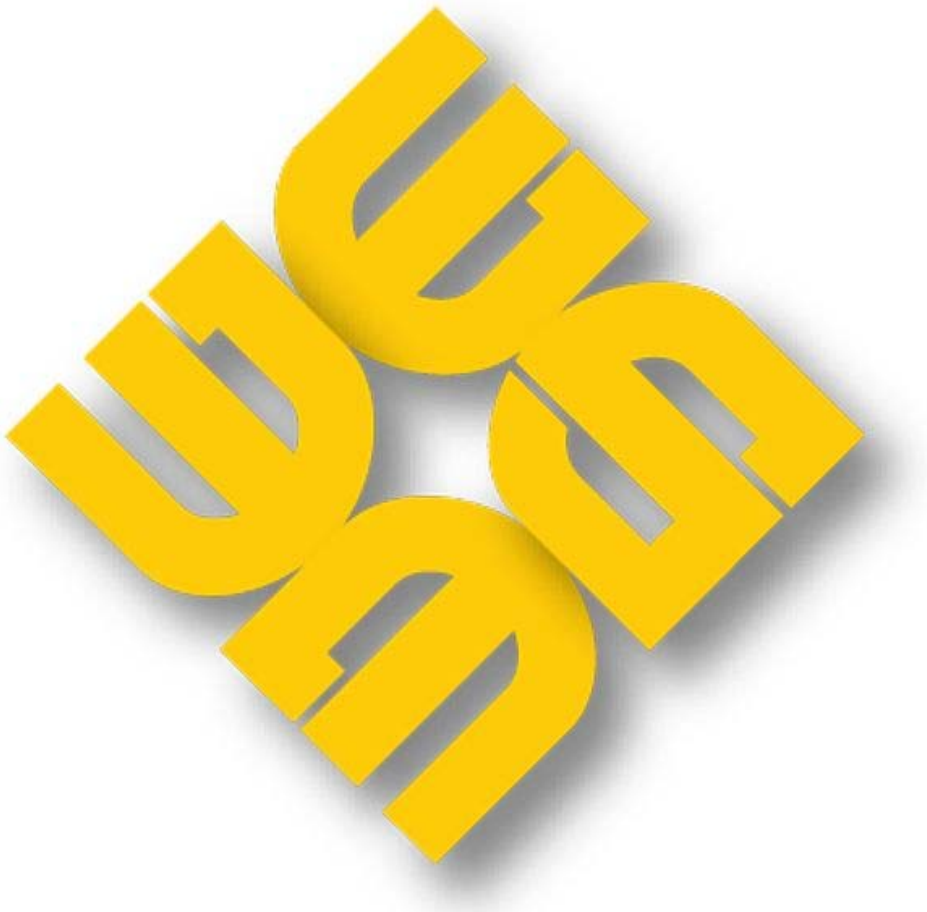
MONTHLY MARKET ASSESSMENT REPORT

For the Billing Period 26 November to 25 December 2011



PHILIPPINE ELECTRICITY MARKET CORPORATION

MARKET ASSESSMENT GROUP (MAG)

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Market Assessment Report

This Report highlights the results of the integrated Luzon and Visayas market operation for the period 26 November to 25 December 2011 and how the market performed compared with the previous billing month.

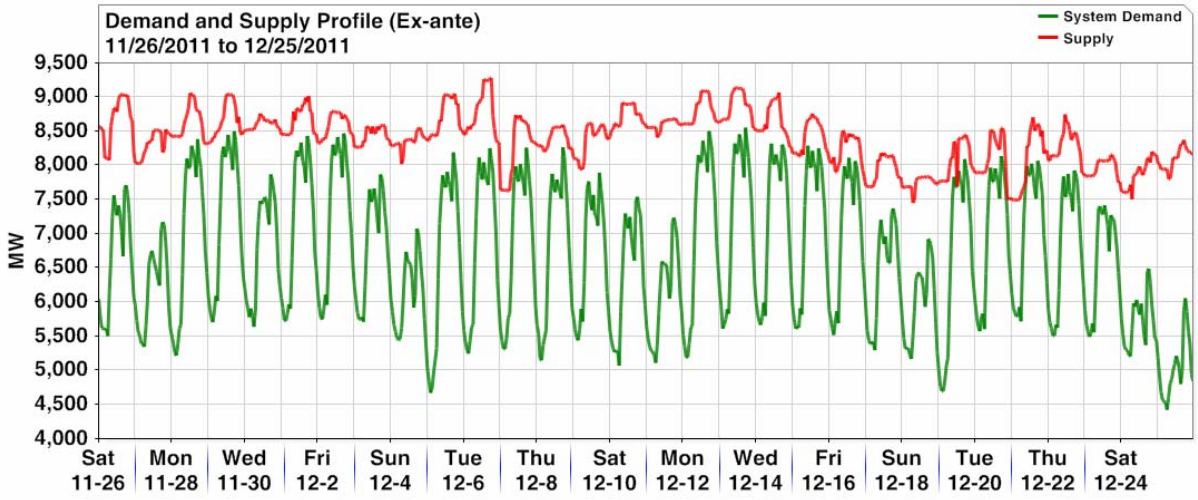
Supply and Demand Situation

With the onset of the cold season in December 2011, the monthly average system demand[1] (ex-ante) slightly decreased by 1.4 percent to 6,699 MW with the hourly demand ranging from a minimum of 4,426 MW to a maximum of 8,554 MW *(Table 1)*. The average regional demand in Luzon decreased by 1.8 percent (5,718 MW to 5,617 MW), while the average regional demand in Visayas increased by 0.4 percent (1,077 MW to 1,081 MW) *(Table 2)*.

Similarly, the monthly average system supply[2] showed a slight decrease from the previous billing month by 0.7 percent (8,460 MW to 8,398) *(Table 1).* The system supply during the period ranged from 7,456 MW to 9,282 MW. While the average regional supply in Luzon decreased by 1.8 percent (7,003 MW to 6,873 MW), the average supply in Visayas increased by 4.6 percent (1,458 MW to 1,525 MW) *(Table 3).* Higher level of capacity on outage caused the decrease in the supply in Luzon, while the lower level of outage capacity contributed to the improvement in Visayas' supply.

The resulting margin between the supply and demand in December was calculated at an average of 1,699 MW (minimum of 8 MW and maximum at 3,763 MW). This was higher by 2 percent from the previous billing month's average margin of 1,665 MW *(Table 1)*.

Figure 1. Demand and Supply (Ex-ante), December 2011



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

Table 1. ***Demand and Supply Summary (Ex-ante), November and December 2011***

	November 2011 (In MW)			December 2011 (In MW)			% M-on-M Change (Nov 2011 - Dec 2011)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Demand	8,446	4,845	6,795	8,554	4,426	6,699	1.3	(8.7)	(1.4)
Supply	9,432	7,417	8,460	9,282	7,456	8,398	(1.6)	0.5	(0.7)
Supply/Demand Variance	3,838	(100)	1,665	3,763	8	1,699	(1.9)	108.2	2.0

Note: The derived values were non-coincident.

Table 2. ***Regional Demand Summary (Ex-ante), November and December 2011***

	November 2011 (In MW)			December 2011 (In MW)			% M-on-M Change (Nov 2011 - Dec 2011)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	7,110	4,041	5,718	7,114	3,627	5,617	0.1	(10.2)	(1.8)
Visayas	1,433	748	1,077	1,452	710	1,081	1.3	(5.1)	0.4

Note: The derived values were non-coincident.

Table 3. ***Regional Supply Summary (Ex-ante), November and December 2011***

	November 2011 (In MW)			December 2011 (In MW)			% M-on-M Change (Nov 2011 - Dec 2011)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	7,864	6,044	7,003	7,773	5,954	6,873	(1.1)	(1.5)	(1.8)
Visayas	1,669	1,178	1,458	1,689	1,343	1,525	1.2	14.0	4.6

Note: The derived values were non-coincident.

Plant Outages

Figures 2 and 3 below show the outage capacity by plant type considered during the ex-ante scheduling process (left Y-Axis) compared with the outage schedule based on NGCP-SO's CY2011 Grid Operating and Maintenance Program (GOMP).

The monthly average outage capacity in December was higher by 10.3 percent than the previous billing month *(Figure 2 and Table 4)*. In Luzon, the capacity on outage (during ex-ante) reached an average of 2,471 MW, ranging from 1,880 MW to 3,547 MW.

Figure 2. ***Plant Outage Capacity, December 2011 - Luzon***

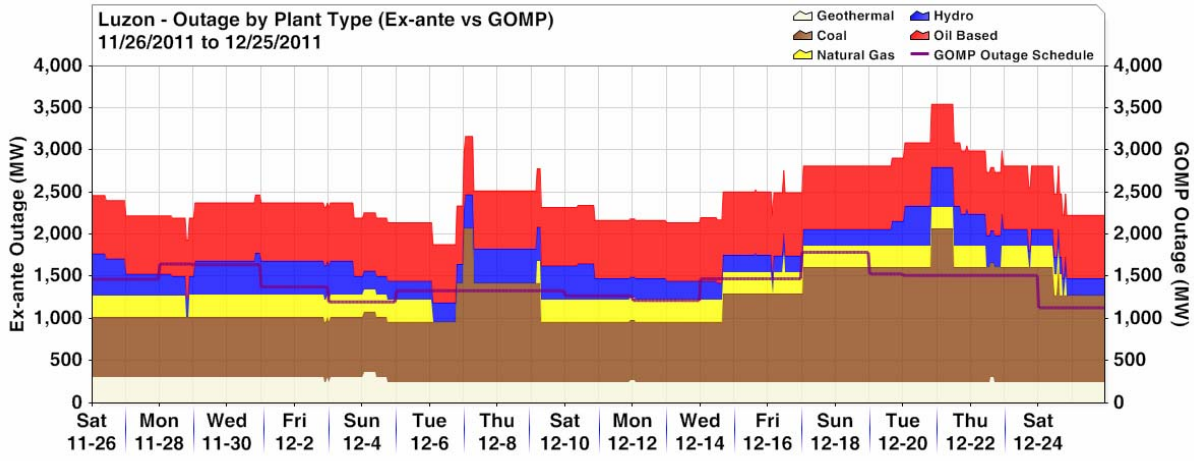


Table 4. Luzon Regional Outage Summary (Ex-ante), November and December 2011

Resource Type	November 2011 (In MW)			December 2011 (In MW)			% M-on-M Change (Nov 2011 - Dec 2011)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	1,689	712	983	1,818	712	969	7.6	0.0	(1.4)
Natural Gas	1,310	0	71	516	0	216	(60.6)		204.4
Geothermal	485	308	330	371	253	270	(23.5)	(17.9)	(18.2)
Hydro	499	97	164	498	197	300	(0.2)	103.3	83.4
Oil Based	692	692	692	752	692	716	8.7	0.0	3.5
TOTAL	3,119	1,809	2,240	3,547	1,880	2,471	13.7	3.9	10.3

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

Table 5 below lists the outages of coal and natural gas plants in Luzon for the billing month of December 2011. The coal plants recorded the highest level of capacity on outage. Pagbilao Unit 1 and Calaca Unit 1 remained on maintenance and forced outage, respectively, during the billing month. The coal plant Masinloc Unit 1 was placed on maintenance outage starting December 17 consistent with the GOMP. Other coal plants Sual Unit 1, Calaca Unit 2, and QPPL encountered forced outages due to various equipment-related concerns.

