



Philippines LNG: Developing New Import Markets

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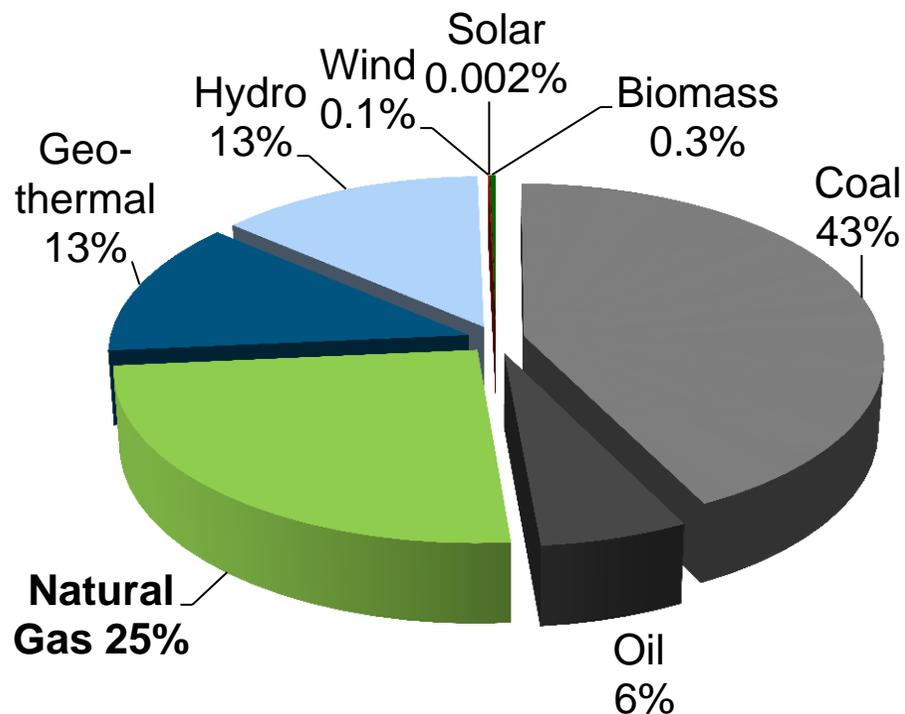

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Agenda

- Understanding Philippines's energy needs and government policy for LNG imports
- Outlining possible terminal projects: Who might win the race to build the terminal?
- Barriers to entry and possible options to manage them

Understanding the Philippines Energy Needs: Current Situation

2013 Generation Mix



- Fuel mix is currently very diversified with a high proportion of renewable and local sources
- Gas makes up 25% of the fuel for power generation in the country – higher if you just look at Luzon
- Practically all the gas comes from Malampaya – a single gas field offshore Palawan via long (504km) undersea pipeline
- The Malampaya concession expires in 2024 and while it may have enough gas for some further expansion, this is not considered sufficient for more than about 5 years at current levels

Source: Philippine DOE (Power Statistics)

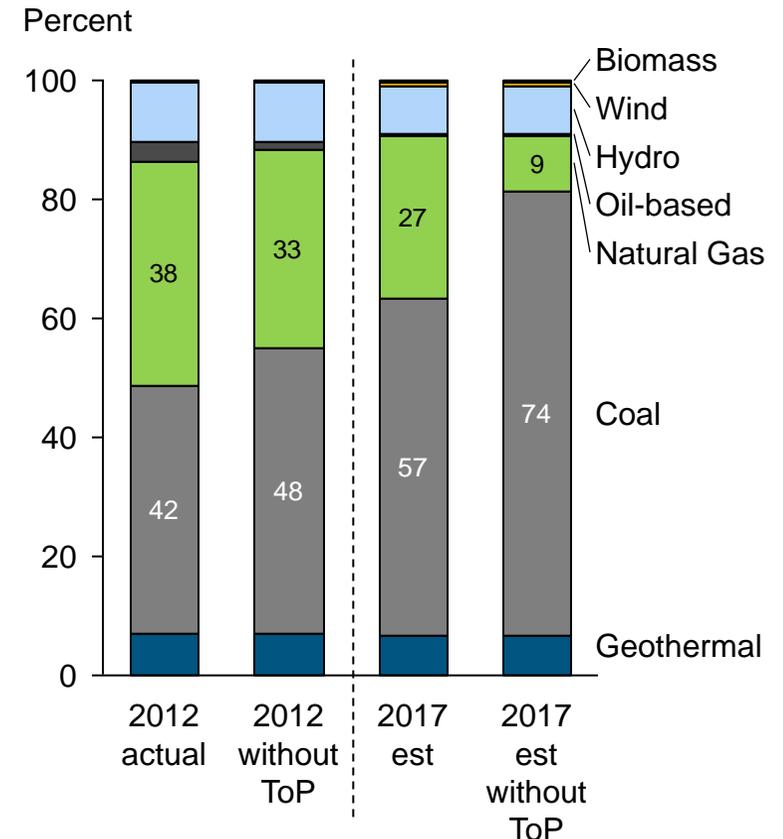
After Malampaya – what then?

And although there is a lot of gas currently burnt, much of it is not economic

- The three gas plants all currently run baseload
- However, they ONLY run baseload because of the “take or pay” (ToP) constraints of the contract for the sale of gas
- Without these ToP constraints, economically the gas-fired plants would run less – acting as peaking or mid-merit plants

Between July 2007 and the end of 2013, Meralco alone spent an extra US\$300m on its gas-fired IPPs compared to the cost saving it could have got from its coal plants

