7	11	0	5	370.0	20.0	233.3	327.3		342.6
TOTAL	210	11	130	61	5	34	56	0	29	244.7	120.0	283.8	272.3		346.4

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

Table 10 shows the major plant outages in Visayas during the billing period. The geothermal plants Malitbog 1 and PGPP1 Unit 1 went on planned outage (as classified by NGCP-SO), although not included in the GOMP.

The planned outages of coal plants Cebu TPP1 and PEDC 2 were not consistent with the GOMP. The shutdown of CEDC 3 slid a few days from the planned outage scheduled on February 1, 2012.

Table 10. Major Plant Outages, February 2012 - Visayas

Plant/Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Remarks
Geothermal Plants					
Mahanagdong B1	7	2/8/2012 1:56	2/18/2012 23:07	10.88	Steam supply deficiency
Malitbog 1	75	2/1/2012 0:24	2/7/2012 14:06	6.57	Annual PMS
Upper Mahiao 2	37.5	2/8/2012 0:20	2/13/2012 1:55	5.07	Steam supply deficiency
Mahanagdong B1	7	2/19/2012 3:01			Steam supply deficiency
Upper Mahiao 3	37.5	2/13/2012 7:47			Steam supply deficiency
Tongonan 1	31	1/17/2012 8:05			Due to high vibration
PGPP1 Unit 1	36.98	2/10/2012 0:02			Corrective maintenance
NNGPP	49.5	7/1/2011 0:11			To conduct plant rectification
Coal Plants					
Cebu TPP1	45	2/12/2012 22:47	2/17/2012 3:25	4.19	Pre arranged
PEDC 2	83.7	1/28/2012 23:30	2/17/2012 14:54	19.64	Scheduled annual PMS
CEDC 3	82	2/18/2012 1:04			Under prventive maintenance

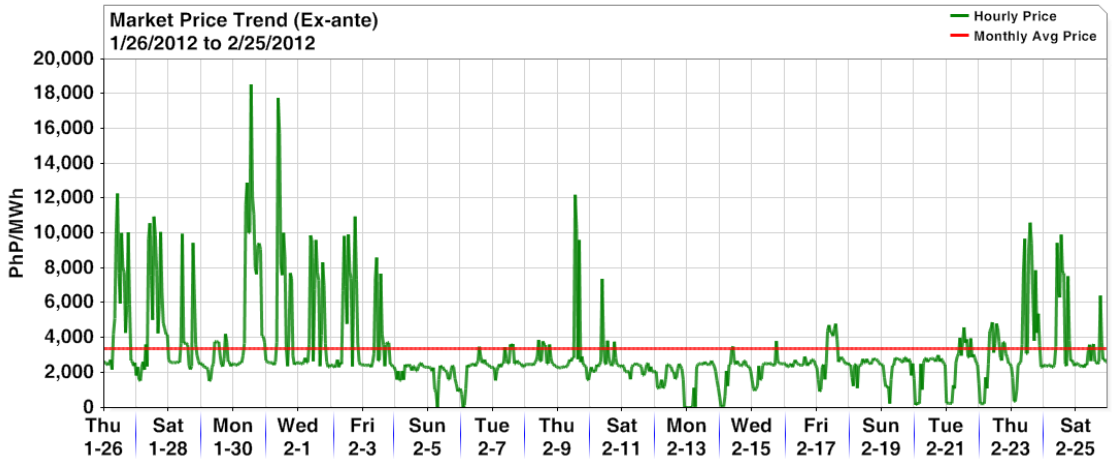
Market Price Outcome

While there was an increase in system demand, the monthly average market price[4] during the billing period decreased significantly by 34.4 percent (PhP1,779/MWh) compared with the previous billing period. However, this was still higher by 8.8 percent (PhP274/MWh) than the same billing period last year. The maximum price during the billing period was registered at PhP18,551/MWh on January 30, 2012 trading hour 1400H while the minimum price was recorded at PhP0/MWh in few occasions on February 12-13, 2012. Highly notable was the 60.1 percent decline in the maximum price from the previous billing period's PhP46,547/MWh.

As shown in Figure 5, relatively lower prices (mostly below PhP4,000/MWh) were observed from February 4-22, 2012 resulting from better supply and demand condition. The supply improved when coal plants QPPL and Sual 2 went back on line from maintenance/scheduled outage on February 3 and February 4, respectively.

In contrary, high prices were observed in the earlier and latter parts of the billing period when tight supply and demand condition prevailed, which was attributed to the outages of major coal plants in Luzon. High prices also occurred on February 9 following the forced outages of the natural gas plants Sta. Rita and San Lorenzo.

Figure 5. Market Price Trend, February 2012



Comparing the regional prices from the previous billing period, the average prices decreased by 36.3 percent (PhP5,218/MWh to PhP3,324/MWh) in Luzon and 23.5 percent (PhP4,884/MWh to PhP3,734/MWh) in Visayas *(Table 11)*.

[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 6. Market Price Trend - Luzon, February 2012

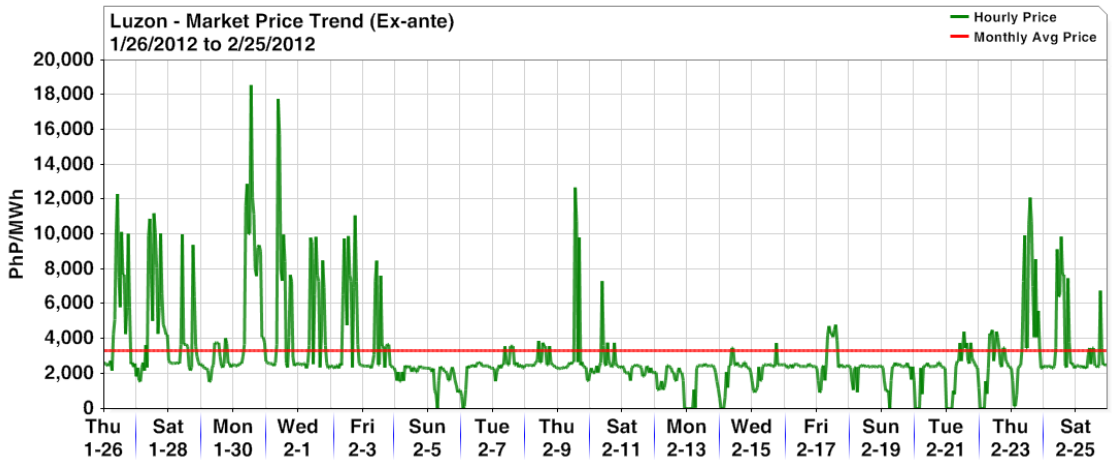


Figure 7. Market Price Trend - Visayas, February 2012

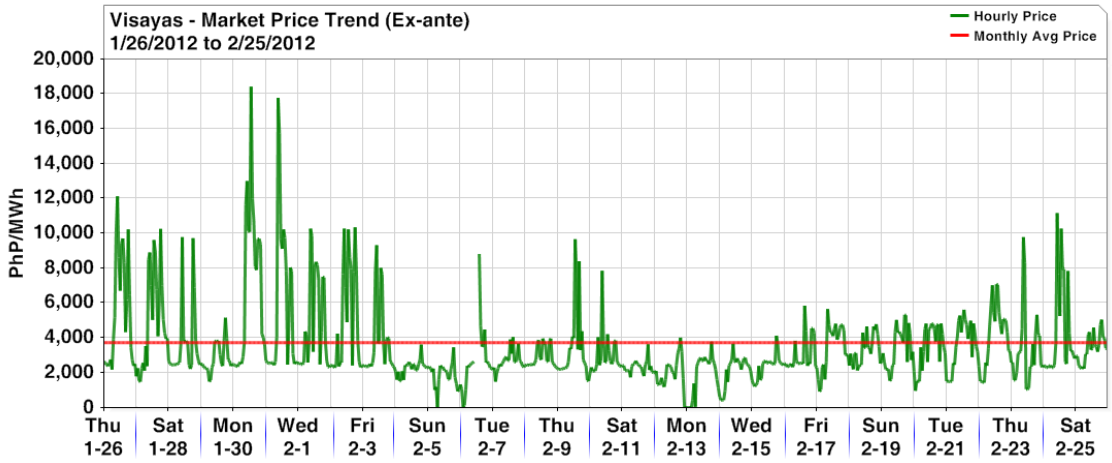


Table 11. Market Price Summary, February 2012, January 2012, and February 2011

	February 2012 (In MW)			January 2012 (In MW)			February 2011 (In MW)			% M-on-M Change (Jan - Feb 2012)			% Y-on-Y Change (Feb 2011 - Feb 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luz-Viz	18,551	0	3,386	46,547	0	5,165	22,850	0	3,112	(60.1)		(34.4)	(18.8)		8.8
Luzon	18,575	0	3,324	46,584	0	5,218	24,623	0	3,055	(60.1)		(36.3)	(24.6)		8.8
Visayas	18,417	0	3,734	46,357	0	4,884	18,722	0	3,431	(60.3)		(23.5)	(1.6)		8.8

The price distribution in figure 8 shows that the previous billing period and the same billing period last year registered market prices beyond PhP20,000/MWh at 1.6 percent (12 trading intervals) and 0.4 percent (3 trading intervals), respectively. The current billing period had more occurrences of price level between PhP2,000/MWh to PhP4,000/MWh (71 percent of the time) against the other periods *(Table 12)*.

