Energy Transition Update Philippines

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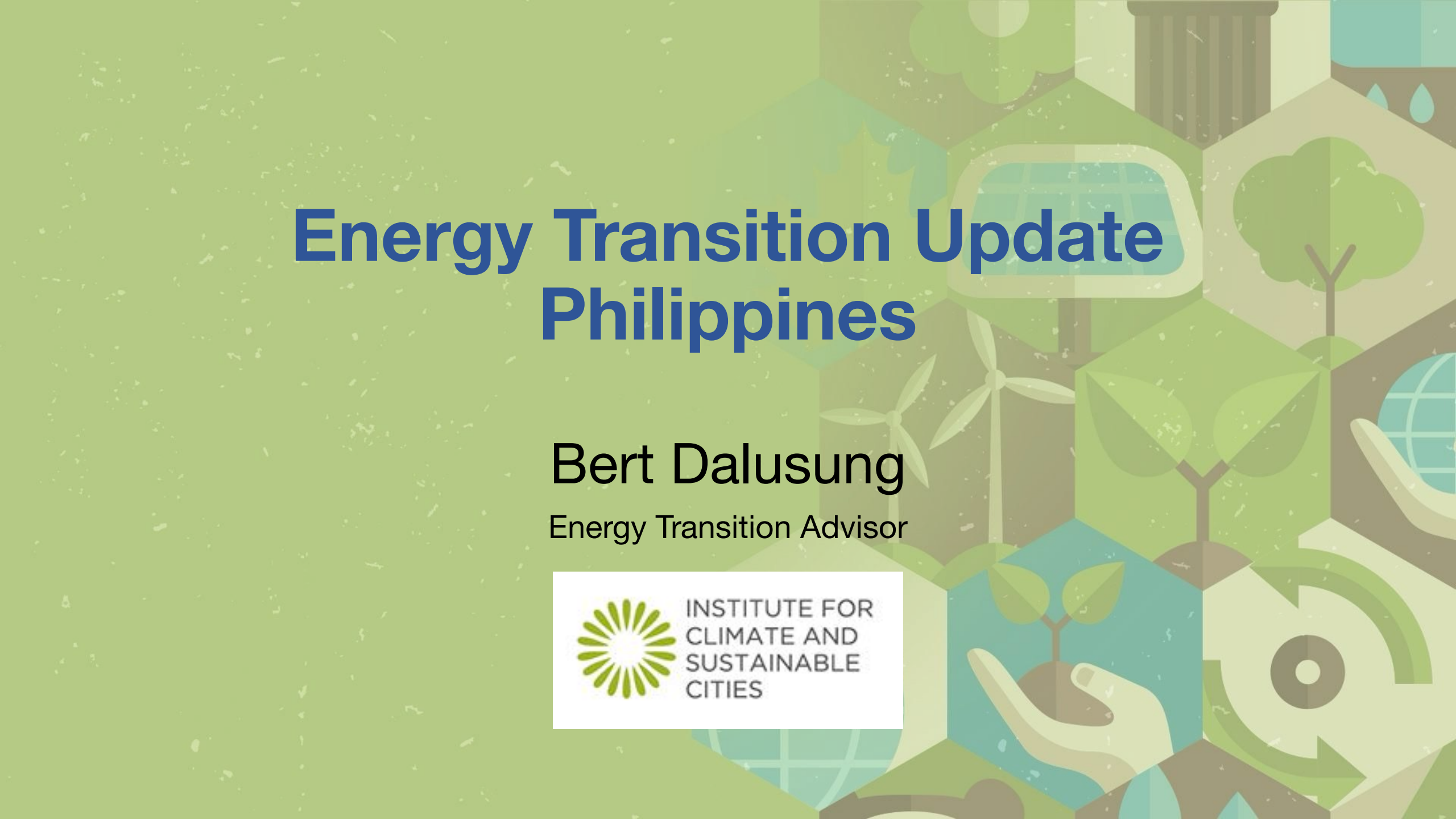
INSTITUTE FOR CLIMATE AND SUSTAINABLE CITIES



ENERGY BALANCE TABLE												
in kTOE												
2019				RENEWABLE ENERGY IN THE PHILIPPINES								
	Coal	Natgas	Oil & Oil Products	Hydro	Geothermal	Solar	Wind	Biomass	Biodiesel	Bioethanol	Electricity	Total
Indigeneous	7,251	3,626	523	2,404	9,162	114	101	7,708	178	169	0	31,237
Imports (+)	16,186	0	22,102	0	0	0	0	0	0	118	0	38,406
Exports (-)	(5,324)	0	(1,520)	0	0	0	0	0	0	0	0	(6,844)
International Marine Bunkers (-)	0	0	(54)	0	0	0	0	0	0	0	0	(54)
International Civil Aviation (-)	0	0	(1,618)	0	0	0	0	0	0	0	0	(1,618)
Stock Change (+/-)	(692)	0	(121)	0	0	0	0	0	9	93	0	(710)
Total Primary Energy Supply	**17,421**	**3,626**	**19,311**	**2,404**	**9,162**	**114**	**101**	**7,708**	**187**	**380**	**0**	**60,416**
Refinery (Crude Run)	0	0	(391)	0	0	0	0	0	0	0	0	(391)
Power Generation (Fuel Input)	(14,555)	(3,409)	(736)	(2,404)	(9,162)	(114)	(101)	(377)	(9)	0	9,101	(21,766)
Transmission/Dist. Loss (-)	0	0	0	0	0	0	0	0	0	0	(822)	(822)
Energy Sector Use & Loss (-)	0	(156)	(224)	0	0	0	0	0	0	0	(743)	(1,123)
Net Domestic Supply	**2,867**	**62**	**17,960**	**0**	**0**	**0**	**0**	**7,332**	**178**	**380**	**7,537**	**36,315**
Statistical Difference												(551)
% Statistical Difference												(2)
Total Final Energy Consumption	**2,867**	**62**	**18,512**	**0**	**0**	**0**	**0**	**7,332**	**178**	**380**	**7,537**	**36,866**
INDUSTRY	**2,673**	**62**	**1,465**	**0**	**0**	**0**	**0**	**1,207**	**15**	**0**	**2,517**	**7,937**
TRANSPORT	**0**	**0**	**12,173**	**0**	**0**	**0**	**0**	**0**	**127**	**380**	**9**	**12,689**
RESIDENTIAL	**0**	**0**	**1,312**	**0**	**0**	**0**	**0**	**5,772**	**0**	**0**	**2,578**	**9,662**
COMMERCIAL	**0**	**0**	**2,339**	**0**	**0**	**0**	**0**	**353**	**33**	**0**	**2,191**	**4,915**
AGRICULTURE	**0**	**0**	**228**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**242**	**474**
OTHERS, NON-ENERGY USE	**194**	**0**	**996**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1,190**
Self-Sufficiency												**51.7**