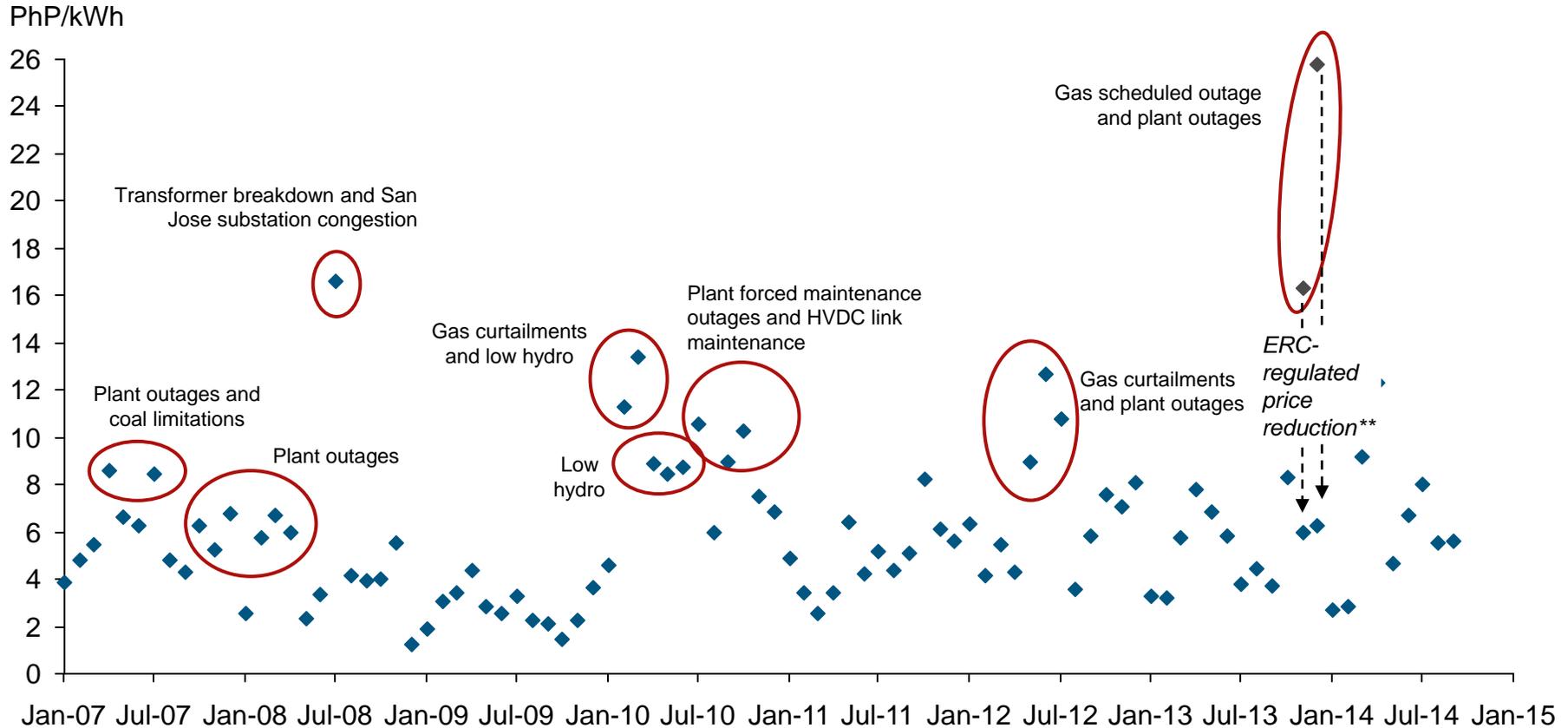
Luzon generation fuel mix



The Philippines has diverted a lot of money from electricity into other things since the completion of Malampaya.....

The Philippines has an “event-driven” electricity sector – much uncertainty and variability for both natural and technical reasons

Average monthly WESM spot settlement price* (2007-14)

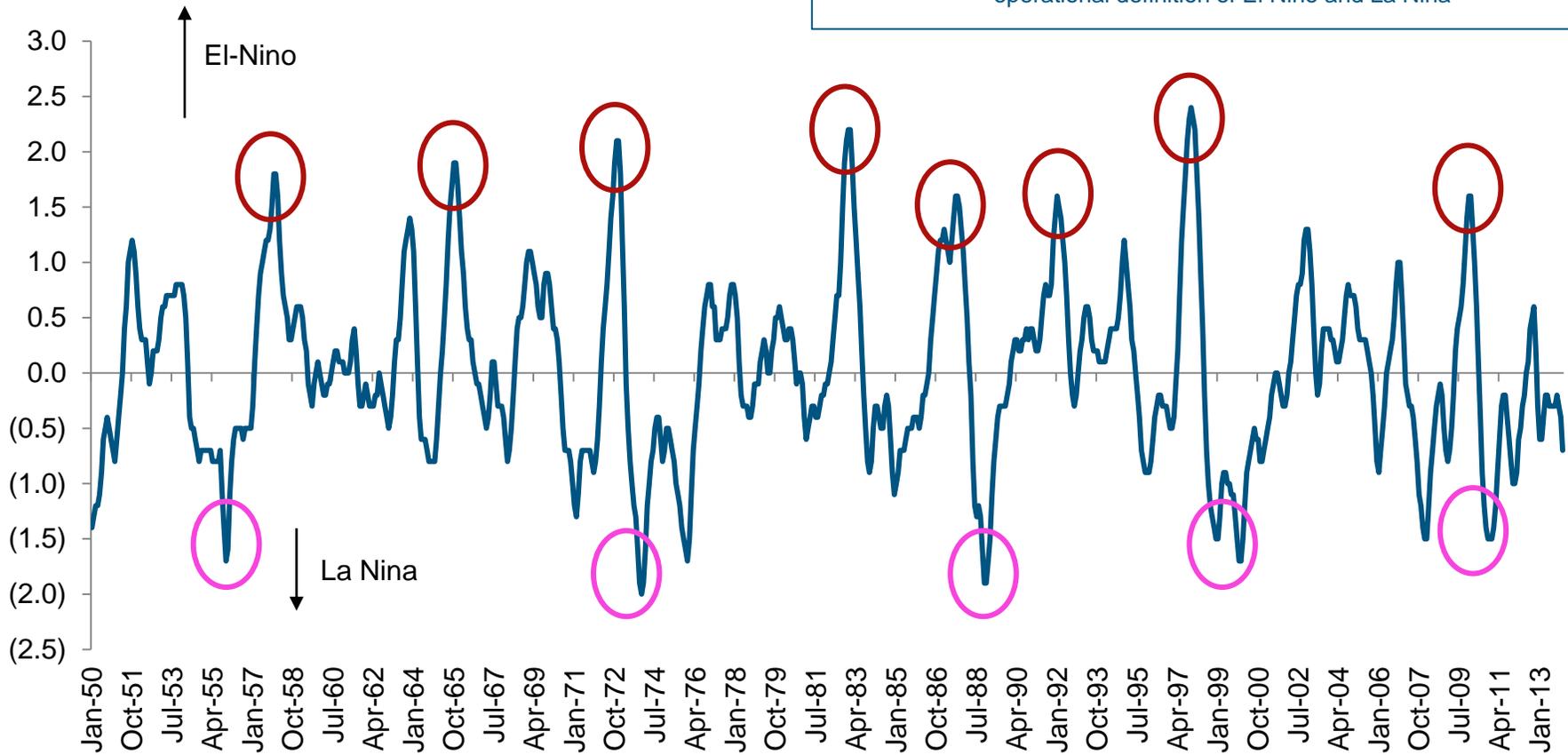


Note: * Buying price (with 100% surplus)
Source: PEMC; TLG analysis

Weather effects vary widely each year – the system must have the capability to deal with strong swings between El Niño and La Niña

NOAA Oceanic Niño Index (ONI)