Figure 8. Market Price Distribution, February 2012, January 2012, and February 2011

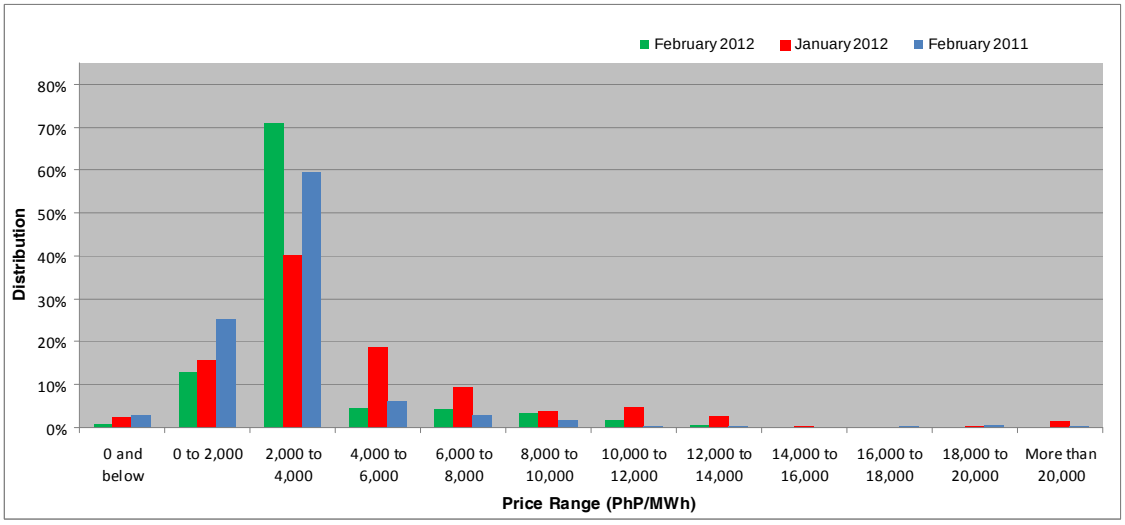


Table 12. Market Price Distribution, February 2012, January 2012, and February 2011

Price Range (PhP/MWh)	% Distribution		
	February 2012	January 2012	Februay 2011
0 and below	0.8	2.3	2.8
0 to 2,000	12.9	15.7	25.0
2,000 to 4,000	71.1	40.2	59.5
4,000 to 6,000	4.8	18.5	6.2
6,000 to 8,000	4.3	9.5	2.8
8,000 to 10,000	3.4	3.8	1.7
10,000 to 12,000	1.7	4.8	0.3
12,000 to 14,000	0.5	2.7	0.4
14,000 to 16,000	0.1	0.4	0.0
16,000 to 18,000	0.1	0.1	0.3
18,000 to 20,000	0.1	0.3	0.5
More than 20,000	0	1.6	0.4
	100.0	100.0	100.0

Comparing regional prices, there was no significant difference in the maximum prices in Luzon and Visayas for the current and previous billing periods. Both the current billing period and same billing period last year have higher average prices in Visayas than Luzon while the previous billing period had lower average price in Visayas than Luzon. These price differences were generally brought about by regional application of pricing error notices (PEN) and HVDC constraints.

Table 13. Regional Price Summary, February 2012, January 2012, and February 2011

	Luzon (In PhP/MWh)			Visayas (In PhP/MWh)			% Difference		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
February 2012	18,575	0	3,324	18,417	0	3,734	0.9		(11.0)
January 2012	46,584	0	5,218	46,357	0	4,884	0.5		6.8
February 2011	24,623	0	3,055	18,722	0	3,431	31.5		(10.9)

High Price Analysis

Market prices above PhP11,000/MWh occurred on January 26, 30-31, 2012 and February 9, 2012. These trading intervals are shown in table 14 with corresponding Reserve Margin Index[5] (RMI).

Table 14. Hourly Price and Reserve Margin Index

Date	Trading Interval	Hourly Price	RMI Ex-ante (%)	RMI Ex-post (%)
1/26/2012	11	12,297	4.25	3.79
1/30/2012	10	11,633	7.23	6.47
1/30/2012	11	12,920	3.88	3.57
1/30/2012	14	18,551	2.35	1.91
1/30/2012	15	12,083	3.79	4.16
1/30/2012	16	11,088	4.96	4.93
1/31/2012	10	17,776	2.21	2.51
1/31/2012	11	15,744	3.46	5.08
2/9/2012	14	12,218	11.11	6.91

January 26, 1100H

During the trading date, the system was experiencing low operating reserve as Malaya 2 was designated as MRU (operating at 130 MW). Luzon pricing error occurred during ex-ante brought about by the congestion in the load-end Meralco substation. It was noted that the reserve margin during ex-post was less than the ex-ante of about 0.46 percent. The calculated price during ex-post was PhP12,297/MWh with Bauang DPP as the marginal plant.

January 30, 1000H-1100H and 1400H-1600H

The 4 trading intervals with market prices above PhP11,000/MWh were affected by the system wide pricing errors that occurred for both ex-ante and ex-post. This was attributed to the basecase constraint in Tongonan transformer 4, which affected Luzon and Visayas prices and schedules. Tightness in the demand and supply conditions was observed especially during trading interval 1400H. The market prices were based on the results of the market re-run.

January 31, 1000H-1100H

Constraint violations on Bauang ‘D BPPC 230 kV line, New Naga - Quiot 138 kV line, and New Naga - Cebu 138 kV line occurred during trading intervals 1000H and 1100H during ex-ante. Due to the congestion, both transactions were subjected to Price Substitution Methodology (PSM). Relatively high PSM prices were derived during these trading intervals due tight demand and supply condition (with RMI of 2.21 and 3.46 percent in ex-ante).

February 9, 2012, 1400H

[5] Reserve Margin Index (RMI) calculates the percent difference of the offered capacity and the demand, including the reserve operating reserve requirement. However, the co-optimization of energy and reserve is not yet implemented.

The prices in Luzon during the trading interval were based on ex-post results due to localized non-congestion pricing error during ex-ante. Higher ex-post prices were derived attributed to the tripping of Sta. Rita and San Lorenzo plants before the end of the trading interval. Worthy to note was the significant change of RMI from ex-ante to ex-post (11.11 percent to 6.91 percent).

Pricing Errors and Market Intervention

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

The market results showed pricing errors occurred in Luzon about 30.9 percent of the time or in 230 trading intervals during the ex-ante process *(from 23.4% or 174 trading intervals of the of the previous* billing *period)*, which was primarily due to the violation of the contingency (N-1) requirement at MERALCO interchange substations in Zapote and Araneta. Meanwhile, system-wide pricing errors were issued in 75 trading intervals due to base case constraint at Tongonan GPP transformer 4, undergeneration *(generation deficiency)* conditions, artificial load shedding (value of lost load) at MERALCO loads in Araneta, Balintawak, and Zapote and input data concerns.

The ex-post market results, on the other hand, indicated system-wide pricing errors in 76 trading intervals likewise due to base case constraint at Tongonan GPP transformer 4 and undergeneration *(generation deficiency)* conditions and input data concerns.

During ex-ante, the PSM was applied for the whole system (Luzon and Visayas) in 39 trading intervals due to constraint violations on several transmission lines as shown in table 16.

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

	Luz-Vis		Luzon		Visayas		Total	
	Freq.	% of Time	Freq.	% of Time	Freq.	% of Time	Freq.	% of Time
PEN (RTD)	75	10.1	230	30.9	2	0.3	305	41.0
PEN (RTX)	76	10.2	4	0.5		-	80	10.8
PSM (RTD)	39	5.2		-		-	39	5.2
PSM (RTX)	10	1.3		-		-	10	1.3
MI		-		-	3	0.4	3	0.4

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

Table 16. PSM Component, February 2012

Price Separation Methodology (PSM) (RTD)	
Kabankalan - Bacolod Line /1	21
New Naga - Quiot Line	1
Bauang BPPC Line New Naga - Quiot Line	1
Bauang BPPC Line New Naga - Quiot Line New Naga - Cebu Line	1
Negros - Panay Line	9
Calauan - Makban Line	6
Total	**39**

Notes: /1 Either Line 1 or 2 triggered the PSM

It was noted that the Kabankalan-Bacolod Lines 1 & 2, which have normal limits of 170 MW each, were given contingency limits ranging from 45 MW to 80 MW each for the period February 16-23, 2012 *(Table 17)*. Based on NGCP-SO Visayas, the reason for the contingency limits is to ensure the security and reliability of Northern Negros and Panay grids so as to prevent the occurrence of blackout. During the said period, constraints occurred in the Kabankalan-Bacolod lines in a total of 156 trading intervals during ex-ante, 21 of which were applied with PSM.