kTOE: Philippines 2019 Energy Balance Table	Coal	Natural Gas	Oil & Oil Products	Renewable Energy	Electricity	Total
Indigeneous	7,251	3,626	523	19,838	0	31,237
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Total Primary Energy Supply	**17,421**	**3,626**	**19,311**	**20,058**	**0**	**60,416**
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Total Primary Energy Supply	**17,421**	**3,626**	**19,311**	**20,058**	**0**	**60,416**
TPES shares	***29%***	***6%***	***32%***	***33%***		***100%***
Net Domestic Supply	**2,867**	**62**	**17,960**	**0**	**7,537**	**36,315**
Net Domestic Supply shares	***8%***	***0.2%***	***49%***		***21%***	***100%***
Total Final Energy Consumption	**2,867**	**62**	**18,512**	**0**	**7,537**	**36,866**
INDUSTRY	**2,673**	**62**	**1,465**	**1,222**	**2,517**	**7,937**
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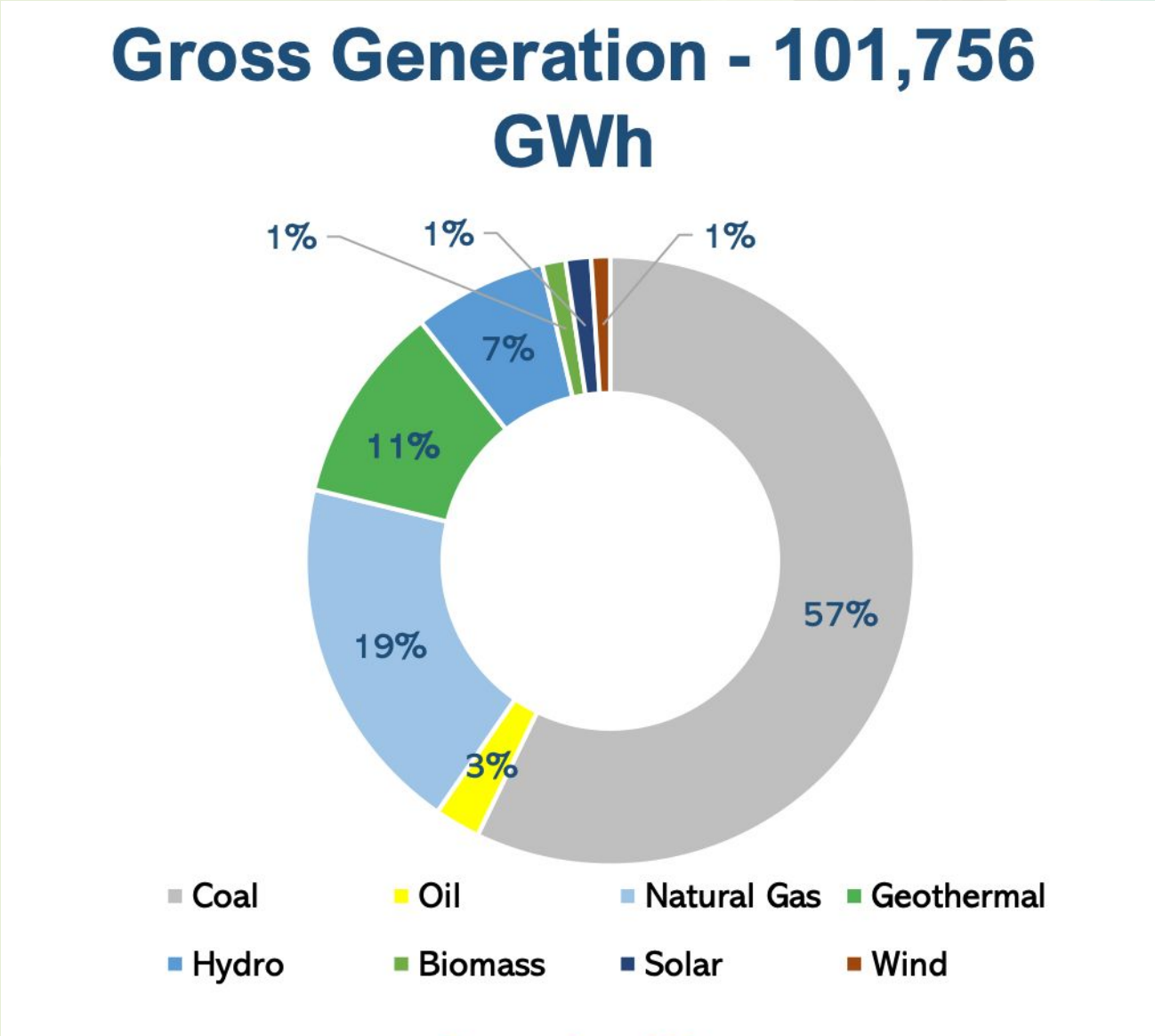
Self-Sufficiency						**51.7**

A key policy action in the energy transition is to move the transport sector away from Oil

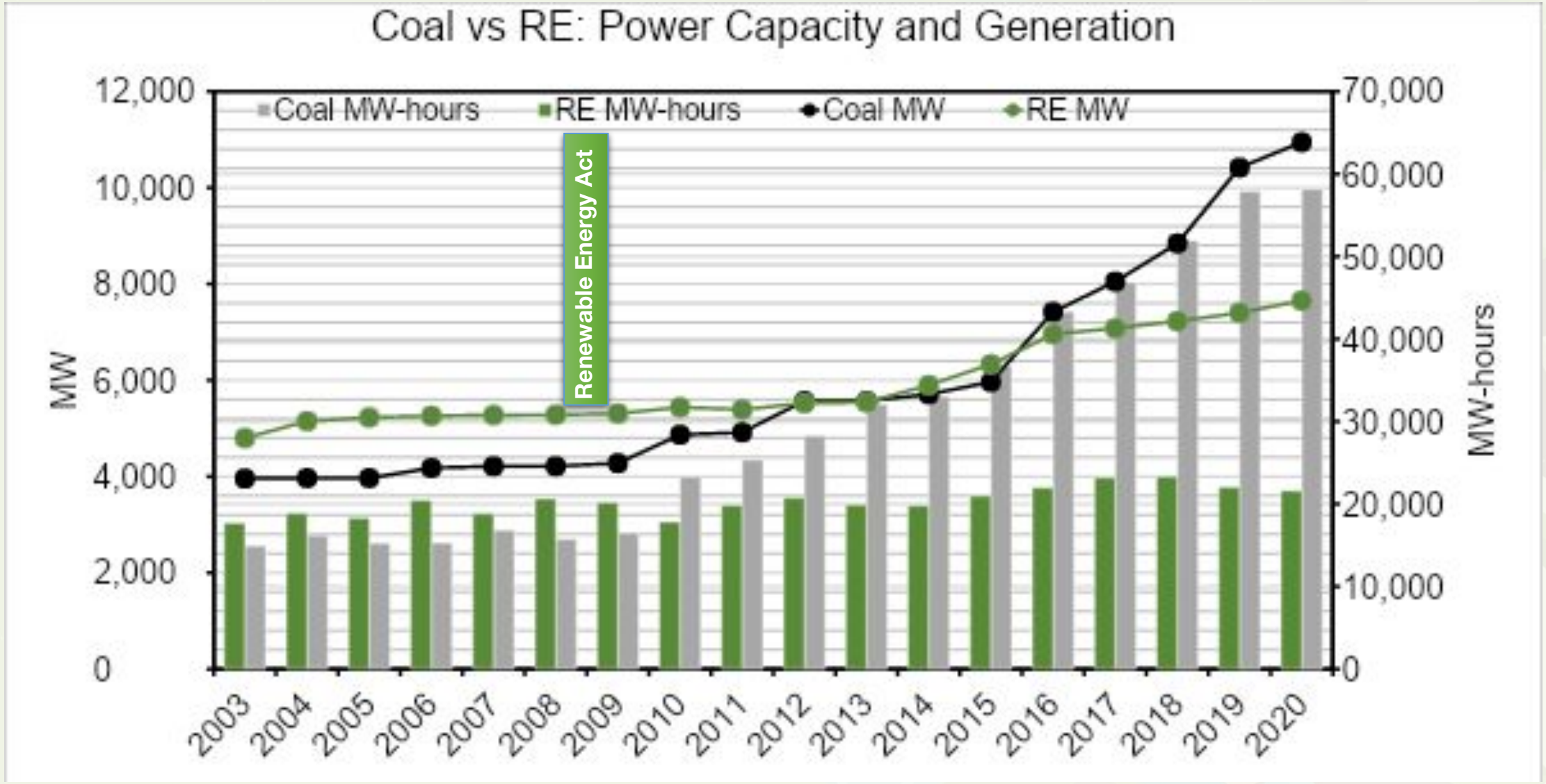
But electricity generation is dominated by Coal at 57% in 2020