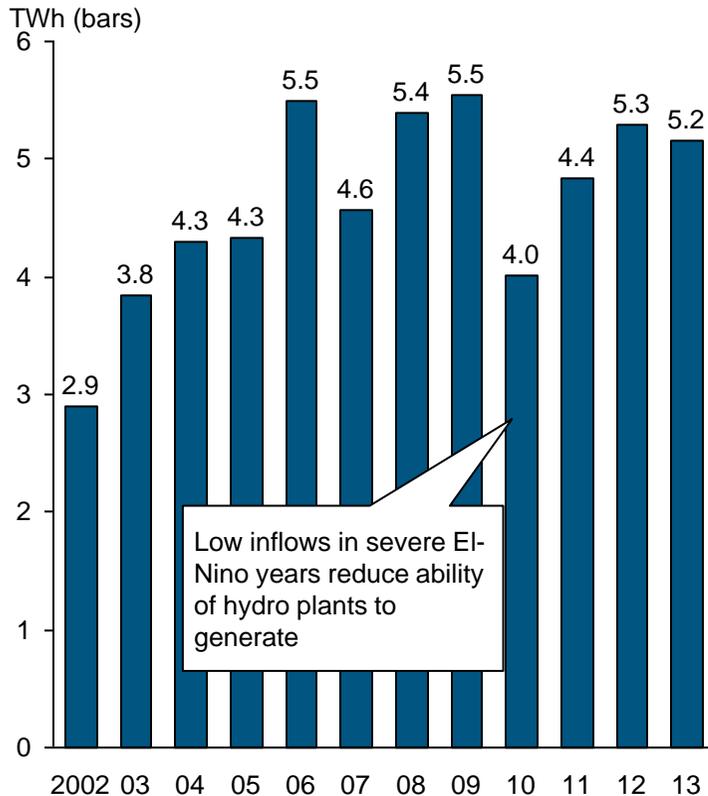
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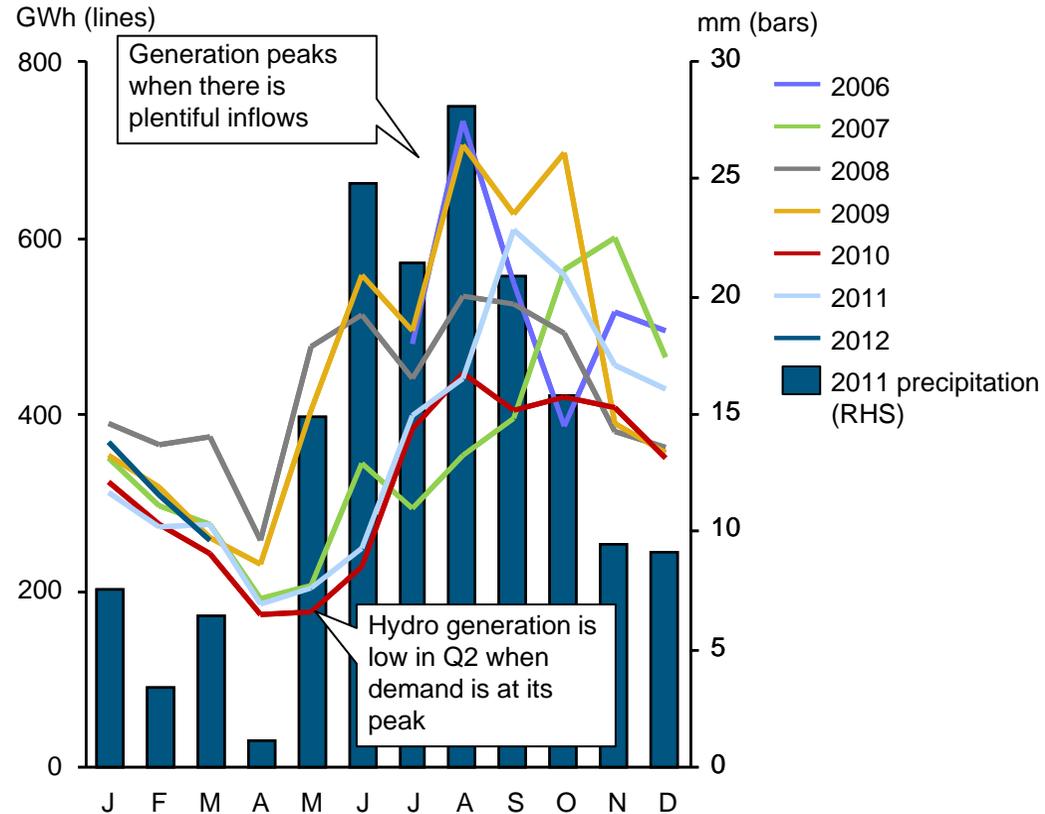
Source: NOAA

And of course hydro is not the same each day, week, month, season, or year

Annual hydro generation in Luzon (2002-13)



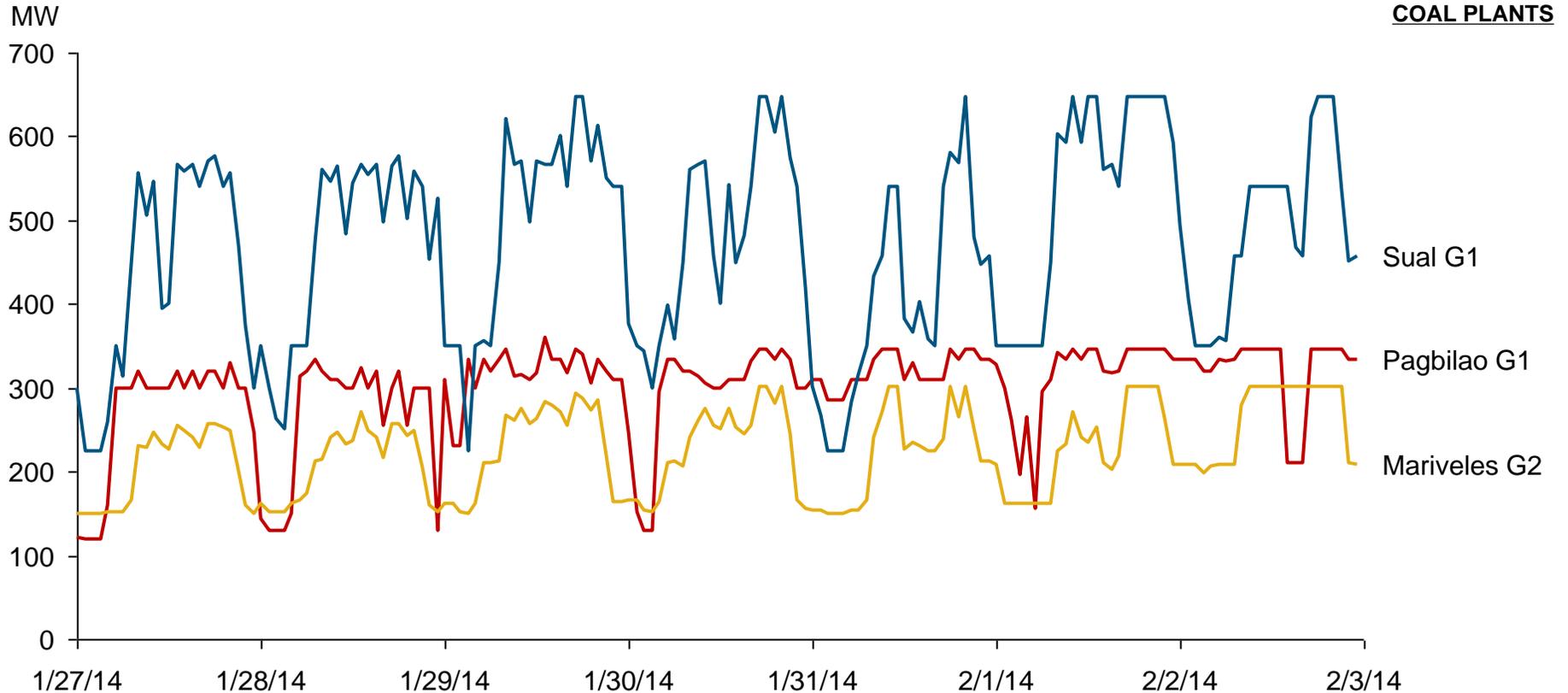
Monthly hydro generation in Luzon and 2011 precipitation (2006-2012)



Source: DOE Power Statistics (2002-13); PEMC; TLG analysis; NOAA

As a consequence of all these things – timely, flexible, capacity is needed

Typical weekly generation schedule (w/c January 27, 2014)



And most flexibility in the market is currently provided by coal – which is not ideal

New power stations running LNG would meet this need but building power stations in the Philippines is more complicated than many places in Asia...

