



Investment Opportunities in the Philippines Market

Mr. Liutong Zhang (Lucas), [Email: lzhang@waterrockenergy.com](mailto:lzhang@waterrockenergy.com); +852 9365 8216
Feb 2020

DISCLAIMER

This draft document is developed to facilitate and stimulate discussion. It may not have been reviewed, and may have factual or other errors.

This document is not to be further reproduced or distributed without express permission from WaterRock Energy Economics (HK) Limited.

Outline

- 1 Market Characteristics of the Philippines**
- 2 Investment Opportunities in the Philippines
- 3 Appendix - Introduction to WaterRock Energy Economics

Reform law (EPIRA) in the Philippines has provided a sound legislative framework for the power industry since 2001

Different Regions in the Philippines Power Market



Electricity Market Largely Liberalized

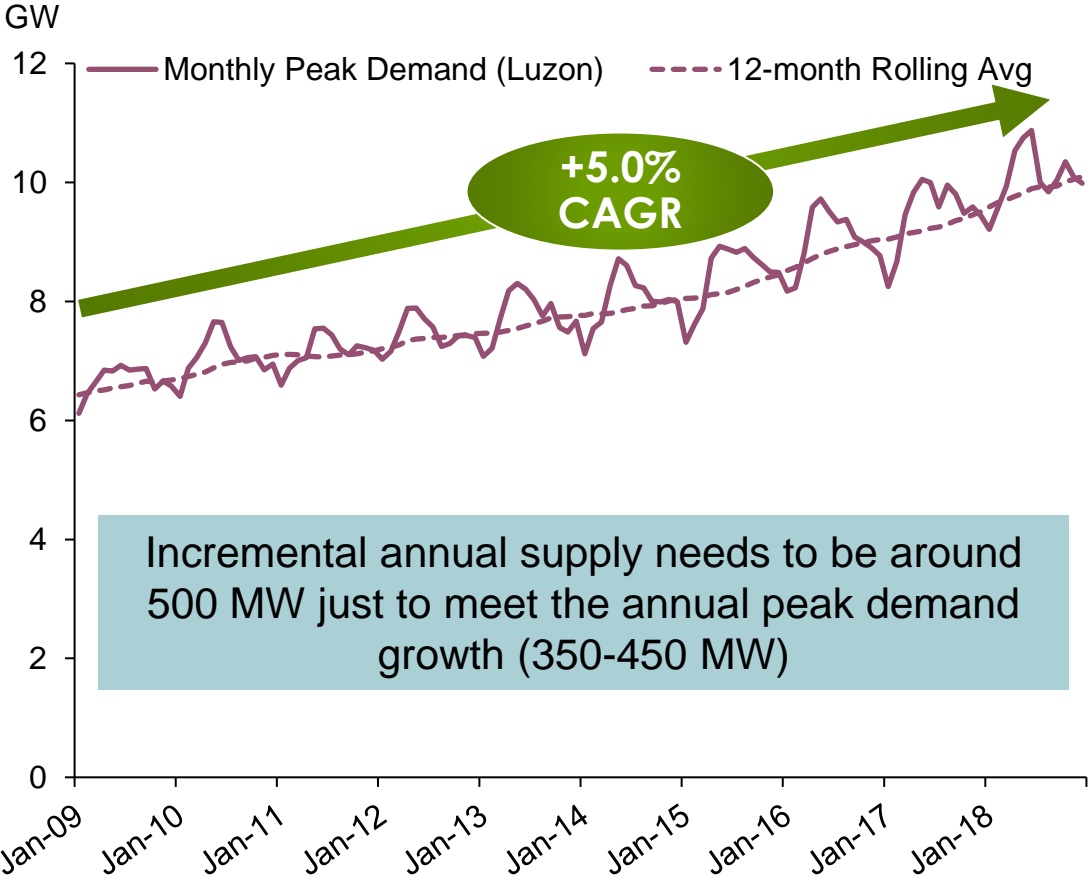
- Generation assets and contracted capacity are largely privatized (>70%)
- Retail tariffs are restructured and unbundled with no cross-subsidies since 2005.

Markets are Functioning OK

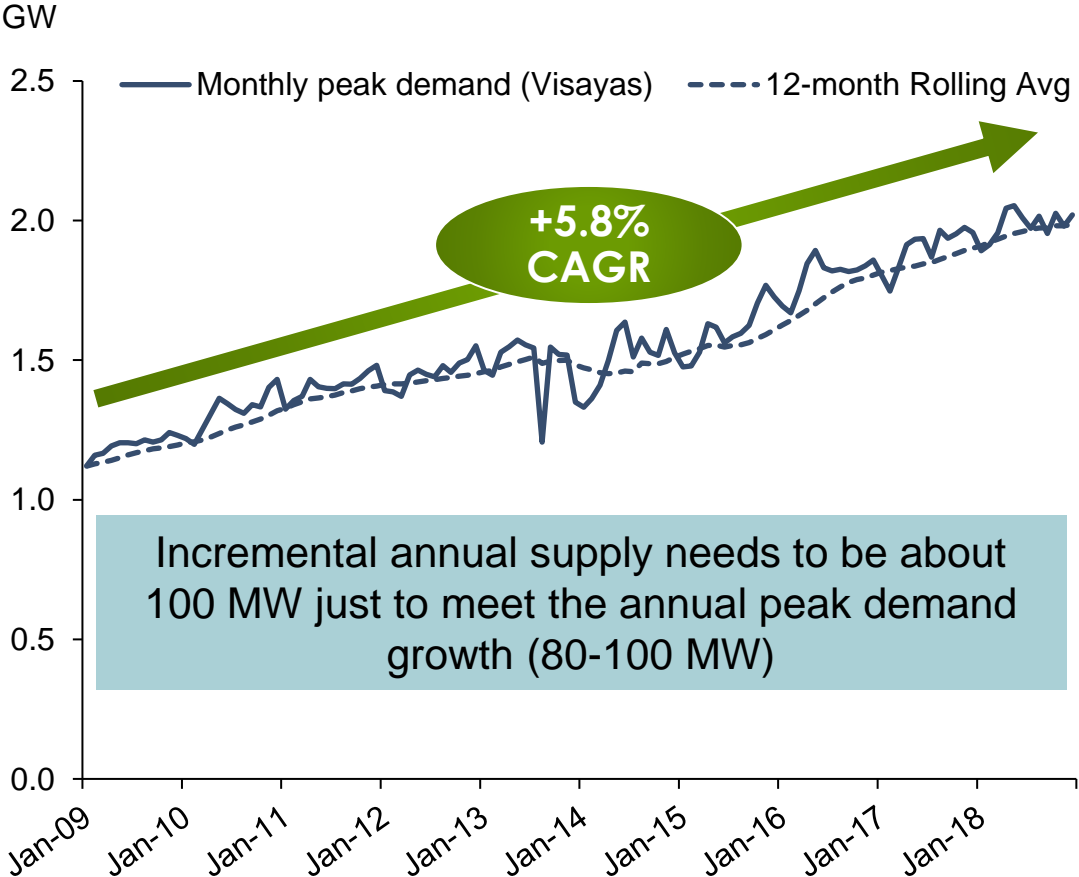
- Wholesale Electricity Spot Market (WESM) commenced operation in Dec 2006, and was expanded to Visayas in Dec 2011. Mindanao is scheduled to start its competitive electricity market in early 2020. Nonetheless, if very low price caps are imposed, it could reduce efficient market signal in WESM
- Retail Competition and Open Access (RCOA) started in 2013 although stalled since 2017
- Under EPIRA, government is restricted to re-enter the generation sector.