The natural gas plants Sta. Rita Units 1 & 3 and San Lorenzo Unit Units 1 & 2 were successively placed on maintenance outage during the billing month, which were behind the GOMP schedule.

Table 5. Major Plant Outages, Luzon, December 2011

Plant/Unit Name	Date/Time Out	Date/Time In	Duration (Days)	Outage Type	Reason
COAL					
Masinloc 1	12/17/11 12:30 AM			Planned Outage	Maintenance
Sual 1	12/6/11 10:59 PM	12/7/11 6:05 AM	0.30	Forced Outage	Total loss of unit power supply
Calaca 1	8/29/11 10:15 PM			Forced Outage	Emergency shutdown due to suspected reheater leak.
Calaca 2	12/14/11 3:05 PM	12/24/11 10:38 AM	9.81	Forced Outage	Boiler reheater tube leak
Calaca 2	12/24/11 1:08 PM	12/24/11 2:36 PM	0.06	Forced Outage	Boiler reheater tube leak
Calaca 2	12/25/11 11:03 PM			Forced Outage	Tripped with a load of 250MW due to inadequate waterwall circulation
Pagbilao 1	10/1/11 12:51 AM			Planned Outage	Maintenance outage
QPPL	12/6/11 6:01 PM	12/9/11 6:24 AM	2.52	Forced Outage	Malfunctioning of CV number 2.
QPPL	12/20/11 7:08 PM	12/21/11 11:48 AM	0.69	Forced Outage	Trouble at ignitor assembly
NUTURAL GAS					
Sta. Rita 1	12/16/11 4:50 AM	12/22/11 10:17 AM	6.23	Planned Outage	Maintenance outage
Sta. Rita 1	12/22/11 9:51 PM	12/23/11 4:28 PM	0.78	Forced Outage	High steam turbine vibration
Sta. Rita 1	12/23/11 7:13 PM	12/24/11 4:37 PM	0.89	Forced Outage	High steam turbine vibration
Sta. Rita 3	12/9/11 4:49 AM	12/16/11 2:16 AM	6.89	Planned Outage	Maintenance
Sta. Rita 3	12/16/11 10:14 AM	12/16/11 11:50 AM	0.07	Forced Outage	GT exhaust trouble
San Lorenzo 1	11/28/11 9:34 PM	12/6/11 1:24 AM	7.16	Planned Outage	Minor inspection of gas turbine.
San Lorenzo 2	11/21/11 4:34 AM	11/28/11 2:10 PM	7.40	Planned Outage	GT minor inspection
San Lorenzo 2	11/28/11 2:47 PM	11/28/11 6:35 PM	0.16	Forced Outage	GT Fuel valve trouble

In Visayas, the capacity on outage averaged at 187 MW (minimum of 96 MW and maximum of 298 MW), which was 18.8 percent lower than the previous month *(Figure 3, Table 6)*.

Figure 3. Plant Outage Capacity, December 2011 - Visayas

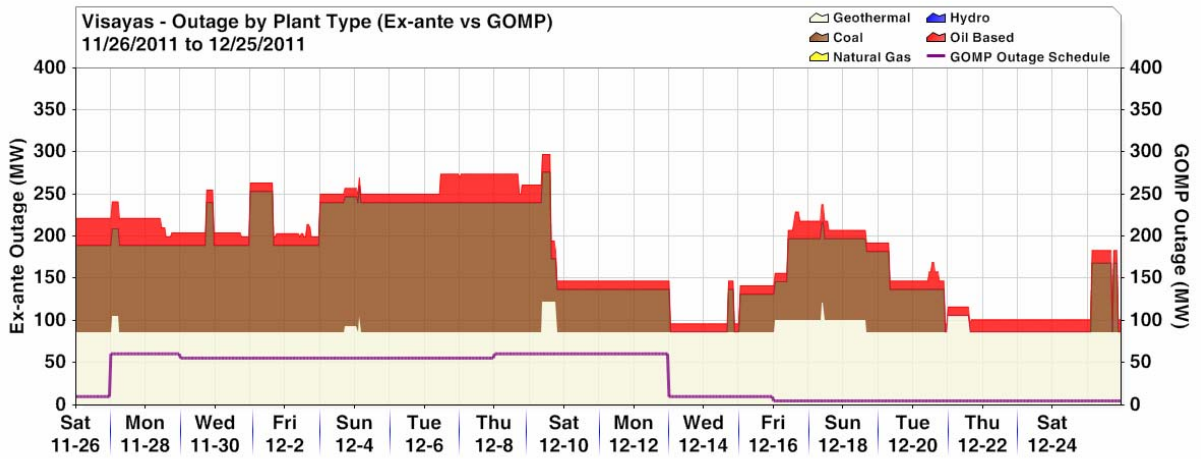


Table 6. Visayas Regional Outage Summary (Ex-ante), November and December 2011

Resource Type	November 2011 (In MW)			December 2011 (In MW)			% M-on-M Change (Nov 2011 - Dec 2011)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	333	0	113	167	0	82	(49.8)		(27.7)
Geothermal	122	86	87	123	86	89	1.0	0.0	2.9
Hydro	0	0	0	0	0	0			
Oil Based	56	10	30	34	10	16	(39.3)	0.0	(47.5)
TOTAL	433	112	230	298	96	187	(31.3)	(14.2)	(18.8)

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

Table 7 below lists the outages of coal plants in Visayas for the billing of month of December 2011. The coal plants Cebu TPP1 and Cebu TPP2 were placed on maintenance outage during the billing month, however, only the latter was consistent with the GOMP. The said plants and other coal plants also encountered forced outages during the month.

Table 7. Major Plant Outages, Visayas, December 2011

Plant/Unit Name	Date/Time Out	Date/Time In	Duration (Days)	Outage Type	Reason
CEDC 1	12/25/11 2:16 AM	12/25/11 9:19 PM	0.79	Forced Outage	Cut-out for maintenance
Cebu TPP1	12/15/11 12:25 AM	12/19/11 7:07 AM	4.28	Planned Outage	Maintenance outage
Cebu TPP2	11/29/11 4:58 PM	11/29/11 10:01 PM	0.21	Forced Outage	Super heater high temperature
Cebu TPP2	12/3/11 12:26 AM	12/13/11 12:13 AM	9.99	Planned Outage	Prearranged shutdown.
Cebu TPP2	12/14/11 4:11 PM	12/14/11 8:07 PM	0.16	Forced Outage	Emergency cut out due to feedwtaer line leakages
Cebu TPP2	12/14/11 8:58 PM	12/14/11 9:07 PM	0.01	Forced Outage	Boiler pressure problem
Cebu TPP2	12/16/11 8:54 AM	12/20/11 9:36 PM	4.53	Forced Outage	Secondary air ducting trouble
Kepco Salcon 2	11/23/11 12:04 AM	12/9/11 2:29 PM	16.60	Planned Outage	Annual PMS
TPC Sangi	11/30/11 11:25 PM	12/1/11 3:30 PM	0.67	Forced Outage	Affected by the tripping at CIPDI.

Market Price Outcome

Consistent with the decrease in system demand, the monthly average price[3] in December slightly decreased by 0.3 percent to PhP5,074/MWh with the highest price posted at PhP64,696/MWh and lowest at PhP0.00/MWh.

Looking at regional prices, the calculations showed different price outcomes for Luzon and Visayas. The average price in Luzon increased by 0.1 percent from PhP5,019/MWh to PhP5,026/MWh, while the average price in Visayas decreased by 2.5 percent from PhP5,461/MWh to PhP5,322/MWh *(Table 8)*. Regional prices reached a high of PhP64,732/MWh in Luzon and PhP64,716/MWh in Visayas.