Gross generation down by 4% from 106,041 GWh in 2019 to 101,756 GWh in 2020

21% RE share in power generation in 2020



Coal has been the dominant fuel source in electricity



Another key policy action in the energy transition is to move the electricity sector away from Coal

Philippine Historical Electricity Demand

- Robust growth at 5.1% per year between 2009 & 2019 before the pandemic
- High 6.8% growth in Mindanao between 2016 and 2019

Actual	Luzon	Visayas	Mindanao	Philippines
2005	6,479	967	1,149	8,595
2006	6,466	997	1,228	8,691
2007	6,643	1,102	1,241	8,987
2008	6,674	1,176	1,204	9,054
2009	6,928	1,241	1,303	9,472
2010	7,656	1,431	1,288	10,375
2011	7,552	1,481	1,346	10,379
2012	7,889	1,551	1,321	10,761
2013	8,305	1,572	1,428	11,305
2014	8,717	1,636	1,469	11,822
2015	8,928	1,768	1,518	12,215
2016	9,726	1,893	1,653	13,272
2017	10,054	1,975	1,760	13,789
2018	10,876	2.053	1,853	14,782
2019	11,344	2.224	2,013	15,581
2020	11,103	2,201	1,978	15,282
%AACGR	3.66	5.64	3.69	3.91

6.8%

5.1%

Mindanao Growth Drivers

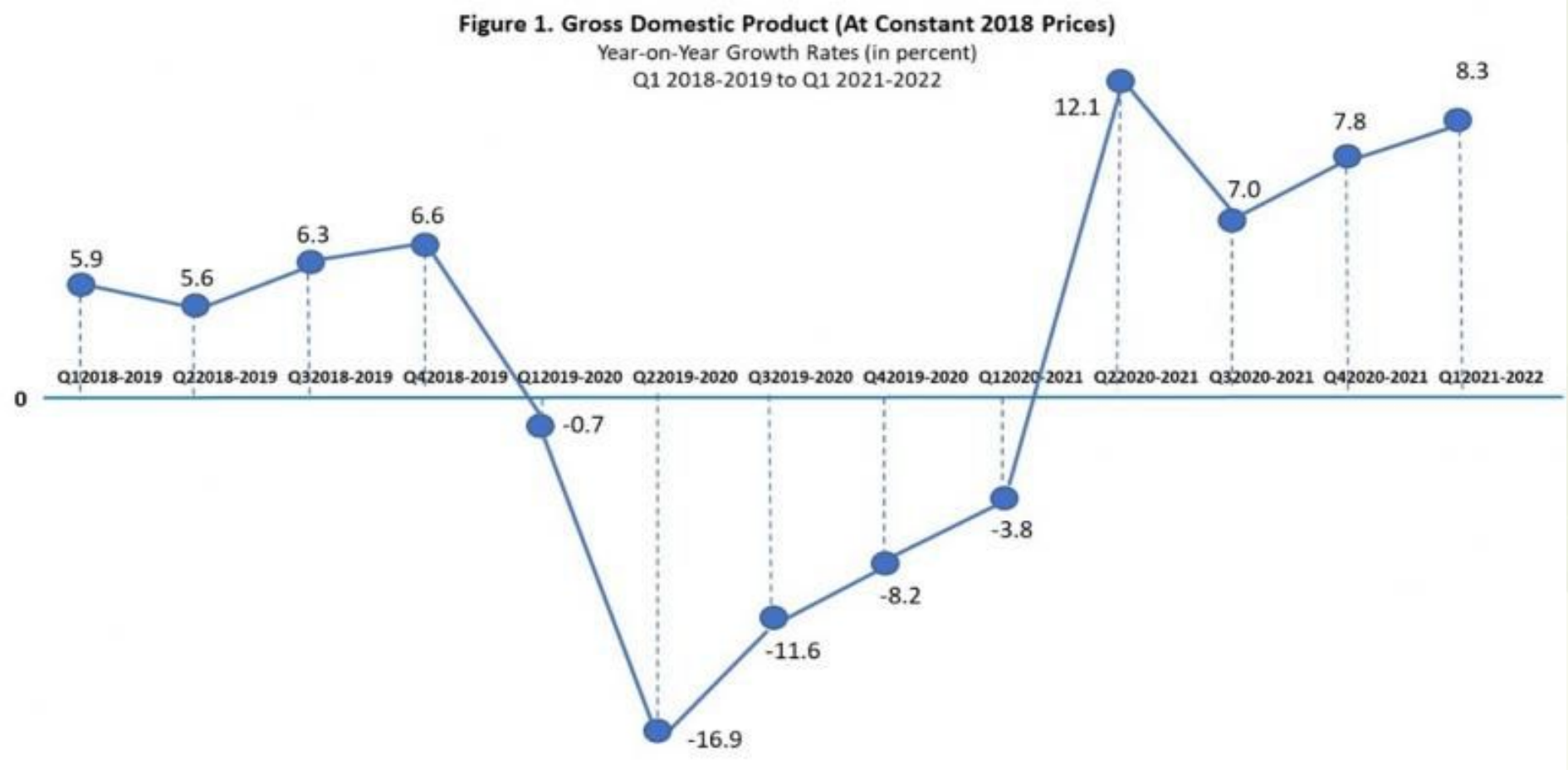
Wholesale and retail trade was the top growth driver with a growth rate of 4.9% between 2021 and 2021 while accounting for 26.5% of Gross Regional Development Product

Manufacturing grew 8.2% while Agriculture grew 3.8%

Table 1. Gross Regional Domestic Product of Northern Mindanao, by Industry
Percent Share, Growth Rate and Contribution to Growth
At Constant 2018 Prices, In Percent and Percentage Point

Industry	2021 Percent Share to GRDP	2020-2021 Growth Rate (in percent)	2021 Contribution to Growth (in percentage point)	Rank
Agriculture, forestry, and fishing	**21.3**	**3.8**	**0.82**	3rd
Industry	**25.7**	**8.7**	**2.18**	
1 Mining and quarrying	0.4	17.8	0.06	15th
2 Manufacturing	13.1	8.2	1.05	2nd
3 Electricity, steam, water, and waste management	4.8	6.5	0.31	7th
4 Construction	7.4	10.7	0.75	4th
Services	**53.1**	**6.2**	**3.27**	
1 Wholesale and retail trade; repair of motor vehicles and motorcycles	26.5	4.9	1.33	1st
2 Transportation and storage	2.3	7.3	0.17	11th
3 Accommodation and food service activities	1.6	16.3	0.24	9th
4 Information and communication	2.4	8.4	0.20	10th
5 Financial and insurance activities	4.0	9.0	0.35	6th
6 Real estate and ownership of dwellings	4.4	1.5	0.07	14th
7 Professional and business services	2.0	4.4	0.09	13th
8 Public administration and defense; compulsory social activities	3.4	4.1	0.14	12th
9 Education	3.9	9.9	0.38	5th
10 Human health and social work activities	1.6	20.6	0.28	8th
11 Other services	0.9	2.0	0.02	16th
Gross Regional Domestic Product	**100.0**	**6.3**	**6.3**	