Steady demand growth in both Luzon and Visayas translates to material need for new capacity and investment

Luzon System Monthly Peak Demand, MW

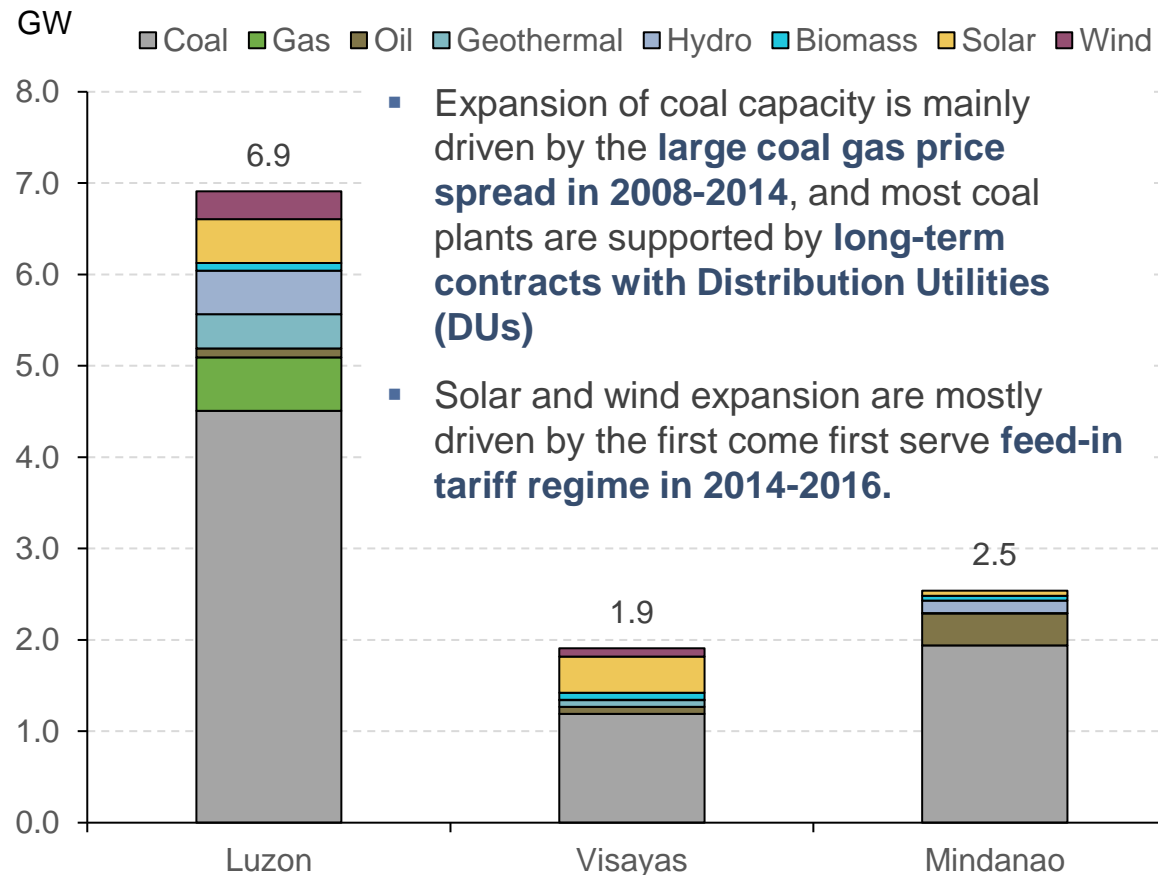


Visayas System Monthly Peak Demand, MW

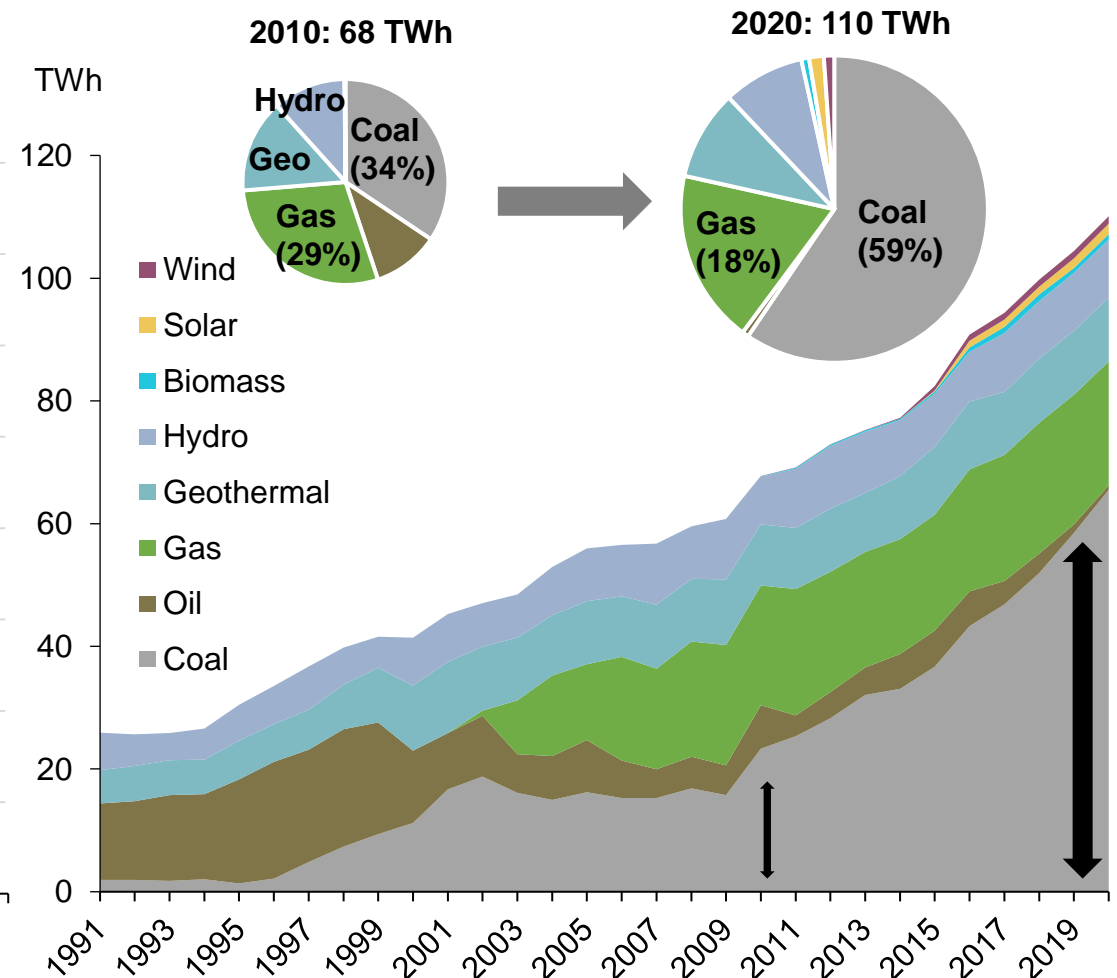


In the past ten years, new capacity (mainly coal) is built to meet the growing demand