Figure 4. Market Price Trend, December 2011

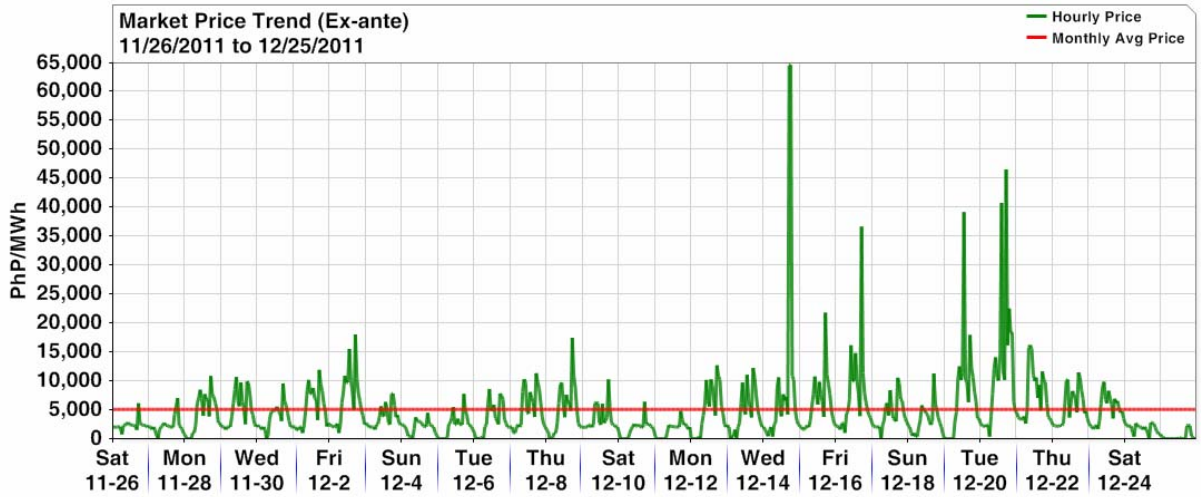
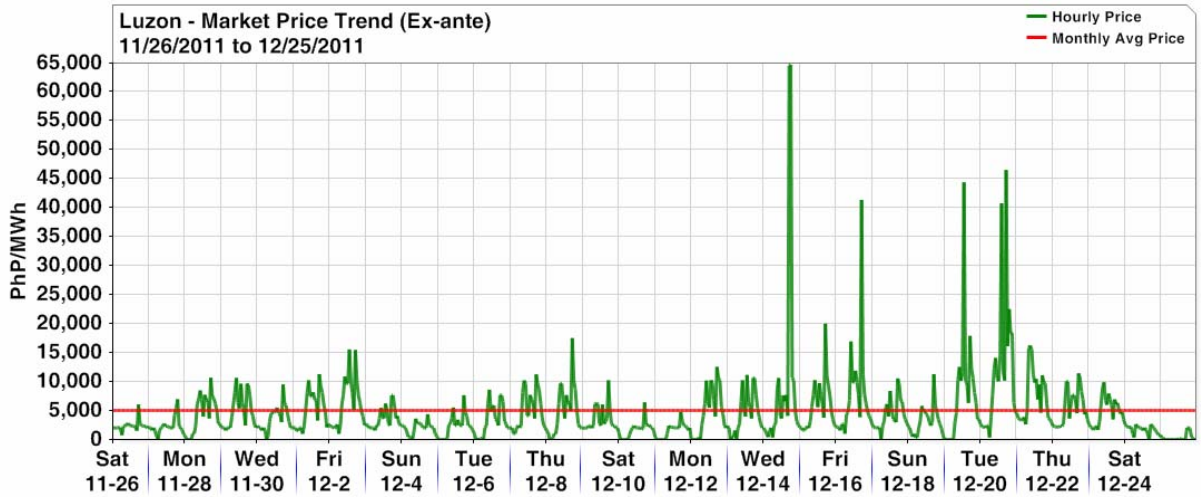


Figure 5. Market Price Trend - Luzon, December 2011



[3] 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 - Visayas, December 2011

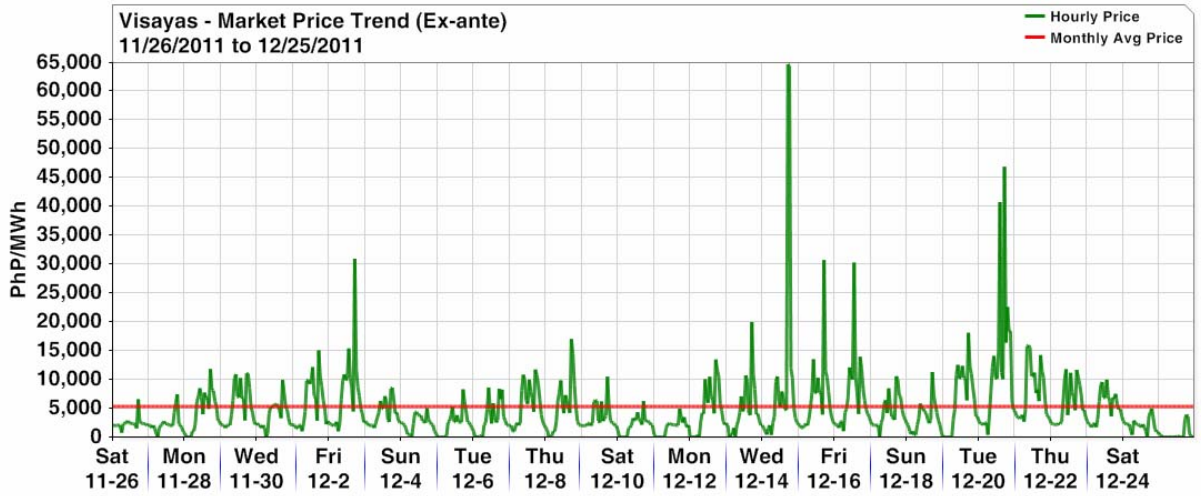


Table 8. Market Price Summary, November and December 2011

	November 2011 (In PhP/MWh)			December 2011 (In PhP/MWh)			% M-on-M Change (Nov 2011 - Dec 2011)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luz-Viz	44,262	0	5,089	64,696	0	5,074	46.2		(0.3)
Luzon	46,669	0	5,019	64,732	0	5,026	38.7		0.1
Visayas	43,359	0	5,461	64,716	0	5,322	49.3		(2.5)

The price distribution in the billing months of November and December 2011 is shown in Figure 7 and Table 9. The two billing months showed identical price distribution at the price levels of PhP10,000/MWh & below (at 90.3% of the time), and above PhP10,000/MWh (at 9.7% of the time).

Figure 7. Market Price Distribution, November and December 2011

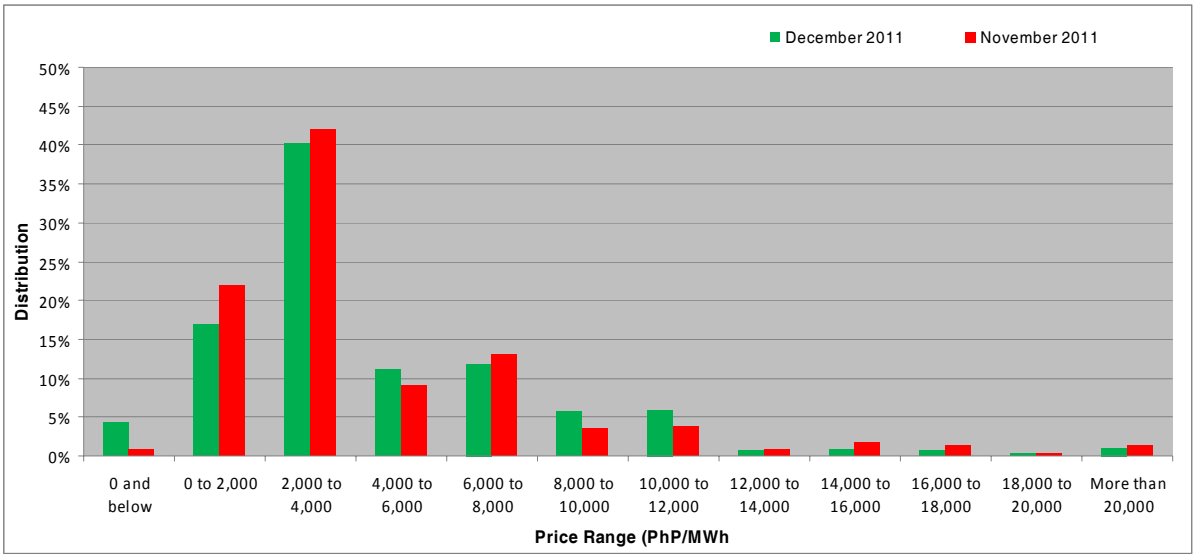


Table 9. Market Price Distribution, November and December 2011

Price Range (PhP/MWh)	% Distribution	
	November 2011	December 2011
0 and below	0.9	4.3
0 to 2,000	21.9	16.9
2,000 to 4,000	41.9	40.3
4,000 to 6,000	9.0	11.1
6,000 to 8,000	13.0	11.8
8,000 to 10,000	3.5	5.8
10,000 to 12,000	3.9	6.0
12,000 to 14,000	0.9	0.7
14,000 to 16,000	1.7	0.8
16,000 to 18,000	1.3	0.7
18,000 to 20,000	0.3	0.4
More than 20,000	1.5	1.1

Similar to the previous month's results, the average price in Luzon in December was lower than the average price in Visayas by 5.9 percent *(Table 10)*.

Table 10. Regional Price Summary, November and December 2011

	Luzon (In PhP/MWh)			Visayas (In PhP/MWh)			% Difference		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
December 2011	64,732	0	5,026	64,716	0	5,322	(0.0)		5.9
November 2011	46,669	0	5,019	43,359	0	5,461	(7.1)		8.8

High Price Analysis

High prices were noted to have occurred in certain periods during the billing month when the margin between supply and demand is relatively low. The planned and forced outages of major coal and natural gas plants, as discussed in previous section, contributed to the tight supply and demand condition in the said periods.

In particular price spikes above PhP30,000/MWh occurred on December 14, 16, 20 and 21.

December 14, 1800H and 1900H

System-wide pricing error occurred during ex-ante in these trading intervals *(1800H due to undergeneration and VoLL at MERALCO and 1900H due to VoLL at MERALCO)*. Meanwhile, the ex-post market prices cleared at PhP60,000/MWh with coal plant TPC (Sangi) as marginal generator.

It was noted that TPC (Sangi) submitted a limited offer of 40 MW at a price of PhP60,000/MWh starting trading interval 1000H of December 14, consisting of a Pmin of 35 MW and 5 MW offer block. TPC (Sangi) cited "capacity outage due to emergency shutdown of its boiler 7" as reason for the offer.

Tight supply and demand condition prevailed during the said trading intervals. Aside from existing outages, the forced outages of coal plants Calaca Unit 2 (starting 1505H) and Cebu TPP 2 (1611H-2007H contributed to the tight supply condition. The low dispatch of hydro plant San Roque due to low offered ramp rates, although it offered a capacity of 400 MW, had also affected the supply in the trading intervals.

December 16, 1800H

In this trading interval, pricing error was issued for Luzon due to N-1 contingency violations at MERALCO substations in Araneta and Zapote, hence, will be settled using the ex-post prices. The ex-post prices cleared at PhP40,000/MWh with oil-based plant Bauang as marginal generator.

Aside from the plant outages, the slow ramp up rate offers of San Roque had affected the supply in this trading interval.

December 19, 1400H

In this trading interval, PSM was applied in Luzon during ex-ante due to the constraint at the Bauang-BPPC line. The PSM was applied in Luzon only due to the binding constraint in the Leyte-Luzon HVDC *(the transfer capability of HVDC from Visayas to Luzon in this trading interval was set by NGCP-SO at 200 MW)*. The resulting unconstrained MCP in Luzon was PhP45,000/MWh (with oil-based plant Bauang as unconstrained marginal generator) and the estimated load reference price was PhP44,414/MWh.

Aside from the plant outages, the slow ramp up rate offers of oil-based plant Limay B and hydro plant San Roque had limited the supply in this trading interval resulting to high unconstrainted MCP in Luzon.

