MAG-MMAR-2012-05

MONTHLY MARKET ASSESSMENT REPORT

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

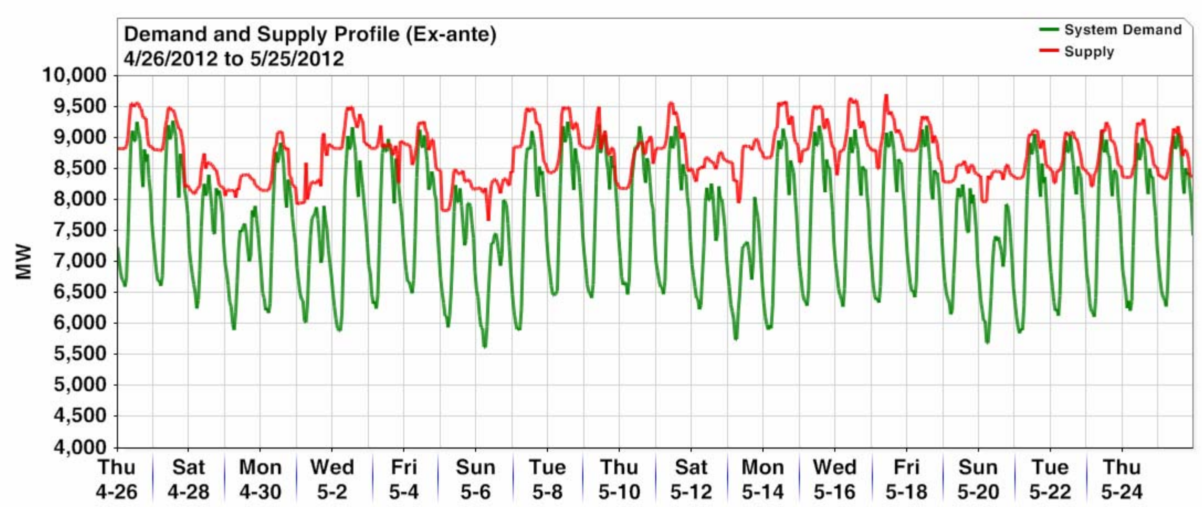
I. Supply and Demand Situation

The monthly average system demand[1] (ex-ante) increased by 8.7 percent to 7,642 MW from the previous billing month's 7,018 MW and by 6.8 percent from last year's 7,153 MW *(Table 1)*. However, the maximum demand of 9,277 MW, which occurred on 27 April 2012 at trading interval 1400H, was lesser by 0.3 percent than the previous billing month's 9,306 MW. Meanwhile, the average regional demand in Luzon (6,489 MW) is significantly higher by 9.1 percent than the previous billing period and by 7 percent from the same billing period last year. On the other hand, demand in Visayas increased by 6.3 percent from the previous billing period and by 6.1 percent from the same billing period last year. Such increase in the demand of both regions from the previous billing periods may be attributed to the 2.8 and 3.5 percent increase in the average mean temperature of Luzon and Visayas, respectively. Although other factors, such as economic growth, may have likewise influenced the demand increase.

The monthly average system supply[2] posted a decrease of 2.2 percent (8,945 MW to 8,749 MW) from the previous billing period but registered an increase of 4.6 percent (8,365 MW to 8,749) from the same billing period last year *(Table 1).* The system supply during the billing period ranged from 7,662 MW to 9,705 MW. Consistent with the decrease in the average system supply, the average regional supply in Luzon and Visayas decreased by 2.6 percent (7,344 MW to 7,151 MW) and by 0.2 percent (1,601 MW to 1,598 MW), respectively, from the previous billing period.

An average of 1,107 MW supply margin was recorded during the billing period, which is significantly lower by 42.1 percent from the previous billing period. Such decrease is attributed to the increase in the system demand and decrease in the system supply.

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



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

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

	May 2012 (In MW)			April 2012 (In MW)			May 2011 (In MW)			% M-on-M Change (Apr - May 2012)			% Y-on-Y Change (May 2011 - May 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Demand	9,277	5,626	7,642	9,306	4,500	7,032	8,842	4,347	7,153	(0.3)	25.0	8.7	4.9	29.4	6.8
Supply	9,705	7,662	8,749	9,630	7,498	8,945	9,402	6,928	8,365	0.8	2.2	(2.2)	3.2	10.6	4.6
Supply/Demand Variance	2,952	-258	1,107	4,563	134	1,913	3,052	(135)	1,213	(35.3)	(292.7)	(42.1)	(3.3)	90.9	(8.7)

Note: The derived values were non-coincident.

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

Mean Temperature	May 2012 (°C)			April 2012 (°C)			May 2011 (°C)			% M-on-M Change (Apr - May 2012)			% Y-on-Y Change (May 2011 - May 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	32	28	30	31	26	29	32	26	30	3.2	7.7	2.8	0.0	7.7	0.0
Visayas	30	28	29	30	26	28.03	30	25	28	0.0	7.7	3.5	0.0	12.0	3.6

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

	May 2012 (In MW)			April 2012 (In MW)			May 2011 (In MW)			% M-on-M Change (Apr - May 2012)			% Y-on-Y Change (May 2011 - May 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	7,872	4,759	6,489	7,921	3,777	5,946	7,485	3,621	6,065	(0.6)	26.0	9.1	5.2	31.4	7.0
Visayas	1,436	823	1,154	1,416	709	1,086	1,380	726	1,087	1.4	16.1	6.3	4.0	13.4	6.1

Note: The derived values were non-coincident.

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

	May 2012 (In MW)			April 2012 (In MW)			May 2011 (In MW)			% M-on-M Change (Apr - May 2012)			% Y-on-Y Change (May 2011 - May 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luzon	8,091	6,026	7,151	8,027	5,814	7,344	7,829	5,430	6,823	0.8	3.6	(2.6)	3.3	11.0	4.8
Visayas	1,699	1,473	1,598	1,723	1,443	1,601	1,740	1,256	1,542	(1.4)	2.1	(0.2)	(2.4)	17.3	3.6

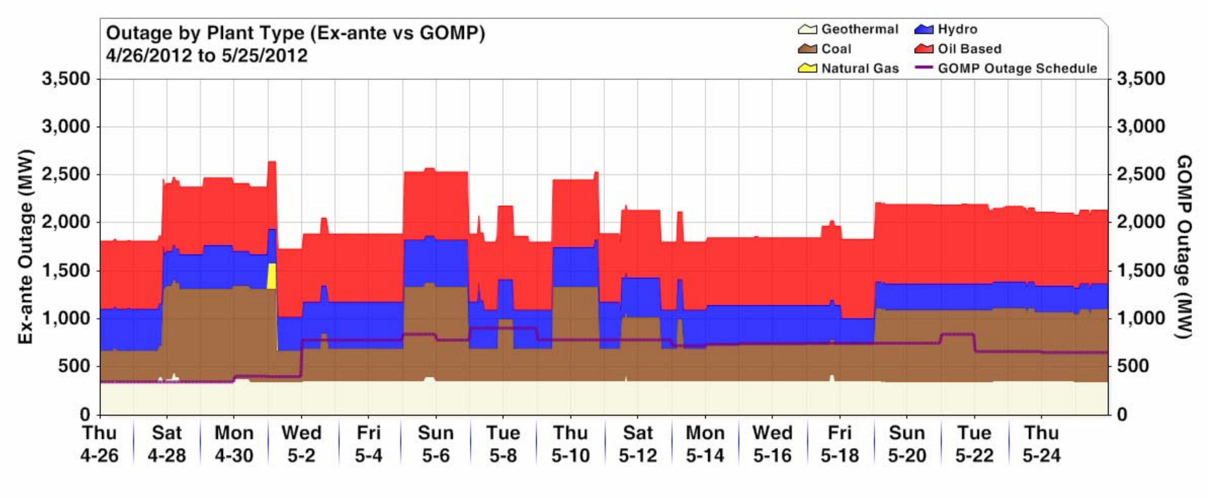
Note: The derived values were non-coincident.

II. Plant Outages

Figure 2 shows the system capacity on outage by plant type compared with the outage schedule indicated in NGCP-SO's CY 2012 Grid Operating and Maintenance Program (GOMP). The capacity on outage reached a maximum of 2,568 MW on 01 May 2012 for six hours (0100H-0600H) when Sual Unit 2 was still unavailable and San Lorenzo Unit 1 went on forced outage. The minimum capacity on outage of 1,656 MW also occurred on the same day (0800H-2400H) when the said plants went back online. The average capacity on outage was 1,992 MW.

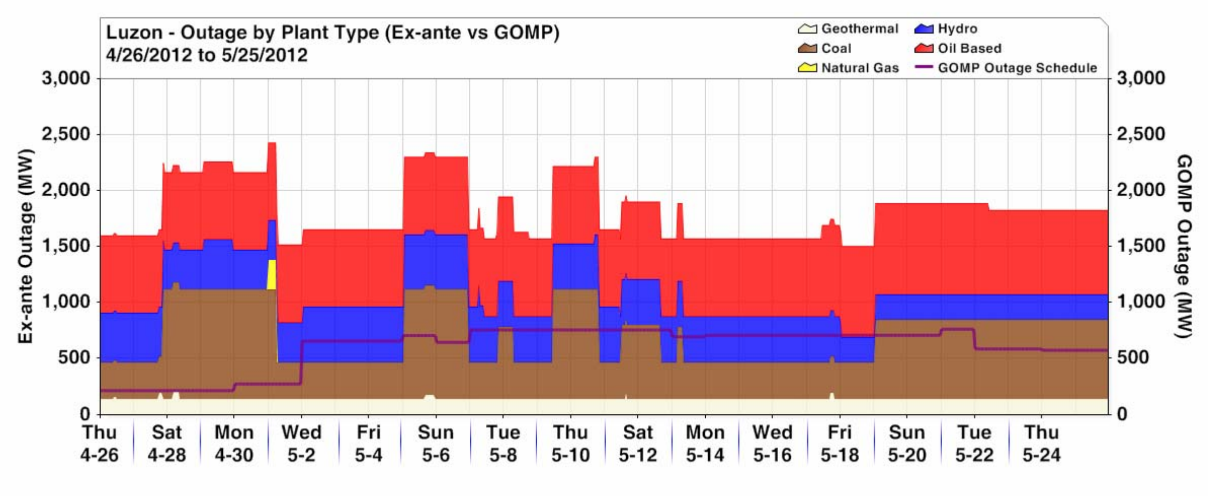
[3] Regional temperature (Average Mean Temperature) is based on Weather Underground website. Luzon temperature is based on Manila station while Visayas temperature is based on Cebu station.

Figure 2. Plant Capacity on Outage, May 2012



The monthly average capacity on outage in Luzon during the billing period was higher by 2.7 percent than the previous billing period *(Table 5)*. The capacity on outage posted an average of 1,820 MW, ranging from 1,504 MW to 2,428 MW. Similar with the previous month, oil-based plants registered the highest outage capacity with an average of 721 MW followed by coal plants with 582 MW.

Figure 3. Plant Outage Capacity, May 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 602 MW.

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

Resource Type	May 2012 (In MW)			April 2012 (In MW)			May 2011 (In MW)			% M-on-M Change (Apr - May 2012)			% Y-on-Y Change (May 2011 - May 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	977	330	582	1,751	330	444	1,676	0	364	(44.2)	0.0	31.1	(41.7)		59.8
Natural Gas	265	0	3	257	0	37	270	0	31	2.9		(93.0)	(2.0)		(91.8)
Geothermal	201.7	139	140	257	139	174	426	308	343	(21.4)	0.0	(19.5)	(52.6)	(54.9)	(59.1)
Hydro	682	223	374	635	173	373	493	95	228	7.5	28.9	0.5	38.4	134.5	64.5
Oil Based	812	692	721	752	692	746	342	242	321	8.0	0.0	(3.3)	137.4	186.0	124.6
TOTAL	2,428	1,504	1,820	3,014	1,413	1,773	2,619	842	1,537	(19.4)	6.4	2.7	(7.3)	78.6	18.4

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), May 2012, April 2012, and May 2011

Resource Type	May 2012 (In MW)			April 2012 (In MW)			May 2011 (In MW)			% M-on-M Change (Apr - May 2012)			% Y-on-Y Change (May 2011 - May 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	382	0	306	0	0	0	0	0	0						
Natural Gas	0	0	0	0	0	0	0	0	0						
Geothermal	119	64	73	147	64	108	176	119	138	(19.1)	0.0	(32.4)	(16.5)	(46.3)	(22.1)
Hydro	312	76	220	595	152	355	522	330	432	(47.5)	(50.0)	(38.0)	13.9	(53.9)	(18.0)
Oil Based	50	0	3	120	0	31	0	0	0	(58.3)		(89.2)			
TOTAL	765	216	602	861	216	493	641	0	570	(11.2)	0.0	22.0	34.4		(13.4)

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. Angat M3 which became unavailable on 03 April 2012 went back online on 18 May 2012. Casecnan Units 1 and 2, which went on maintenance outage on 16 April 2012, went back online on 07 May 2012 and 28 April 2012, respectively. On the other hand, San Roque Unit 3 was on planned outage from 02 May 2012 to 18 May 2012. The other hydro plants Angat M1 and M2, Botocan, Bakun 1 and 2, Binga 1 and Botocan which were already out prior to the billing period, remained on outage during the billing period.