Table 17. PSM Distribution, February 2012

Results of Constraints and PSM	Kabankalan - Bacolod Line Limitations (MW)				
	No. of Tradfing Intervals				
Transmission Limitations	**45**	**50**	**70**	**80**	**Total**
Constraint (RTD)	6	31	65	33	135
PSM (RTD)		6	4	11	21
Total No. of Constraints	**6**	**37**	**69**	**44**	**156**

Figure 9 and Table 18 show the correlation of the hourly prices and demand in February 2012 and the previous billing period and same billing period last year. In general, all billing periods showed positive relationship between price and demand although the level of significance is not that strong. With respect to prices above PhP10,000/MWh, the relationship diminished considerably. This indicated that the high prices in all three periods were not primarily driven by demand.

Figure 9. Market Price Distribution, February 2012, January 2012, and February 2011

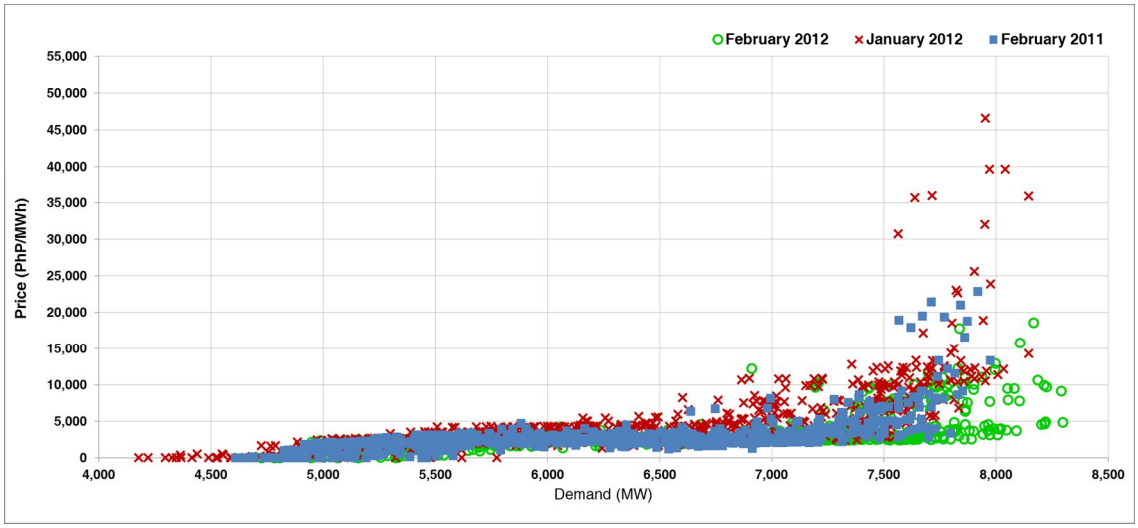


Table 18. Price and Demand Relationship, February 2012, January 2012, and February 2011

	February 2012	**January 2012**	**February 2011**	**%M-on-M Change**	**%Y-on-Y Change**
All Prices	0.6009	0.6610	0.5963	(9.1)	0.8
Prices >= PhP10,000	0.3039	0.3652	0.5171	(16.8)	(41.2)

HVDC Scheduling

During the billing period, constraints in the HVDC occurred only in relevant trading intervals (seven during ex-ante and eight during ex-post) when the transfer capability of the HVDC was set by NGCP-SO to zero due to a problem at Naga side *(Table 19)*. Improvement in supply condition especially in Luzon may have contributed to the non-maximization of the HVDC limits.

In the previous billing period, constraint in the HVDC occurred in 34 trading intervals during ex-ante and 38 trading intervals during ex-post. While NGCP-SO still manages the scheduling of the HVDC flow, constraint in the HVDC occurred at about 59 percent of the time during the same billing period last year. It was on April 29, 2011 when the free-flow of HVDC was implemented. *(Tables 19 to 20)*

Table 19. Summary of HVDC Limits Imposed by NGCP-SO and Results of HVDC Schedules (Ex-ante and Ex-post), February 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	440/440	Total	0/0	150/180	150/440	440/440	Total
Visayas to Luzon		**8**	**711**	**3**	**722**		**7**	**710**	**3**	**720**
Limit Not Maximized		*8*	*711*	*3*	*722*		*7*	*710*	*3*	*720*
Limit Maximized [1\]					-					-
Luzon to Visayas			**12**		**12**			**12**		**12**
Limit Not Maximized			*12*		*12*			*12*		*12*
Limit Maximized [1\]					-					-
No Flow [1\]	**7**				***7***	**8**				***8***
TOTAL	**7**	**8**	**723**	**3**	**741**	**8**	**7**	**722**	**3**	**740**

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), January 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	150/150	150/440	440/440	Total	0/0	150/150	150/440	440/440	Total
Visayas to Luzon		**28**	**680**	**1**	**709**		**29**	**674**	**1**	**704**
Limit Not Maximized		*5*	*679*	*1*	*685*		*4*	*674*	*1*	*679*
Limit Maximized [1\]		*23*	*1*		*24*		*25*			*25*
Luzon to Visayas			**27**		**27**			**32**		**32**
Limit Not Maximized			*17*		*17*			*19*		*19*
Limit Maximized [1\]			*10*		*10*			*13*		*13*
No Flow [1\]	**7**				***7***	**7**				***7***
TOTAL	**7**	**28**	**707**	**1**	**743**	**7**	**29**	**706**	**1**	**743**

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), February 2011

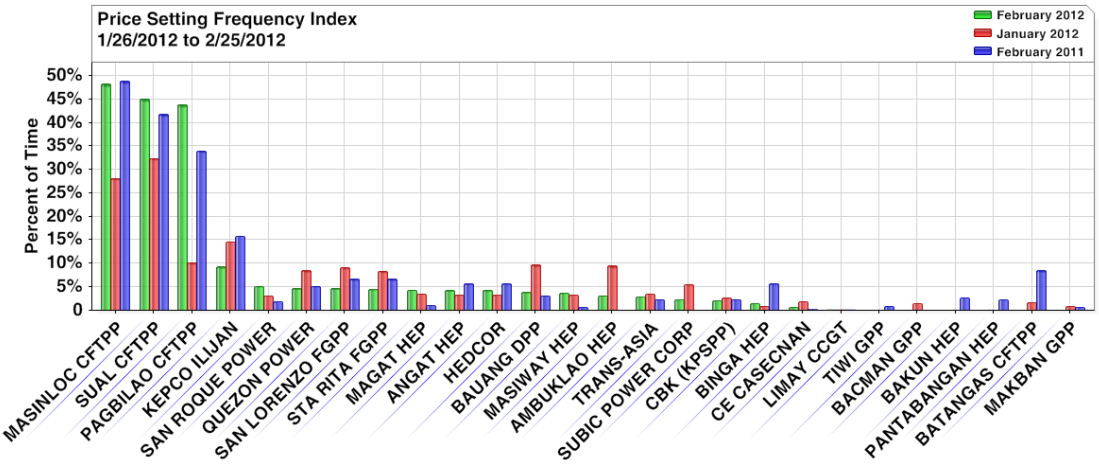
Results of HVDC Scheduling	Direction of HVDC Flow Imposed during Ex-ante				Direction of HVDC Flow Imposed during Ex-post			
	Vis to Luz	Luz to Vis	Zero Limit	Total	Vis to Luz	Luz to Vis	Zero Limit	Grand Total
HVDC Limit Not Maximized [1\]	240	63		303	240	72		312
HVDC Limit Maximized [2\]	172	95		267	160	106		266
Zero HVDC Schedule [2\]	57	87	29	173	64	65	35	164
TOTAL	***469***	***245***	***29***	***743***	***464***	***243***	***35***	***742***
Percent of Total Intervals	*63%*	*33%*	*4%*		*63%*	*33%*	*5%*	

Notes: 2\ with price separation

Price Setting Plants[6]

As shown in Figure 10, 20 plants from Luzon have been considered as price setters across all price levels during the billing period. The coal plants Masinloc (at 48%), Sual (at 45%), and Pagbilao (at 44%), natural gas plant Kepco Ilijan (at 9%), and hydro plant San Roque HEP (at 5%) remained the top five frequent price setters. It was noted that the Price Setter Frequency Index (PSFI) of the coal plants Masinloc and Pagbilao increased significantly during the billing period compared with the previous billing period. It was noted that said coal plants experienced outages in the previous billing period. The same plants were also the frequent price setters in the same billing period last year.