New Capacity Addition in the Philippines (2010-2020)



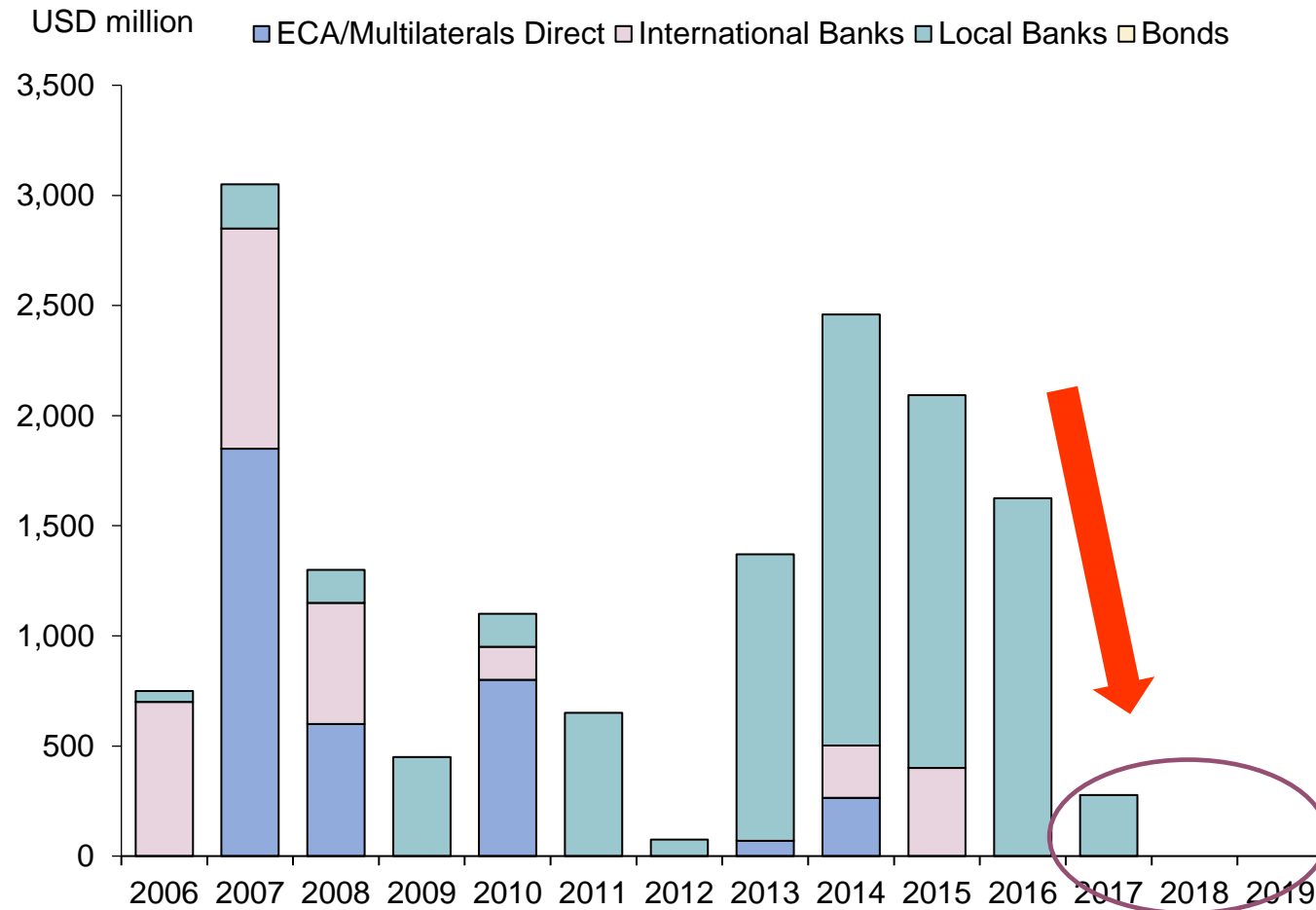
Generation Fuel Mix in the Philippines



Financing new projects have come to a halt due to regulatory uncertainty, and thus market will tighten quickly after 2021

Project Finance in the Philippines (Luzon, Visayas and Mindanao)

2006-2019



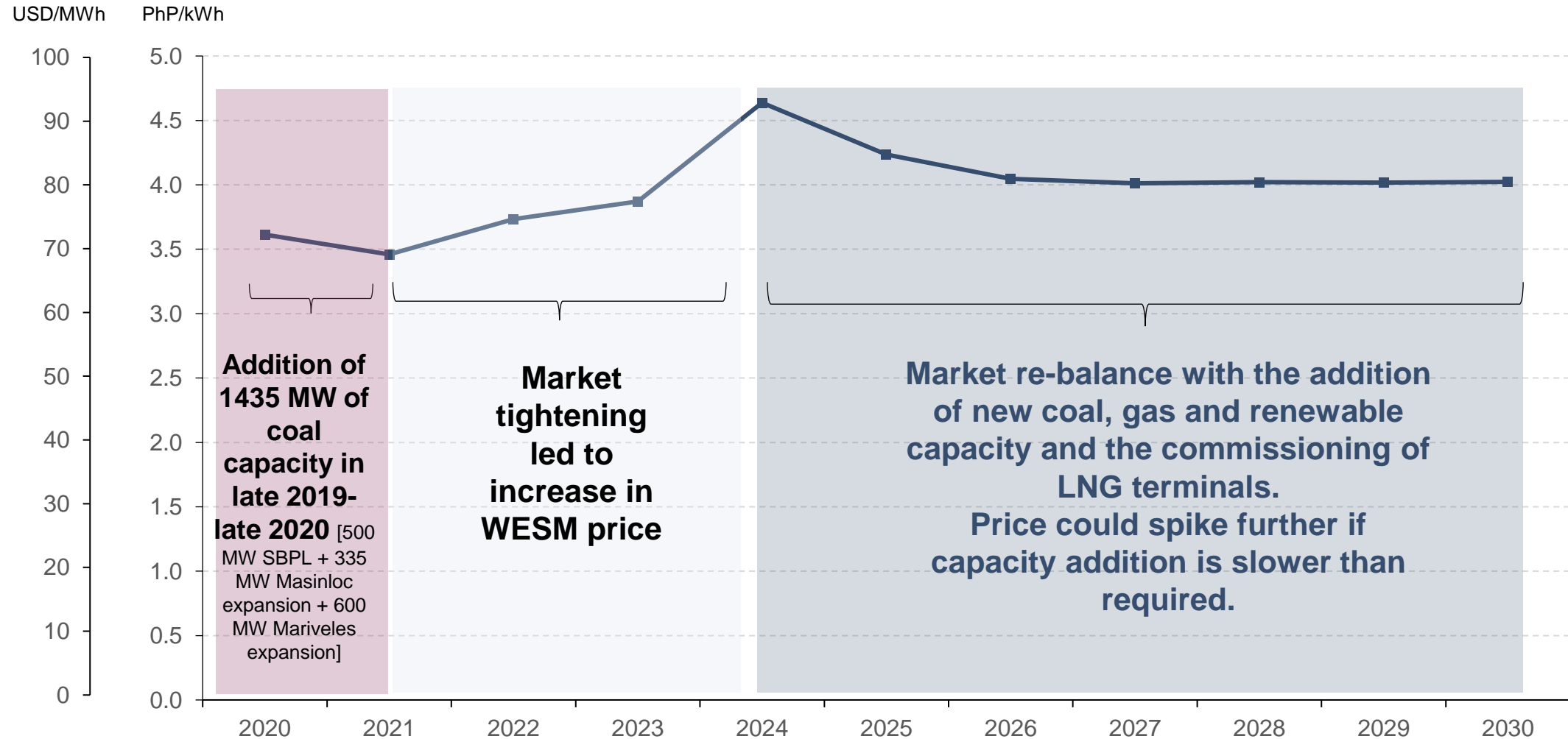
- Since 2010, local banks have become the key financing source for local power projects
- Since 2017, financing of new projects have almost come to a halt, partly due to
 - Regulatory uncertainty on the approval of the 3.55 GW coal projects that filed long-term PSAs with Meralco DU before April 29, 2016. In July 2019, Supreme Court has ruled that power contracts signed between June 30, 2015 and April 29, 2016 need to be subjected to the competitive selection process.
 - Implementation of CSP for new capacity is still uncertain.