December 20, 1500H

In this trading interval, PSM was applied during ex-ante in Luzon and Visayas due to the constraint at the Bauang-La Trinidad line. The resulting unconstrained MCP was PhP40,000/MWh (with oil-based plant Bauang as unconstrained marginal generator) and the estimated load reference price was PhP40,835/MWh.

Aside from the plant outages, the low dispatch of oil-based plant Limay and hydro plant San Roque due to their low offered ramp up rates had reduced the supply in this trading interval.

December 20, 1800H

System-wide pricing error occurred during ex-ante due to undergeneration and VoLL at MERALCO. Meanwhile, the ex-post market prices cleared at PhP46,648/MWh with oil-based plant Limay A as marginal generator.

Aside from the plant outages, the ramp limited offers of oil-based plant Limay and hydro plant San Roque had affected the supply in this trading interval.

Pricing Errors and Market Intervention

The summary of the issuance of pricing error notice (PEN) and application of the price substitution methodology (PSM) is shown in Table 11.

The market results showed pricing errors occurring in Luzon at about 27 percent of the time or 193 trading intervals during the ex-ante process *(from 30% or 222 trading intervals of the of the previous month)*, 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 39 trading intervals due to base case constraint violation at generator transformers (Palinpinon and Leyte GPPs), undergeneration *(generation deficiency)* conditions, artificial load shedding (value of lost load) at MERALCO loads in Zapote and Araneta, and input data concerns.

The ex-post market results, on the other hand, indicated system-wide pricing errors in 30 trading intervals likewise due to base case constraint violation at generator transformers (Palinpinon and Leyte GPPs), undergeneration *(generation deficiency)* conditions and input data concerns.

During ex-ante, the PSM was applied for the whole system (Luzon and Visayas) in 84 trading intervals due to (i) constraint at Amadeo-Calaca line 1 as a result of N-1 contingency applied on Calaca-Sta. Rosa and Amadeo-Calaca lines (November 26-28), (ii) constraint at BPPC-Kadampat line as a result of N-1 contingency applied on Kadampat-San Manuel 500kV lines (December 17-18), and (iii) constraint at Bauang-La Trinidad line as a result of N-1 contingency applied on San Manuel 230kV tie line (December 19-20).

Table 11. PEN, PSM and MI Summary, December 2011

	Luz-Viz		Luzon		Visayas		Total	
	Freq.	% of Time	Freq.	% of Time	Freq.	% of Time	Freq.	% of Time
PEN (RTD)	39	5.4	193	26.8	10	1.4	234	32.5
PEN (RTX)	30	4.2			1	0.1	31	4.3
PSM (RTD)	84	11.7	3	0.4			87	12.1
PSM (RTX)	2	0.3					2	0.3
MI								

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

Figure 8 and Table 12 shows the correlation of the hourly prices and demand in December and the previous billing month of November. In general, both periods showed positive relationship between price and demand although not significant. With respect to prices above PhP10,000/MWh, the relationship considerably diminished. This indicated that the high prices in both months were not primarily driven by demand.

Figure 8. Price and Demand, November and December 2011

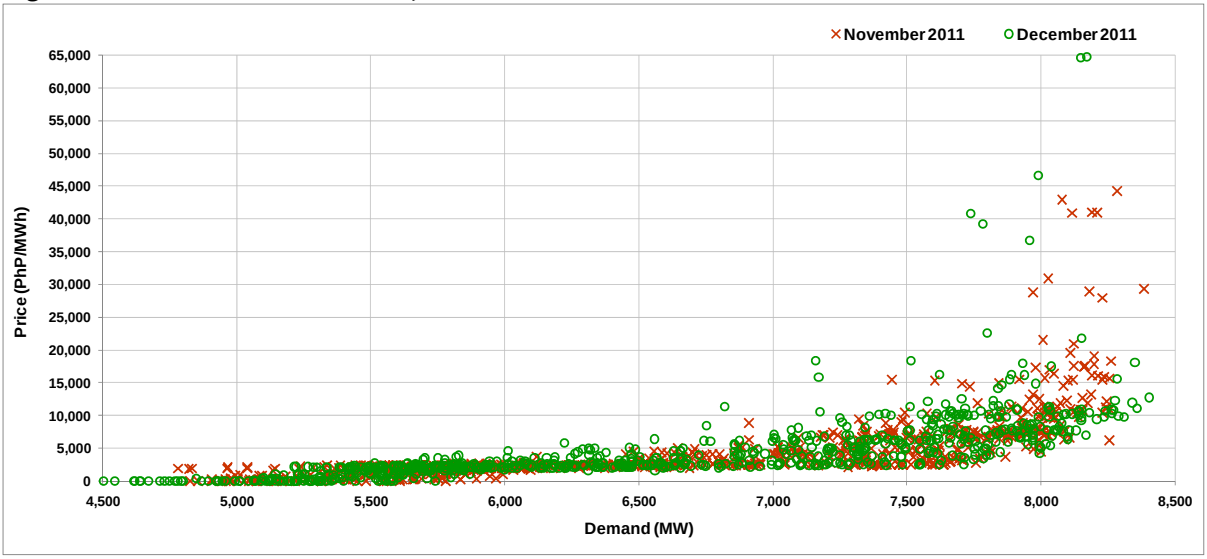


Table 12. Price and Demand Relationship, November and December 2011

	November 2011	December 2011	% M-on-M Change
All Prices	0.6621	0.6105	(7.8)
Prices >= PhP10,000	0.2974	0.1318	(55.7)

HVDC Scheduling

In December, constraint in the Leyte-Luzon HVDC occurred in 34 trading intervals during ex-ante and 24 trading intervals during ex-post. Most of the constraints occurred in relevant trading intervals where the transfer capability of the HVDC from Luzon to Visayas (150 MW) was maximized during the scheduling processes. The rest of the constraints occurred in relevant trading intervals when the transfer capability of the HVDC from Visayas to Luzon was set at lower level by NGCP-SO. The occurrence of constraints in the HVDC in December was higher than the previous billing month. *(Tables 13 and 14)*

Table 13. Summary of HVDC Limits Imposed by NGCP-SO and Results of HVDC Schedules (Ex-ante and Ex-post), December 2011

Results of HVDC Scheduling	HVDC Limit during Ex-ante (Visayas/Luzon) (No. of Trading Intervals)					HVDC Limit during Ex-post (Visayas/Luzon) (No. of Trading Intervals)				
	150/35	150/180	150/200	150/440	Total	150/35	150/180	150/200	150/440	Total
Visayas to Luzon	**4**	**15**	**5**	**599**	**623**	**5**	**16**	**5**	**601**	**627**
Limit Not Maximized	*2*	*13*	*2*	*599*	*616*		*15*	*4*	*600*	*619*
Limit Maximized [1\]	*2*	*2*	*3*		*7*	*5*	*1*	*1*	*1*	*8*
Luzon to Visayas	**1**			**96**	**97**				**93**	**93**
Limit Not Maximized	*1*			*69*	*70*				*77*	*77*
Limit Maximized [1\]				*27*	*27*				*16*	*16*
TOTAL	**5**	**15**	**5**	**695**	**720**	**5**	**16**	**5**	**694**	**720**

Notes: 1\ with price separation

Table 14. Summary of HVDC Limits Imposed by NGCP-SO and Results of HVDC Schedules (Ex-ante and Ex-post), November 2011

Results of HVDC Scheduling	HVDC Limit during Ex-ante (Visayas/Luzon) (No. of Trading Intervals)				HVDC Limit during Ex-post (Visayas/Luzon) (No. of Trading Intervals)			
	150/0	150/100	150/440	Total	150/0	150/100	150/440	Total
Visayas to Luzon	**-**	**2**	**625**	**627**	**-**	**2**	**623**	**625**
Limit Not Maximized		*2*	*625*	*627*		*2*	*623*	*625*
Luzon to Visayas	**1**	**8**	**107**	**116**	**1**	**8**	**109**	**118**
Limit Not Maximized	*1*	*7*	*102*	*110*	*1*	*6*	*97*	*104*
Limit Maximized [1\]		*1*	*5*	*6*		*2*	*12*	*14*
No Flow [1\]	**1**			**1**	**1**			**1**
TOTAL	**2**	**10**	**732**	**744**	**2**	**10**	**732**	**744**

Notes: 1\ with price separation

Price Setting Plants[4]

As shown in Figure 9, 21 plants from Luzon have been considered as price setters across all price levels in December. The coal plants Masinloc (at 30%), Sual (at 23%) and Pagbilao (at 21%), natural gas plant Kepco Ilijan (at 17%) and hydro plants Ambuklao (at 11%) remained the top five frequent price setters. It was noted that the price setting frequency of hydro plant San Roque significantly decreased during the month compared with the previous month.

In Visayas *(Figure 10),* 18 plants have been considered as price setters across all price levels with coal plants PEDC (at 23%), CEDC (at 19%) and KSPC (at 15%), and geothermal plant Leyte A (at 21%) as most frequent price setters. It was noted that the price setting frequency of coal plants PEDC and CEDC significantly increased during the month.