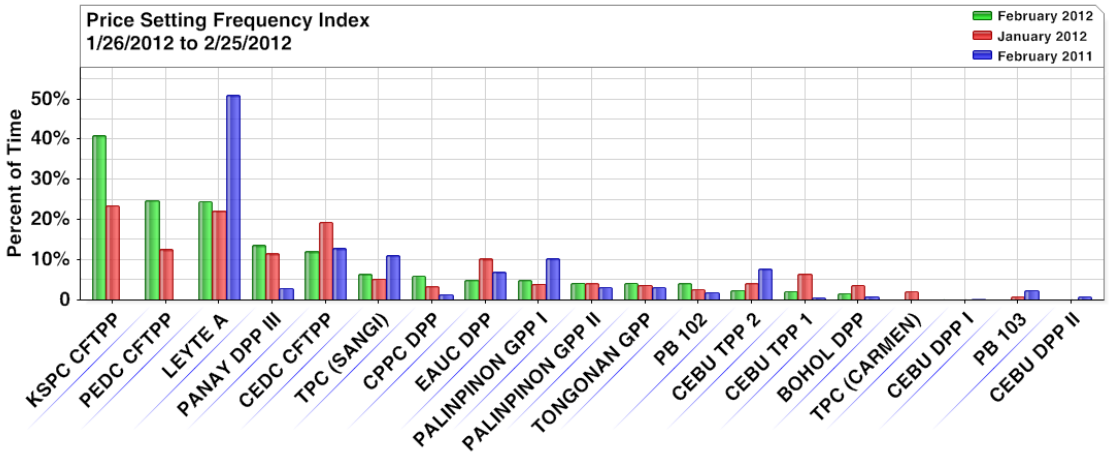
Figure 10. Price Setting Frequency Index (Luzon Plants), February 2012, January 2012, and February 2011



In Visayas *(Figure 11),* 17 plants have been considered as price setters across all price levels with coal plants KSPC (at 41%), PEDC (at 25%) and CEDC (at 12%), geothermal plant Leyte A (at 25%), and oil-based plant Panay DPP 3 (at 14%) as most frequent price setters. KSPC and PEDC did not manifest as price setters during the same billing period last year because the said coal plants have yet to register in the WESM.

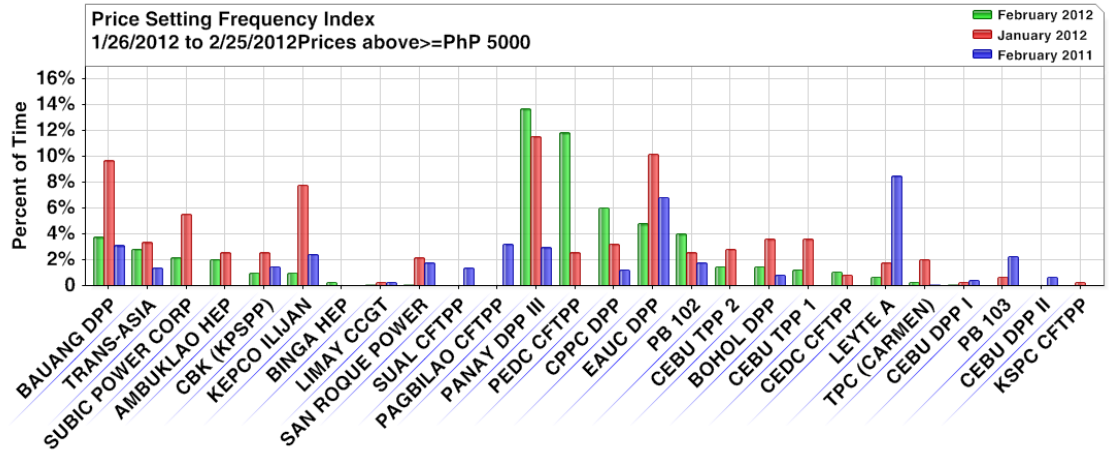
[6] A generator trading node is considered as a price setter when its last accepted offer price is between 95% to 100% of its nodal price. A generating plant is considered as price setter if at least one of its trading nodes was price setter in a given trading hour. The percentages stated in the price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

Figure 11. Price Setting Frequency Index (Visayas Plants), February 2012, January 2012, and February 2011



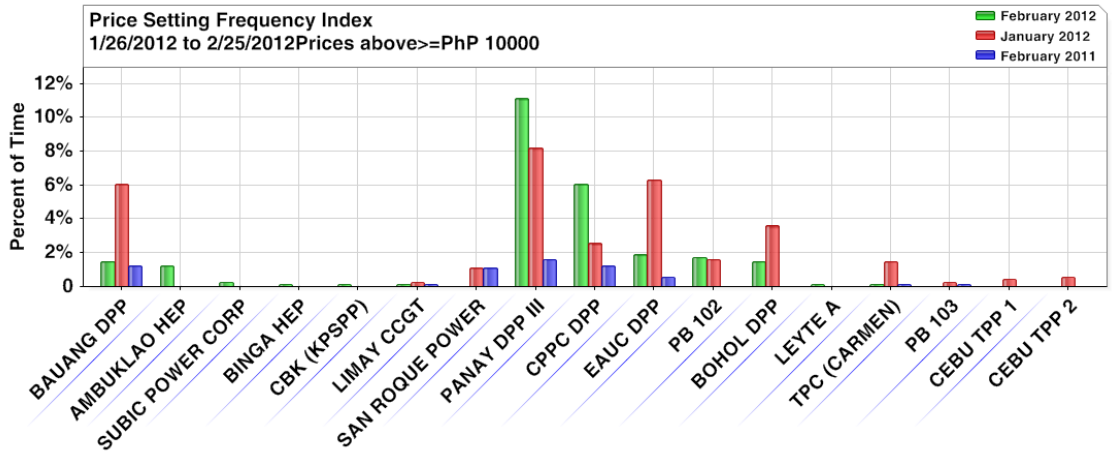
Looking at the PhP5,000/MWh and above price range, 21 plants have been considered as price setters composed of nine (9) plants from Luzon and twelve (12) plants from Visayas *(Figure 12)*. During the billing period in review, the oil-based plants Bauang DPP (at 4%), Trans Asia (at 3%), and Subic (at 2%) topped the price setting plants from Luzon. Meanwhile, the oil based plants Panay DPP III (at 14%), CPPC (6%) and EAUC (at 5%), and coal plant PEDC (12%) were the top price setting plants from Visayas.

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



The number of price setters at the price level of PhP10,000/MWh and above was reduced to 13 plants in the billing period: 6 plants from Luzon and 7 plants from Visayas *(Figure 13)*. The top 3 price setters included Panay DPP III, CPPC, and EAUC.

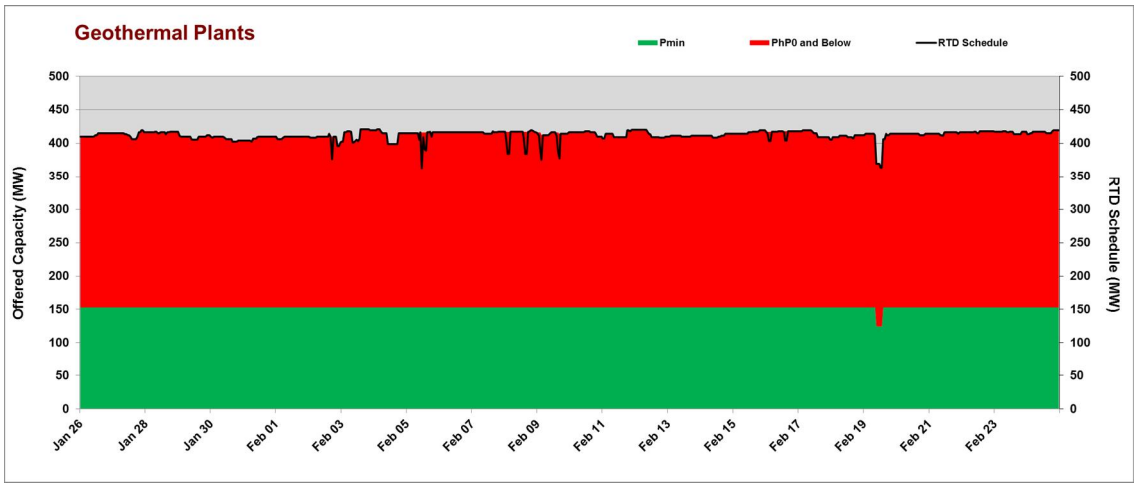
Figure 13. Price Setting Frequency Index (PhP10,000 and Above), February 2012, January 2012, and February 2011