Limited financing activities will lead to very limited capacity addition in 2021-2024, so the market will tighten very fast after 2021

Note: 2013-2019 are based on estimates from WaterRock Energy for **new** project with size bigger than 50 MW. Thus, most solar and biomass plants are not included in the data collation.

Wholesale Electricity Spot Market (WESM) prices is expected to increase quickly after 2021 to incentivize new capacity expansion

Forecast Time-weighted Average WESM Price



Outline

- 1 Market Characteristics of the Philippines
- 2 Investment Opportunities in the Philippines**
- 3 Appendix - Introduction to WaterRock Energy Economics

As demand grows robustly with changes in technological and fuel market, opportunities are plenty and diverse in the Philippines

Opportunities

Market Context

a

To meet growing demand



- Demand in Luzon, Visayas and Mindanao is expected to grow 4-6 percent on the back of strong economic growth.
- Annual incremental capacity to meet the growing demand is 600-800 MW

b

To displace old technology/ infrastructure



- Domestic gas production is expected to decline after 2022 due to depleting gas reserve; New LNG terminals offer a cost-effective solution to ensure availability of gas to existing and new CCGT capacity
- Old coal and gas plants built in the 1990s need to be replaced or refurbished

c

To acquire privatized assets



- PSALM has a mandate to privatize its assets under EPIRA, and it plans to privatize Malaya oil, CBK and Casecan hydro as well as Mindanao coal power plants in 2020-22.

d

M&A Opportunities



- Merger & acquisition opportunities are likely to be sporadic as most of the “obvious” targets have been divested. Some “stranded” solar plants built in 2016 without feed-in-tariff may be keen to be divested.

e

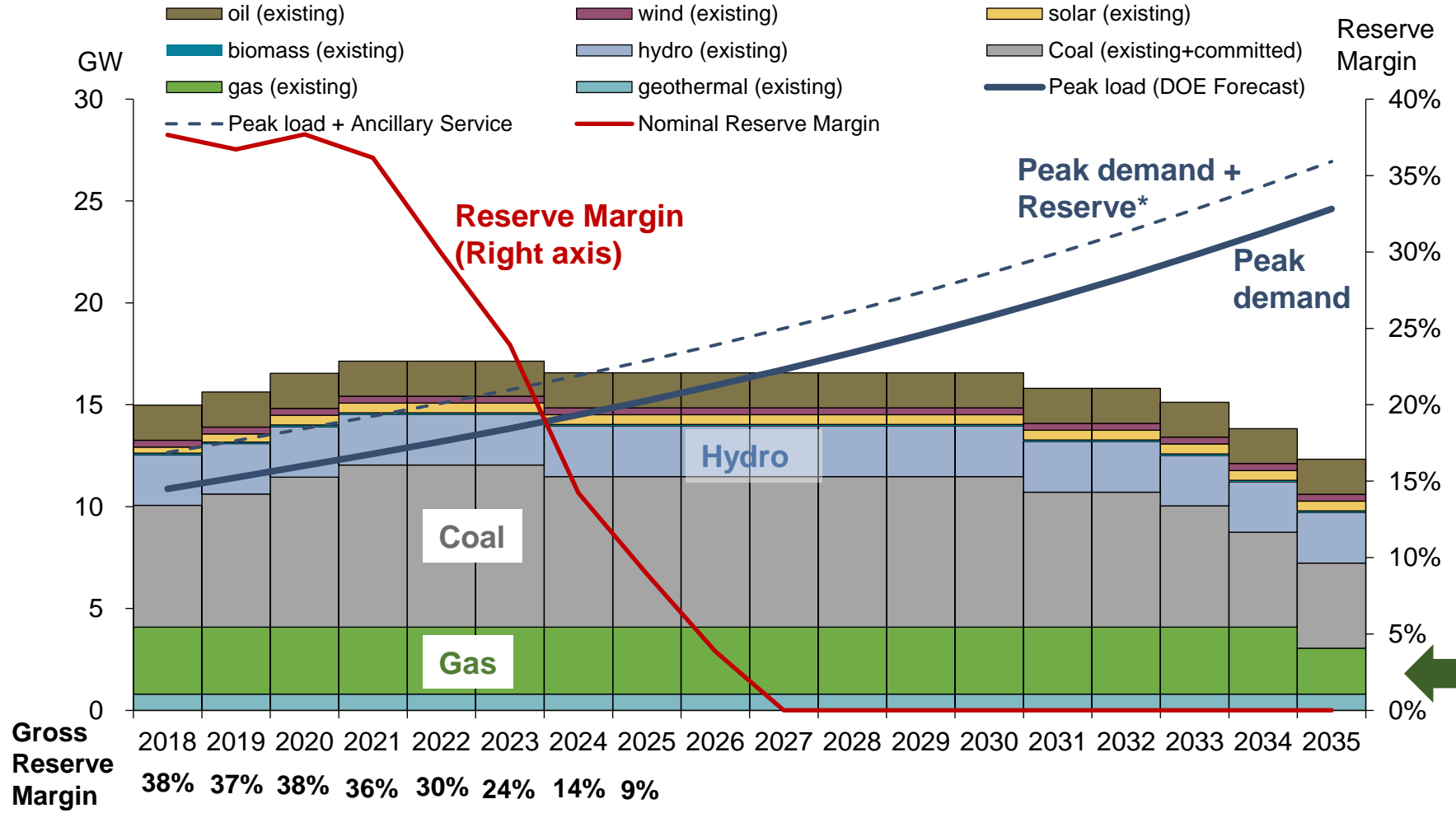
Special projects



- Cost of renewable technologies (such as solar and battery energy storage) continues to fall, and thus they are likely to be economical for more applications in the power sector.

a To meet growing demand
 New capacity and gas infrastructure needs to be financed soon, or the
 Philippines market could experience power shortage after 2024