- There is no national Government owned electricity “utility” in the Philippines
- There are no Government backed long term PPA’s on offer and no Government Guarantees
 - The electricity legislation (EPIRA) prevents the Government from building or contracting for power stations (except in emergency situations)
- There are two electricity markets – the WESM (Luzon and Visayas) and the IMEM (Mindanao)
- There is a degree of open access and retail competition – meaning some loads are contestable
- There remains extensive regulation of electricity contracts between generators and retailers
 - Not all of which is well designed or well implemented

So an investor in power in Philippines has to manage commercial and regulatory risks through private sector investment and debt. Add to that the costs of building an LNG terminal as well...

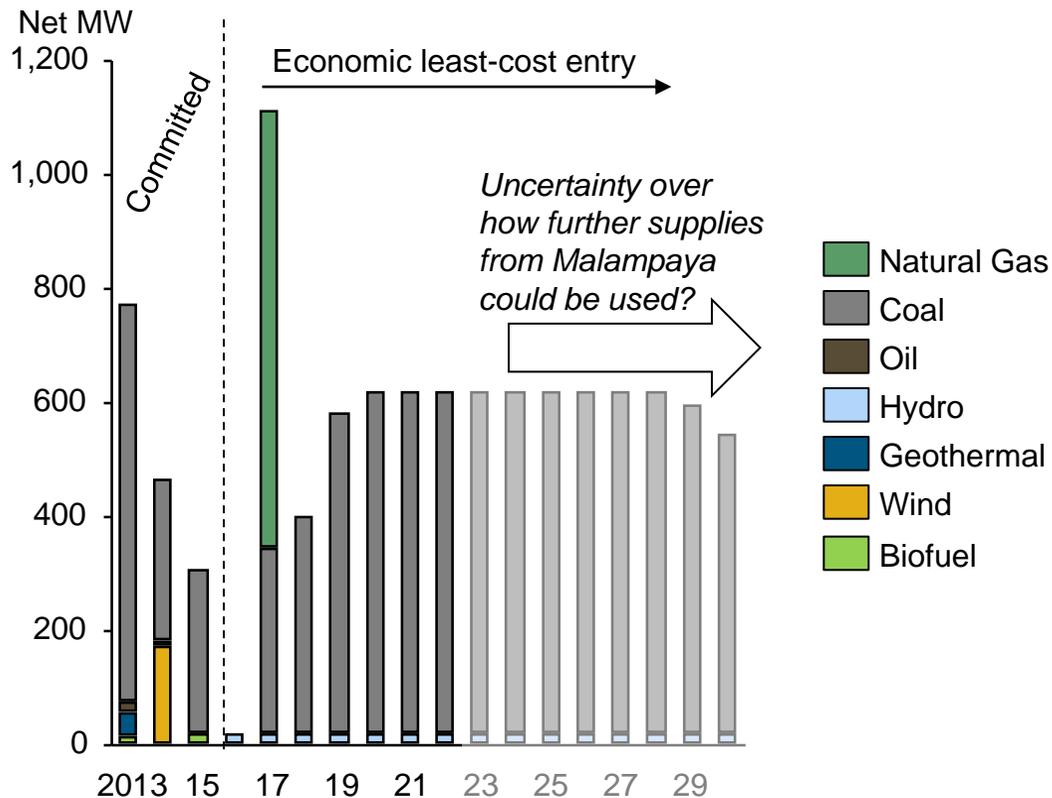
Is it even possible?

So how much LNG could be economic in the power sector?

- This is a question we answered recently as part of our work on the Gas Master Plan for the Philippines
- To answer the question, we modelled the electricity market using our electricity market simulation tool (QUAFU) to identify:
 - What type of plant is most economic to build in the future in the Philippines given the current plant mix, future load projections and costs of different type of new build options
 - How would existing gas-fired plant operate after their existing gas contracts expire
 - Are there any other ways LNG could enhance the system, without adding to system costs?

We showed that there was a case for LNG in the least-cost capacity expansion plan for the WESM and that this ran mid-merit

Least-cost capacity expansion plan for Luzon under expected assumptions



- Near-term need for more cost effective mid-merit / peaking capacity
- Conservatively, an LNG-fired CCGT of about 600-800 MW and a LNG import terminal appear to be the least-cost option
- They are able to recover reasonable returns on their invested capital (including for terminal)
- The amount of LNG-fired capacity required is relatively robust to near-term committed capacity
- However, at expected coal and LNG prices, coal generation will continue to be least-cost option for most of future capacity requirement

Note: EWC plant assumed to not be committed
Source: DOE (committed plants as of Aug 2013); TLG analysis

In the longer term, existing plants would run mid-merit rather than as baseload plant if take-or-pay constraints are eased

- As we noted earlier, the Philippines already has 2700MW of gas-fired capacity which runs baseload, out of merit
- Between 2022 and 2024, the gas contracts forcing this plant to run baseload expire
- When that happens, the existing plant will be able to operate economically in a mid-merit role
- This means that no further gas-fired capacity is needed in the WESM

There is a current window of opportunity for some additional mid-merit plant, but LNG fired power does not require investments in large amounts of plant

In addition to building new power stations, there is also an opportunity to import LNG to back up the existing domestic gas