Generator Offer Pattern

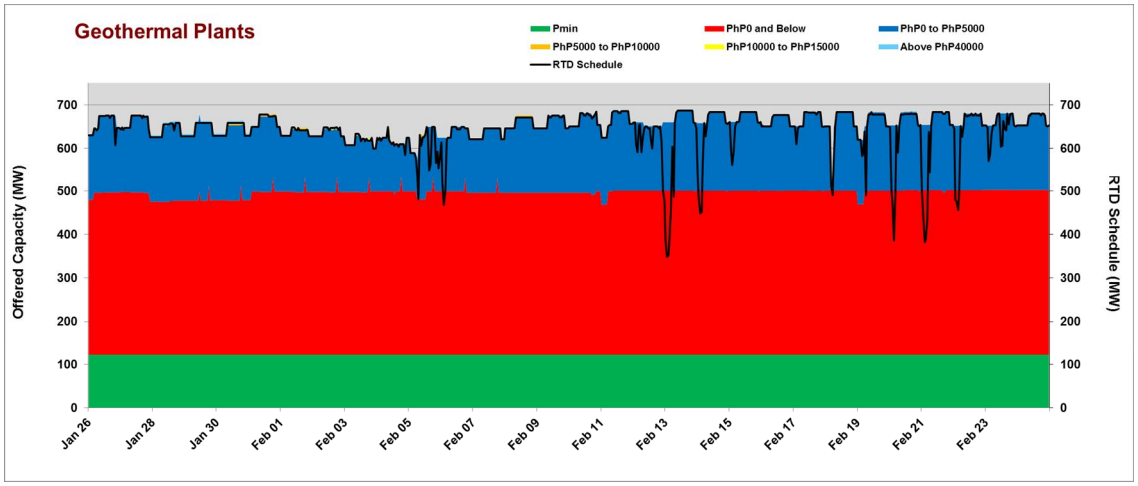
Geothermal plants in Luzon had the lowest price offer among the plant resources with offer prices of PhP0.00/MW and below *(Figure 14)*. Consequently, most of the time, the maximum offered capacity of geothermal plants in Luzon were scheduled for dispatch.

Figure 14. Geothermal Plants Offer Pattern (Luzon), February 2012



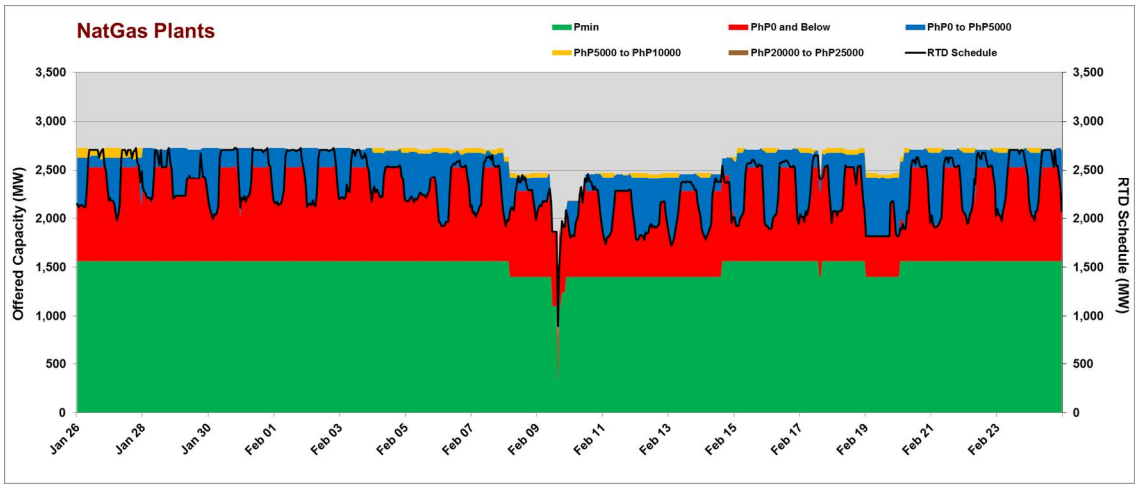
On the other hand, the offer prices of the geothermal plants in Visayas were mostly in the range of PhP0 to PhP5,000/MW, except in several trading intervals ranging above PhP5,000 *(Figure 15)*. Offer price reached as high as PhP62,000/MW.

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



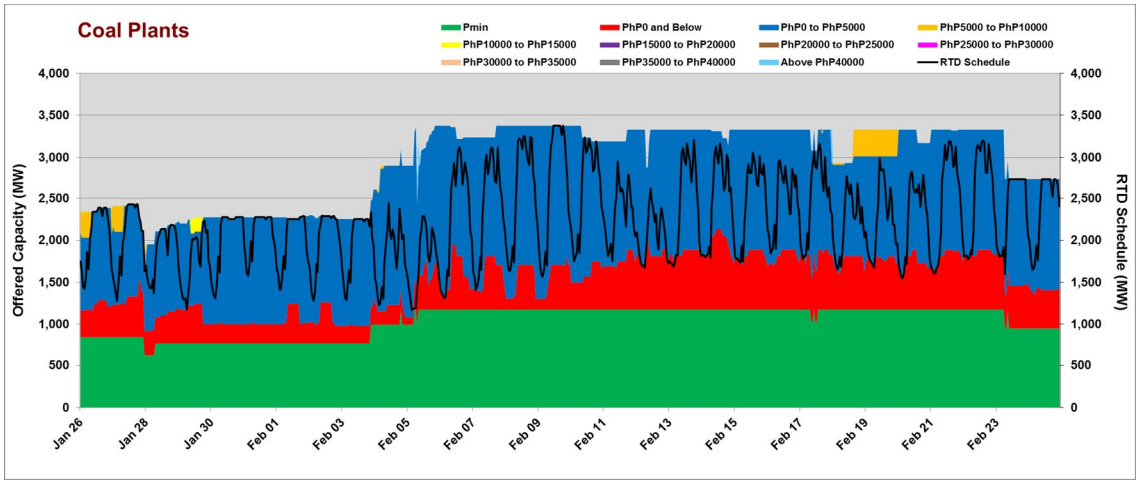
About 99% of the offered capacities (average of 2,615 MW) of natural gas plants were priced at PhP5,000/MW and below. The other 1% of the offered capacities (average of 26 MW) were priced above PhP5,000/MW *(Figure 16)*. As discussed earlier, natural gas plants had the lowest average capacity on outage, improving the level of capacity offered for the billing period with 2,641 MW, an increase of an average of 10 MW from the previous billing period.

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



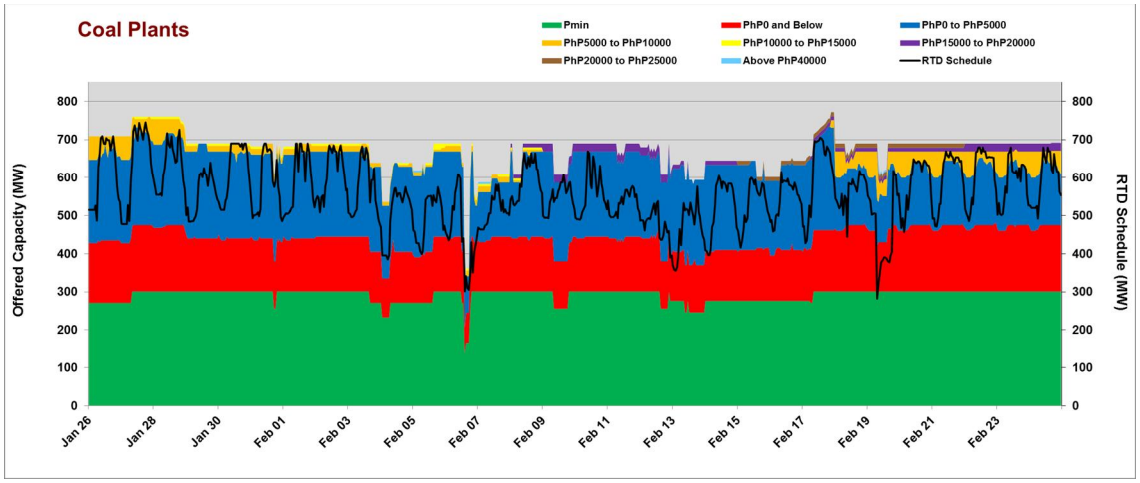
About 99% of the offered capacities of coal plants in Luzon (average of 2,909 MW) were priced at PhP5,000/MW and below *(Figure 17)*. When Sual 2 and QPPL were synchronized back to the grid on February 3 and 4, the average offered capacity improved to 2,937 MW, way above the previous billing period's average offered capacity of 2,327 MW.