Supply and Demand Dynamics in Luzon



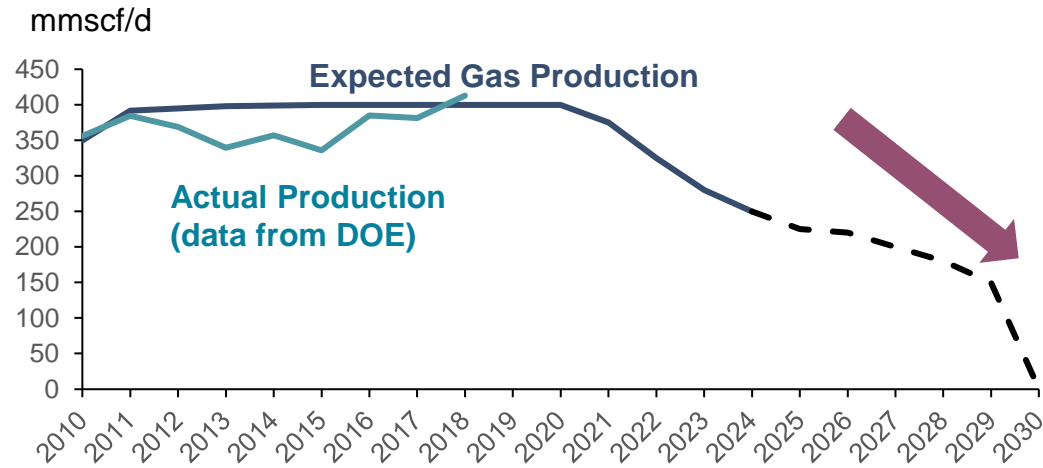
- Market fundamental will start to tighten quickly after 2021
- New capacity [both thermal and renewables] will need to be financed and built quickly to meet the growing demand.

Uncertainty on future Malampaya gas production after 2024 poses risk on future gas availability to the existing 3.2 GW CCGT plants and power supply adequacy

a To Meet Growing Demand (Thermal Capacity)

The economics of coal vs gas has become more complex and careful analysis needs to be done to assess the most economical option

Domestic Gas Production

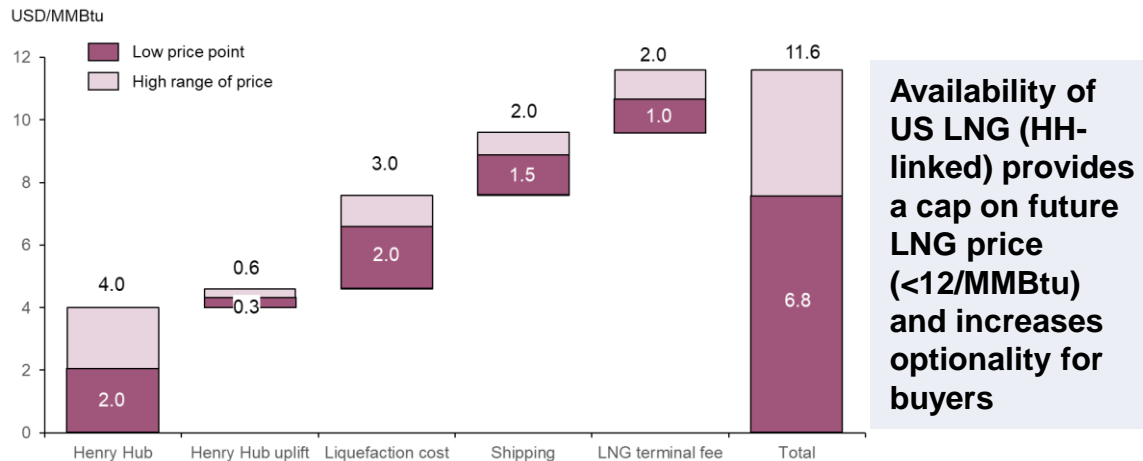


Plan on New LNG Terminals

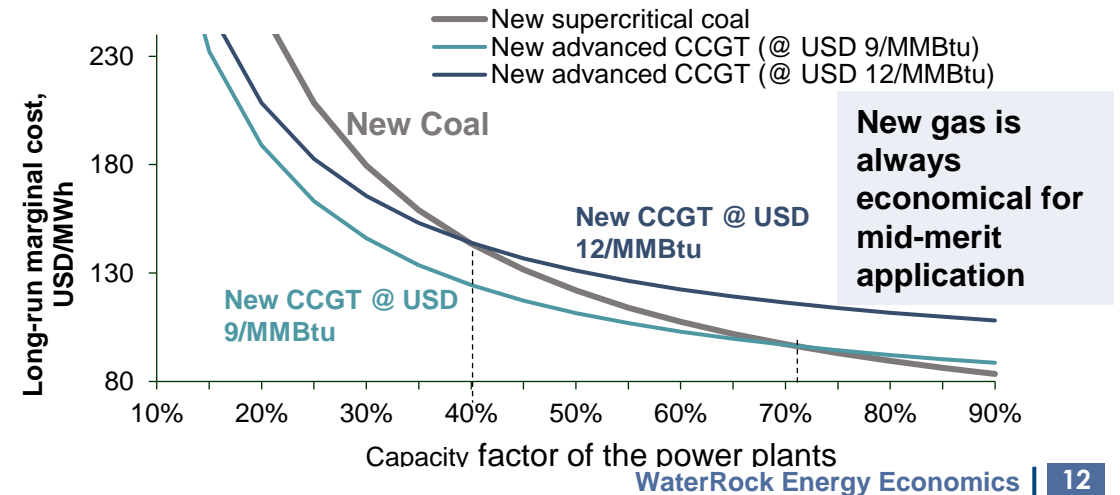
Project	Owner
First Gen LNG Terminal in Batangas	First Gen, Tokyo Gas (20%) & potentially a third partner
EWC Pagbilao LNG	EWC
SMC Global Power FSRU offshore in Batangas Bay	SMC Global Power
PNOC-led LNG project	PNOC and other developers
CNOOC and Phoenix Energy JV	CNOOC and Phoenix Energy