In the case of oil-based plants, Limay 6 which experienced forced outage prior to the billing period went back online on 22 May 2012. Meanwhile, Limay Unit 2 which was on outage since 06 January 2012, went back online on 08 May 2012. Malaya 1 remained on outage during the entire billing period. Oil-based plants accounted for 39 percent of the average total capacity on outage in Luzon.

Coal plants accounted for 32 percent of the average total capacity on outage *(Table 8 lists the major coal plants outages during the billing period)*. Due to equipment-related concern, Sual, Pagbilao, Masinloc and Calaca units encountered forced outages on separate occasions during the billing period. Pagbilao Unit 1 remained unavailable during the rest of the billing period since it underwent emergency shutdown on 19 May 2012.

Table 7. Major Plant Outages, May 2012 – Luzon

Plant/Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Remarks
Hydro Plants					
San Roque 3	137	5/2/2012 0:01	5/18/2012 0:01	16.0	Planned outage
Casecnan 1	82.5	4/16/2012 5:01	5/7/2012 7:08	21.09	Upgrading of PLC and DCS
Casecnan 2	82.5	4/16/2012 5:01	4/28/2012 5:37	12.03	Upgrading of PLC and DCS
Angat M 3	50	4/3/2012 9:10	5/18/2012 0:01	44.62	APMT
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
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
Botocan	20.8	10/22/2011 16:24			Defective 61CL4 test and check by NPC
Geothermal Plants					
Makban 6	55	7/12/2006 19:02			Turbine vibration
Tiwi 3	43.7	10/23/2005 13:26			Steam fed to unit 2 for testing
Oil based Plants					
Limay 6	60	5/17/2012 10:46	5/22/2012 9:35	4.95	Non-availabilityof C02
Limay 2	60	1/6/2012 16:01	5/8/2012 17:00	123.04	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, May 2012 - Luzon

Plant/Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Remarks
Coal Plants					
Sual 2	647	4/27/2012 22:22	5/1/2012 2:16	3.2	To facilitate correction for governor valve trouble
Sual 1	647	5/5/2012 0:25	5/6/2012 22:19	1.9	Trouble at intermediate pressure at governor valve
Masinloc 2	315	5/7/2012 20:31	5/8/2012 8:02	0.5	On emergency shutdown for drag chain conveyor repair
Sual 1	647	5/9/2012 12:20	5/10/2012 18:48	1.3	Boiler tube leak
Calaca 2	330	5/11/2012 11:05	5/12/2012 15:43	1.2	Master fuel trip
Masinloc 1	315	5/13/2012 3:03	5/13/2012 7:19	0.2	Loss of Primary Air Fan No. 2 (Loss of flame)
Calaca 1	330	8/29/2011 22:15			Emergency shutdown due to suspected reheater leak.
Pagbilao 1	382	5/19/2012 0:23			Emergency shutdown due to boiler tube leak

Luzon planned outage factor[4] (figure 4 and table 9) shows that coal plants were placed on planned outages during colder months (January to February) while hydro plants scheduled their maintenance works during hotter months (April to May) in line with the low water elevation in dams being observed. Other hydro plants in planned outage were currently undergoing rehabilitation and refurbishment. Geothermal plants had a consistent outage factor of 2.3 percent.

Figure 4. Planned Outage Factor – Luzon

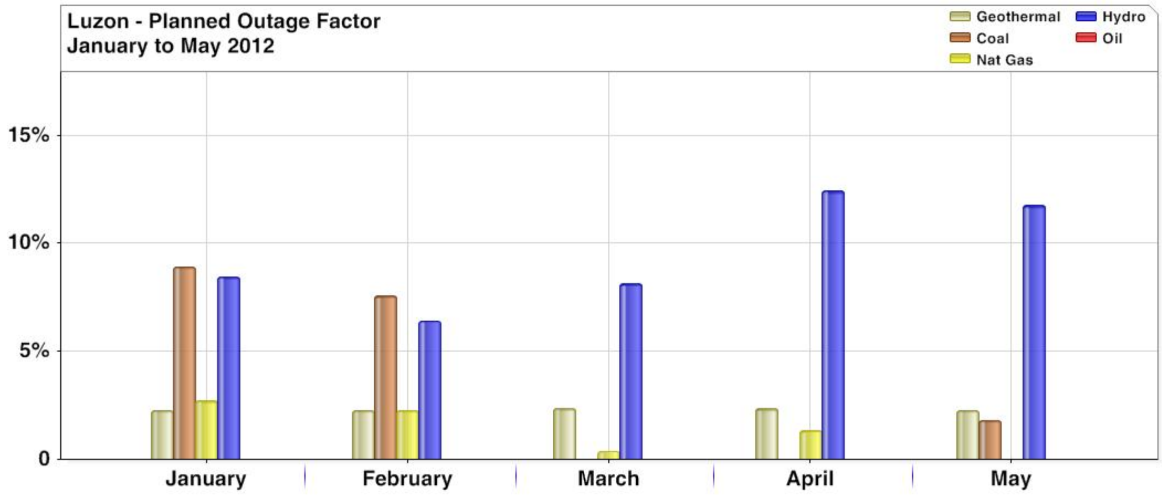


Table 9. Planned Outage Factor - Luzon

Luzon	Geothermal	Coal	Nat Gas	Hydro	Oil
January	2.3%	8.9%	2.7%	8.5%	0%
February	2.3%	7.6%	2.3%	6.4%	0%
March	2.4%	0%	0.4%	8.1%	0%
April	2.3%	0%	1.3%	12.5%	0%
May	2.3%	1.8%	0.0%	11.8%	0%

Meanwhile, the forced outage factor[5] of all plants in Luzon shown in figure 5 and table 10 denotes that oil based plants had the highest forced outage factor among other plant types. Malaya 1 with capacity of 300 MW was the main contributor from billing periods January to May. The said thermal plant was placed on outage on August 15, 2011. Coal plants also

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

showed significant forced outage factor above 10 percent. These forced outages were attributed to the recurring equipment-related trouble of almost coal plants. Calaca 1 was on shutdown (forced outage) due to suspected reheater leak on August 29, 2011. Highly noted is the almost zero forced outage factor of natural gas plants which indicate a more reliable supply and efficiency in plant operation.

Figure 5. Forced Outage Factor – Luzon

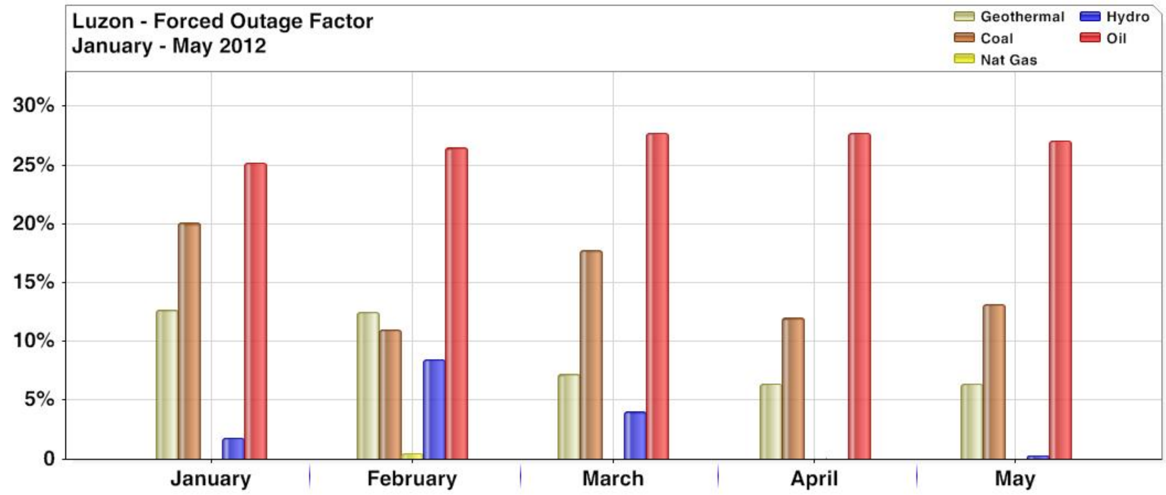


Table 10. Forced Outage Factor - Luzon

Luzon	Geothermal	Coal	Nat Gas	Hydro	Oil
January	12.7%	20.1%	0%	1.8%	25.2%
February	12.5%	11.0%	0.5%	8.5%	26.5%
March	7.2%	17.8%	0.1%	4.1%	27.8%
April	6.4%	12.0%	0%	0.1%	27.7%
May	6.4%	13.2%	0%	0.3%	27.1%

Visayas capacity on outage *(Figure 6)* was mainly attributed to geothermal plants with an average capacity on outage of 139 MW followed by the coal plants with 18 MW. The average capacity on outage in Visayas during the billing period was lesser by 31.5 percent from the previous billing period but greater by 267.1 percent from the same billing period last year. The highest capacity on outage was registered on 02 May 2012.

Figure 6. Plant Capacity on Outage, May 2012 - Visayas

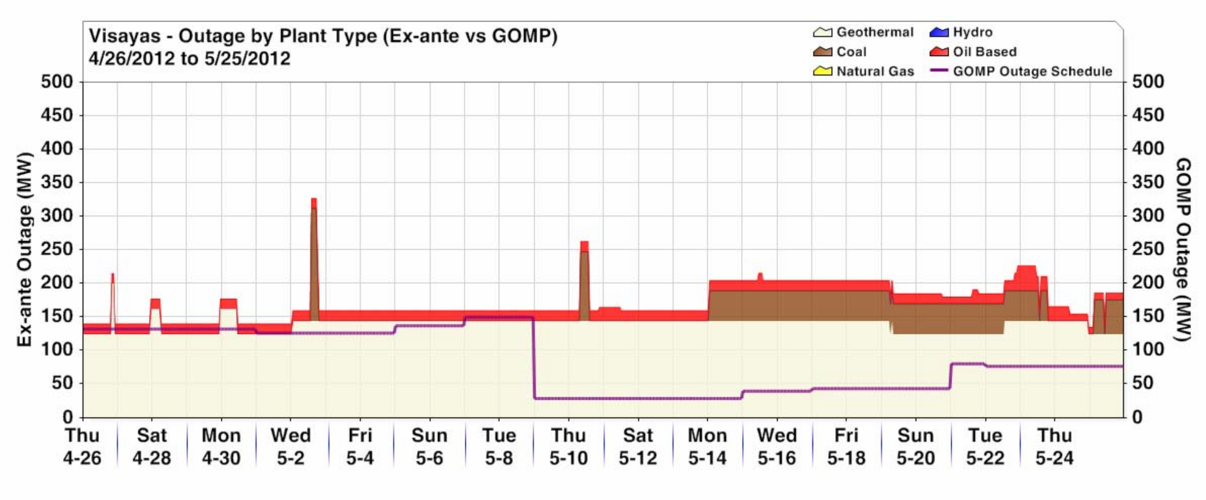


Table 11. Visayas Regional Outage Summary (Ex-ante), May 2012, April 2012, and May 2011

Resource Type	May 2012 (In MW)			April 2012 (In MW)			May 2011 (In MW)			% M-on-M Change (Apr - May 2012)			% Y-on-Y Change (May 2011 - May 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	167	0	18	129	0	32	148	0	16	30.1		(44.5)	13.1		13.0
Geothermal	200	125	139	275	200	204	74	0	27	(27.3)	(37.5)	(31.8)	168.5		423
Hydro	0	0	0	0	0	0	0	0	0						
Oil Based	37	10	15	20	15	15	22	0	5	85.0	(33.3)	0.4	68.2		239.6
TOTAL	327	135	172	363	215	251	193	0	47	(10.0)	(37.2)	(31.5)	69.4		267.1

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

Table 12. Visayas Regional Outage Summary (GOMP), May 2012, April 2012, and May 2011

Resource Type	May 2012 (In MW)			April 2012 (In MW)			May 2011 (In MW)			% M-on-M Change (Apr - May 2012)			% Y-on-Y Change (May 2011 - May 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	84	0	36	129	0	41	45	0	21	(35.0)		(10.7)	86.0		
Geothermal	38	0	22	80	38	62	0	0	0	(53.4)		(64.1)			
Hydro	0	0	0	0	0	0	0	0	0						
Oil Based	44	5	27	47	6	17	6	0	1	(7.2)	(16.7)	59.6	692.7		2,798.2
TOTAL	150	29	85	177	49	120	51	0	22	(15.2)	(40.2)	(28.8)	197.4		289.0

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

Several coal plants in Visayas went on forced outages during the period *(Table 13)*. Coal plants Cebu TPP1, KSPC 1 and PEDC Units 1 and 2 experienced forced outages, although they were able to synchronize back to the grid within the billing period. Aside from several geothermal plants that were already on outage prior to the billing period, PGPP Unit 3 was placed on maintenance outage during the period.