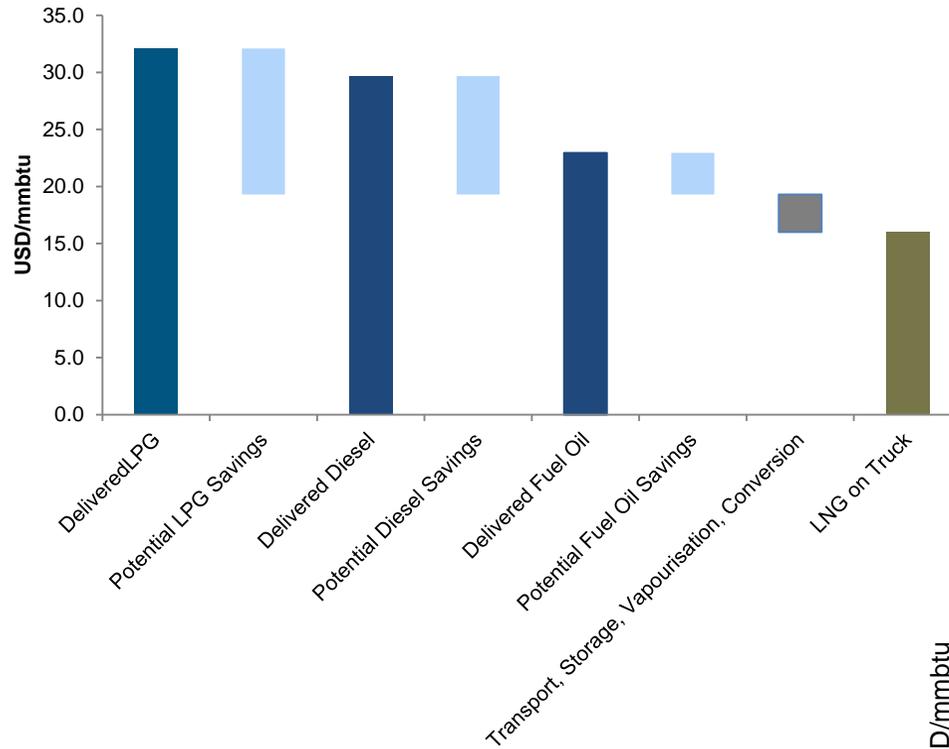
- Imported LNG is more cost effective than liquids, meaning that having the option to back-up Malampaya with LNG is a valuable option
- If LNG is used to replace liquid fuels when Malampaya is on outage, an opportunity to save in the order of USD20-25 million per annum exists
- Reduced availability also means more expensive generation is needed to replace lost capacity

	Start date	Duration	Estimated additional system cost (mPhP)
Scheduled Malampaya maintenance outage	22 Nov 2006	25 days	2,500
	27 Jun 2008	4 days	1,000
	10 Feb 2010	30 days	1,300
	20 Oct 2011	7 days	900
	13 Jul 2012	8 days	600
	11 Nov 2013	30 days	4,000
	<i>Subtotal:</i>		10,300
Unscheduled Malampaya supply outages	Average curtailment of 1,700MW over about 287 hours since 2006		740
	Total:		11,040

This is a conservative value – if one took into account the impact on the market price as well it may be higher

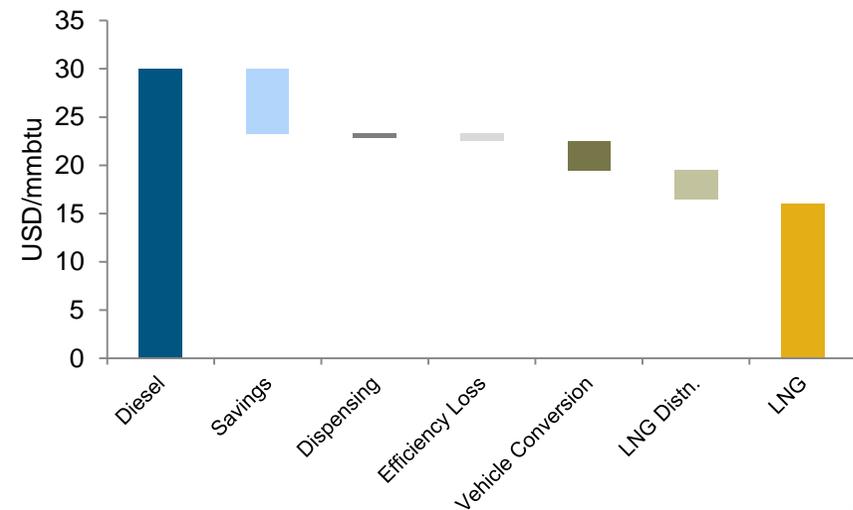
Note: * Used in scheduled maintenance outages
Source: DOE; TLG analysis

And in the longer term, there are additional markets for gas



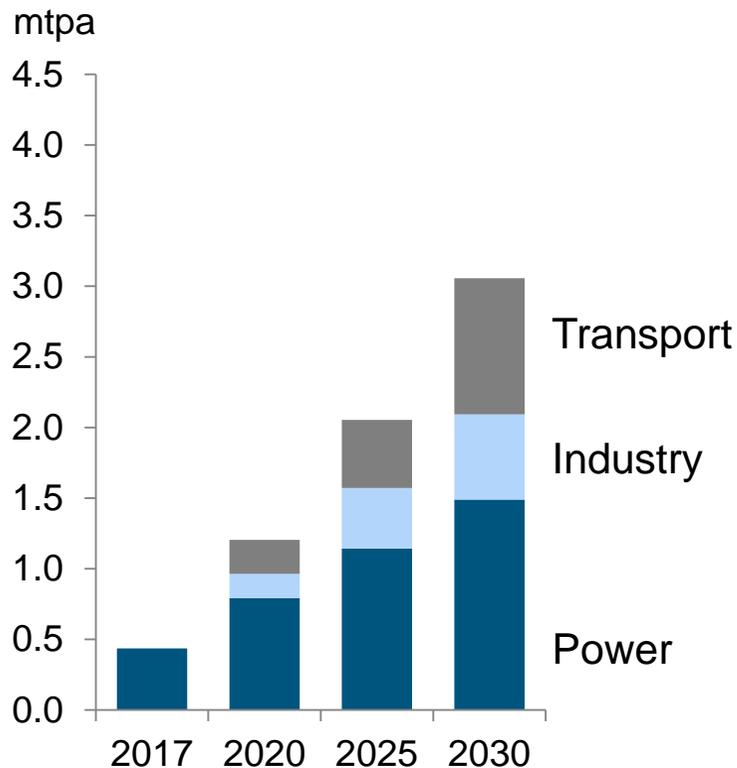
LNG would result in considerable savings over LPG and diesel as a heating fuel

And also as a transport fuel



Our base case scenario has growing demand from power, industry and transport

Forecast LNG consumption



- In the short term, we believe it is more economic to move LNG by truck to industry than by pipeline
- There are a number of diesel fired power stations in Visayas and Mindanao that could be converted to run on LNG – most of these are proximate to the coast and could be serviced by small barges on a “milk run” from the main Luzon terminal
- Development of gas pipelines in the Philippines is problematic due to access to land – over time if this is solved and after a base industrial demand has grown, then additional pipelines into Manila make sense

So, there IS commercial potential for LNG in the Philippines, but not a huge amount

- Most of the potential LNG demand comes from the power sector:
 - To back up existing power stations now; or fuel existing power stations after 2024
 - Fuel for new power stations from 2017 onwards
- Backing up existing power stations is worth about USD 20-25 million per annum until 2024
- There is an economic case for about 600-800 MW of new power stations, running mid-merit
 - Highly variable gas demand due to variations in annual rainfall (hydro), outages, and weather (El Nino) meaning quantities of LNG required are significantly less than 1mtpa in the near term
 - No economic case for new baseload gas fired power stations – coal is always a cheaper option for baseload, even after factoring in possible carbon credits
- Small but potentially growing demand for gas in industry and transport

Unfortunately our findings do not sit well with recent “policy” ... developed independently of this work

- The Energy Secretary developed a Fuel Mix policy at the same time we were running this project, which states that 30% of the electricity in the Philippines will come from gas.
- It appears to roughly take the fuel mix in 2008 (the year the RE law was passed) and expands it out into the future
- However, appears to be a political desire with no economics nor analytics underpinning in.
- Nor any active policy either (no mandatory actions required)

The recommendations of the Gas Master Plan are out of line with the “new” Fuel Mix policy – which is causing confusion in the DOE

So – what will actually happen?