No committed financing yet

Fundamental Shift in LNG Market



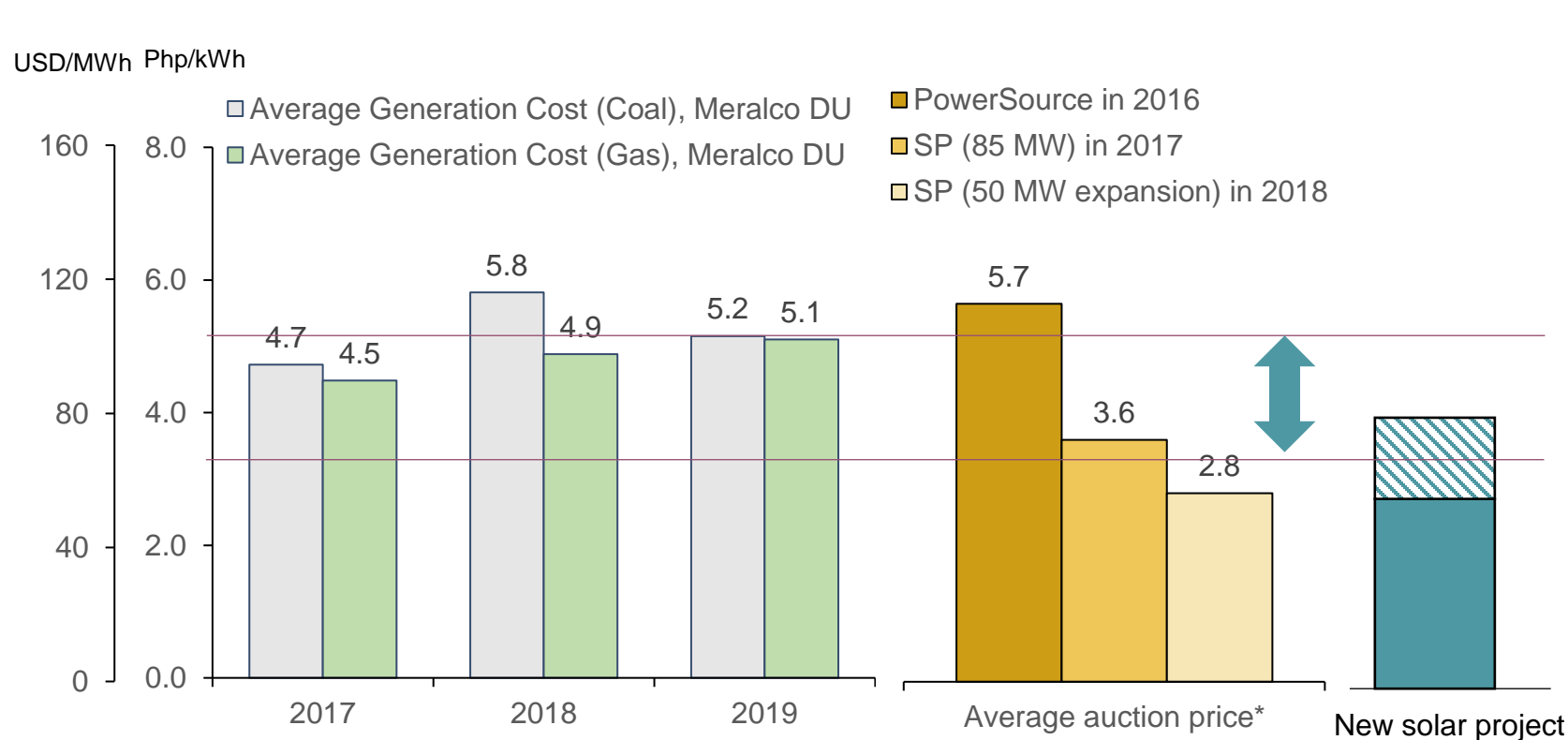
Economics of Coal vs Gas



a To meet growing demand (Renewables)

The economic space for solar capacity is big, but transmission connection and the ability to enter PSAs with DUs will be the key constraining factors

Generation cost of Solar could be Cheaper than New Coal/Gas

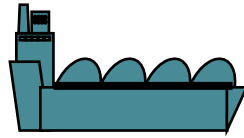
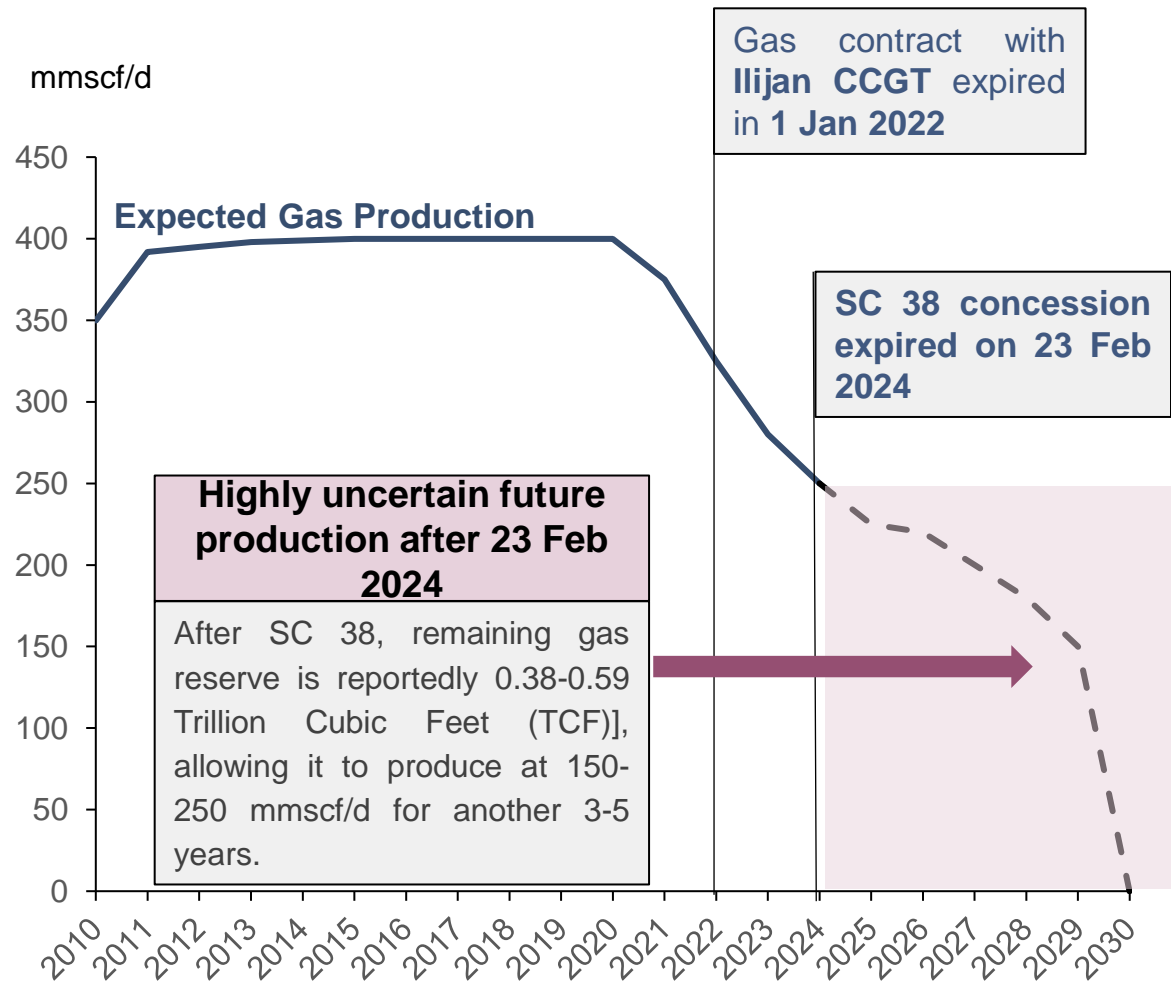


- Cost of new solar projects depends on the size of the project, the capital expenditure for building transmission lines to connect to the nearest substation etc.
- The total cost could be in 3.5-4 peso/kWh (i.e. USD 70-80/MWh). This makes solar more economical than building new coal or gas plants. It is also commercially viable to simply sell solar generation to the WESM market.
- **Key questions/constraining factors:**
 - Ability to connect to the transmission grid?
 - Willingness of DUs to sign long-term contracts?
 - Implementation of Renewable Portfolio Standard (RPS) and Green Energy Option Programs (GEOP)?