Table 13. ***Major Plant Outages, May 2012 - Visayas***

Plant/Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Remarks
			Geothermal Plants		
PGPP2 Unit 3	19.56	5/2/2012 0:02	5/19/2012 6:18	17.26	Unit on PMS
Mahanagdong B1	7	2/19/2012 3:01			Steam supply deficiency
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		
PEDC 1	83.7	5/2/2012 13:06	5/2/2012 19:34	0.27	Affected by the tripping of PECO 20MVA transformer
PEDC 2	83.7	5/2/2012 13:06	5/2/2012 16:38	0.15	Affected by the tripping of PECO 20MVA transformer
Kepco Salcon 1	103	5/10/2012 6:13	5/10/2012 13:10	0.29	Tripped-Boiler drum pressure high
Cebu TPP1	45	5/14/2012 0:33	5/23/2012 10:46	9.43	Semi annual PMS
Cebu TPP2	50.8	5/25/2012 2:26			Boiler tube leak

Visayas region which primarily consists of geothermal, coal, and oil based plants showed minimal monthly planned outage factor, except in January and February billing periods. It was noted during those billing periods that PEDC 1 conducted annual preventive maintenance (APM) in January while CEDC 3 and PEDC 2 also underwent APM in February. Consistently, oil based plants showed 2.4 percent outage factor because PB 101 Units 1 and 4 were still on engine overhauling since last year.

Figure 7. ***Planned Outage Factor – Visayas***

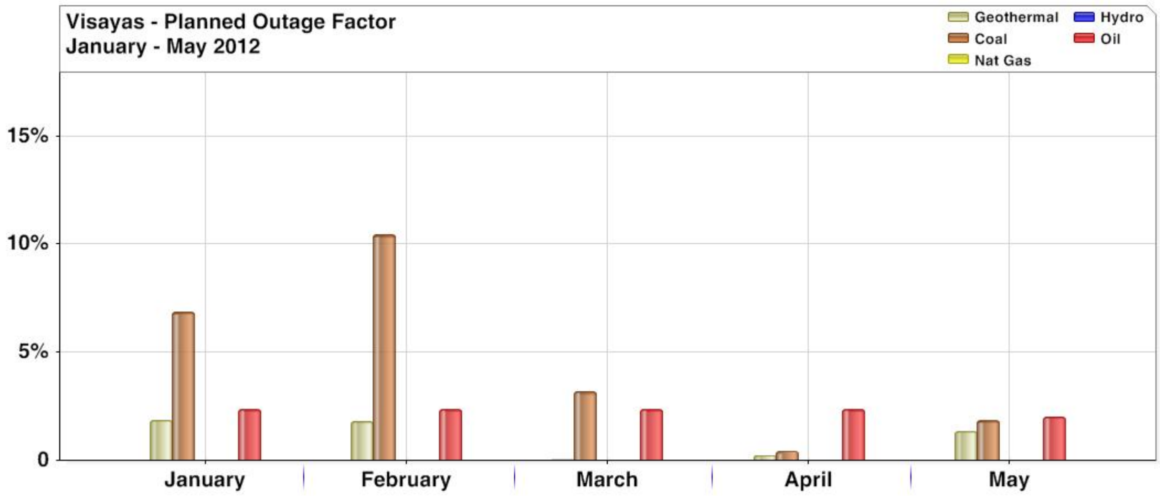


Table 14. ***Planned Outage Factor - Visayas***

Visayas	Geothermal	Coal	Oil
January	1.9%	6.8%	2.4%
February	1.8%	10.4%	2.4%
March	0.1%	3.2%	2.4%
April	0.2%	0.4%	2.4%
May	1.3%	1.8%	2.0%

In Figure 8 and Table 15, all plant types registered less than 5 percent forced outage factor, except for coal plants when its outage factor went as high as 10 percent in March due to multiple forced outages of PEDC CFTPP, KSPC 1, and Cebu TPP1. During the May billing period, geothermal plants recorded the highest forced outage factor in Visayas brought about by the forced outages of Leyte A and Tongonan GPP..

Figure 8. Forced Outage Factor – Visayas

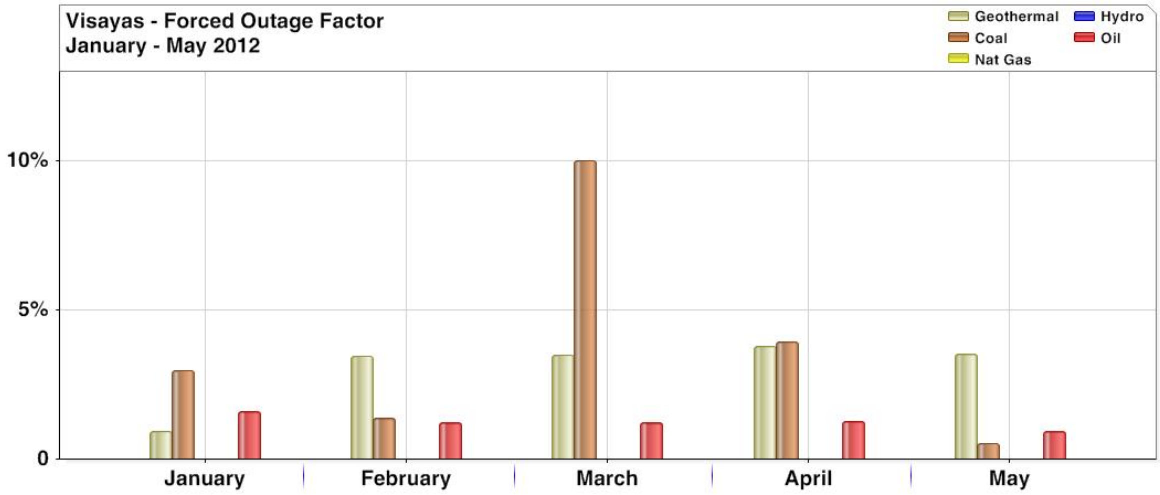


Table 15. Forced Outage Factor - Visayas

Visayas	Geothermal	Coal	Oil
January	0.9	3.0	1.6
February	3.5	1.4	1.2
March	3.5	10.0	1.2
April	3.8	3.9	1.3
May	3.5	0.5	0.9

III. Market Price Outcome

The resulting market prices[6] throughout the billing period were relatively higher than the previous billing period. The average price of PhP6,835/MWh was significantly higher by 84.3 percent than the previous billing period's PhP3,710/MWh and by 15 percent than last year's PhP5,946/MWh *(Table 16)*. The highest price recorded was PhP63,092/MWh on May 9 at trading interval 1400H and the lowest was PhP1/MWh.

The increase in market prices was attributed to the tight demand and supply conditions that were observed during the period. Demand increased with the effect of summer while supply was limited due to unexpected outages of large coal-fired plants as well as reduced hydro availability. With lower available capacity from coal and hydro power plants, the more

[6] 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.

expensive oil-based plants were scheduled for dispatch and accordingly set the price, particularly during the peak hours.

Figure 9. Market Price Trend, May 2012

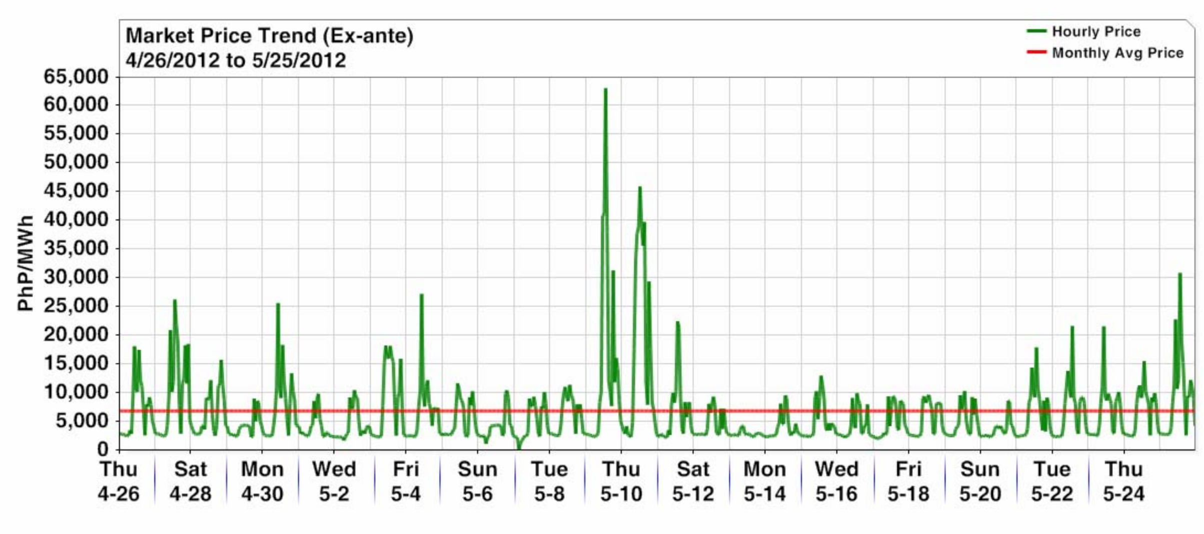


Figure 10. Market Price Trend - Luzon, May 2012

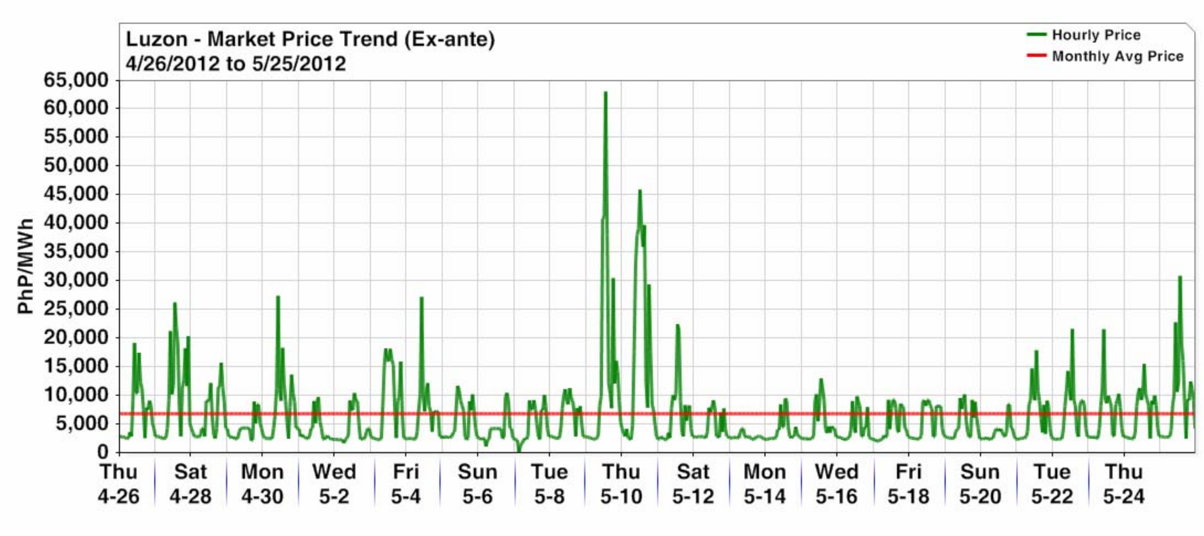
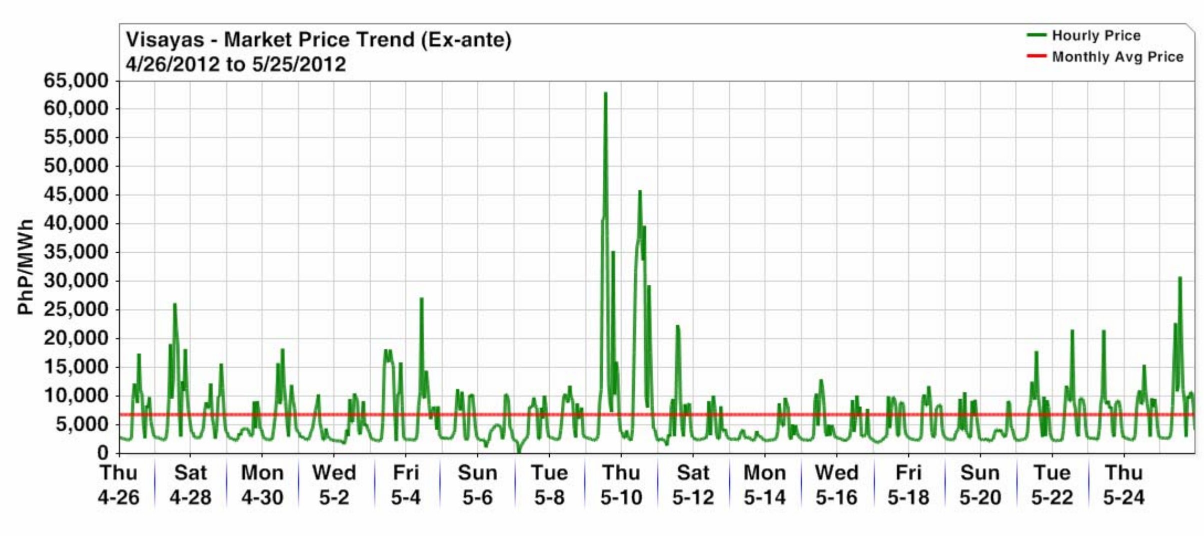


Figure 11. Market Price Trend - Visayas, May 2012



Comparing the regional prices from the previous billing period, the average prices significantly increased by 83.8 percent (PhP3,719/MWh to PhP6,835/MWh) in Luzon and 87 percent (PhP3,660/MWh to PhP6,845/MWh) in Visayas *(Table 16)*.