Philippine GDP at 8.3% Q1 growth

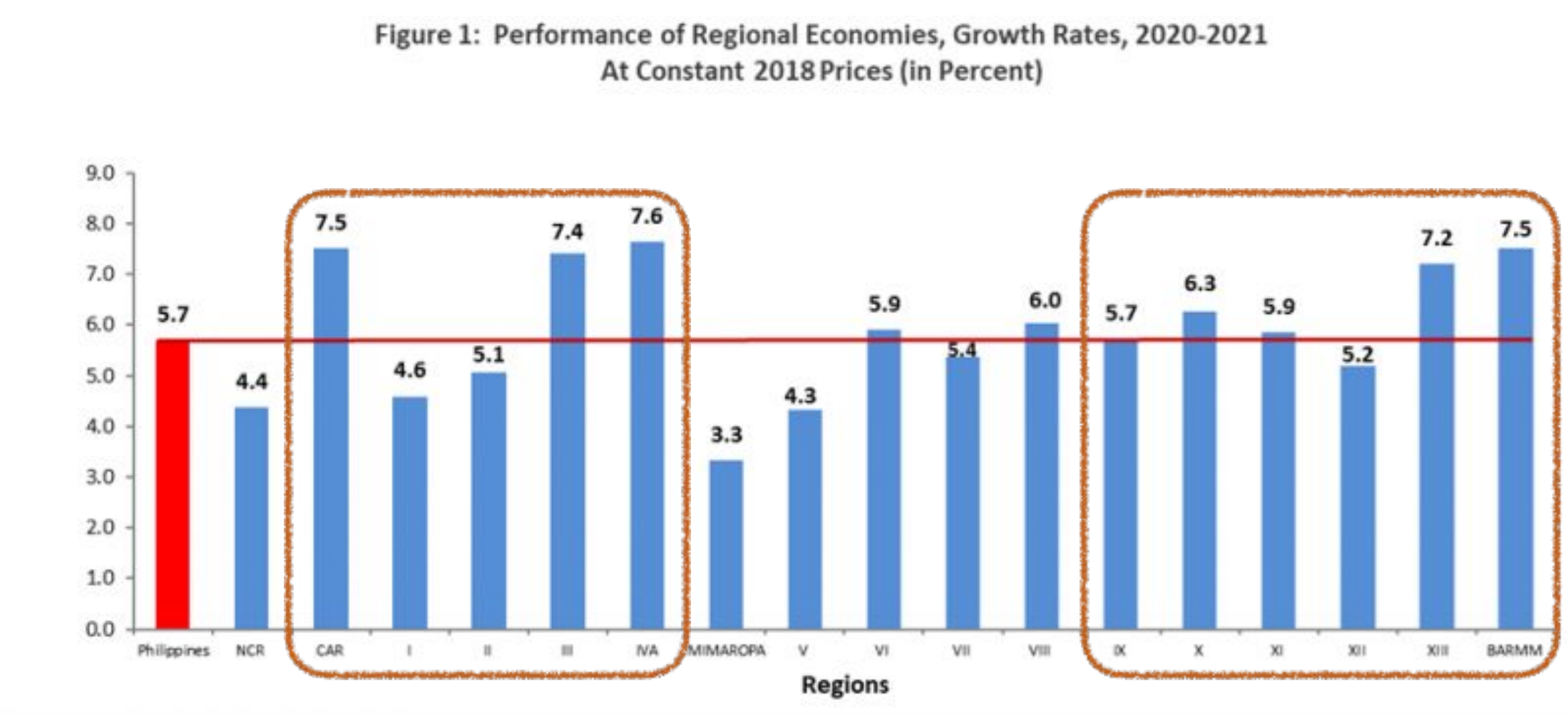


Philippine Electricity Demand Forecast, MW

- Robust growth at **6.5%** per year between 2021 & 2040
- Key growth areas are **North Luzon (10%)** and **Mindanao (7.8%)**

Area		2021	2022	2023	2024	2025	2030	2035	2040
LUZON		11,841	12,387	13,125	13,917	14,769	20,070	27,138	36,101
MERALCO		8,381	8,714	9,032	9,371	9,718	11,670	14,021	16,852
1	NCR	5,659	5,885	6,099	6,328	6,563	7,880	9,468	11,379
2	North	367	381	395	410	425	511	614	738
3	South	2,355	2,448	2,538	2,633	2,730	3,279	3,939	4,735
North Luzon		2,607	2,767	3,089	3,445	3,841	6,586	10,623	16,101
1	Ilocos	214	223	241	263	290	466	680	878
2	Mt. Province	126	132	144	158	173	266	378	458
3	North Central	278	284	329	369	419	691	1,004	1,243
4	Cagayan Valley	284	292	321	353	390	670	1,036	1,358
5	West Central	478	505	554	615	690	1,244	2,107	3,245
6	South Central	1,168	1,271	1,438	1,620	1,810	3,154	5,295	8,779
7	North Tagalog	59	60	63	66	69	94	122	140
South Luzon		853	906	1,004	1,101	1,210	1,814	2,494	3,148
1	Batangas/Cavite	432	456	504	550	605	918	1,294	1,698
2	Laguna/ Quezon	112	118	128	135	144	177	197	202
3	Bicol	310	332	372	416	461	719	1,003	1,249
VISAYAS		2,394	2,528	2,691	2,891	3,111	4,423	6,280	8,827
1	Panay	447	472	502	539	580	825	1,172	1,647
2a	Cebu	1,151	1,215	1,294	1,390	1,496	2,126	3,019	4,244
2b	Bohol	102	108	115	123	133	188	268	376
3	Leyte-Samar	295	311	331	356	383	544	773	1,086
4	Negros	400	422	449	483	520	739	1,049	1,474
MINDANAO		2,098	2,223	2,395	2,584	2,789	4,138	6,088	8,751
1	North Western	248	258	278	304	332	531	822	1,215
2	Lanao Area	126	128	133	142	152	223	321	444
3	North Central	453	461	516	572	623	863	1,212	1,694
4	North Eastern	170	174	185	202	219	350	543	805
5	South Eastern	619	662	720	768	829	1,279	1,932	2,855
6	South Western	482	540	563	596	634	892	1,257	1,738
Philippines		16,333	17,138	18,211	19,392	20,669	28,631	39,506	53,679

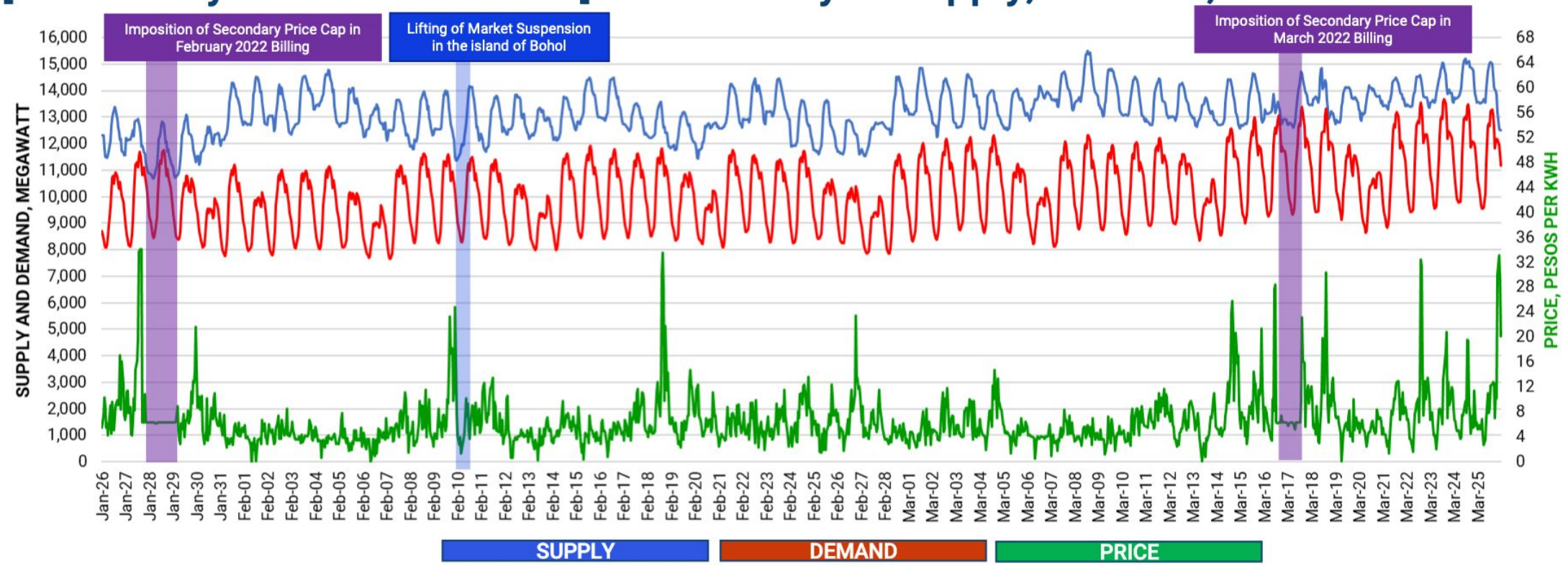
North Luzon & Mindanao are the high growth areas