- The Natural Gas Master Plan proposed a specific transaction structure to bring in a privately owned FSRU to deliver back up LNG and supply for the economic amount of new power stations
- It required only a small amount of Government assistance to get the process started... but so far, there are no indications that the DOE will act on any of the recommendations
 - DOE is understaffed and much focus is currently on the “emergency” power for next year
 - A number of internal movements within DOE mean that staff who were in charge of this project have now moved elsewhere
- However, all is not lost.
- There are a number of initiatives from the private sector that may deliver very similar outcomes

A year ago a number of private sector proponents were active in this space....

- At the start of our Master Plan study, we interviewed all the active proponents looking to build LNG terminals in Philippines
 - Most were looking at land-based terminals
 - Most were looking at “base load” options for gas power plants and off-take
 - Few really understood the market
- Our study recommended an FSRU instead of a land-based terminal
 - The amount of gas required is small, meaning expensive land-based terminals are unnecessary
 - Flexibility is important – timing may change – faster options are more appropriate
 - Building on land is problematic in Philippines – land acquisition and approvals delay projects so a floating solution has advantages

...however now the credible suspects have been narrowed down

- EWC is under construction at Pagbilao
 - Land-based terminal using “marine-based” technology to keep costs down
 - Significant progress has been made on the terminal and turbines have arrived on site for the power station
 - Construction started before the project was fully funded, making it hard to predict how it would outturn
- Shell has been undertaking a FEED study for LNG import at Batangas
 - Their JV SPEX is currently the sole supplier of gas to the Philippines, with a depleting field, giving Shell a clear economic incentive to find a way to continue supplying gas to the Philippines market
- First Gen has also been looking at LNG options
 - First Gen owns two of the three gas-fired power stations currently operating and is building two more – a peaking plant and another mid-merit plant
 - Those plants will initially share gas from the existing gas supply, but this is only a short term solution so First Gen have a clear economic driver to find alternative supplies
- Meralco was previously looking at a terminal but now appears to be just looking at a gas-fired power station
 - As the largest distribution utility in the Philippines, it makes a very credible and credit-worthy counter party for any importer of LNG

Any of the options could supply the economic need for LNG-fired capacity in the power sector

- EWC's project is around 600MW and currently has no power contracts - meaning that it would operate as required in the WESM exactly as our model predicted
- First Gen's projects take existing inflexible gas and remove the take-or-pay to allow much more flexible and economic burn of the existing Malampaya gas – but all these power stations will need fuel in the future after Malampaya
- Meralco has long argued that flexible, mid-merit power is what is needed in the Philippines electricity market

All these projects are consistent with the economic requirement of the power sector and all are private-sector driven

But barriers to entry still remain

- There are no environmental incentives for gas-based generation in the Philippines
- Regulation of power supply contracts continues to undermine efficient outcomes
 - Contract regulation is currently based on a “cost-plus” basis that does not take account of market prices nor what alternative contracts might be available.
 - There are no incentives for distribution utilities to procure an overall least cost portfolio
 - As such, it makes it harder to highlight how mid-merit and peaking generation options fit into the mix compared to “cheaper” baseload coal.
- Government policy and intervention in the electricity market is undermining private sector incentives
 - Interference in the market to lower market prices “after the fact” has caused some generators to lose money
 - Lowering the cap on the market price and adding a new “secondary” price cap at a level lower than a peaking plant needs to recover its costs has serious implications for new investment
- There remains no clarity of rules on NG use and infrastructure

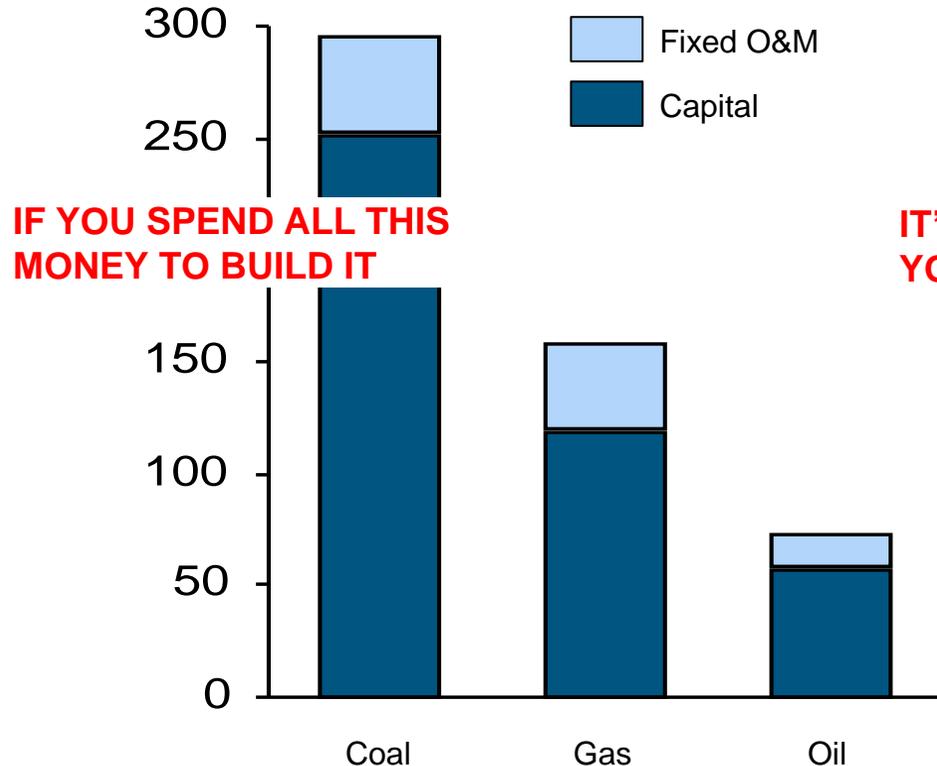
Lack of regulatory incentives for retailers to contract are possible one of the biggest barriers to entry of new flexible plant

- Retailers are the companies who buy from the wholesale market and sell to end use customers
- In the Philippines these are distribution utilities and co-operatives servicing franchise consumers (as well as a small number of retailers servicing the contestable market)
- The purchases of these retailers are regulated by the ERC, but this regulation is unlike that found in most markets
- The regulation is focussed solely on individual contracts
 - It does no analysis of whether the contract is actually NEEDED, only the cost of the contract
 - It does not take account overall purchases by the retailer
 - It does not take into account alternatives available
 - And nobody regulates what is not contracted (that is, purchases from the spot market)
- Once approved, all the costs of these contracts are passed directly through to the consumer, even if they later change, even if the contract is not needed