Table 16. Market Price Summary, May 2012, April 2012, and May 2011

	May 2012 (In PhP/MWh)			April 2012 (In PhP/MWh)			May 2011 (In PhP/MWh)			% M-on-M Change (Apr - May 2012)			% Y-on-Y Change May 2011 - May 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Luz-Vis	63,092	1	6,837	21,814	0	3,710	61,703	0	5,946	189.2		84.3	2.3		15.0
Luzon	63,092	1	6,835	25,337	0	3,719	62,125	0	6,008	149.0		83.8	1.6		13.8
Visayas	63,092	1	6,845	18,452	0	3,660	59,489	0	5,600	241.9		87.0	6.1		22.2

The price distribution in Figure 12 shows the price movements during the billing period compared with previous billing period and same billing period last year. The frequency of prices falling within the price range of PhP2,000/MWh to PhP4,000/MWh notably decreased from 75.3 percent in April to 48.6 percent in May. Correspondingly, prices falling within the price level of PhP8,000/MWh to PhP10,000/MWh and above PhP10,000/MWh increased from 4.6 percent to 16 percent and 2.5 percent to 14.2 percent, respectively *(Table 17).* Likewise, prices above Php 20,000 occurred 3.3 percent of the time during the billing period, a notable increase from previous billing period's 0.3 percent.

Figure 12. Market Price Distribution, May 2012, April 2012, and May 2011

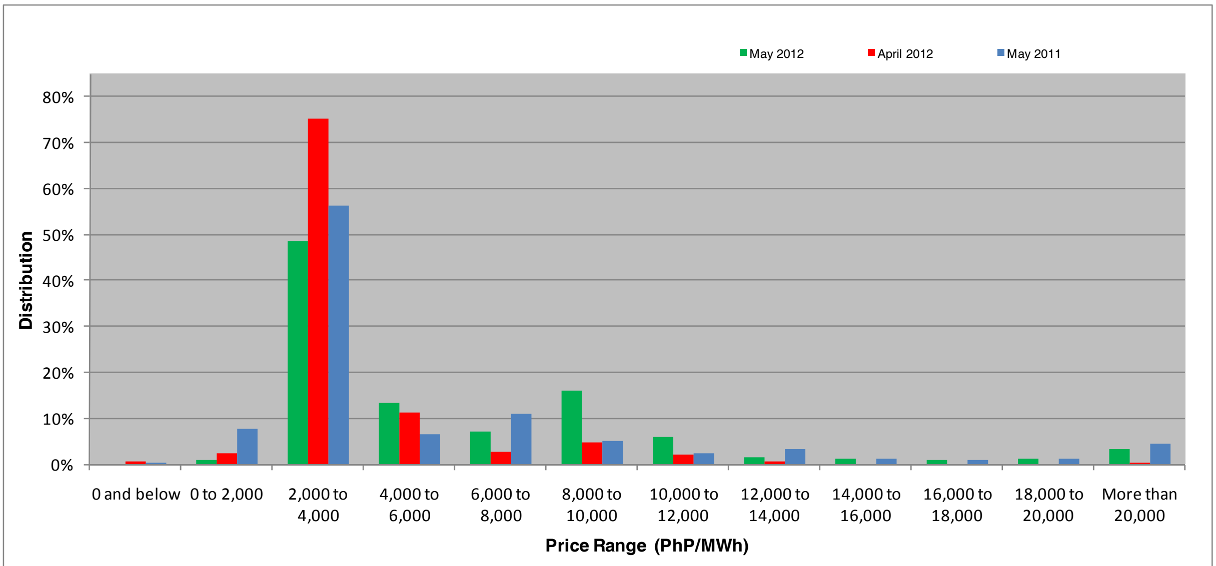


Table 17. Market Price Distribution, May 2012, April 2012, and May 2011

Price Range (PhP/MWh)	% Distribution		
	May 2012	April 2012	May 2011
0 and below	0.0	0.7	0.4
0 to 2,000	0.8	2.4	7.6
2,000 to 4,000	48.6	75.3	56.3
4,000 to 6,000	13.2	11.3	6.5
6,000 to 8,000	7.2	2.7	11.0
8,000 to 10,000	16.0	4.6	5.1
10,000 to 12,000	6.0	2.2	2.4
12,000 to 14,000	1.5	0.7	3.2
14,000 to 16,000	1.3	0.0	1.1
16,000 to 18,000	1.0	0.0	1.0
18,000 to 20,000	1.1	0.0	1.1
More than 20,000	3.3	0.3	4.3

The average price in Luzon was 0.1 percent lower than the average price in Visayas.

Table 18. Regional Price Summary, May 2012, April 2012, and May 2011

	Luzon (In PhP/MWh)			Visayas (In PhP/MWh)			% Difference		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
May 2012	63,092	1	6,835	63,092	1	6,845	0.0	(1.5)	(0.1)
April 2012	25,337	0	3,719	18,452	0	3,660	37.3		1.6
May 2011	62,125	0	6,008	59,489	0	5,600	4.4		7.3

High Market Prices on 09-10 May 2012

09 May 2012 (1200H-1500H, 1900H)

High market prices exceeding PhP30,000/MWh were observed on 09 May 2012 at trading intervals 1200H-1500H and 1900H. The highest hourly market price of PhP63,092/MWh occurred during the trading day at trading interval 1400H. A tight demand and supply condition was observed during the trading day, which worsened starting 1200H trading interval following the emergency shutdown of Sual Unit 1 due to boiler tube leak.

The ex-ante market prices in trading intervals 1200H-1500H were based on the PSM-applied prices resulting from the occurrence of constraints in Visayas. The ex-post market price in 1400H, on the other hand, was based on the result of a market re-run due to an undergeneration pricing error.

The oil-based plants Bauang and Limay, and coal plant TPC (Sangi) have set the price in the said trading intervals.

10 May 2012 (1000H-1600H)

High market prices still prevailed on 10 May 2012, particularly in trading intervals 1000H-1600H where the prices exceeded PhP30,000/MWh. Undergeneration (generation deficiency) condition was experienced in the market during these trading intervals, which was attributed to the continued outage of Sual Unit 1 as well as the forced outage of KSPC Unit 1 (a coal plant in Visayas) at 0613H-1310H.

PSM-applied prices resulting from the occurrence of constraints in Luzon were used for the ex-ante prices in trading intervals 1300H and 1600H. The ex-ante prices in trading intervals 1000H-1200H, 1400H-1500H and ex-post prices in trading intervals 1000H-1500H were based on the results of the market re-run due to undergeneration pricing errors.

The oil-based plants Bauang and Limay have also set the price in the said trading intervals.

IV. Pricing Errors and Market Intervention

The frequency of the issuance of PEN, PSM application, and market intervention events is shown in Table 19.

Although the occurrences of pricing errors in Luzon during ex-ante process significantly dropped from last month's 77 percent, they remained high at 53.5 percent (corresponding to 385 trading intervals). Such occurrences were mainly due to the violation of the contingency N-1 requirement at MERALCO interchange substations in Araneta, Balintawak, Dolores and

Zapote. Meanwhile, the decrease in the occurrences of pricing errors during the billing period is attributed to the less occurrence of contingency constraint violation in the Zapote interchange substation following the re-energization of Zapote Transformer 1 on 29 April 2012.

System-wide pricing errors were issued in 13 trading intervals during ex-ante process due to undergeneration *(generation deficiency)* conditions, MMS Input data concerns, and artificial load shedding (value of lost load) at MERALCO loads in Araneta, Dolores and Zapote.

The ex-post market results, on the other hand, indicated system-wide pricing errors in 22 trading intervals due to undergeneration conditions and MMS input data concerns.

System-wide application of the PSM was noted in 40 trading intervals during ex-ante. The same was mainly due to the constraints at Bauang-BPP, Naga-Quiot, and Naga-Cebu lines.

Likewise noteworthy is the absence of market intervention in the past two months.

Table 19. PEN, PSM and MI Summary, May 2012

	Luz-Vis		Luzon		Visayas		Total	
	Freq.	% of Time	Freq.	% of Time	Freq.	% of Time	Freq.	% of Time
PEN (RTD)	13	1.8	385	53.5	1	0.1	398	55.3
PEN (RTX)	22	3.1		-		-	22	3.1
PSM (RTD)	40	5.6		-		-	40	5.6
PSM (RTX)	7	1.0		-		-	7	1.0
MI		-		-		-		-

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

Figure 13 and Table 20 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. Results showed no significant relationship between prices above PhP10,000/MWh and demand.

Figure 13. Price and Demand Relationship, May 2012, April 2012, and May 2011

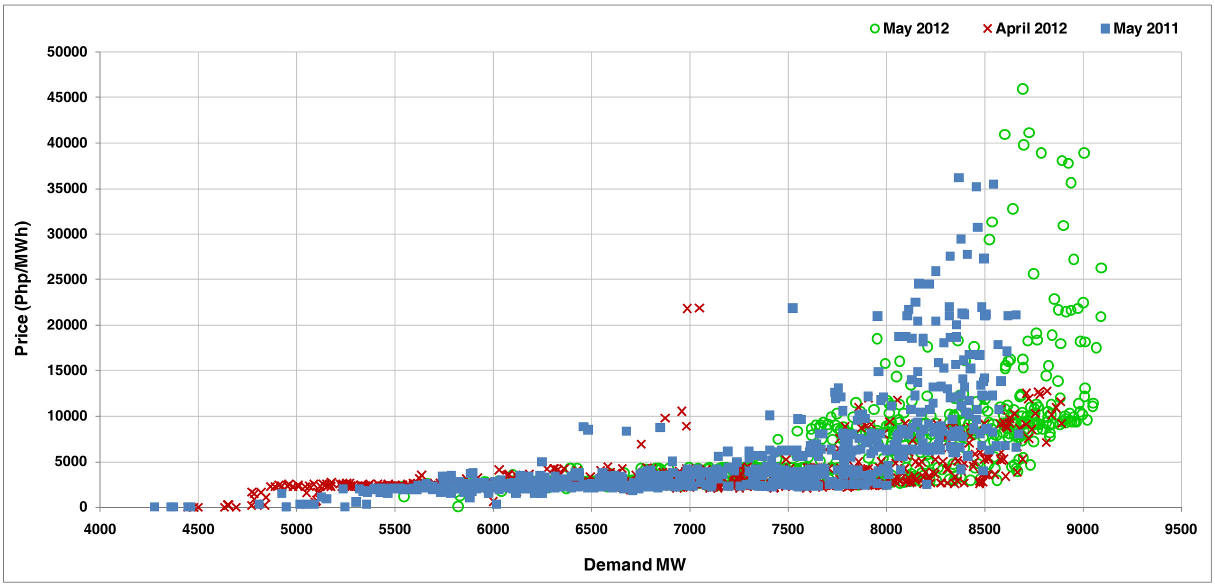


Table 20. Price and Demand Relationship, May 2012, April 2012, and May 2011

	May 2012	April 2012	May 2011	% M-on-M Change	% Y-on-Y Change
All Prices	0.6093	0.5652	0.6974	7.8	(12.6)
Prices >= PhP10,000	0.3021	-0.6422	0.4355	(147.0)	(30.6)

V. HVDC Scheduling

Although the transfer capability of the HVDC going to Luzon was set by NGCP-SO to 200 MW during certain trading intervals on 14-16 May 2012, no occurrences of constraints was noted during the billing period, unlike in the previous billing period when constraints in the HVDC occurred 4 percent of both ex-ante and ex-post runs.