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



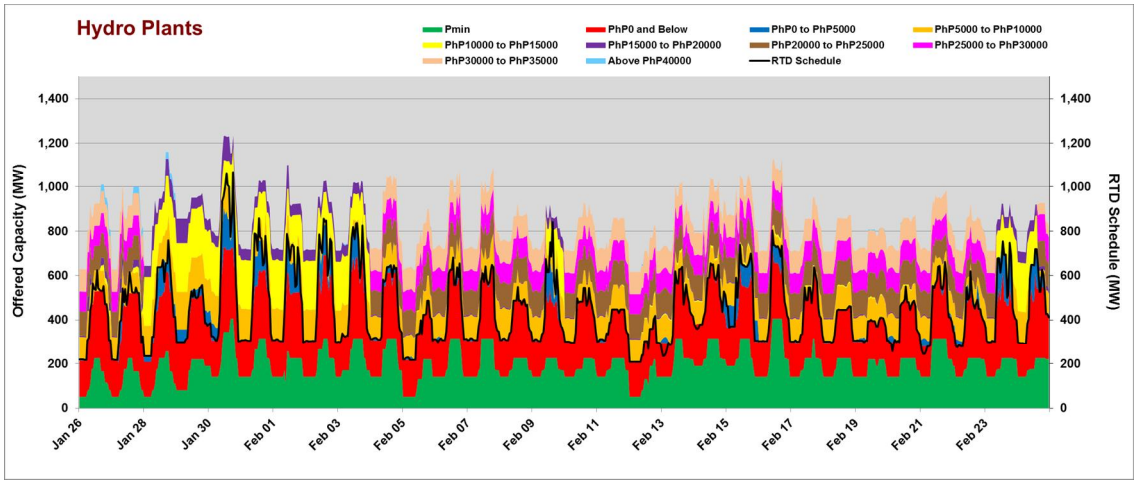
In Visayas, about 95% of the offered capacity of coal plants (average of 639 MW) were priced at PhP5,000/MW and below. The other 5% of the offered capacities (average of 34 MW) were priced above PhP5,000/MW, reaching as high as PhP62,000/MW in few occasions during February 5 and 7 *(Figure 18)*. Coal average offered capacity (672 MW) declined from previous billing period due to the outages of Cebu TPP1, PEDC 2, and CEDC 3.

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



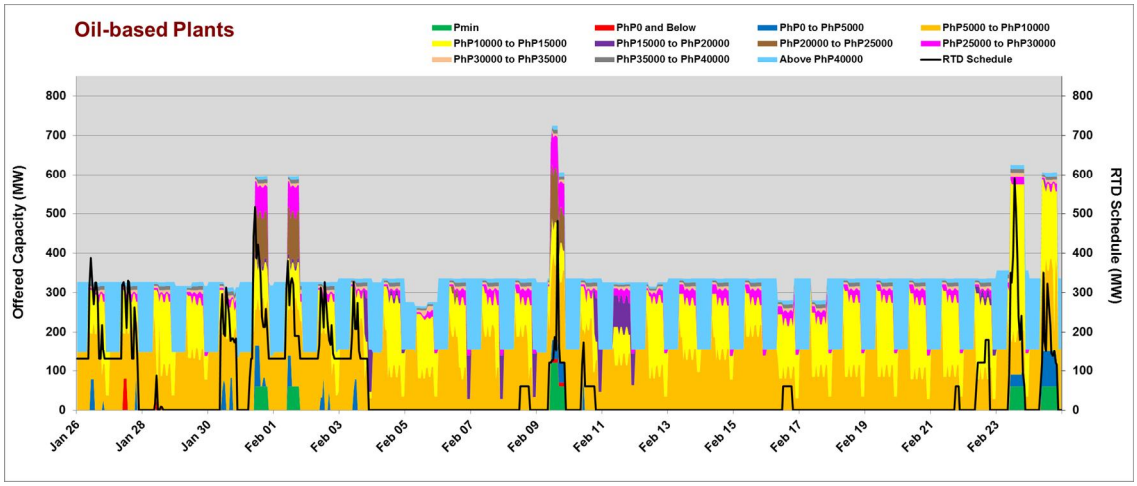
In Figure 19, the capacity and price offers of hydro plants in Luzon during the billing period remained volatile, ranging from 616 MW to 1,234 MW. Also, it was observed that in many occasions, the maximum capacity was offered at a higher price range of PhP30,000/MW to PhP35,000/MW.

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



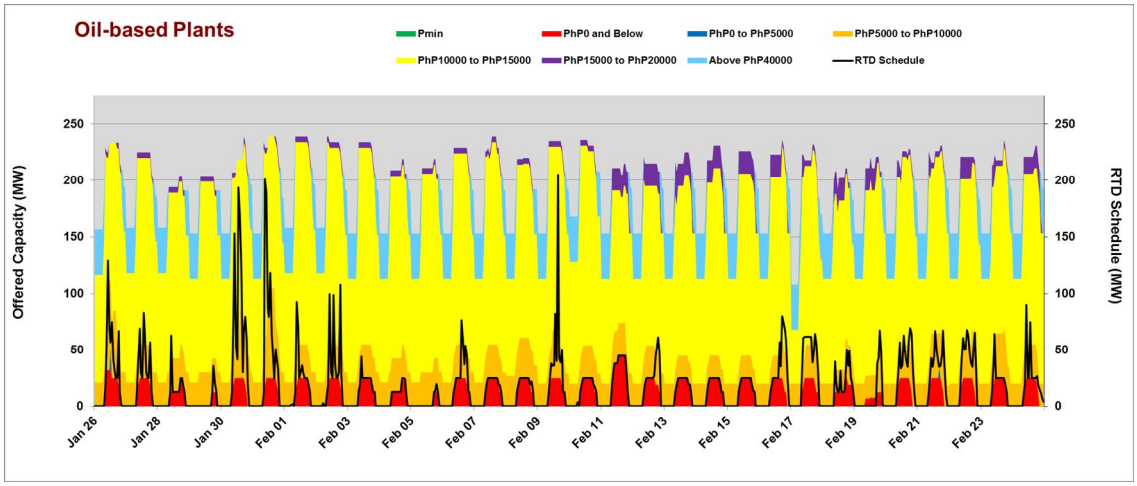
The offered capacity of the Luzon oil-based plants ranged from 265 MW to 725 MW while the offer prices ranged between PhP0.00/MW and PhP62,000/MW. The low capacity offers from oil-based plants in Luzon accounts to about 32% of the capacity gap in the region *(Figure 20).* Limay CCGT and Malaya TPP were scheduled/dispatched as must run units in certain trading intervals during the billing period due to tight supply and demand condition.

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



The capacity and price offers from oil-based plants in Visayas ranged from 108 MW to 239 MW and PhP0.0/MW to PhP60,000/MW, respectively *(Figure 21)*.

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



Capacity Factor

During the current billing period, geothermal plants in Luzon showed 100 percent capacity factor based on offered capacity *(Table 22)*. Almost all the time, the Luzon geothermal plantsǫmaximum offered capacity were being scheduled for dispatch in the system due to its low offer price (below PhP0.00/MW). It was also noted that due to outages and capacity gaps, the capacity factor of geothermal plants was 47 percent and 66 percent based on registered capacity and net of outages, respectively.

Natural gas plants consistently have high capacity factors above 80 percent. A modest decline was observed in month-on-month comparison in RTD schedule versus registered less outage capacity and offered capacity.

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

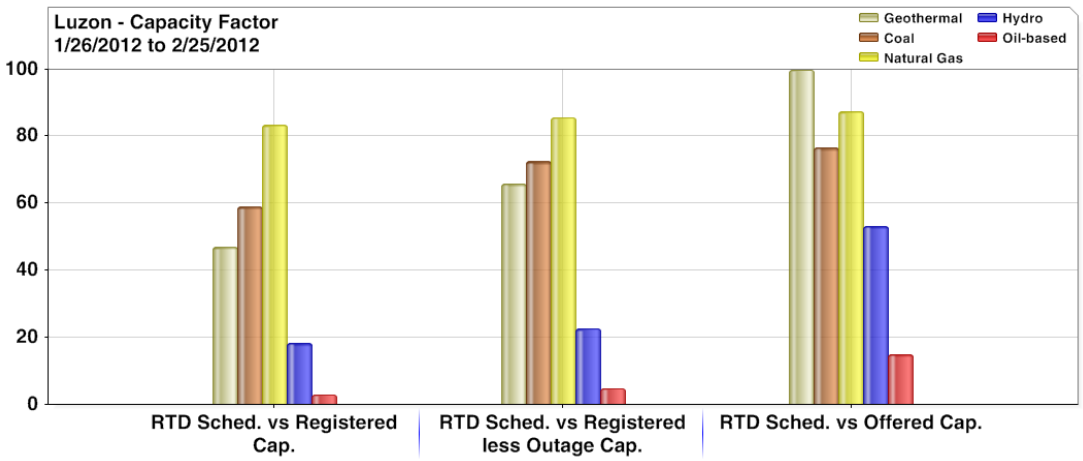


Table 22. Summary of Capacity Factor by Plant Type in Luzon, February 2012, January 2012, and February 2011