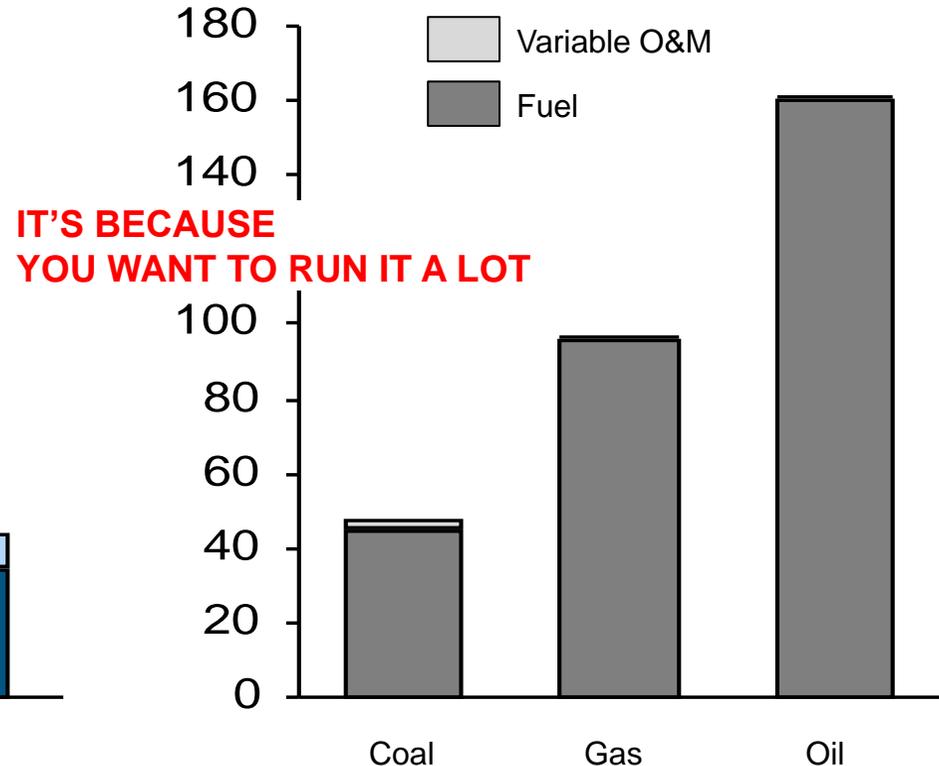
The impact means that retailers focus on what is easy to get approved, not on what is actually needed. They have no incentives to contract efficiently

In any market, or to meet any load shape of electricity demand, there is a mix of plants that is cheapest

Fixed costs - \$/kW per year

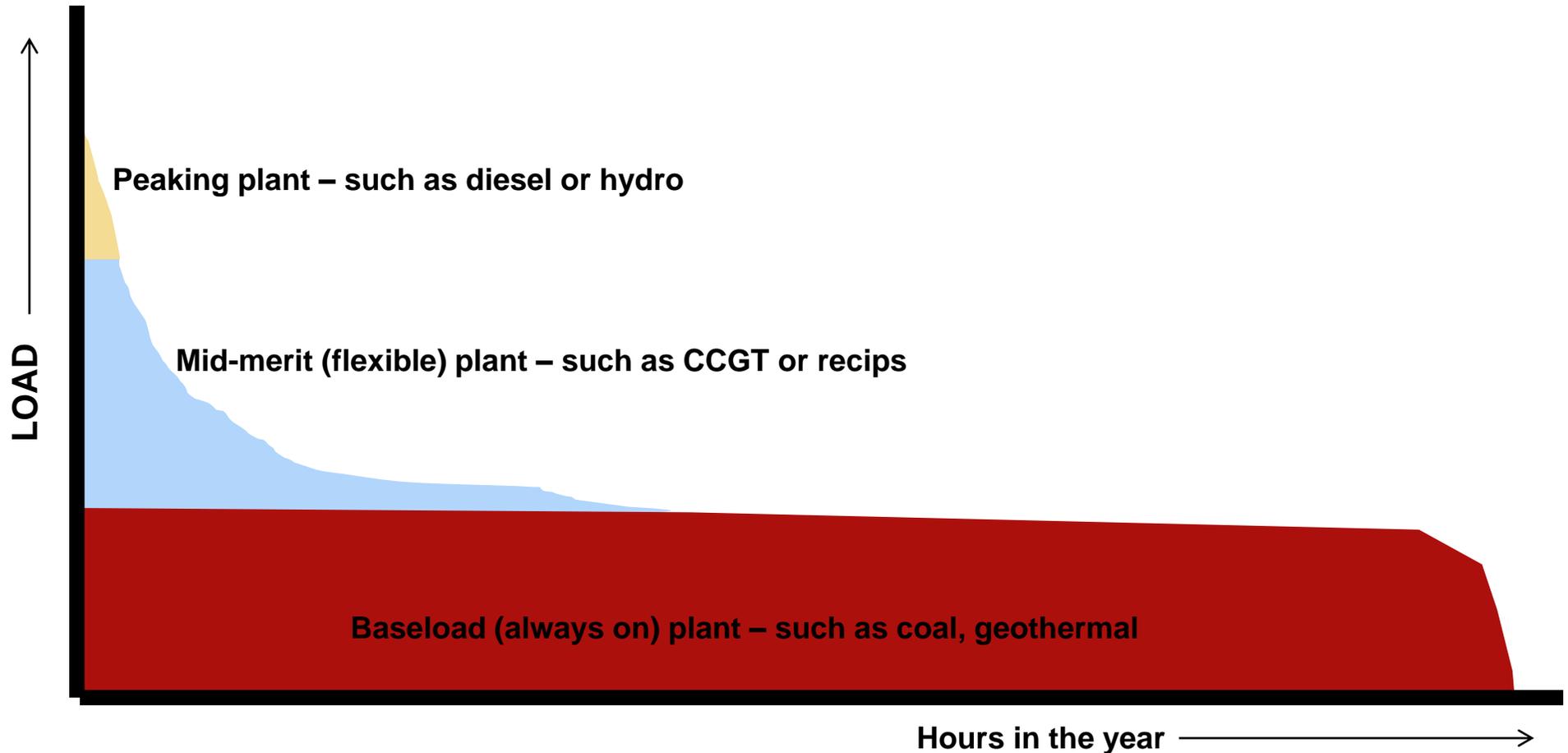


Variable costs - \$/MWh



No single technology is inherently “better” than the other – it is the way they are mixed that makes the optimal solution