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

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

Notes: 1\ with price separation

Table 22. Summary of HVDC Limits Imposed by NGCP-SO and Results of HVDC Schedules (Ex-ante and Ex-post), 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 23. Summary of HVDC Limits Imposed by NGCP-SO and Results of HVDC Schedules (Ex-ante and Ex-post), May 2011

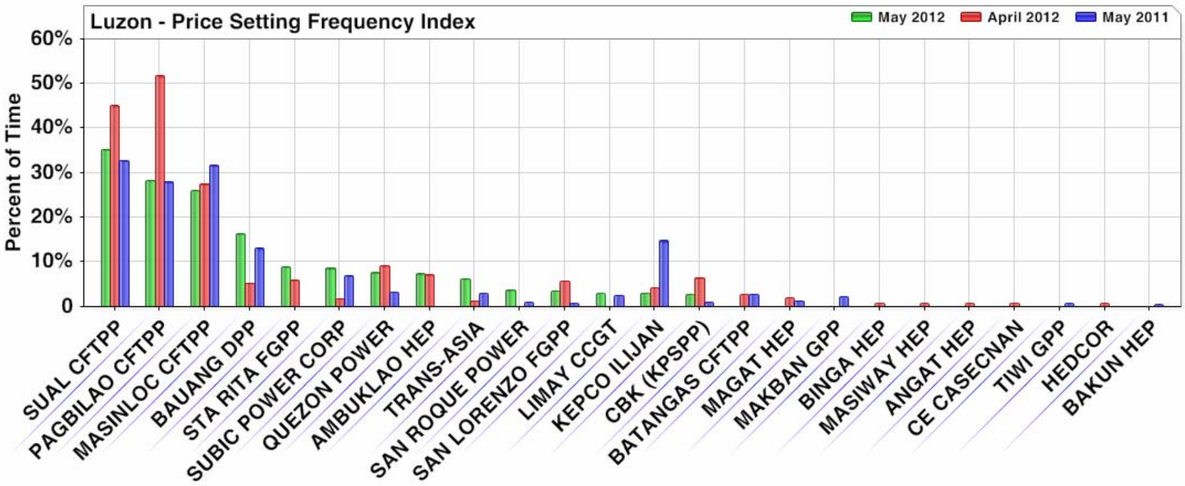
Results of HVDC Scheduling	HVDC Limit during Ex-ante (Visayas/Luzon)					HVDC Limit during Ex-post (Visayas/Luzon)				
	150/150	150/300	150/440	70/440	Total	150/150	150/300	150/440	70/440	Total
Visayas to Luzon	9	52	548	1	610	9	52	540	1	602
Limit Not Maximized	*1*	*36*	*548*	*1*	*586*	*1*	*35*	*540*	*1*	*577*
Limit Maximized 1	*8*	*16*			*24*	*8*	*17*			*25*
Luzon to Visayas			20		20			27		27
Limit Not Maximized			*20*		*20*			*27*		*27*
TOTAL	9	52	568	1	630	9	52	567	1	629

Notes: 1\ with price separation

VI. Price Setting Plants[7]

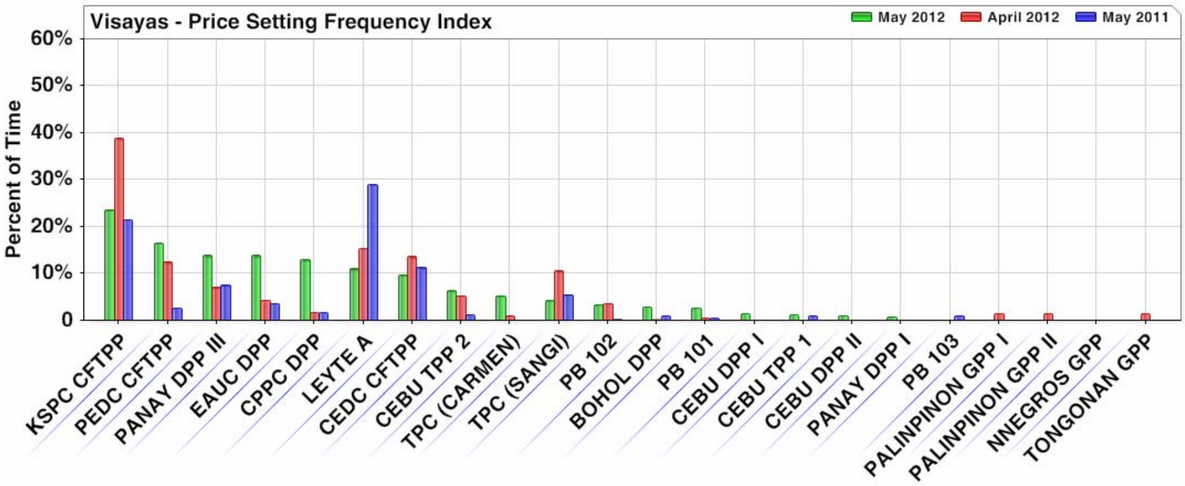
As shown in Figure 14, 14 plants from Luzon have been considered as price setters across all price levels during the billing period. As with the previous billing period and same billing period last year, the coal plants Sual CFTPP (at 35%), Pagbilao CFTPP (at 28%) and Masinloc FTPP (at 26%) remained the top three frequent price setters in spite of the decrease in the plants' PSFIs from the previous billing period. The said decrease in their PSFI is associated with the higher level of market prices during the period. Correspondingly, this translated to the increase in the PSFI of oil-based plants in Luzon and Visayas.

Figure 14. Price Setting Frequency Index (Luzon Plants), May 2012, April 2012, and May 2011



In Visayas *(Figure 15),* 19 plants have been considered as price setters across all price levels with coal plants KSPC CFTPP (at 23%), PEDC CFTPP (at 16%), and other oil plants PANAY DPP III (at 14%), EAUC DPP (at 14%) and CPPC DPP (at 13%) as the most frequent price setters.

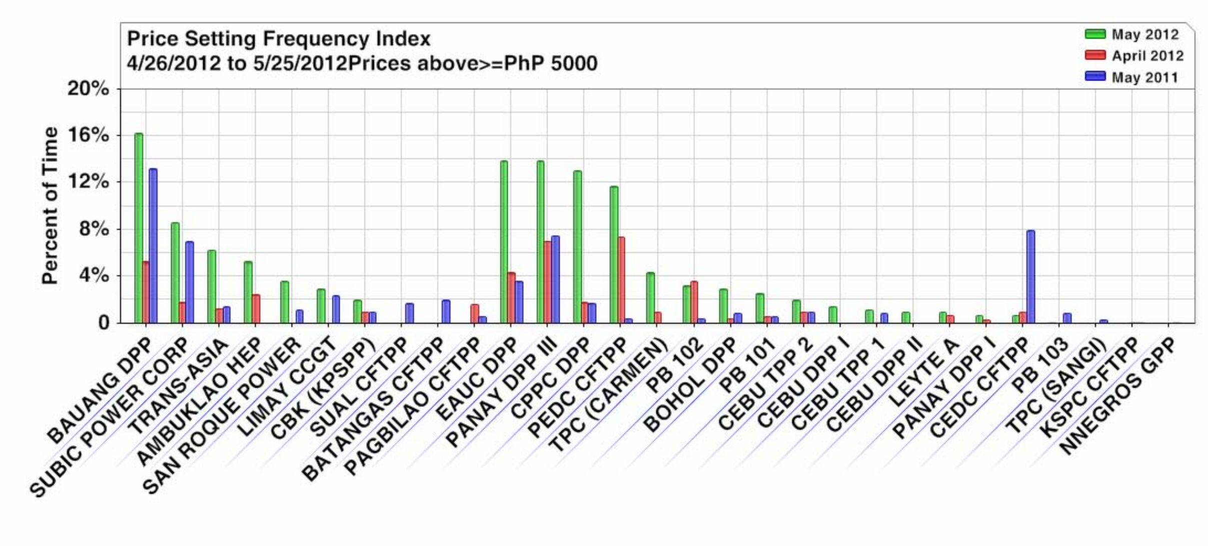
Figure 15. Price Setting Frequency Index (Visayas Plants), May 2012, April 2012, and May 2011



[7] 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.

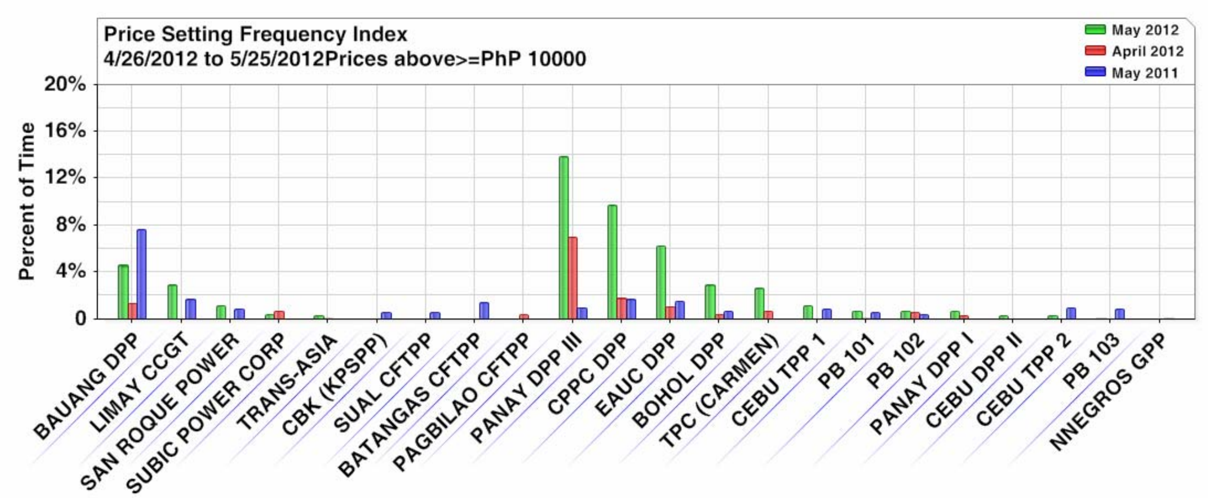
Looking at the PhP5,000/MWh and above price range, the number of price setters increased to 23 plants, composed of 7 plants from Luzon and 16 plants from Visayas *(Figure 16).* The oil-based plants Bauang (at 16%), SUBIC power (at 9%) and TRANS-ASIA (at 6%) topped the price setting plants from Luzon. Meanwhile, the oil-based plants EAUC DPP (at 14), PANAY DPP III (at 14) and CPPC DPP (at 13) were the top price setting plants from Visayas.

Figure 16. ***Price Setting Frequency Index (PhP5,000 and Above), May 2012, April 2012, and May 2011***



During the billing period, the number of price setters at the price level of PhP10,000/MWh and above increased to 18 plants, 6 plants from Luzon and 12 plants from Visayas. Oil-based plants PANAY DPP III, CPPC DPP and EAUC DPP were the top 3 price setters.

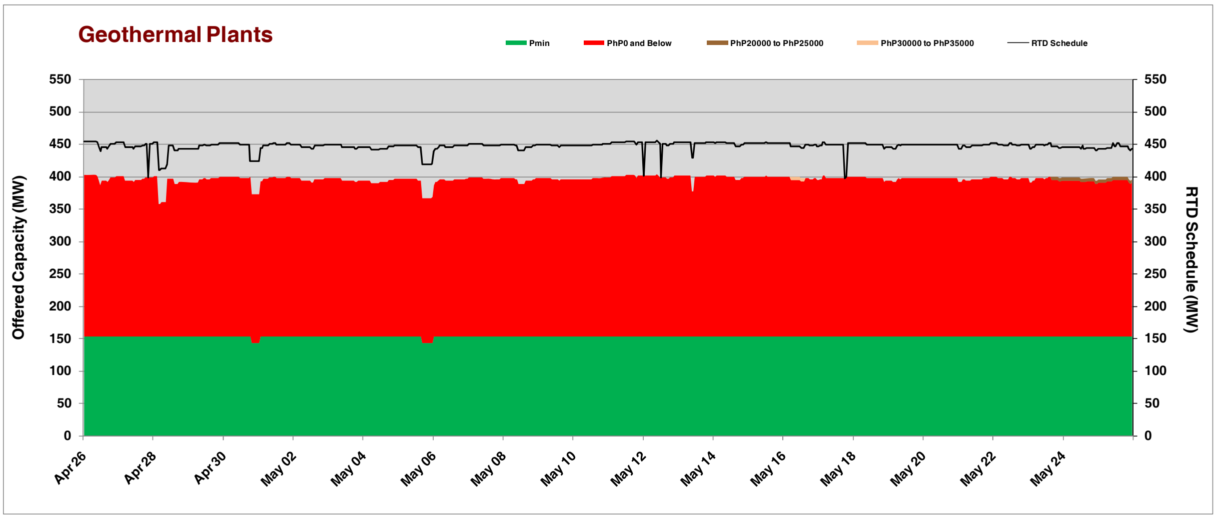
Figure 17. ***Price Setting Frequency Index (PhP10,000 and Above), May 2012, April 2012, and May 2011***



VII. Generator Offer Pattern

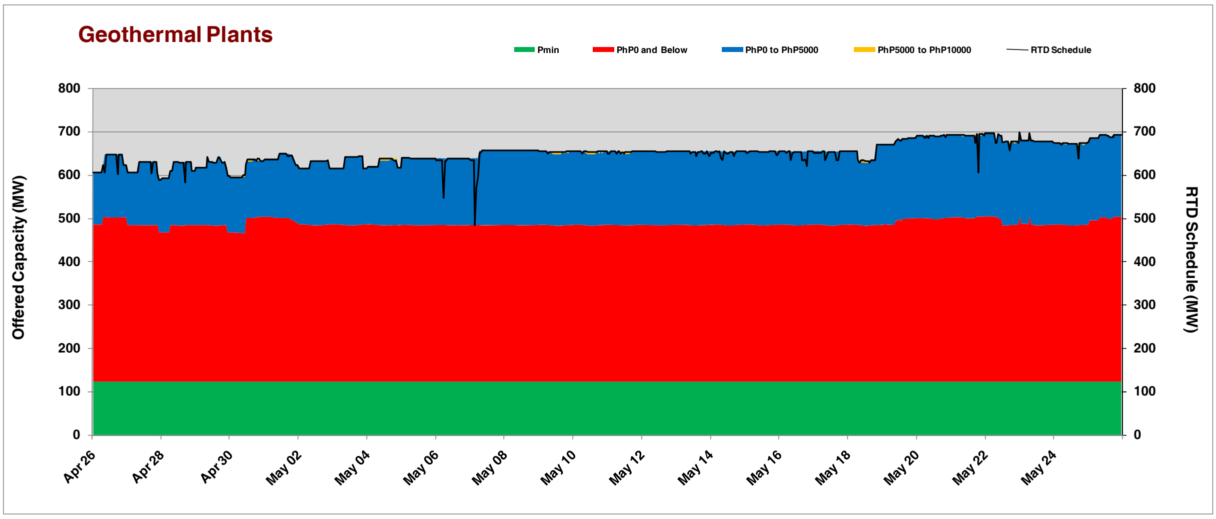
Geothermal plants in Luzon had the lowest price offer among the plant resources. It was noted that most of the time, the offered capacities were priced at PhP0.00/MW and below *(Figure 18)*. Consequently, about 99.8 percent of the offered capacity of the geothermal plants in Luzon was scheduled for dispatch. Likewise, it is important to note that the reason why the RTD schedule is greater than the offered capacity by an average of 51 MW may be attributed to the fact that during this period, the Bacman G01 continued to be scheduled for dispatch through the imposition of security limits by NGCP-SO in compliance with the commercial operation requirements (commissioning test).