Figure 9. Price Setting Frequency Index (Luzon Plants), November and December 2011

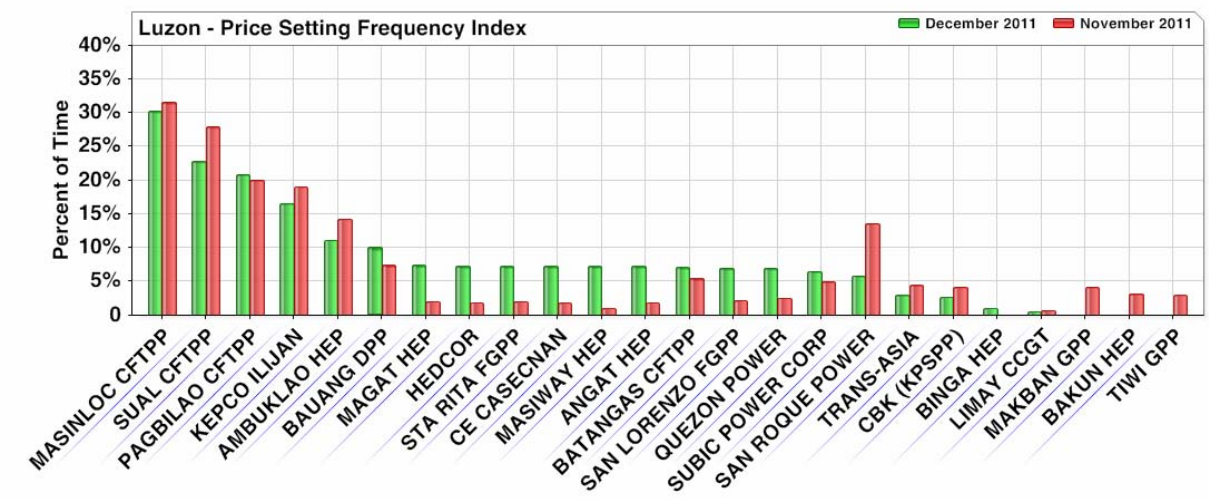
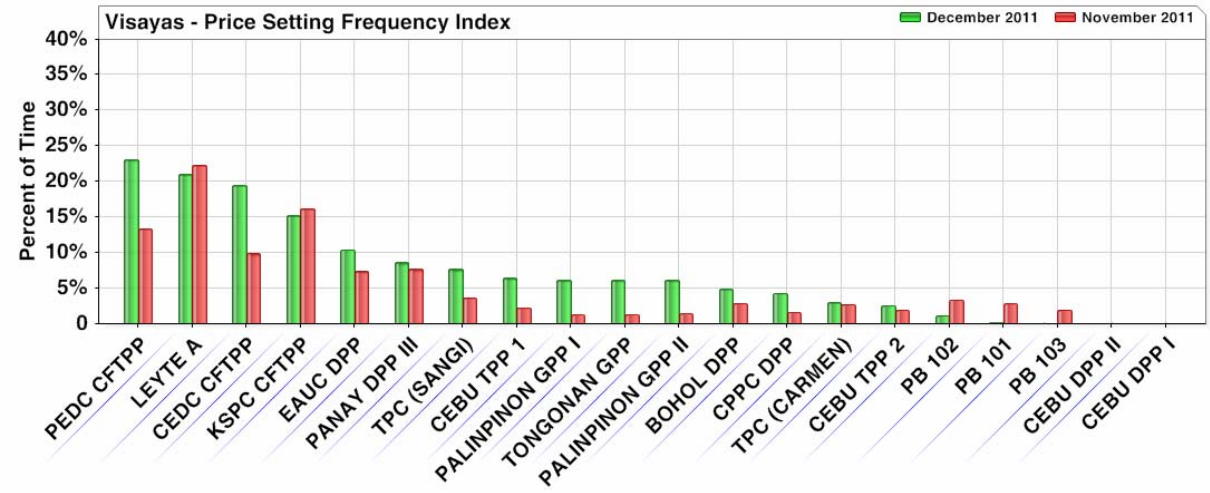


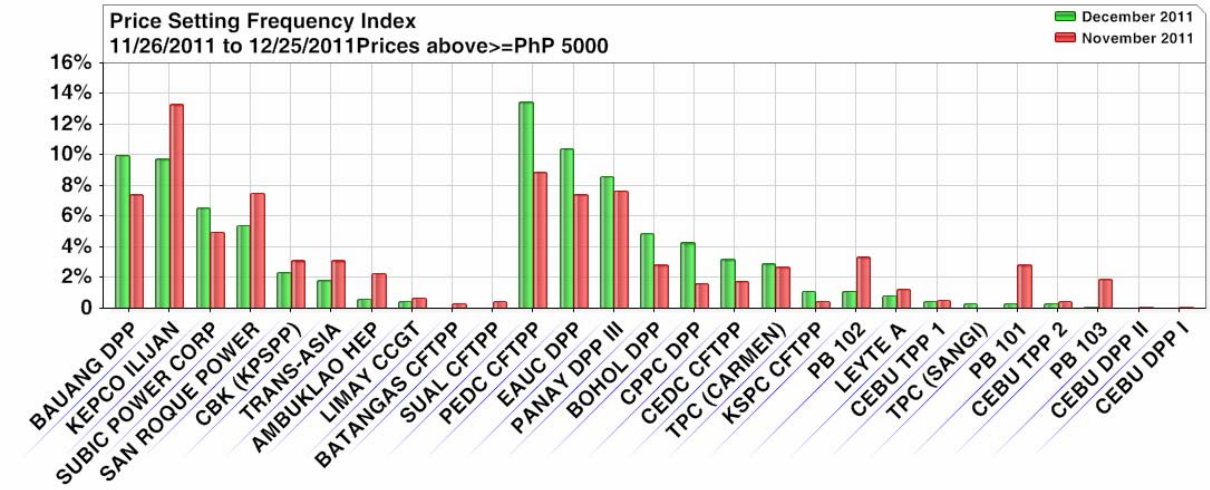
Figure 10. Price Setting Frequency Index (Visayas Plants), November and December 2011



[4] 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.

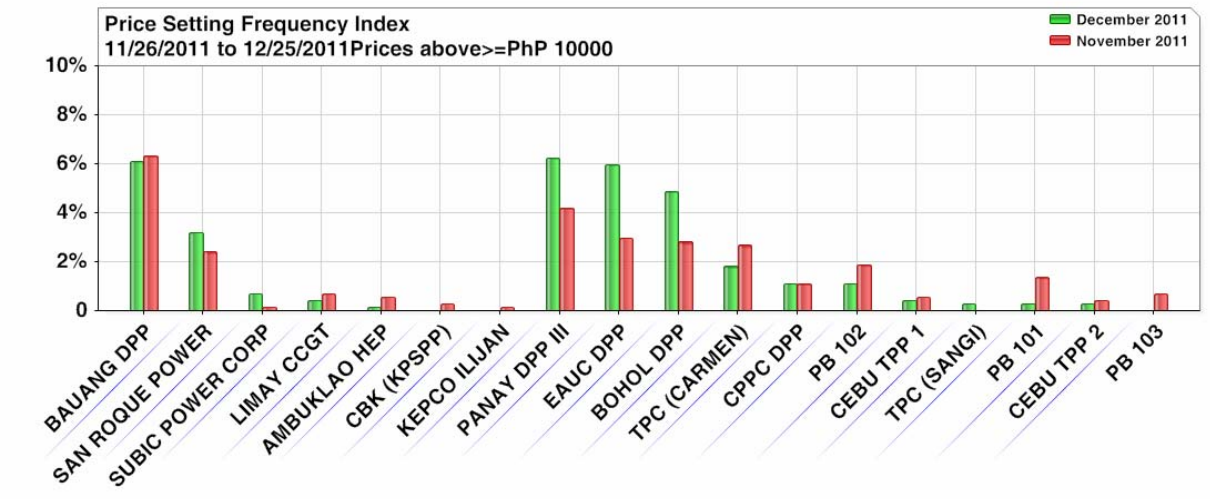
Looking at the PhP5,000/MWh and above price range, 23 plants have been considered as price setters composed of eight (8) plants from Luzon and sixteen (15) plants from Visayas *(Figure 11)*. The natural gas plant Ilijan (at 10%), oil-based plants Bauang (at 10%) and Subic (at 7%), and hydro plant San Roque (at 8%) topped the price setting plants from Luzon. Meanwhile, the coal plant PEDC (at 13%), and oil-based plants EAUC (at 10%) and Panay DPP (at 9%) were the top price setting plants from Visayas. These were the same top frequent price setting plants in the previous month.

Figure 11. Price Setting Frequency Index (PhP5,000 and Above), November and December 2011



The number of price setters at the price level of PhP10,000/MWh and above was reduced to 15 plants, five plants from Luzon and 10 from Visayas *(Figure 12)*.

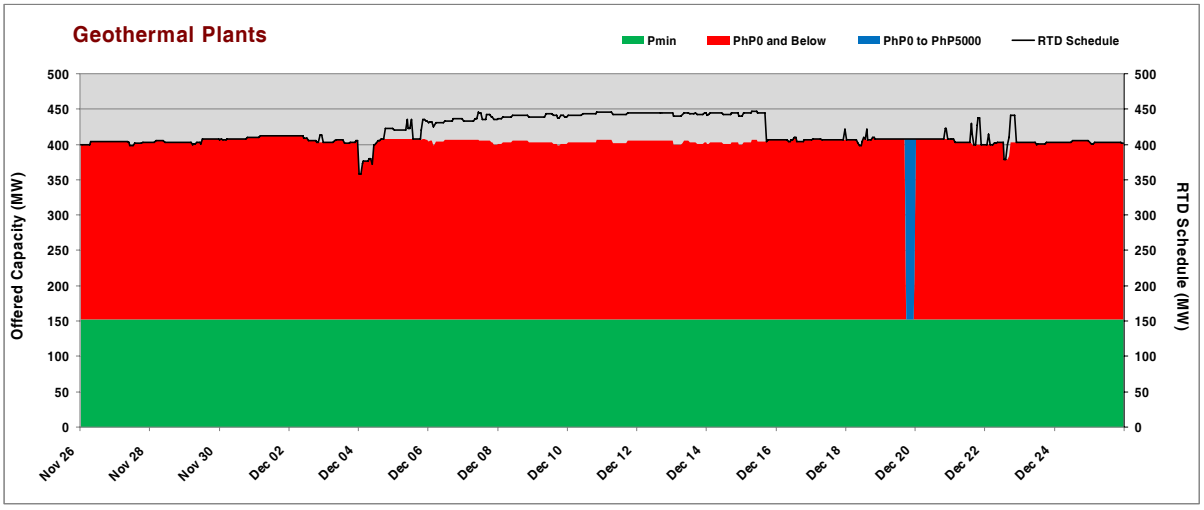
Figure 12. Price Setting Frequency Index (PhP10,000 and Above), November and December 2011



Generator Offer Pattern

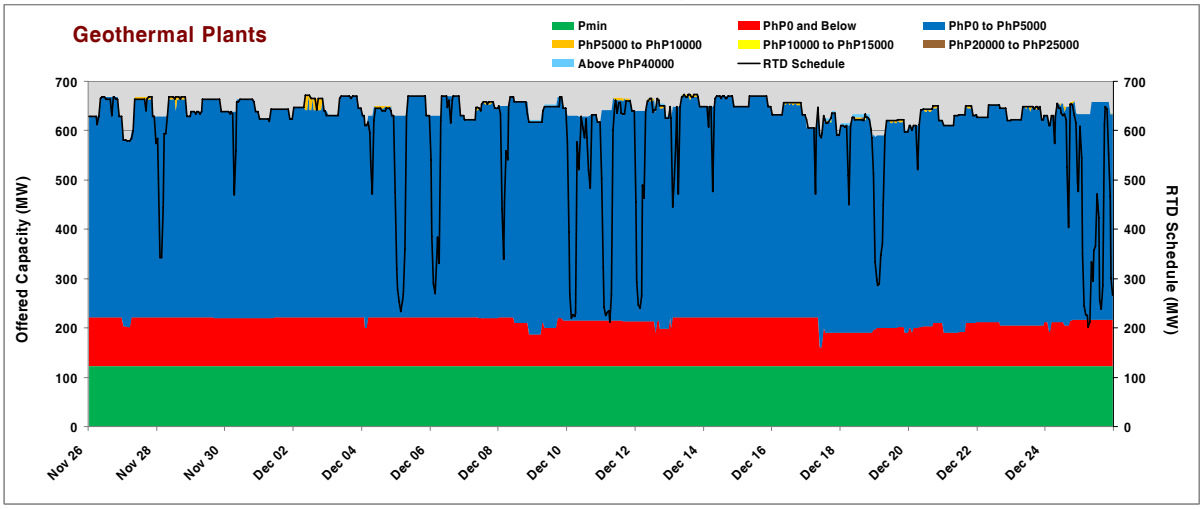
The offer prices of the geothermal plants in Luzon, except on certain trading intervals on December 19, were PhP0.00/MW and below *(Figure 13)*. The higher values of RTD schedule than offered capacity resulted from the scheduling of the Bacman 1 as must run unit, which was undergoing commissioning test.