Plant Type	RTD Sched. vs Registered Cap.				
	February 2012	January 2012	February 2011	%M-on-M Change	%Y-on-Y Change
Coal	59%	51%	54%	16.5	(6.3)
Natural Gas	83%	83%	87%	0.8	(5.3)
Geothermal	47%	47%	48%	(0.8)	(1.5)
Hydro	18%	20%	17%	(10.6)	17.7
Oil-based	3%	3%	0%	(14.2)	674.3
Plant Type	**RTD Sched. vs Registered less Outage Cap.**				
	February 2012	January 2012	February 2011	%M-on-M Change	%Y-on-Y Change
Coal	72%	75%	63%	(3.2)	18.9
Natural Gas	85%	85%	90%	0.7	(5.7)
Geothermal	66%	66%	77%	(0.7)	(13.4)
Hydro	23%	23%	18%	(4.0)	27.7
Oil-based	5%	5%	1%	(12.9)	864.7
Plant Type	**RTD Sched. vs Offered Cap.**				
	February 2012	January 2012	February 2011	%M-on-M Change	%Y-on-Y Change
Coal	77%	83%	68%	(7.5)	21.1
Natural Gas	87%	87%	92%	0.4	(5.1)
Geothermal	100%	100%	99%	(0.1)	0.5
Hydro	53%	57%	75%	(6.3)	(24.0)
Oil-based	15%	18%	5%	(16.4)	250.0

Table 23. Capacity Factor by Plant Type in Luzon, February 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	1,669,022	2,832,408	2,305,506	2,178,311	59%	72%	77%
Natural Gas	1,714,173	2,060,210	2,005,039	1,964,981	83%	85%	87%
Geothermal	306,799	654,497	466,211	307,354	47%	66%	100%
Hydro	329,899	1,801,745	1,465,943	621,514	18%	23%	53%
Oil-based	38,785	1,333,248	816,900	259,727	3%	5%	15%

Visayas had only 3 major plant types, namely, geothermal, coal, and oil based plants *(Figure 23)*. In RTD schedule versus offered capacity, only geothermal plants improved by a modest 1.5 percent from the previous billing period and 7.4 percent against last year. Generally, there was a decrease in the capacity factors of coal plants and oil-based plants. Taking into account prevalent offer structures of oil based plants in Visayas, the demand drove the capacity factor of oil based plants.

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

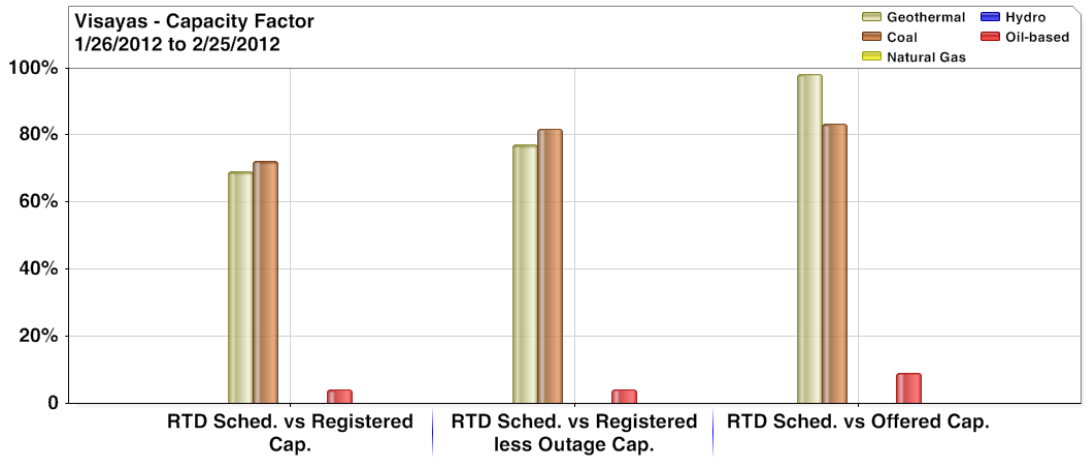


Table 24. Summary of Capacity Factor by Plant Type in Visayas, February 2012, January 2012, and February 2011

Plant Type	RTD Sched. vs Registered Cap.				
	February 2012	January 2012	February 2011	%M-on-M Change	%Y-on-Y Change
Coal	72%	75%	87%	(3.2)	(13.7)
Geothermal	69%	67%	69%	3.3	(2.7)
Oil-based	4%	5%	5%	(25.0)	12.4
Plant Type	**RTD Sched. vs Registered less Outage Cap.**				
	February 2012	January 2012	February 2011	%M-on-M Change	%Y-on-Y Change
Coal	82%	82%	92%	(0.5)	(11.4)
Geothermal	77%	73%	73%	6.1	5.5
Oil-based	4%	6%	5%	(25.2)	(25.1)
Plant Type	**RTD Sched. vs Offered Cap.**				
	February 2012	January 2012	February 2011	%M-on-M Change	%Y-on-Y Change
Coal	83%	84%	131%	(0.8)	(35.7)
Geothermal	98%	97%	90%	1.5	7.4
Oil-based	9%	12%	12%	(26.0)	(1.5)

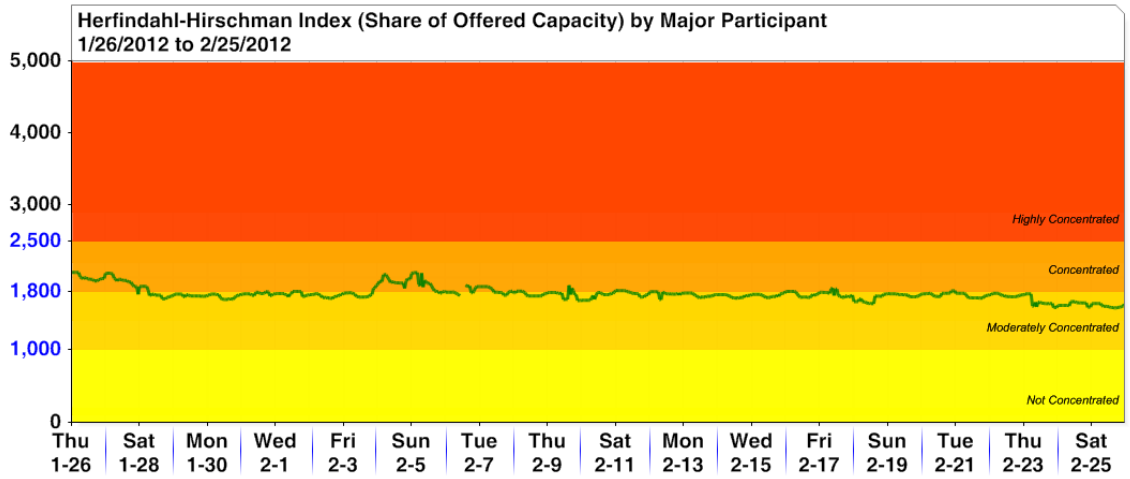
Table 25. Capacity Factor by Plant Type in Visayas, February 2012

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	415,152	574,423	506,872	498,376	72%	82%	83%
Geothermal	476,827	690,464	618,451	485,931	69%	77%	98%
Oil-based	13,109	329,893	318,446	145,008	4%	4%	9%

Market Concentration

The Herfindahl-Hirschman Index (HHI) calculated based on offered capacity by major participants' grouping still indicated a concentrated to moderately concentrated market condition during the billing period *(Figure 24)*.

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

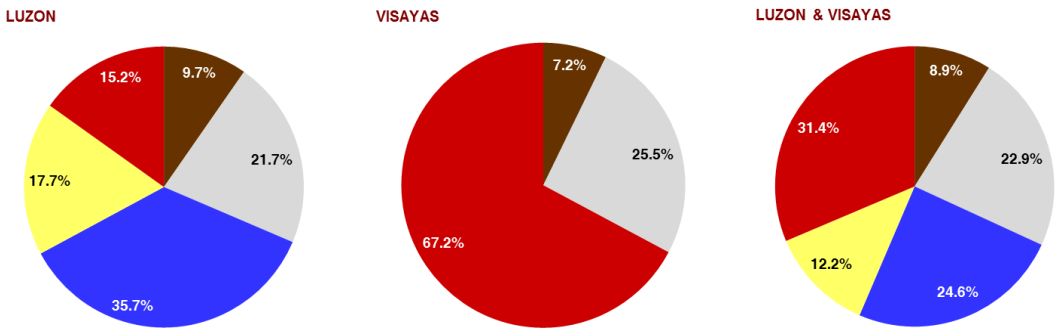


Compliance Monitoring

Compliance to Must Offer Rule

Continued non-compliance with the must-offer rule by generator trading participants in Luzon and Visayas was observed throughout the covered billing period. About 60.3 percent and 59.1 percent of the total generator-trading intervals[7] in Luzon and Visayas had capacity gap[8], respectively, during the billing period. Figure 25 and table 26 show the summary of the generator-trading intervals with capacity gap distributed by resource type. In Luzon, hydro plants had the highest share at 35.7 percent followed by geothermal plants at 21.7 percent. Meanwhile in Visayas, it was oil based plants that had the highest share at 67.2 percent followed by geothermal plants at 25.5 percent.

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



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

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

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Coal	2,350	9.70%	792	7.24%	3,142	8.94%
Geothermal	5,255	21.70%	2,793	25.54%	8,048	22.90%
Hydro	8,657	35.75%			8,657	24.63%
Natural Gas	4,282	17.68%			4,282	12.18%
Oil-based	3,672	15.16%	7,349	67.21%	11,021	31.35%
Total	24,216	100%	10,934	100%	35,150	100%

Figure 26 and table 27 shows the summary of the generator-trading intervals with capacity gap distributed based on the category of reasons[9] provided by the generator trading participants. The equipment related failures topped the cause of the capacity gaps in Luzon and Visayas at 33.8 percent and 47.9 percent, respectively.