Figure 18. Geothermal Plants Offer Pattern (Luzon), May 2012



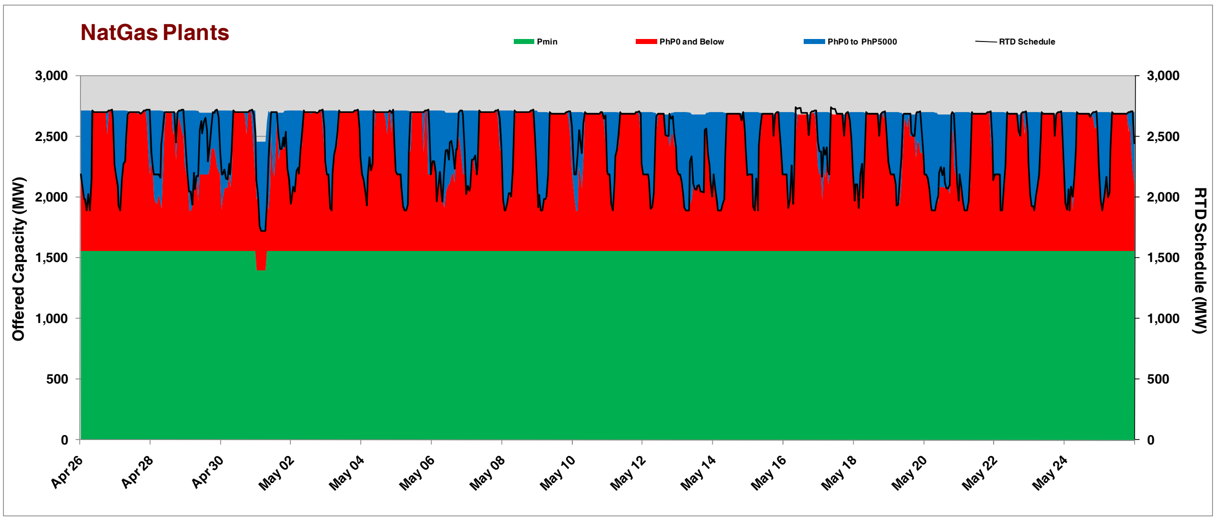
On the other hand, the offer prices of the geothermal plants in Visayas were mostly in the range of PhP0/MW to PhP5,000/MW *(Figure 19)*.

Figure 19. Geothermal Plants Offer Pattern (Visayas), May 2012



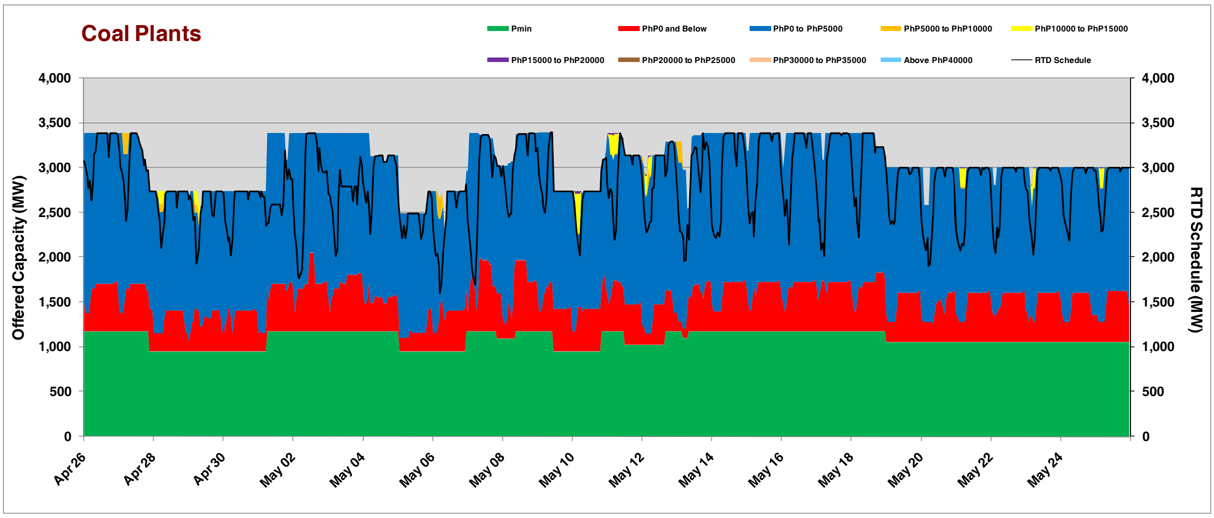
The Offer prices of natural gas plants in Luzon remained below PhP5,000/MW *(Figure 20).*

Figure 20. Natural Gas Plants Offer Pattern (Luzon), May 2012



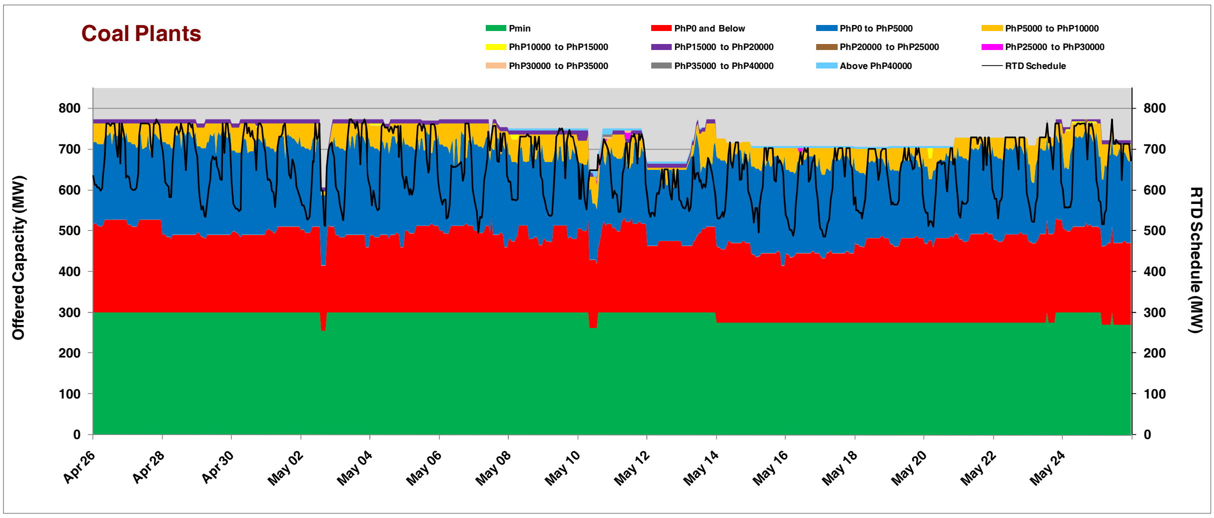
About 99 percent of the offered capacities of coal plants in Luzon (average of 3,084 MW) were priced at PhP5,000/MW and below *(Figure 21)*. The remaining 1 percent of the offered capacities (average of 16 MW) were priced above PhP5,000/MW. The capacity offer of the coal plants notably decreased during the 1st and 2nd week of the billing month due to the unit outages of Sual and on the latter part of the billing period due to the forced outage of Pagbilao.

Figure 21. Coal Plants Offer Pattern (Luzon), May 2012



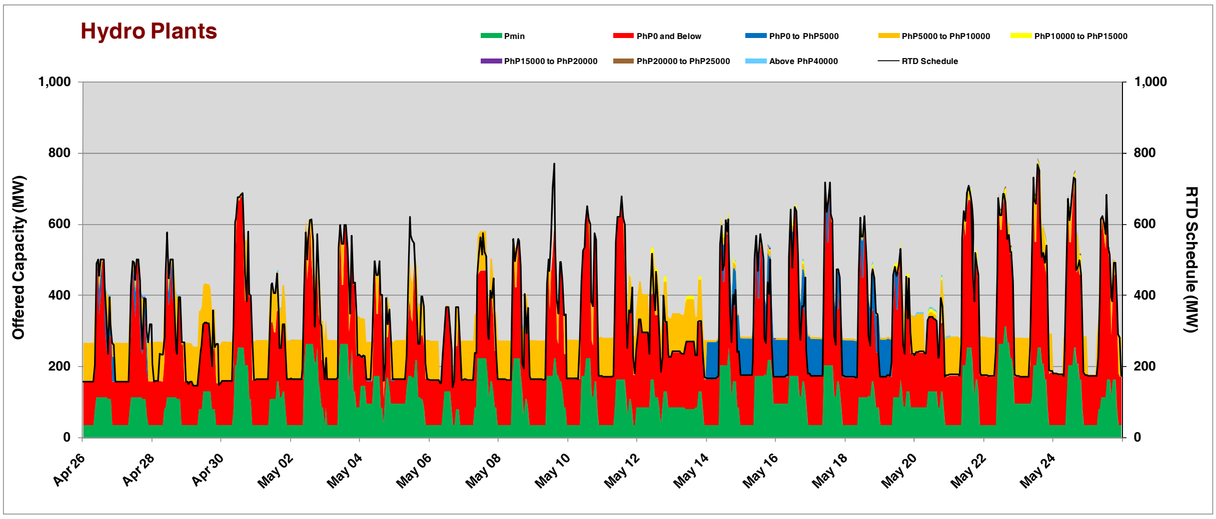
In Visayas, about 93 percent of the offered capacity of coal plants (average of 691 MW) were priced at PhP5,000/MW and below. The other 7 percent of the offered capacities (average of 51 MW) were priced above PhP5,000/MW, reaching as high as PhP60,000/MW *(Figure 22)*.

Figure 22. Coal Plants Offer Pattern (Visayas), May 2012



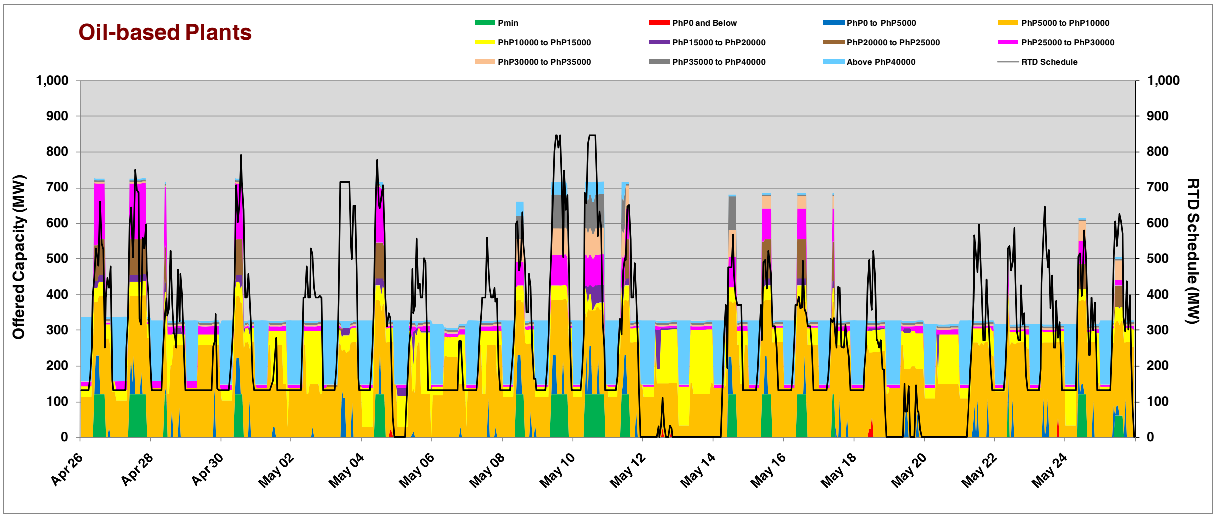
The aggregate hourly offer pattern of hydro plants in Luzon remained highly volatile in terms of capacity and price *(Figure 23).* The capacity offers range from 146 MW to 1,284 MW while the offer prices ranged from negative PhP250/MW to PhP62,000/MW. The limited or non-submission of offers from hydro plants still comprised about 56% of the capacity gap in Luzon.