Figure 13. Geothermal Plants Offer Pattern (Luzon), December 2011



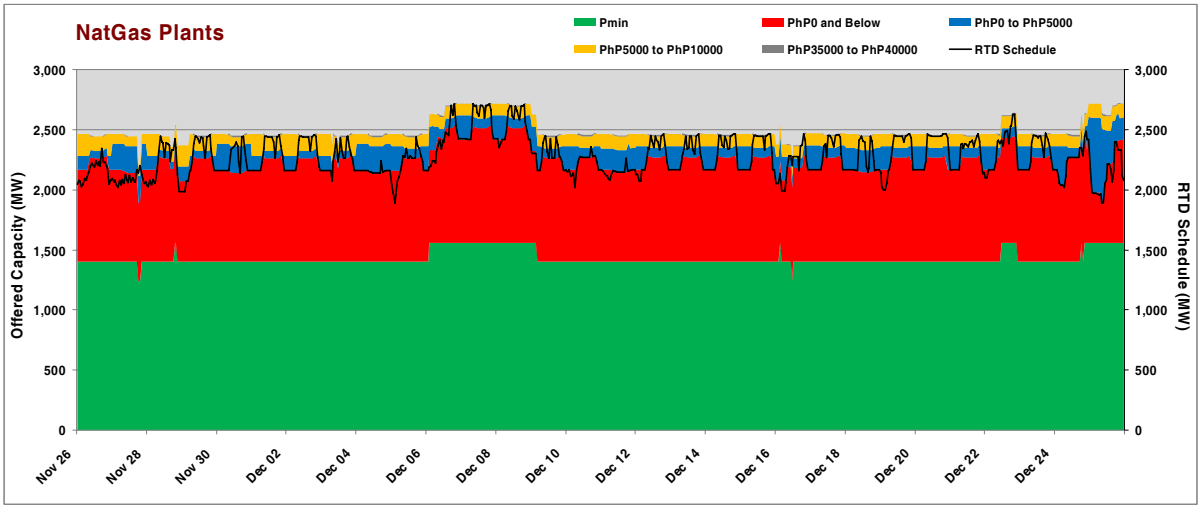
The offer prices of the geothermal plants in Visayas remained below PhP5,000/MW, but still showed a peak-offpeak variation in the offered capacity *(Figure 14)*.

Figure 14. Geothermal Plants Offer Pattern (Visayas), December 2011



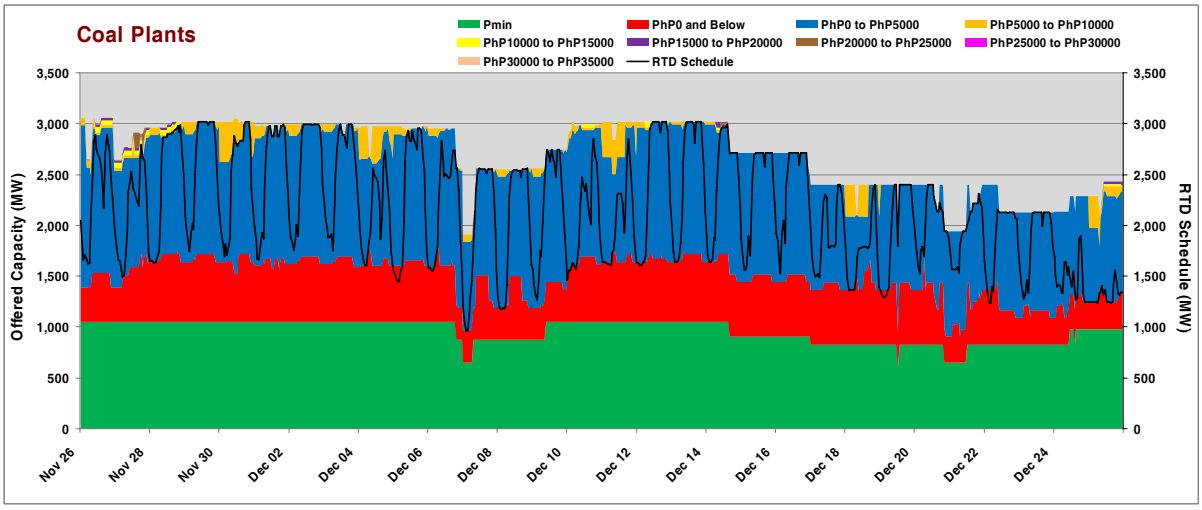
About 96% of the offered capacities (average of 2,378 MW) of natural gas plants were priced at PhP5,000/MW and below. The other 4% of the offered capacities (average of 109 MW) were priced above PhP5,000/MW *(Figure 15)*. As discussed earlier, the natural gas plants Sta. Rita Units 1 & 3 and San Lorenzo Unit Units 1 & 2 were successively placed on maintenance outage during the month resulting to the lower available capacity of the natural plants.

Figure 15. Natural Gas Plants Offer Pattern (Luzon), December 2011



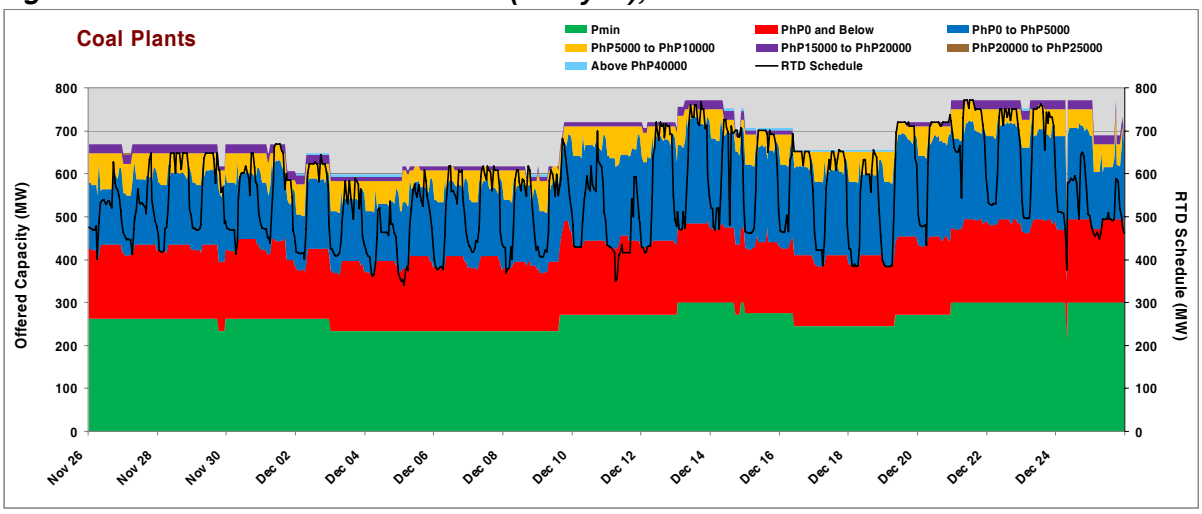
About 98% of the offered capacities of coal plants in Luzon (average of 2,636 MW) were priced above at PhP5,000/MW and below *(Figure 16)*. The offered capacity of coal plants in Luzon were greatly affected by planned and forced outages.

Figure 16. Coal Plants Offer Pattern (Luzon), December 2011



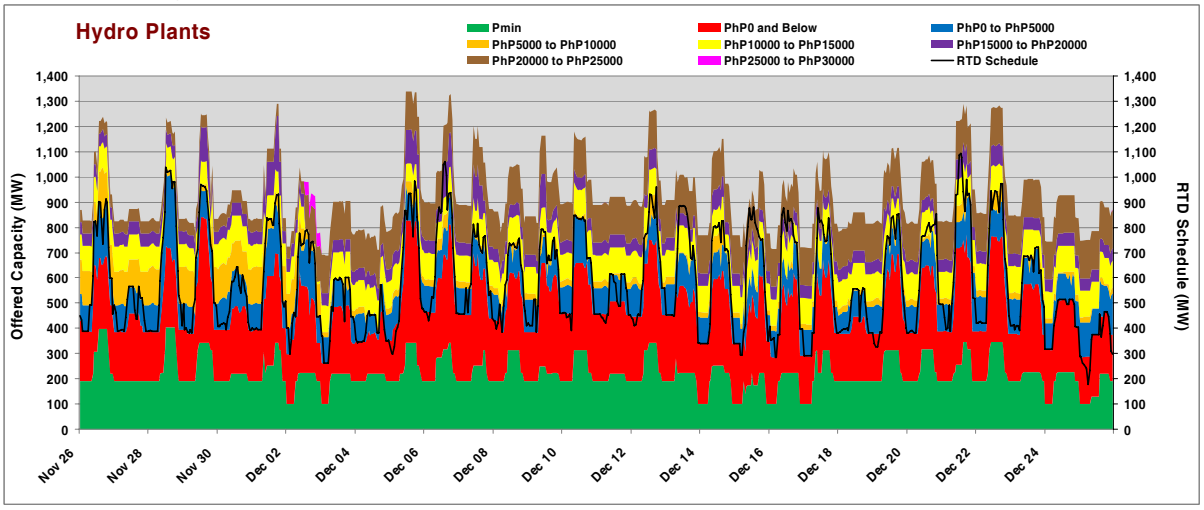
In Visayas, about 91% of the offered capacity of coal plants in Visayas (average of 619 MW) were priced at PhP5,000/MW and below. The other 9% of the offered capacities (average of 64 MW) were priced above PhP5,000/MW, reaching as high as PhP60,000/MW *(Figure 17)*. The offered capacity of coal plants in Visayas were also affected by planned and forced outages.