Power Capacities as of 31 December 2021 and 2021 Demand, MW					
	Luzon	Visayas	Mindanao	Philippines	Share
Coal	7,522.9	1,349.4	2,041.0	10,913.3	**46.0%**
Oil	1,435.6	480.4	734.2	2,650.2	11.2%
Gas	3,286.1	Declining Malampaya gas field		3,286.1	13.8%
Geothermal	768.7	881.1	103.3	1,753.1	7.4%
Hydro	2,473.0	19.6	1,006.8	3,499.4	14.7%
Wind	282.9	90.0		372.9	1.6%
Biomass	131.1	131.0	13.5	275.6	1.2%
Solar	586.3	380.6	31.3	998.2	4.2%
Subtotal	16,486.6	3,332.1	3,930.1	23,748.8	100.0%
Fossil	12,244.6	1,829.8	2,775.2	16,849.6	**70.9%**
Renewable	4,242.0	1,502.3	1,154.9	6,899.2	29.1%
Subtotal	16,486.6	3,332.1	3,930.1	**23,748.8**	100.0%
2021 Demand	11,841.0	2,394.0	2,098.0	**16,333.0**	

High WESM prices indicate low reserves leading to dispatch of oil power plants

[26 January to 25 March 2022] Luzon-Visayas Supply, Demand, and Price

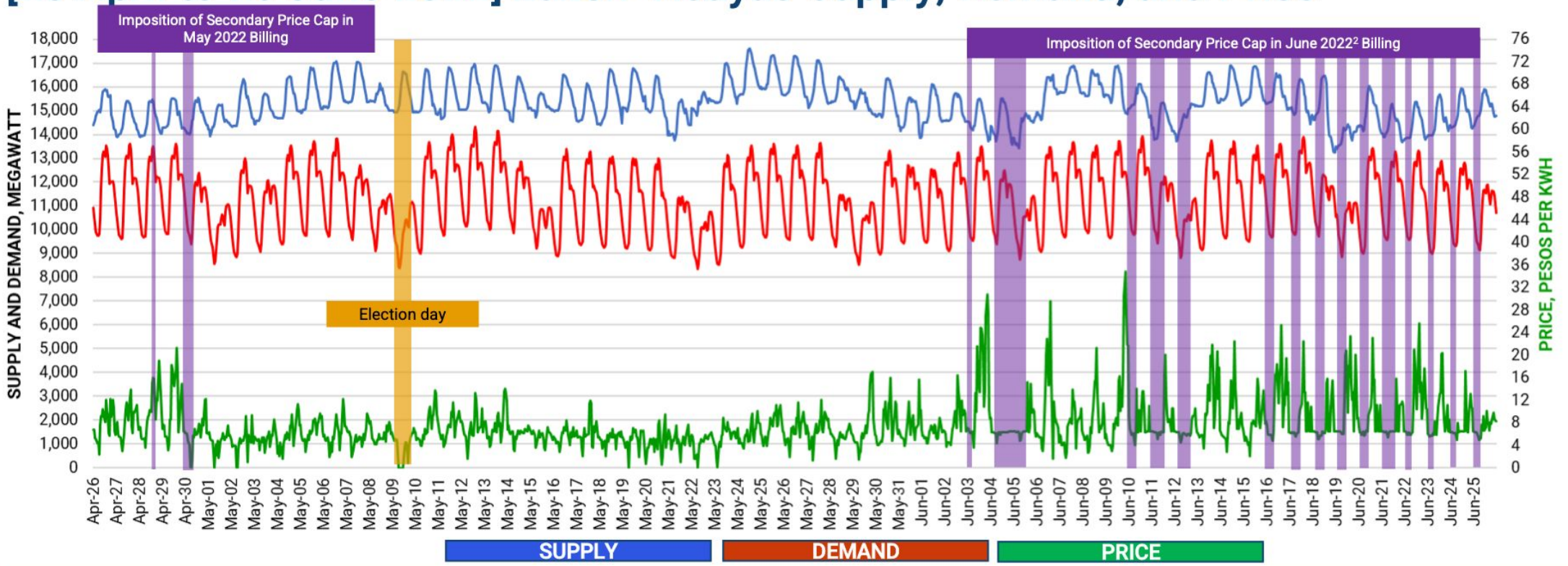


PERIOD COVERED	AVERAGE				HIGHEST DEMAND				
	SUPPLY (MW)	DEMAND (MW)	MARGIN (MW)	PRICE (PHP/KWH)	DATE AND TIME	SUPPLY (MW)	DEMAND (MW)	MARGIN (MW)	PRICE (PHP/KWH)
February 2022 Billing	12,851	9,781	3,070	6.19	02/15/2022 14:30	14,413	11,985	2,428	5.61
March 2022 Billing	13,546	10,600	2,946	6.97	03/23/2022 13:45	14,979	13,749	1,231	14.60