Figure 23. Hydro Plants Offer Pattern (Luzon), May 2012



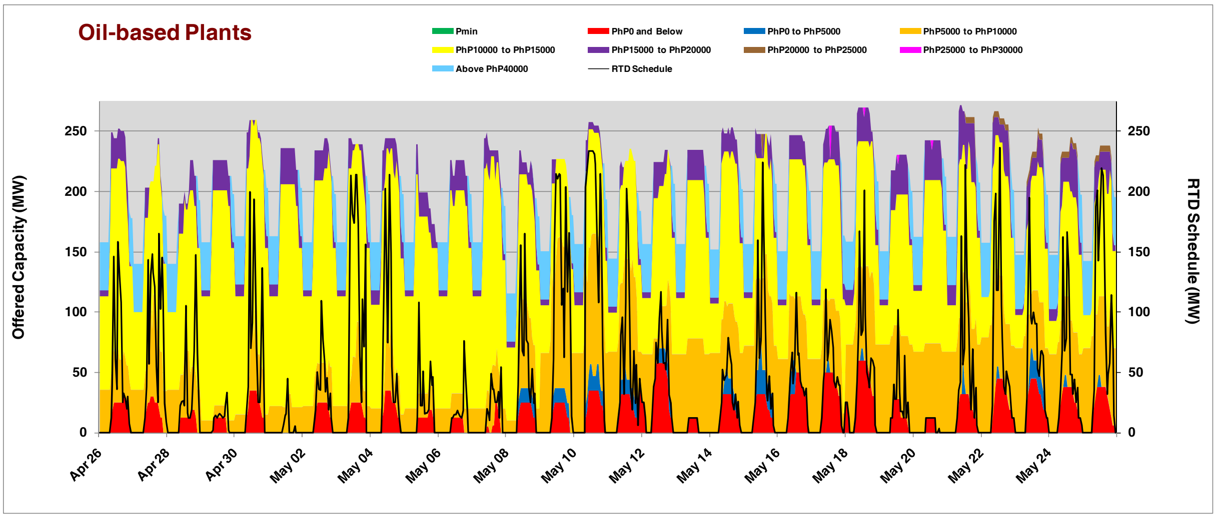
The oil-based plants accounted for 25% of the capacity gap in the region (average of 1,663 MW) due to the limited or non-submission of offers. Bauang submitted offers during peak hours only while Malaya did not submit any offer for the entire period. Notwithstanding Malaya's non-submission of offers, there were certain intervals when it was called to run as MRU by the NGCP-SO. Thus, it can be noted that there were certain trading intervals during the covered period where the RTD schedule is greater than the offered capacity.

Figure 24. Oil-based Plants Offer Pattern (Luzon), May 2012



The capacity and price offers from oil-based plants in Visayas ranged from 71 MW to 265 MW and and PhP0.00/MW to PhP62,000/MW, respectively. The Visayas oil-based plants accounted for 72 percent of the capacity gap in the Visayas.

Figure 25. Oil-based Plants Offer Pattern (Visayas), May 2012



VIII. Capacity Factor

During the current billing period, geothermal plants in Luzon showed more than 100 percent capacity factor based on offered capacity *(Table 24)*. 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. Similarly, calculations indicate that the capacity factor of geothermal plants based on registered capacity and net of outages increased from the previous billing month.

Figure 26. Capacity Factor (Luzon Plants), May 2012

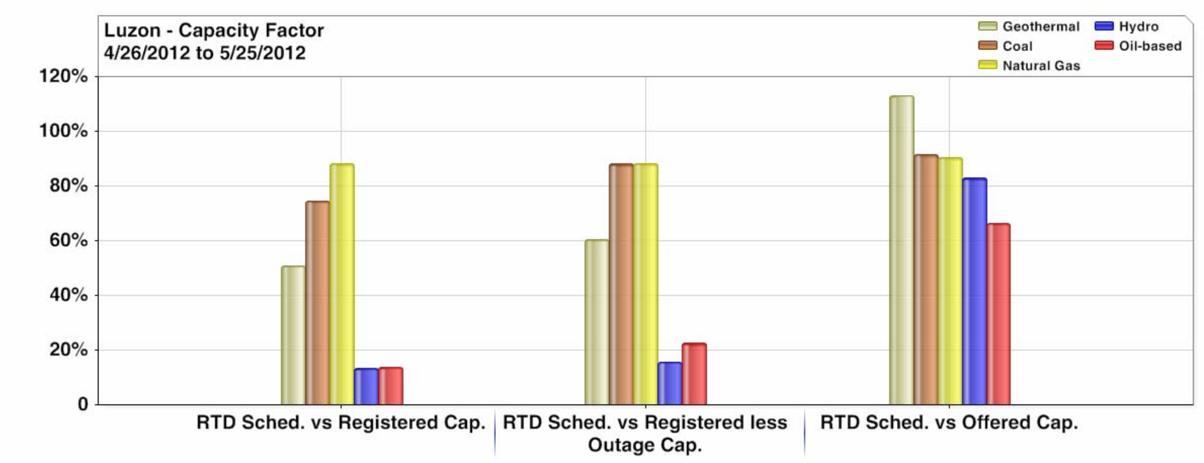


Table 24. Summary of Capacity Factor by Plant Type in Luzon, May 2012, April 2012, and May 2011

Plant Type	RTD Sched. vs Registered Cap.				
	May 2012	April 2012	May 2011	%M-on-M Change	%Y-on-Y Change
Coal	75%	69%	69%	8.4	(0.6)
Natural Gas	88%	81%	90%	8.5	(9.3)
Geothermal	51%	50%	43%	0.7	18.0
Hydro	13%	13%	10%	(1.4)	34.6
Oil-based	14%	7%	9%	98.7	(25.2)
Plant Type	RTD Sched. vs Registered less Outage Cap.				
	May 2012	April 2012	May 2011	%M-on-M Change	%Y-on-Y Change
Coal	88%	78%	76%	13.1	1.7
Natural Gas	88%	82%	91%	7.2	(9.1)
Geothermal	60%	63%	75%	(3.9)	(15.8)
Hydro	16%	16%	11%	(0.7)	37.9
Oil-based	22%	12%	11%	92.4	4.0
Plant Type	RTD Sched. vs Offered Cap.				
	May 2012	April 2012	May 2011	%M-on-M Change	%Y-on-Y Change
Coal	92%	81%	83%	12.7	(2.7)
Natural Gas	90%	84%	92%	7.7	(8.9)
Geothermal	113%	112%	97%	0.8	15.1
Hydro	83%	57%	92%	45.1	(37.9)
Oil-based	66%	37%	56%	80.4	(34.5)

Table 25. Capacity Factor by Plant Type in Luzon, May 2012

Plant Type	Total RTD Sched. (MW-Hr)	Total Registered Cap. (MW-Hr)	Total Registered less Outage Cap. (MW-Hr)	Total Offered Cap. (MW-Hr)	Capacity Factors		
					Registered Cap.	Registered less Outage Cap.	Offered Cap.
	(A)	(B)	(C)	(D)	(A / B)	(A / C)	(A / D)
Coal	2,042,766	2,741,040	2,322,161	2,231,858	75%	88%	92%
Natural Gas	1,758,122	1,993,752	1,991,898	1,943,534	88%	88%	90%
Geothermal	321,646	633,384	532,500	284,833	51%	60%	113%
Hydro	232,197	1,756,224	1,477,093	280,184	13%	16%	83%
Oil-based	181,214	1,327,680	808,620	273,214	14%	22%	66%

The calculation showed improvement in the capacity factors of the oil-based and coal plants in Visayas. On the other hand, calculations showed a decrease in the capacity factor of geothermal plants *(Figure 27 and Table 26).*

Figure 27. Capacity Factor (Visayas Plants), May 2012

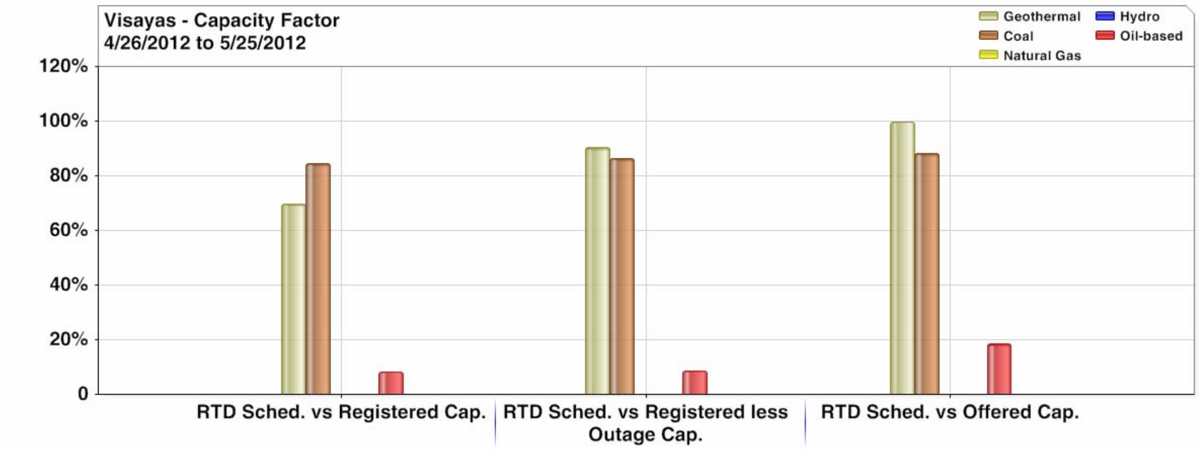


Table 26. Summary of Capacity Factor by Plant Type in Visayas, May 2012, April 2012, and May 2011

Plant Type	RTD Sched. vs Registered Cap.				
	May 2012	April 2012	May 2011	%M-on-M Change	%Y-on-Y Change
Coal	84%	77%	97%	10.0	(20.5)
Geothermal	70%	71%	70%	(2.1)	1.4
Oil-based	8%	3%	5%	209.3	(46.2)
Plant Type	RTD Sched. vs Registered less Outage Cap.				
	May 2012	April 2012	May 2011	%M-on-M Change	%Y-on-Y Change
Coal	86%	80%	97%	7.8	(10.6)
Geothermal	90%	91%	70%	(0.7)	28.8
Oil-based	9%	3%	5%	209.1	72.4
Plant Type	RTD Sched. vs Offered Cap.				
	May 2012	April 2012	May 2011	%M-on-M Change	%Y-on-Y Change
Coal	88%	82%	100%	8.1	(18.8)
Geothermal	100%	99%	97%	0.7	2.2
Oil-based	18%	6%	15%	213.7	(60.5)

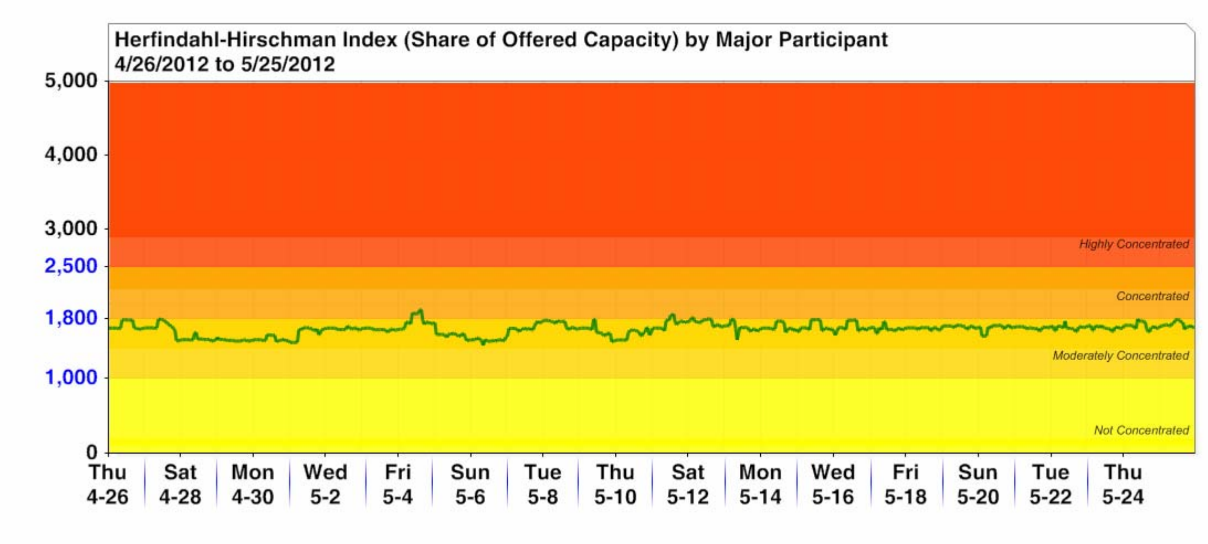
Table 27. Capacity Factor by Plant Type in Visayas, May 2012

Plant Type	Total RTD Sched. (MW-Hr)	Total Registered Cap. (MW-Hr)	Total Registered less Outage Cap. (MW-Hr)	Total Offered Cap. (MW-Hr)	Capacity Factors		
					Registered Cap.	Registered less Outage Cap.	Offered Cap.
	(A)	(B)	(C)	(D)	(A / B)	(A / C)	(A / D)
Coal	471,501	558,144	545,890	534,628	84%	86%	88%
Geothermal	467,016	670,896	516,947	468,265	70%	90%	100%
Oil-based	27,227	328,807	317,724	147,557	8%	9%	18%

IX. **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 28)*.

Figure 28.** **Hourly HHI based on Offered Capacity by Major Participant Grouping, May 2012



X. **Compliance Monitoring**

Compliance to Must Offer Rule

Continued failure by generator trading participants to submit their maximum available capacity was observed throughout the covered billing period. About 62 percent and 53 percent of the total generator-trading intervals[8] in Luzon and Visayas, respectively, had capacity gap[9] during the billing period. Figure 29 and Table 28 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 26 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 66.4 percent followed by geothermal plants at 28.3 percent.