Figure 17. Coal Plants Offer Pattern (Visayas), December 2011



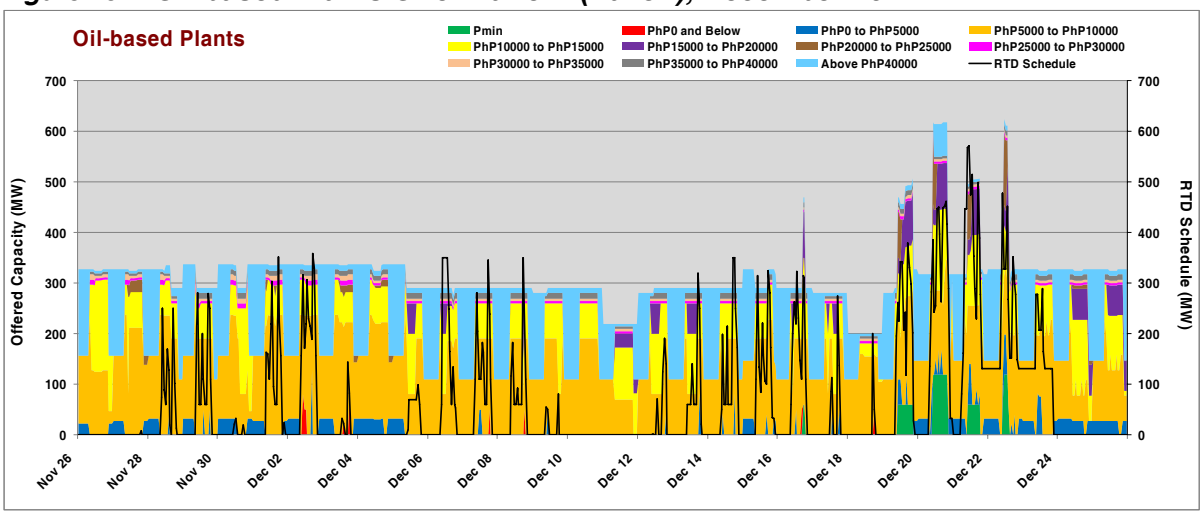
It appeared that there was consistency in the offer prices of hydro plants in Luzon during the billing month. The capacity offers, however, remained volatile ranging from 690 MW to 1,339 MW. *(Figure 18)*

Figure 18. Hydro Plants Offer Pattern (Luzon), December 2011



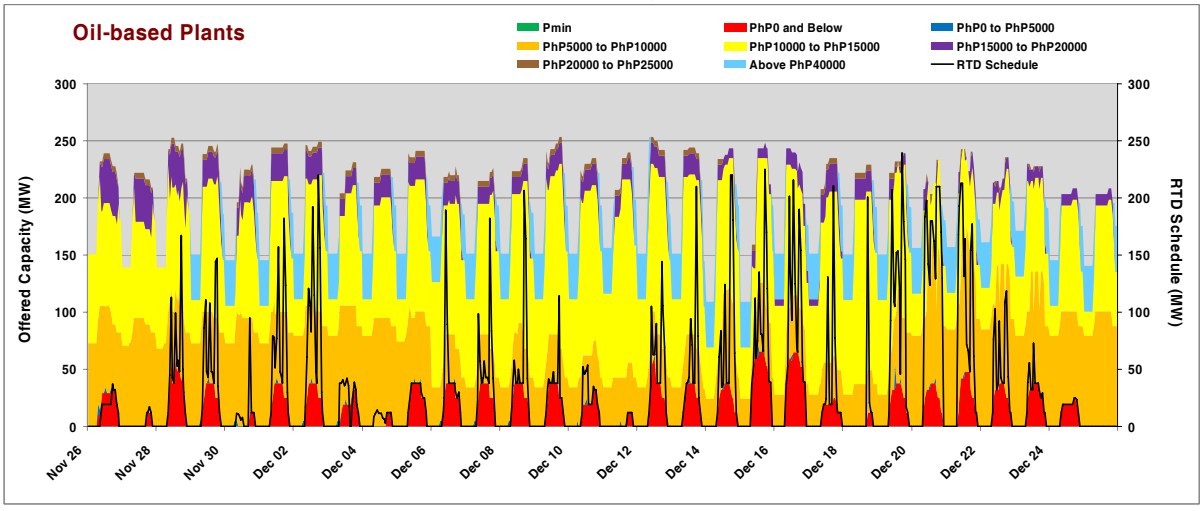
The offered capacity of the Luzon oil-based plants ranged from 200 MW to 625 MW while the offer prices ranged between PhP0.00/MW and PhP62,000/MW. The low capacity or offers from oil-based plants in Luzon accounts to about 32% of the capacity gap in the region *(Figure 19).* Limay and Malaya were scheduled/operated as must run units in certain trading intervals during the month due to tight supply and demand condition. This was the reason for the higher level of RTD schedule than offered capacity in said trading intervals.

Figure 19. Oil-based Plants Offer Pattern (Luzon), December 2011



The capacity and price offers from oil-based plants in Visayas ranged from 109 MW to 254 MW and PhP0.00/MW to PhP60,000/MW, respectively *(Figure 20)*. There was a shift in the offer structure of one of the oil-based plants in Visayas during the billing month where the plant's capacity was offered at about PhP60,000/MW during offpeak hours.

Figure 20. Oil-based Plants Offer Pattern (Visayas), December 2011



Capacity Factor

As shown in Table 15, the calculations showed an increase in the capacity factor of geothermal plants in Luzon, which had been influenced by the scheduling of Bacman 1 as must run unit for commissioning tests. It also showed improvement in the capacity factor of oil-based plants. On the other hand, the calculations indicated a decrease in the capacity factors of natural gas and hydro plants during the billing month due to plant outages. *(Figure 21 and Table 15)*

Figure 21. Capacity Factor (Luzon Plants), December 2011

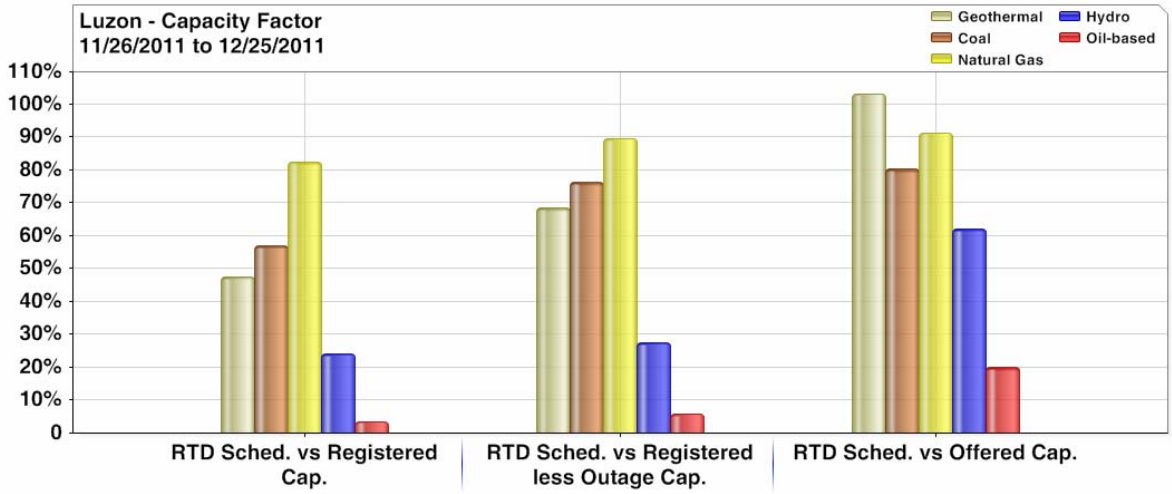


Table 15. Summary of Capacity Factor by Plant Type in Luzon, November and December 2011

Plant Type	RTD Sched. vs Registered Cap.			RTD Sched. vs Registered less Outage Cap.			RTD Sched. vs Offered Cap.		
	November 2011	December 2011	%Change	November 2011	December 2011	%Change	November 2011	December 2011	%Change
Coal	56%	57%	1%	76%	76%	1%	80%	80%	1%
Natural Gas	87%	83%	-5%	90%	90%	0%	92%	91%	-1%
Geothermal	43%	47%	9%	70%	68%	-2%	98%	103%	6%
Hydro	26%	24%	-8%	28%	27%	-2%	67%	62%	-7%
Oil-based	3%	4%	15%	5%	6%	17%	16%	20%	28%

Table 16. Capacity Factor by Plant Type in Luzon, December 2011

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	1,559,591	2,741,040	2,043,382	1,941,930	57%	76%	80%
Natural Gas	1,638,455	1,982,232	1,826,513	1,790,819	83%	90%	91%
Geothermal	300,728	633,384	439,237	291,052	47%	68%	103%
Hydro	417,423	1,743,250	1,527,245	671,789	24%	27%	62%
Oil-based	45,301	1,290,240	774,720	226,837	4%	6%	20%

Similar to the previous month's results, the calculations still showed a decrease in the capacity factors of the oil-based in Visayas. The calculations also showed a decrease in the capacity factor of coal and geothermal plants based on offered capacity *(Figure 22 and Table 17).*