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

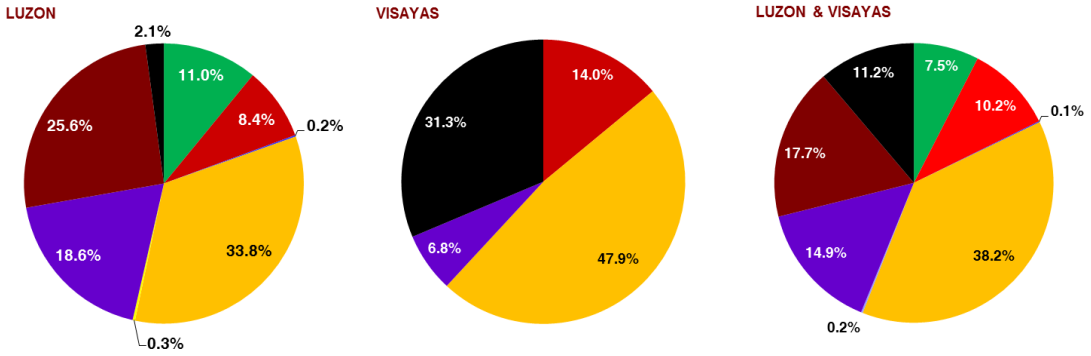


Table 27. Generator-Trading Intervals with Capacity Gap by Reason, February 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Limitation on Water Elevation	2,652	10.95%			2,652	7.54%
Ancillary Services	2,044	8.44%	1,533	14.02%	3,577	10.18%
Start-up/Shutdown	42	0.17%			42	0.12%
Equipment-related Failure	8,174	33.75%	5,236	47.89%	13,410	38.15%
Commercial Test	67	0.28%			67	0.19%
Steam Pressure and Temperature Variation	4,511	18.63%	739	6.76%	5,250	14.94%
Must Run Units						
Others	6,209	25.64%			6,209	17.66%
No Reason	517	2.13%	3,426	31.33%	3,943	11.22%
Total	24,216	100%	10,934	100%	35,150	100%

Table 28 shows the level of capacity gap for the whole system during the three billing periods. In general, the average capacity gap decreased by 8.4 percent from the previous billing period and 29.9 percent from the same billing period last year. The hydro plants had the largest average capacity gap in the 3 billing periods. Highly notable is the improvement in the capacity gap of coal plants in month-on-month (decreased by 31.6%) and year-on-year (decreased by 34.6%) comparison. On the other hand, geothermal plants showed an

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

increase in the month-on-month and year-on-year comparison by 1.2 percent and 68.2 percent, respectively.

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

Resource Type	February 2012 (MW)			January 2012 (MW)			February 2011 (MW)			% M-on-M Change (Jan - Feb 2012)			% Y-on-Y Change (Feb 2011 - Feb 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	956	68	171	946	49	250	681	18	262	1.1	36.6	(31.6)	40.4	281.4	(34.6)
Natural Gas	410	32	54	324	36	61	452	12	43	26.5	(11.1)	(11.3)	(9.2)	179.1	24.4
Geothermal	258	199	214	291	176	211	202	111	127	(11.3)	13.1	1.2	27.7	79.3	68.2
Hydro	1,503	829	1,136	1,567	819	1,239	1,942	1,209	1,648	(4.1)	1.2	(8.4)	(22.6)	(31.5)	(31.1)
Oil Based	835	375	749	842	413	775	1,378	898	1,232	(0.8)	(9.2)	(3.3)	(39.4)	(58.2)	(39.2)
TOTAL	3,303	1,732	2,323	3,273	1,944	2,536	4,199	2,728	3,312	0.9	(10.9)	(8.4)	(21.3)	(36.5)	(29.9)

Compliance to RTD Schedule

About 15.8 percent and 7.9 percent of the total generator-trading intervals in Luzon and Visayas, respectively, have observed deviations between real time ex-ante dispatch (RTD) schedule[10] and actual dispatch[11] exceeding the +/-3% tolerance limit[12] during the billing period. Figure 27 and table 29 show the summary of the generator-trading intervals with deviations distributed by resource type. The hydro and geothermal plants have the highest shares at 39.1 percent and 31.6 percent in Luzon, respectively. In Visayas, the coal plants contributed more than half of the generator-trading intervals with deviations.

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

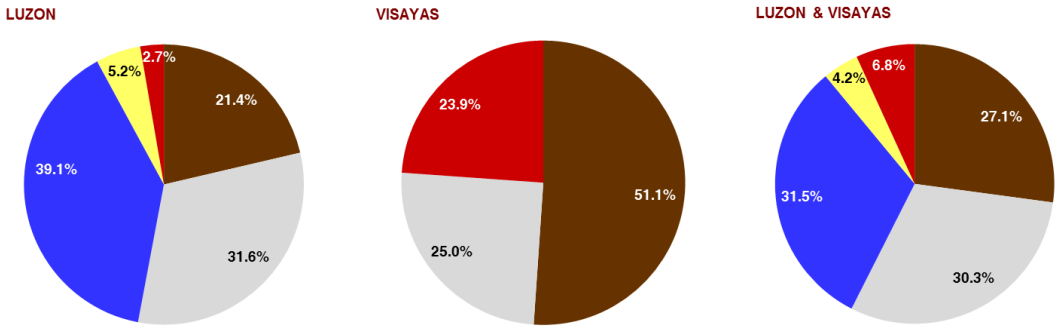


Table 29. Generator-Trading Intervals with RTD Deviation by Resource, Feb 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Coal	1,357	21.36%	781	51.08%	2,138	27.12%
Geothermal	2,009	31.62%	383	25.05%	2,392	30.34%
Hydro	2,485	39.11%		0%	2,485	31.52%
Natural Gas	330	5.19%		0%	330	4.19%
Oil-based	173	2.72%	365	23.87%	538	6.82%
Total	6,354	100%	1,529	100%	7,883	100%

Figure 28 and table 30 shows the summary of the generator-trading intervals with deviations categorized based on the reasons provided by NGCP-SO. In Luzon, the intra-hour deviation in demand and reserve utilization accounts to about 18.1 percent and 19.7 percent of the deviations, respectively. Similarly, the intra-hour variation in demand was the primary reason for the observed deviations in Visayas. The must run unit and reserve utilization accounts to

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

6 percent and 3.6 percent of the deviations in Visayas, respectively. Meanwhile, the reasons for about 58 percent of deviations have yet to be determined.

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

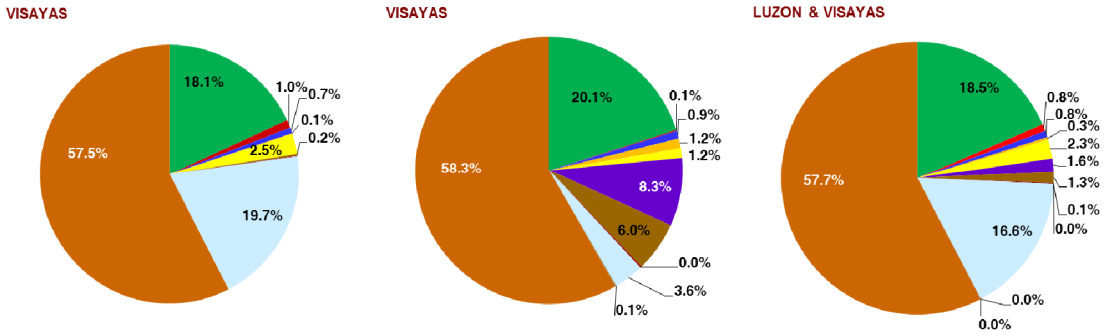


Table 30. Generator-Trading Intervals with RTD Deviation by Reason, February 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Intra-hour Variation	1,152	18.13%	307	20.08%	1,459	18.51%
Affected by Non-Compliance of Other Generators	63	0.99%	2	0.13%	65	0.82%
Start-up/Shutdown, Generator/Load Tripping	46	0.72%	14	0.92%	60	0.76%
Island Grid	5	0.08%	18	1.18%	23	0.29%
Generator Problem	161	2.53%	18	1.18%	179	2.27%
Non-Compliance to Dispatch Instruction			127	8.31%	127	1.61%
Must Run Units	13	0.20%	92	6.02%	105	1.33%
Line Limitation	5	0.08%	3	0.20%	8	0.10%
Import/Export						
Reserve Utilization	1,252	19.70%	55	3.60%	1,307	16.58%
RTD Discrepancy			2	0.13%	2	0.03%
Visayas Requirement	1	0.02%			1	0.01%
No Category	3,656	57.54%	891	58.27%	4,547	57.68%
Total	6,354	100.00%	1,529	100.00%	7,883	100.00%