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

Figure 29. Generator-Trading Intervals with Capacity Gap by Resource, May 2012

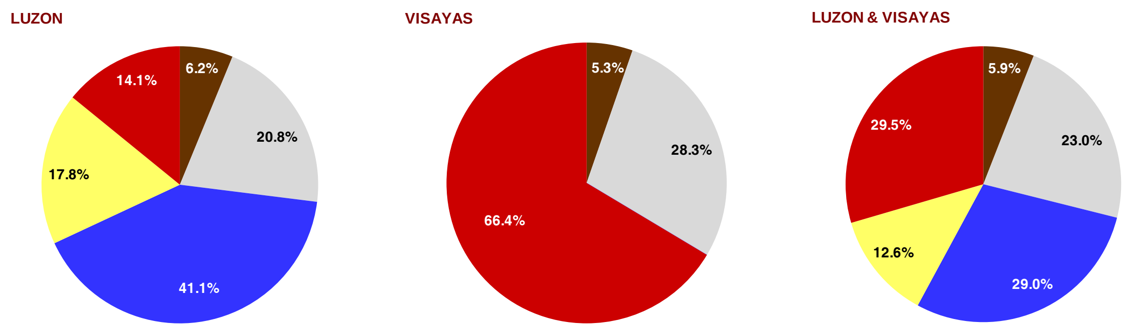
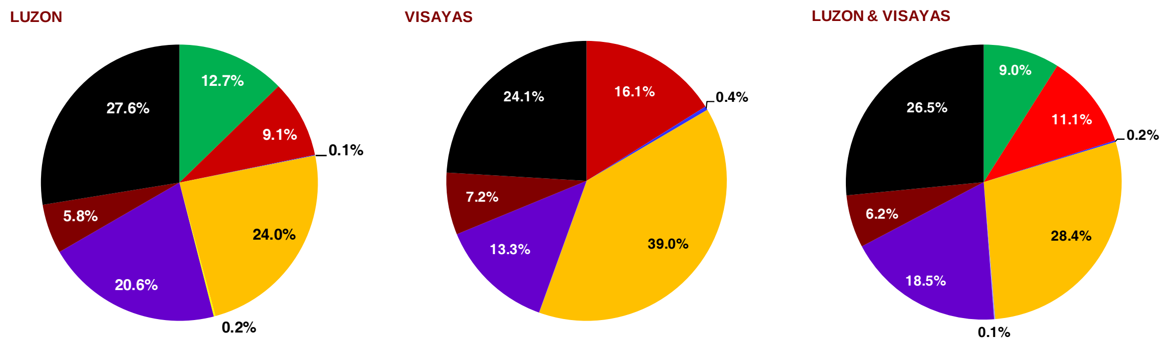


Table 28. Generator-Trading Intervals with Capacity Gap by Resource, May 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Coal	1,505	6.2%	536	5.3%	2,041	5.9%
Geothermal	5,031	20.8%	2,855	28.3%	7,886	23.0%
Hydro	9,957	41.1%	-	-	9,957	29.0%
Natural Gas	4,313	17.8%	-	-	4,313	12.6%
Oil-based	3,425	14.1%	6,710	66.4%	10,135	29.5%
Total	**24,231**	**100.0%**	**10,101**	**100.0%**	**34,332**	**100.0%**

Figure 30 and Table 29 show the breakdown of the generator-trading intervals with capacity gap based on the category of reasons[10] 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 28.4 percent, followed by steam supply concerns at 18.5 percent, and ancillary services at 11.1 percent., Meanwhile, no reasons were provided by the generator trading participants for 26.5 percent of these occurrences..

Figure 30. Generator-Trading Intervals with Capacity Gap by Reason, May 2012



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

Table 29. Generator-Trading Intervals with Capacity Gap by Reason, May 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	3,078	12.7%			3,078	9.0%
Ancillary Services	2,198	9.1%	1,626	16.1%	3,824	11.1%
Start-up/Shutdown	18	0.1%	41	0.4%	59	0.2%
Equipment-related Failure	5,806	24.0%	3,941	39.0%	9,747	28.4%
Commercial Test	45	0.2%			45	0.1%
Steam Supply	5,002	20.6%	1,339	13.3%	6,341	18.5%
Others	1,403	5.8%	724	7.2%	2,127	6.2%
No Reason	6,681	27.6%	2,430	24.1%	9,111	26.5%
Total	**24,231**	**100.0%**	**10,101**	**100.0%**	**34,332**	**100.0%**

Table 30 compares the system capacity gap in May 2012 with the previous month and same month of the previous year. During the three billing periods, hydro and oil-based plants consistently had the highest level of capacity gap. On the average, the current billing period saw an increase of 10.7 percent in the capacity gap from the previous month's 3,032 MW but lower by 20.8 percent compared to the previous year's 3,828 MW.

Table 30. Summary of Capacity Gap by Plant Type (MW), May 2012

Resource Type	May 2012 (In MW)			April 2012 (In MW)			May 2011 (In MW)			% M-on-M Change (Apr - May 2012)			% Y-on-Y Change (May 2011 - May 2012)		
	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
Coal	968	33	140	967	16	154	696	33	295	0.1	108.2	(8.8)	38.9	(52.3)	(47.9)
Natural Gas	144	43	67	141	39	54	310	26	50	2.1	11.6	23.6	(54.4)	51.0	9.4
Geothermal	562	419	486	452	296	364	459	240	348	24.5	41.7	33.6	(1.7)	23.3	4.6
Hydro	2,047	1,321	1,683	1,772	830	1,501	2,013	1,340	1,760	15.5	59.1	12.1	(12.0)	(38.0)	(14.7)
Oil Based	1,136	598	980	1,088	655	959	1,762	1,051	1,545	4.4	(8.7)	2.2	(38.2)	(37.7)	(37.9)
TOTAL	**4,224**	**2,595**	**3,357**	**4,034**	**2,223**	**3,032**	**4,336**	**3,117**	**3,828**	4.7	16.8	10.7	(7.0)	(28.7)	(20.8)

Compliance to RTD Schedule

During the billing period, about 12 percent and 7 percent of the total generator-trading intervals in Luzon and Visayas, respectively, have observed deviations between the real time ex-ante dispatch (RTD) schedule[11] and actual dispatch[12], exceeding the +/-3% tolerance limit[13]. As indicated in Figure 31 and Table 31, the hydro and coal plants recorded the highest occurrences of deviations at 40 percent and 24.1 percent in Luzon, respectively. Likewise, coal plants registered the highest occurrences of deviations at 51.6 percent in Visayas.

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

Figure 31. Generator-Trading Intervals with RTD Deviation by Resource, May 2012

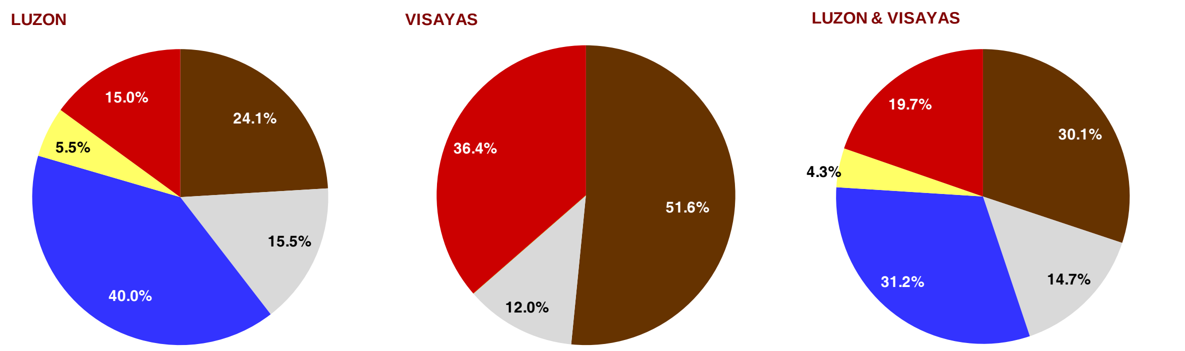


Table 31. Generator-Trading Intervals with RTD Deviation by Resource, May 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Coal	1,141	24.1%	691	51.6%	1,832	30.1%
Geothermal	735	15.5%	161	12.0%	896	14.7%
Hydro	1,896	40.0%	-	-	1,896	31.2%
Natural Gas	262	5.5%	-	-	262	4.3%
Oil-based	710	15.0%	488	36.4%	1,198	19.7%
Total	**4,744**	**100.0%**	**1,340**	**100.0%**	**6,084**	**100.0%**

Illustrated in Figure 32 and Table 32 are the summary of the generator-trading intervals with deviations classified according to the reasons provided by NGCP-SO. In Luzon, 26.1 percent and 15.4 percent of the total generator-trading intervals with deviations were due to reserve utilization and intra-hour variation in demand, respectively. In the case of Visayas, intra-hour variation topped the list at 17.1 percent, followed by non-compliance to dispatch instruction at 12.5 percent. However, reasons for the observed deviations in 40.9 percent and 49.3 percent of the total generator-trading intervals in Luzon and Visayas, respectively, have not been accounted for.

Figure 32. Generator-Trading Intervals with RTD Deviation by Reason, May 2012

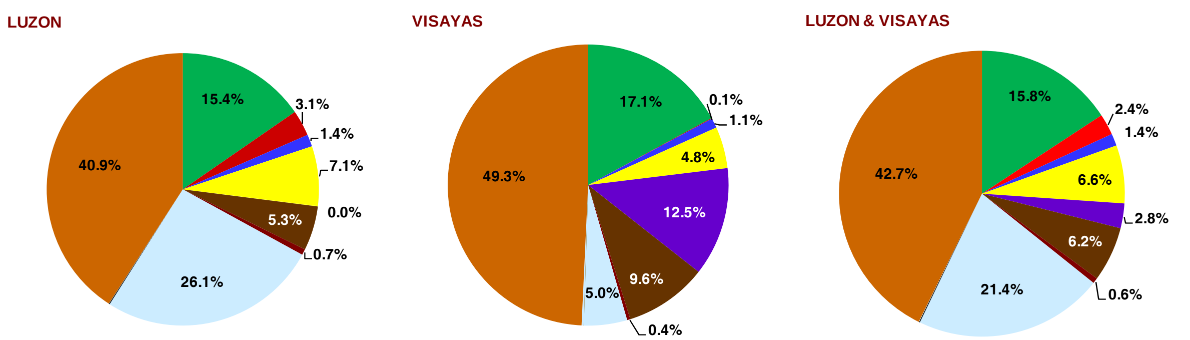


Table 32. Generator-Trading Intervals with RTD Deviation by Reason, May 2012

	Luzon		Visayas		Luzon and Visayas	
	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total	Generator-Trading Intervals	% of Total
Intra-hour Variation	730	15.4%	229	17.1%	959	15.8%
Affected by Non-Compliance of Other Generators	145	3.1%	1	0.1%	146	2.4%
Start-up/Shutdown, Generator/Load Tripping	68	1.4%	15	1.1%	83	1.4%
Generator Problem	336	7.1%	64	4.8%	400	6.6%
Non-Compliance to Dispatch Instruction	2	0.0%	168	12.5%	170	2.8%
Must Run Units	250	5.3%	128	9.6%	378	6.2%
Line Limitation	33	0.7%	5	0.4%	38	0.6%
Reserve Utilization	1236	26.1%	67	5.0%	1,303	21.4%
RTD Discrepancy	6	0.1%		0.0%	6	0.1%
Visayas Requirement		0.0%	3	0.2%	3	0.0%
No Category	1938	40.9%	660	49.3%	2,598	42.7%
Total	**4,744**	**100.0%**	**1,340**	**100.0%**	**6,084**	**100.0%**