*Note: for the competitive selection process on solar capacity, the winning offer has an initial price and an escalation factor of 2%. We calculate the simple average of price over 20 years to determine the average auction price.

b To displace old technology/infrastructure
LNG Terminal can ensure the availability of gas for existing and new CCGT capacity, and increase flexibility in the system

Future Production of Malampaya Gas Field

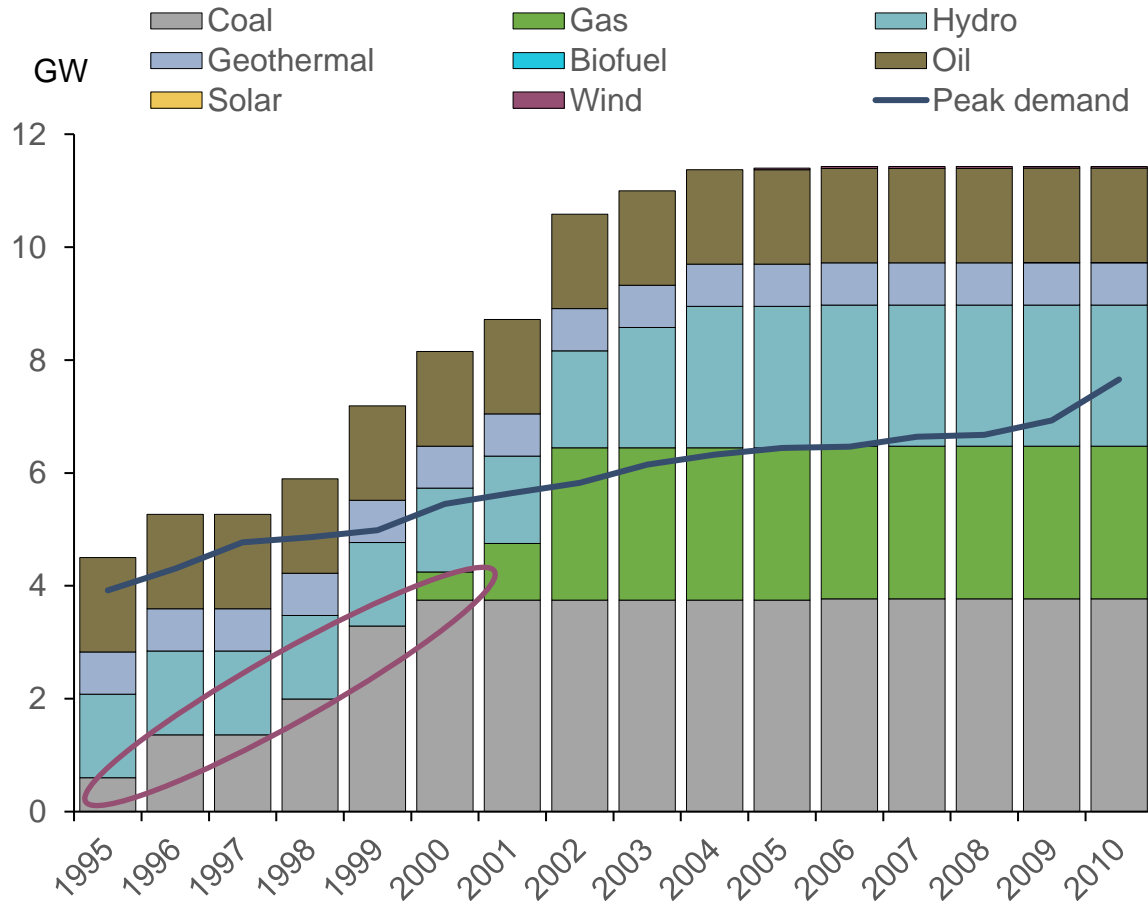


An LNG terminal is critical to:

- Ensure the availability of gas to both existing and new gas capacity
 - Existing CCGT capacity is cost competitive for base-load application and new CCGT capacity is cost competitive for mid-merit application; gas can also provide values for improving environmental sustainability and enhancing energy security in the Philippines.
- Provide flexibility values and
- Provide other knock-on positive impacts such as increased negotiation leverage and learning to position the Philippines as one of the LNG trading hubs in Asia.

b To displace old technology/infrastructure
The old coal and gas capacity will need to be replaced or refurbished in 2020s

Capacity Addition in 1995-2010 in Luzon



- The first wave of coal-fired power projects (totaled 3.1 GW*) was built in 1996-2000 in Luzon, which was under the fast track program backed up 25-year power sale agreements to relieve power shortage in 1990s.
- These coal projects are reaching the end of their economic life, so they need to be replaced or refurbished.
- 2.7 GW of CCGT capacity signed back-to-back long-term power sale agreements with Meralco DU, and they are commissioned in early 2000s. They will also need to be refurbished in late 2020s.

*Note: The old coal plants include 2x300 MW Calaca units, 2x 382 MW Pagbilao units, (315+344) MW Masinloc units, 2x647 MW Sual units and 460 Quezon power unit.
 The old gas plants include 1200 MW Ilijan, 1043 MW Santa Rita and 527 MW San Lorenzo units.

c To acquire privatized assets
PSALM has plans to privatize several assets in 2020-2022, of which the hydro power projects will be likely attractive to international investors

Remaining PSALM Power Assets for Privatization

	Rated Capacity	Sale	(Indicative) Bid Date
Malaya Thermal Power Plant (Luzon),	650 MW oil plant	Physical asset	Q1 2020
Caliraya-Botocan-Kalayaan (CBK) HEPPs	797.92 MW contracted capacity (pumped storage hydro-power plant operated by CBK Power Company in Luzon)	IPP BROT/PPA contract up to 07 Feb 2026; IPP contract transfers to IPPA	2020
Casecnan HEPP	228 GWh contracted energy (hydro-power plant operated by CE Casecnan Water and Energy Company in Luzon)	IPP BOT/PPA contract up to 05 Apr 2022; IPP contract transfers to IPPA	2021
Mindanao coal-fired power plant	200 MW contracted capacity (coal plant in Mindanao)	IPP BOT/PPA contract up to 15 Nov 2031 operated by STEAG State Power	2022
Agus-Pulangi HEPPs (Mindanao)	1001.1 MW Hydro	Physical asset	Privatization is subjected to consultation with Congress and PSALM Board's policy direction