* Hourly average values are shown on the graph

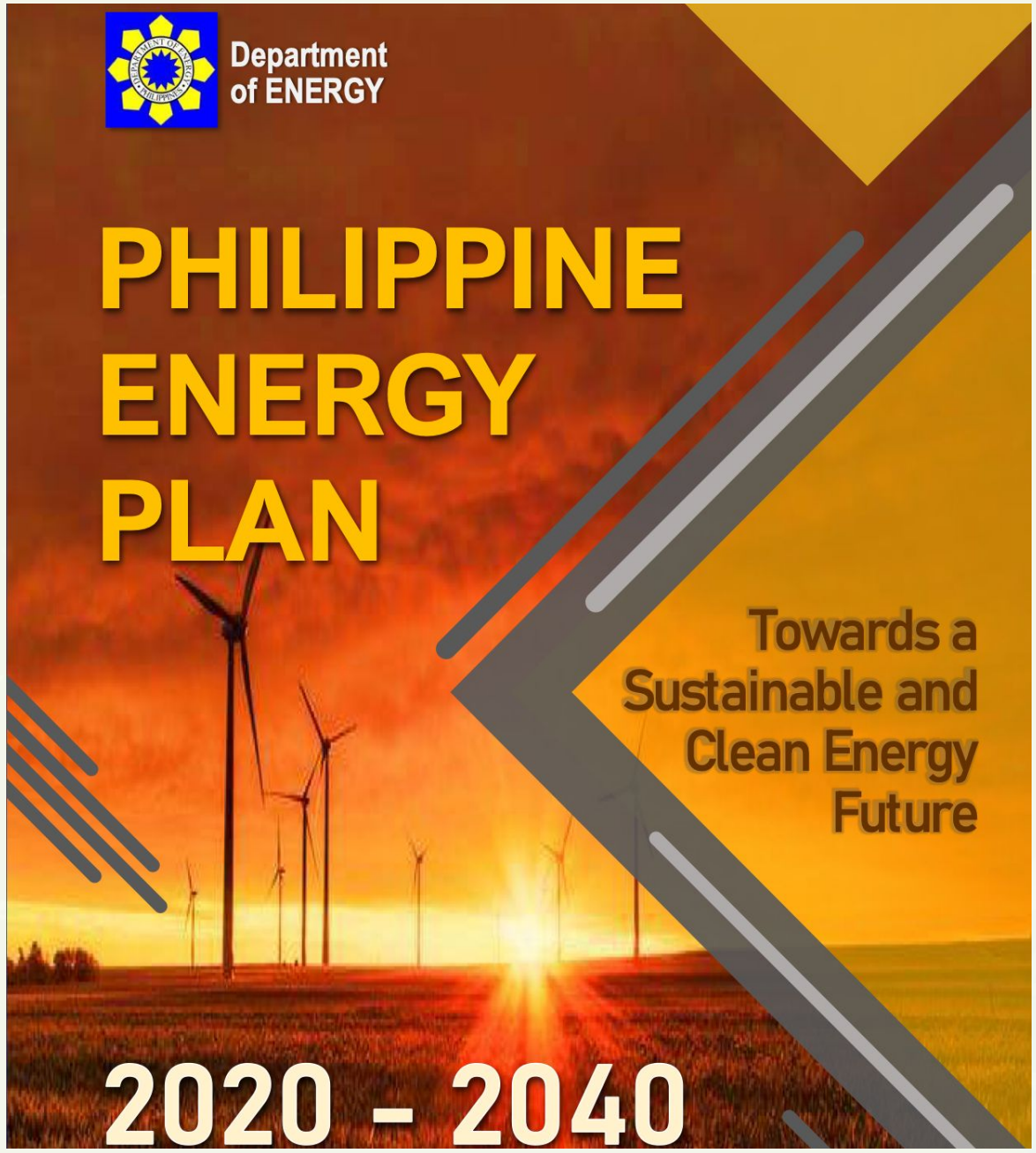
High WESM prices indicate low reserves leading to dispatch of oil power plants

[26 April to 25 June 2022] Luzon-Visayas Supply, Demand, and Price[1]



PERIOD COVERED	AVERAGE				HIGHEST DEMAND				
	SUPPLY (MW)	DEMAND (MW)	MARGIN (MW)	PRICE (PHP/KWH)	DATE AND TIME	SUPPLY (MW)	DEMAND (MW)	MARGIN (MW)	PRICE (PHP/KWH)
May 2022 Billing	15,406	11,259	4,147	6.21	05/12/2022 14:25	16,912	14,380	2,532	21.43
June 2022 Billing	15,214	11,325	3,889	8.51	06/10/2022 14:10	15,853	14,030	1,822	34.78

[1] Hourly average values are shown on the graph



"This updated plan, like its predecessor (PEP 2018-2040), reiterates the energy sector's goal to chart a ***transformative direction towards attaining a clean energy future***."

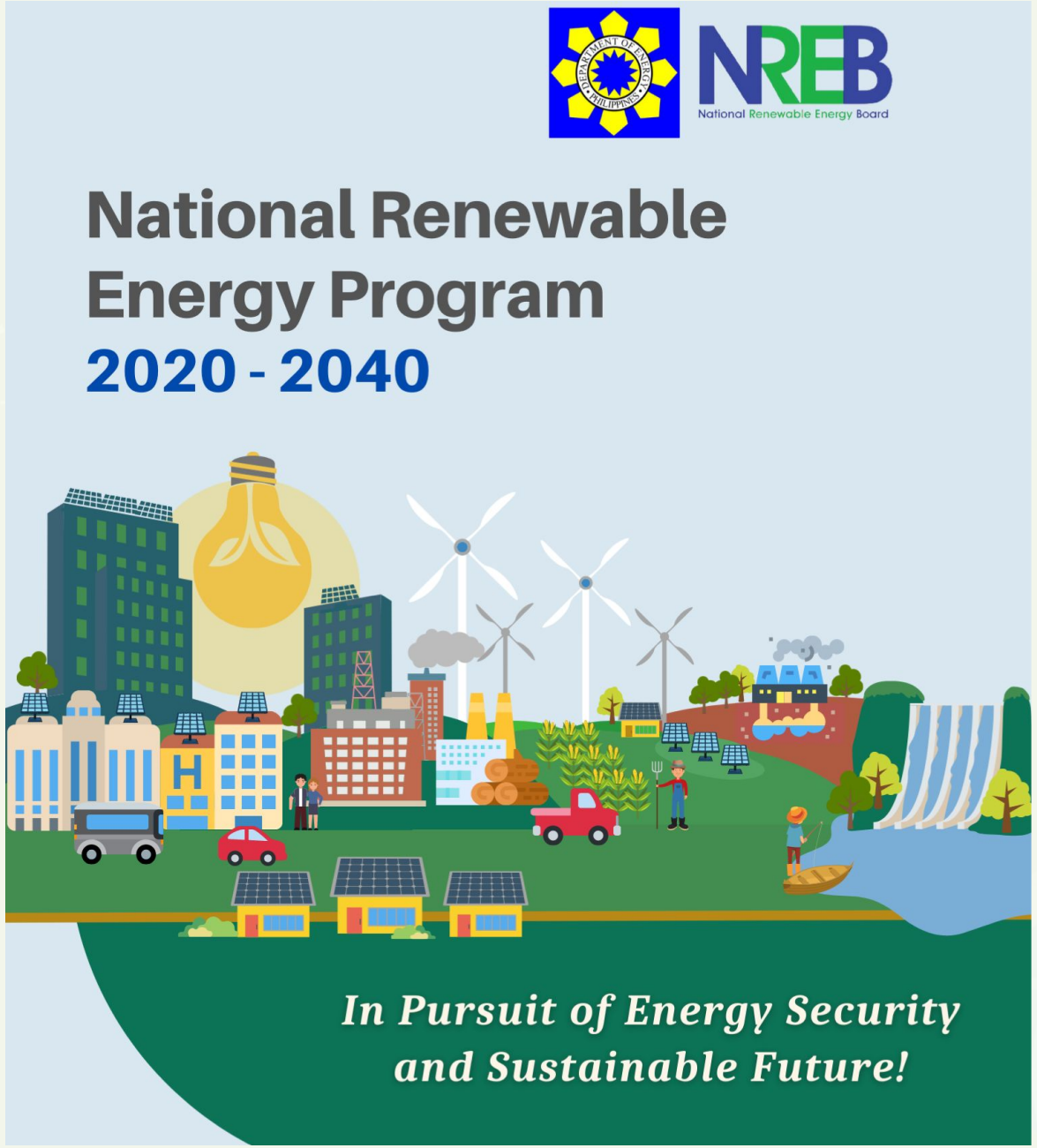
" … policies directed by the Energy Secretary …the ***aggressive Renewable Energy (RE)*** and Energy Efficiency and Conservation (EEC) institutionalization programs, ***moratorium on new***

REFERENCE SCENARIO

- Present development trends and strategies continue;
- **35.0 percent renewable energy share** in the power generation mix by 2040;
- **LNG importation starting 2022**;
- Energy Consumption levels that **support an accelerated economic expansion post COVID-19;**
- **Current blending schedule for biofuels (2.0 percent biodiesel and 10.0 percent bioethanol)** maintained until 2040;
- **5.0 percent penetration rate of electric vehicles** for road transport (motorcycles, cars, jeepneys) by 2040; and
- **Current efforts on EEC as a way of life** continues until 2040.