Figure 22. Capacity Factor (Visayas Plants), December 2011

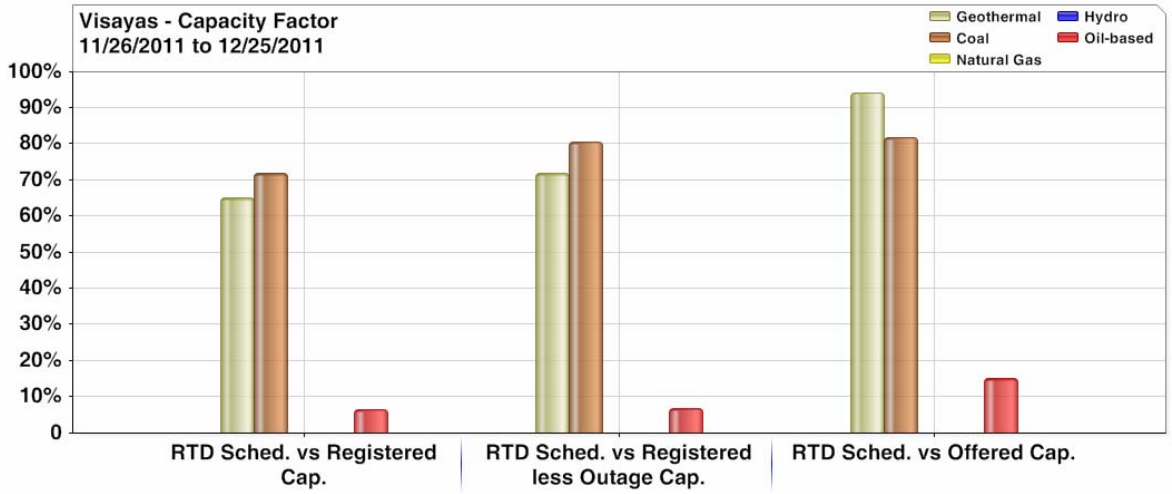


Table 17. Summary of Capacity Factor by Plant Type in Visayas, November and December 2011

Plant Type	RTD Sched. vs Registered Cap.			RTD Sched. vs Registered less Outage Cap.			RTD Sched. vs Offered Cap.		
	November 2011	December 2011	%Change	November 2011	December 2011	%Change	November 2011	December 2011	%Change
Coal	69%	72%	5%	81%	80%	0%	84%	82%	-2%
Geothermal	65%	65%	0%	72%	72%	0%	97%	94%	-3%
Oil-based	7%	6%	-14%	8%	7%	-16%	19%	15%	-22%

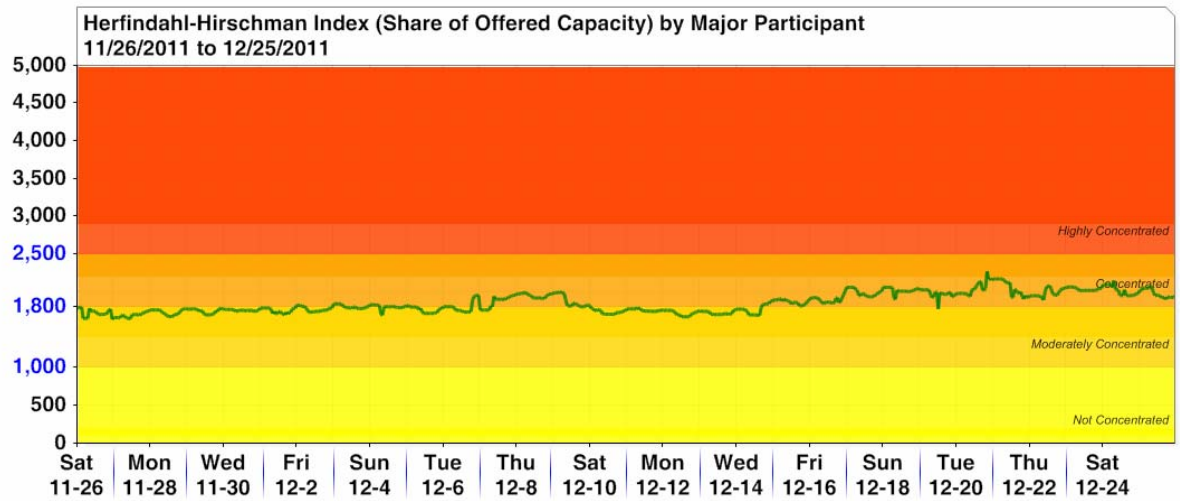
Table 18. Capacity Factor by Plant Type in Visayas, December 2011

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	401,814	558,144	499,224	491,714	72%	80%	82%
Geothermal	436,684	670,896	606,804	463,260	65%	72%	94%
Oil-based	21,654	335,676	324,331	143,018	6%	7%	15%

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 period *(Figure 23)*.

Figure 23. Hourly HHI based on Offered Capacity by Major Participant Grouping, December 2011



Compliance Monitoring

Compliance to Must Offer Rule

Continued non-compliance with the must-offer rule by generator trading participants was observed throughout the covered period. Figure 24 shows a high percentage of capacity gap[5] at around 59 percent and 65 percent of the total generator resource-trading intervals[6] in Luzon and Visayas, respectively.

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

Figure 24. Summary of Compliance Monitoring to Must Offer Rule, December 2011

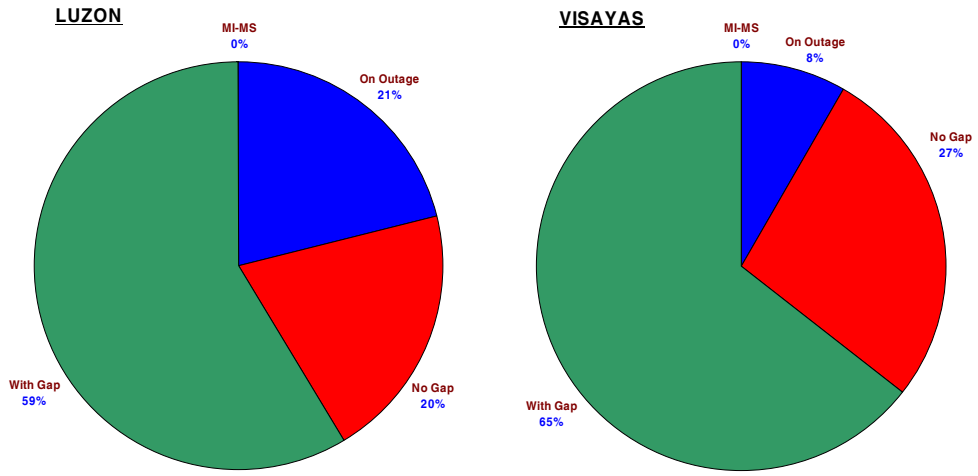
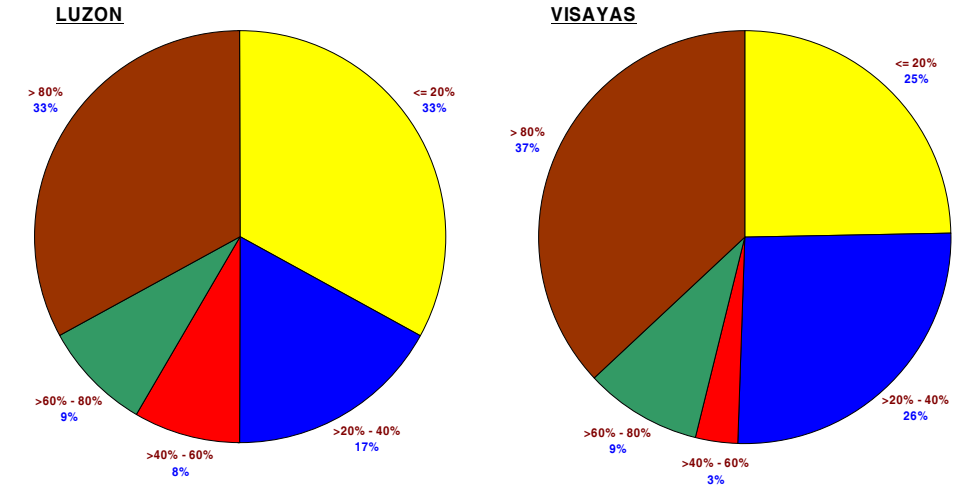


Figure 25 shows the proportion of the capacity gap to the registered capacity[7] net of outage capacity[8] and the corresponding frequency distribution of the generator resource-trading intervals with capacity gap. It shows that the proportion of the capacity gap above 80% constitute about 33% and 37% of the relevant generator resource-trading intervals in Luzon and Visayas, respectively.

Figure 25. Distribution of Observed Capacity Gap, December 2011

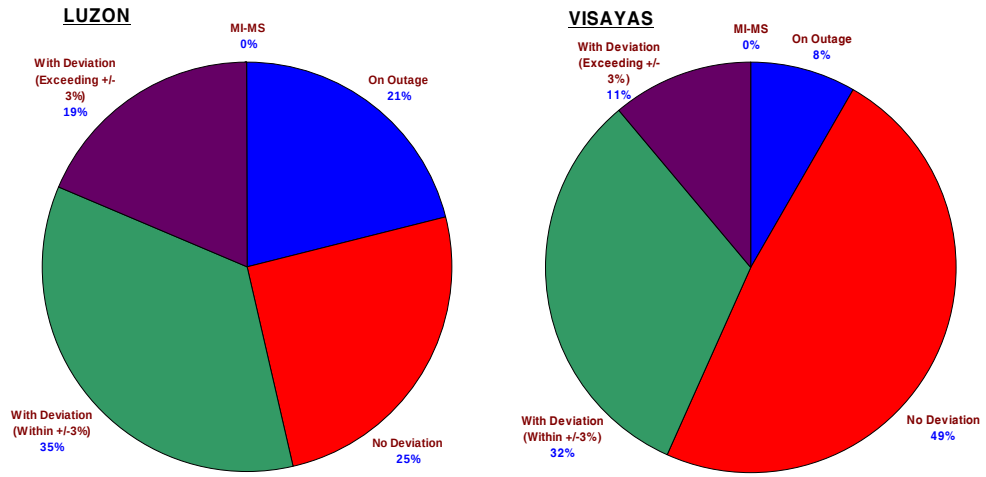


Compliance to RTD Schedule

Figure 26 shows that around 19 percent and 11 percent of the total generator resource-trading intervals in Luzon and Visayas, respectively, have deviations between the RTD schedule[9] and actual dispatch[10] exceeding the +/-3% tolerance limit[11] in the billing month of September 2011.

[7] Registered capacity - capacity of each generator resource node registered with the market.
[8] Outage capacity - validated outage capacity of each generator resource node per trading interval.
[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 26. Summary of Compliance Monitoring to RTD Schedule, December 2011



The summary of dispatch deviations exceeding the +/-3% in terms of percent deviation and frequency distribution is shown in Figure 27. Majority of the dispatch deviations were within +/-20% at about 70 percent and 63 percent of the relevant generator resource-trading intervals in Luzon and Visayas, respectively. Likewise noted was the frequency of dispatch deviations exceeding 80 percent at 13 percent and 21 percent in Luzon and Visayas, respectively.

Figure 27. Distribution of Observed Deviation, December 2011