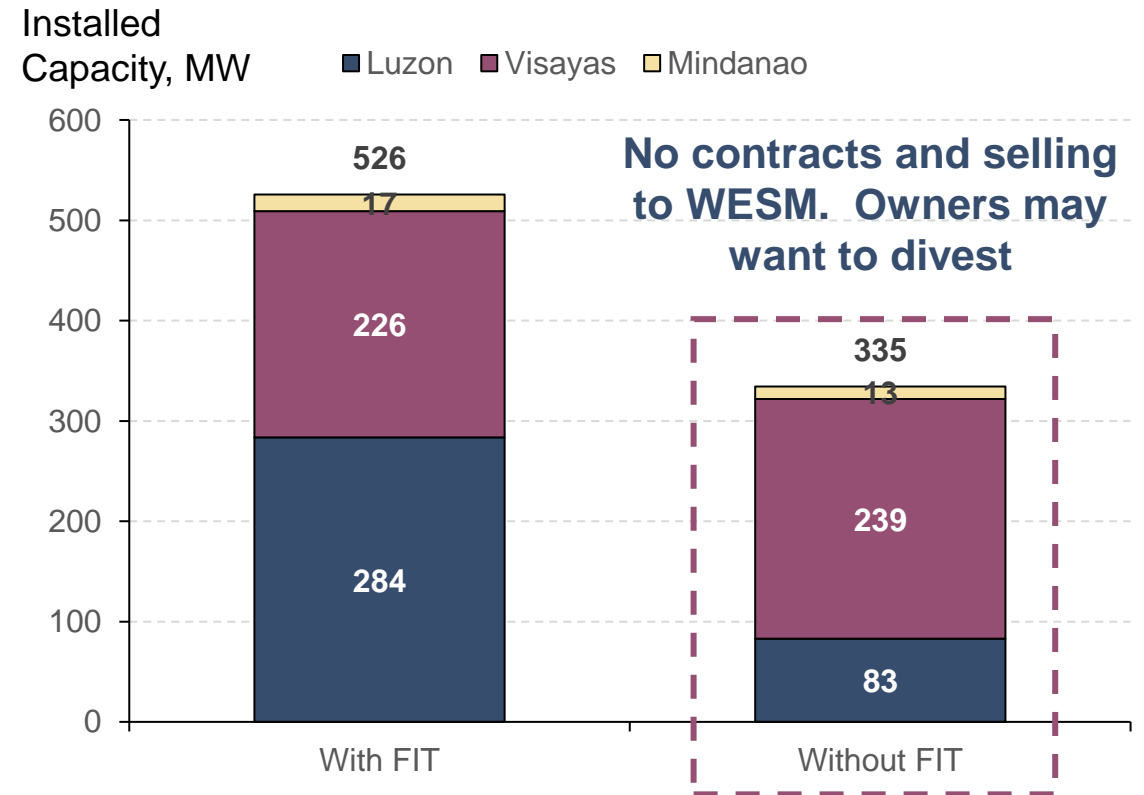
d M&A Opportunities

Merger & acquisition opportunities are likely to be sporadic as most of the “obvious” targets have been divested

Selected M&A activities in 2016-2019

- 2016
 - AboitizPower paid Blackstone \$1.2 bn in GNPow coal project deal
- 2017
 - GIC and Macquarie Infrastructure fund bought Philippines’ EDC share for up to \$1.3 billion
- 2018
 - SMC Power acquired AES coal project for \$1 billion
- 2019
 - AboitizPower acquired 60 percent of AC Energy’s thermal energy unit
 - KEPCO acquired 38 percent in Solar Philippines’s 50 MW Calatagan Solar plant (obtained FIT)
 - Ayala Corp acquired Phinma Energy

Potential Divestment Opportunities Exist for the “Stranded” Solar Plants Built in 2016



There is also a pending regulation to open the utilities sector to full foreign ownership

e Special Projects

Many other niche opportunities also exist, and detailed assessment of local factors are required

There are likely increasing opportunities on “green” solutions

- **Behind the meter generation (like rooftop solar).** A targeted business development plan is important to have a focused effort to build up the business. Different business models can be adopted
 - For example, for B2B rooftop solar business, one can adopt different models: (a) consumer owned; (b) solar leasing; (c) solar PPA; (d) solar + retail.
- **Battery energy storage to provide ancillary service.** Given the lack of additional capacity to supply ancillary services, battery could be a cost competitive option to provide regulating reserves
 - As solar and wind capacity account for a higher percentage of installed in Visayas and there is also a lack of flexible capacity in the Visayas grid, the value of battery is likely the highest among the three main grids.
- **Technologies for demand response.** With tightening market fundamental, the Philippines government (like many other countries) will likely look to see how it can introduce demand response programs in the medium-term

Even with the identified opportunities, there are many hurdles to overcome to commercialize and capture the value

? Many Questions Remain to be Answered

- What are the available **Commercial Mechanisms** that define commercial opportunities?
- Who are the **Competitors** and what are their motivations and commercial objectives?
- What are the **Risks** that need to be evaluated?
- Does the investment **Create Future Options** which may become valuable?
- What are the **Exit Options**?

**We can work closely with you
to address these questions
one-by-one**

Thanks and Contact

WaterRock Energy Economics

www.waterrockenergy.com

WaterRock Energy Economics (HK)

Unit 1001, 10/F, Wharf T&T
Centre, Harbour City,
7 Canton Road,
Tsim Sha Tsui, Hong Kong

Key contact numbers,
No. in HK: +852 9365 8216
China: +86 155 0757 1202
Wechat: zhangliutong83112

**For enquiries, contact
Liutong Zhang (Lucas)**

lzhang@waterrockenergy.com

Skype: liutongzhang



Outline

1 Market Characteristics of the Philippines

2 Investment Opportunities in the Philippines

3 Appendix - Introduction to WaterRock Energy Economics

Who is WaterRock Energy Economics

Background:

- A boutique market and economic consulting firm for provision of advisory services related to the power and gas markets in ASEAN and East Asia regions
- Small, nimble and client-focused.
- Focus on the power and gas sector in the Philippines, Singapore, Taiwan, Hong Kong and mainland China
- Very analytical team
- Deep local knowledge and connection with local companies
- Flexibility to partner with other consulting firms for projects.

Services:

- **Transaction Support:** Offer due diligence studies on power and gas assets in ASEAN and greater China region. To date, the team have supported the successful completion of >20 GW of renewable and thermal capacity with a transaction value of more than US\$30 billion
- **Market Analysis:** Provide independent and detailed fundamental market analysis on the power, gas and oil sector since 1990s. Key focused topics are opportunities and risks of investing in RE sector, economics of power plants and gas infrastructure projects (like LNG terminals) etc
- **Regulatory Support:** Provide analysis and support on regulatory issues related to fuel mix, market design, market power mitigation and long-term resource adequacy in competitive electricity markets such as Singapore and the Philippines
- **Modelling Support:** Create and provide power dispatch and optimization modelling support for power companies and consultancies.

We focus on the power and gas sector in ASEAN and East Asia Regions

Our key strengths to support transaction, market or regulatory work in the Philippines

Key Strength of WaterRock

Long and deep experience in all kinds of generation sources

Advising > 5 GW of renewable and thermal capacity investment or M&A

In-depth understanding of regulatory and policy issues

Advising foreign investors on CSP, RPS, ROCA and WESM market design

Strong network of local contacts

Good relationship with local experts and regulators (ERC, DOE, Energy Committee)

Power Optimization Tool of WaterRock Energy

(to systematically understand cost competitiveness, dispatch and market price of existing and new power plants)

Key inputs

Power dispatch and optimization model

Illustrative supply curves

Key supply parameters:

- Capacity
- Heat rate
- Fuel input and fuel price
- Variable operating cost
- Historical bid price

Key demand parameters:

- Demand profile
- Demand growth

New entry economics:

- Capital cost
- WACC/hurdle rate

Dispatch Module

Long-term optimization

Capacity Expansion Module