CLEAN ENERGY SCENARIO

- **35.0 percent and 50.0 percent RE share** in the power generation mix by 2030 and 2040;
- **5.0 percent blending for biodiesel starting 2022;**
- **1.5 percent increase in aggregated natural gas consumption** from the transport and industry sectors between 2020 and 2040;
- **10.0 percent penetration rate of electric vehicles** for road transport (motorcycles, cars, jeepneys) by 2040;
- **5.0 percent energy savings** on oil products and electricity by 2040; and
- At least **12.0 percent reduction in the GHG emission** for the Nationally Determined Contribution (NDC)



The basis for the Clean Energy Scenario targets is the latest update of the NREP.

Table 2. Status of FIT Implementation, as of 31 December 2021

Technology	FIT Installation Target	ERC Approved Rates	With Certificate of Endorsement to ERC		FIT Installation Target Remaining Balance
	Capacity (MW)	PhP/kWh	No. of Projects	Capacity (MW)	Capacity (MW)
Hydropower	151.113 MW 250	5.90	5	35.956	98.887
		5.8705[c]	1	8.500	
		5.8705[d]	8	102.901	
		TBD*	2	3.756	
Wind	200 200[a] 400 MW	8.53	3	249.9	0
		7.40[b]	3	144	
Solar	50 450[a] 500 MW	9.68	6	108.90	0
		8.69[b]	17	417.05	
Biomass	250 250 MW	6.63	12	117.351	0
		6.5969[c]	4	14.564	
		TBD*	15	125.13	
Ocean	10	Deferred	-	-	-
Total	1,410		76	1,328.008	98.887

[a] Additional Installation Targets

[b] FIT rates for the respective additional installation targets (Wind – Energy Regulatory Commission [ERC] Resolution No. 14, Series of 2015; Solar – ERC Resolution No. 6, Series of 2015)

[c] Degressed FIT rates (Hydropower and Biomass – ERC Resolution No. 1, Series of 2017)

[d] Degressed FIT rates (Hydropower and Biomass – ERC Resolution No. 6, Series of 2021)

*To be determined

FIT has reduced consumer costs of electricity

IEMOP
INDEPENDENT ELECTRICITY MARKET OPERATOR
PHILIPPINES

IMPACT ON ENERGY COSTS OF THE INTEGRATION OF FEED-IN TARIFF (FIT) QUALIFIED RESOURCES: NOVEMBER 2014 TO FEBRUARY 2019

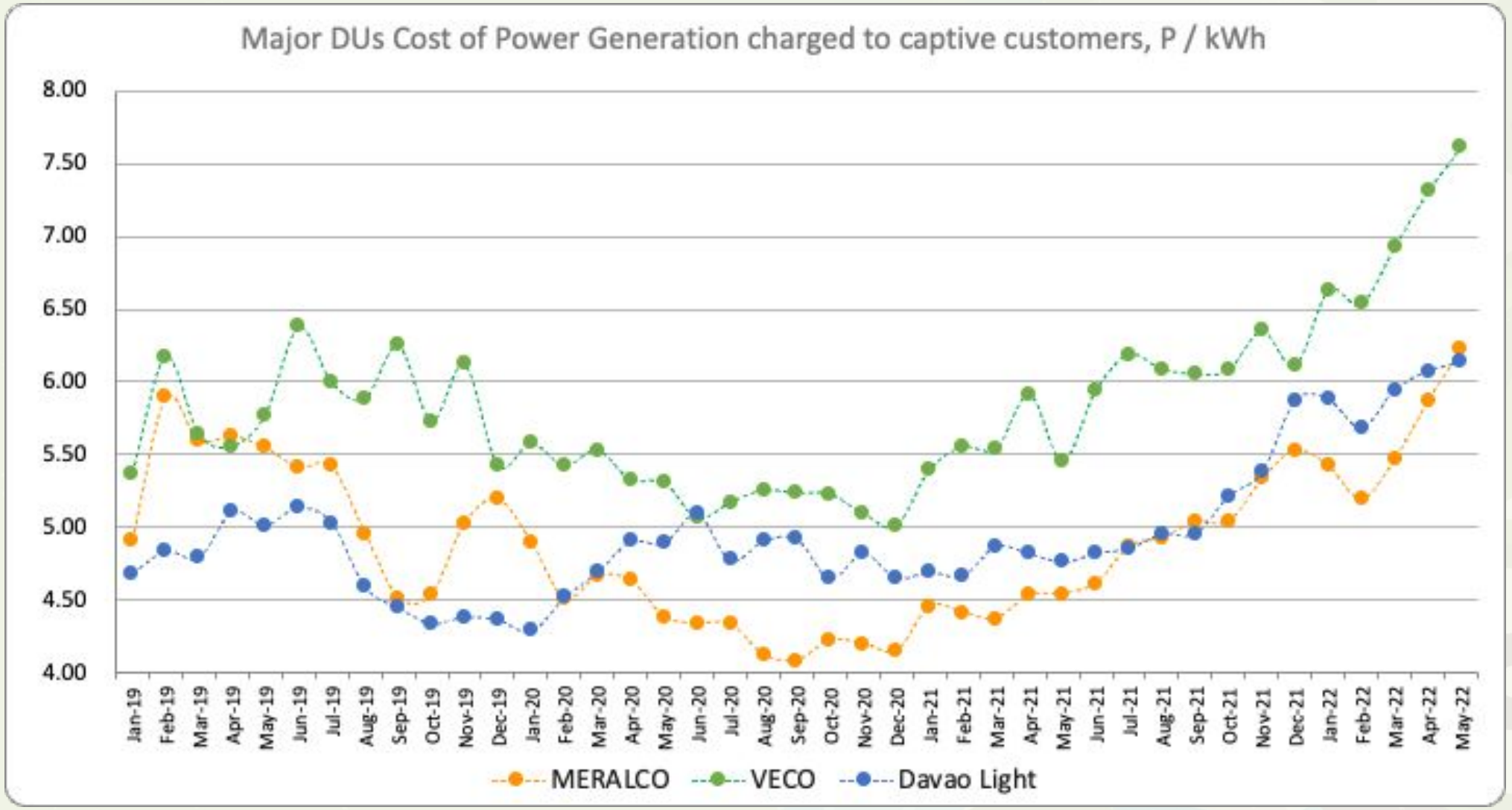
Independent Electricity Market Operator of the Philippines, Inc. (IEMOP)
May 2019

Disclaimer: This study attempts to describe and quantify the effect of the implementation of the feed-in tariff (FIT) system in the scheduling and pricing process of the WESM. The results of the study were simulated based on historical results of the WESM and considers certain assumptions. The study is not intended to predict future performance and impact of the FIT-qualified resources and should not be used as basis for such .

Abstract

This paper provides the results of the study on the impact on energy costs of the integration of FIT-qualified resources for the period November 2014 to February 2019 (Study Period). Based on the results, even with FIT Allowance (FIT-All) being charged to consumers, the integration of FIT-qualified resources benefited the whole system with a rate reduction of 9.27 centavos per kWh or PhP 32.09 B avoided cost. The net reduction is a result of lower generation costs from the WESM whose prices were decreased by the integration of FIT-qualified resources.

The benefits of FIT are much higher today!



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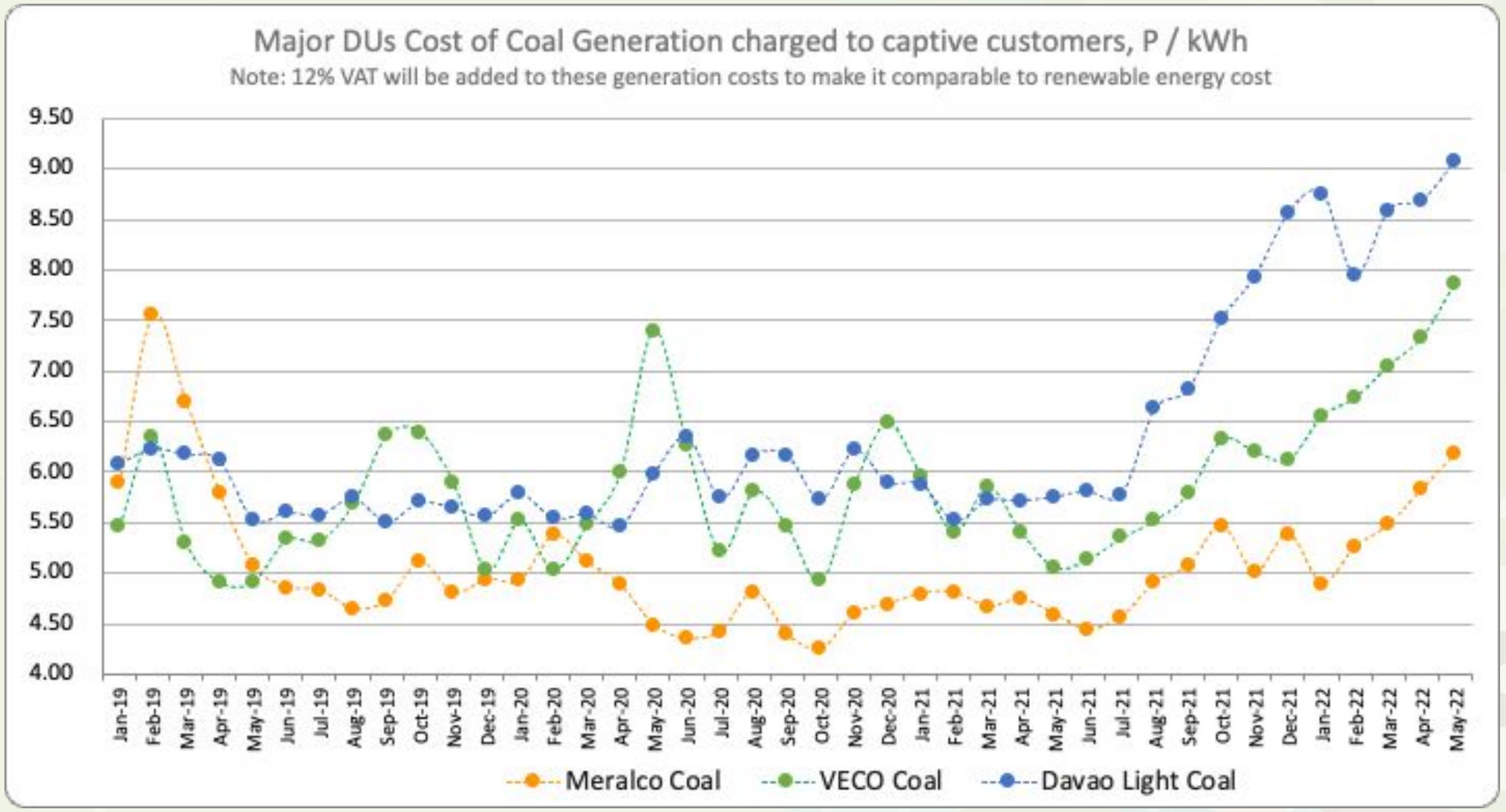
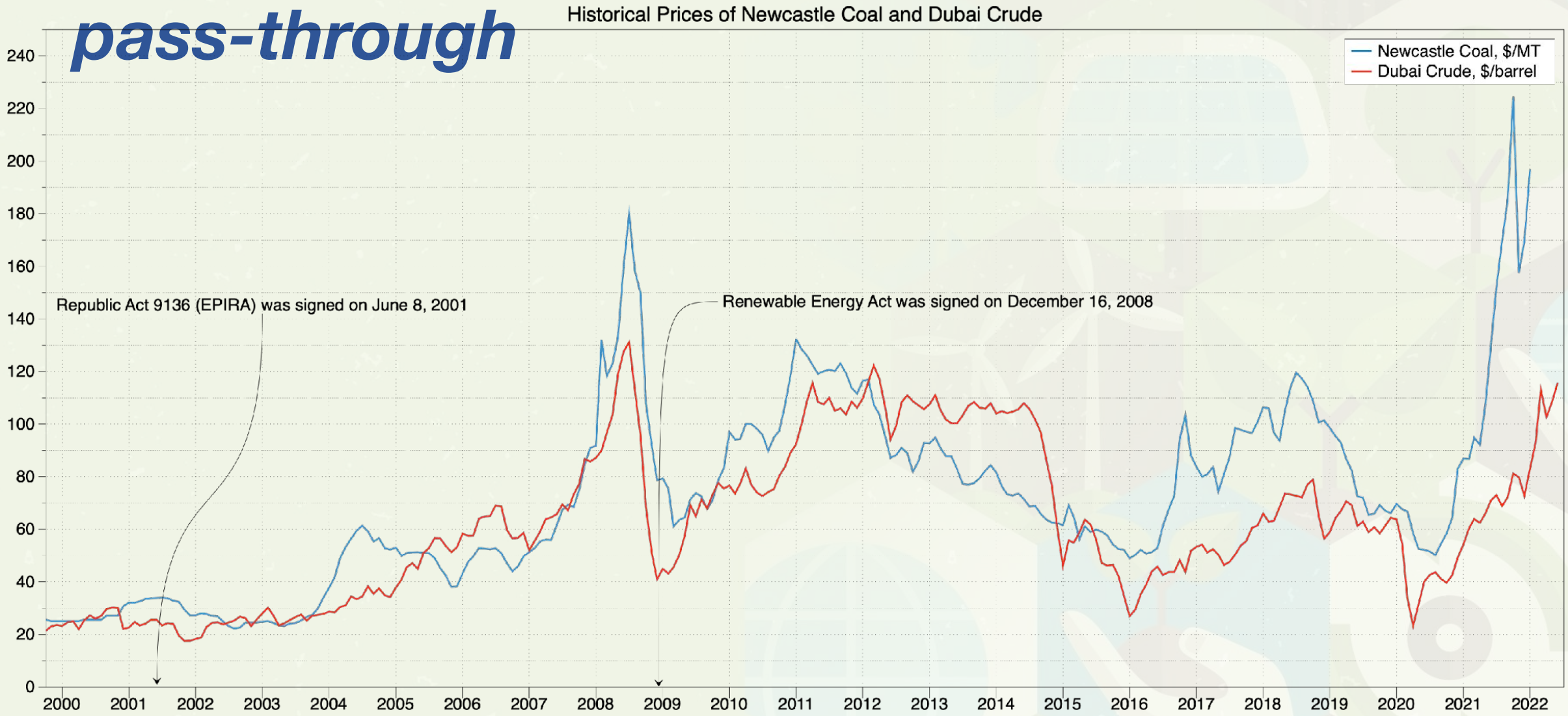


Volatile prices due to *automatic fuel price pass-through*



Volatile prices due to automatic fuel price pass-through

https://tradingeconomics.com/commodity/coal

*Coal is expected to trade at **411.55 USD/MT** by the end of this quarter, according to Trading Economics global macro models and analysts expectations. Looking forward, we estimate it to trade at **491.13** in 12 months time.*

Highlights of the President's SONA on Energy

- Need to "build new power plants", "…taking advantage of recent technologies in **renewable energy**".
- Cited "onshore and offshore wind potential of 255 GW by 2030"
- Use of gas "in the interim"
- "Reexamine strategy towards building nuclear power plants in the Philippines" while taking note of "new technologies that allow for smaller-scale nuclear plants"
- **Renewable energy is at the top of the climate agenda.**
- Must examine the entire system of transmission and distribution to lower energy costs for consumers and industries.