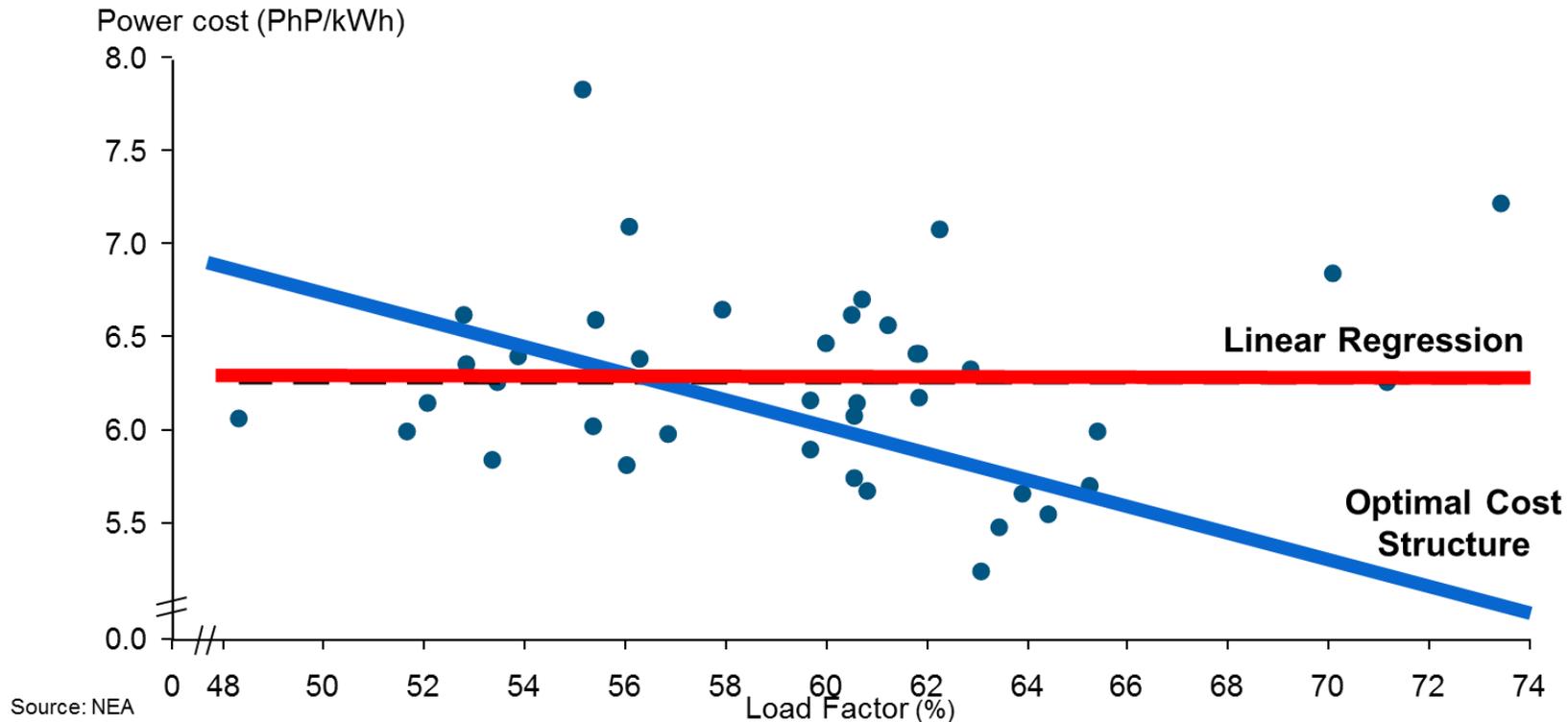
In a market like the Philippines, we would expect retailers to purchase a mix of peak, baseload and mid-merit capacity to meet their needs



This is important because it is the incentives on retailers to contract that drives the contract underpinning new entry into a merchant market

If you look at the data, retailers in the Philippines are not contracting according to an optimal mix

Average power cost vs. load factor for Luzon grid ECs (2012)



Source: NEA

The evidence is consistent with our hypothesis, that the structure of regulation does not incentivise contracting for anything other than baseload plant

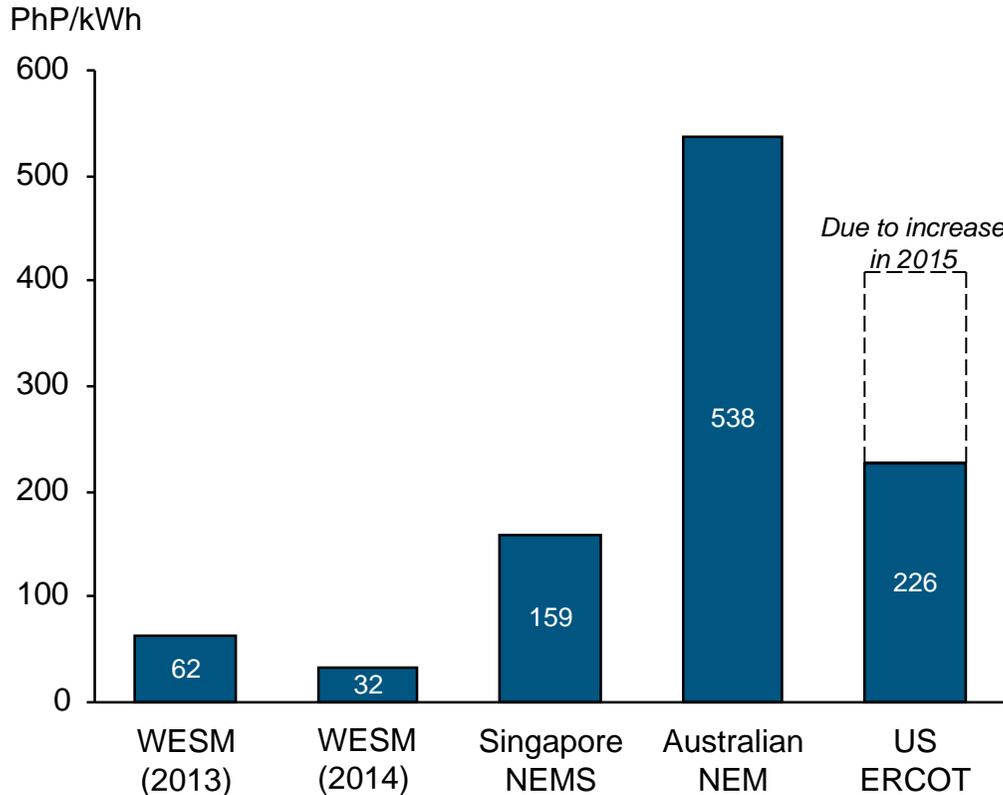
In addition, normal merchant markets put risks on retailers to encourage them to contract (and to contract efficiently)

- Since WESM purchases are not subject to regulation, all WESM costs are passed through to consumers
- In other markets, customers have fixed tariffs, and if spot prices are high, it is RETAILERS, not the customers, who bear this risk
- In Philippines this is backwards.
- Since customers bear the risk, the regulator and the DOE worry about high WESM prices and have capped the price

This band-aid solution merely tackles the symptom, not the disease and in the long term will make the problem worse

The market cap price much lower than other markets

Comparison of the Market Price Caps



With a higher price cap:

More attention would be paid to effective contracting strategies – especially contracts to cover outages and peak demand

Flexible and responsive capacity (such as that provided by LNG) would become more commercially attractive, leading to earlier replacement of older, expensive, and less responsive capacity

However risk to retailers would increase, as they would be more exposed to uncovered (spot) price risk

And changes to the regulatory environment are required to support this outcome

The market woes and regulatory short-comings may yet hinder efficient development of LNG in the Philippines

In summary

- There is an economic case for LNG to enter the Philippines
- The market is driven by the private sector and the private sector is responding to the needs
- Government policy is lagging private sector needs and recent decisions are actively deterring new investment
- And regulation continues to undermine the incentives for efficient contracting which would assist in underpinning new entry

We continue to watch, wait and push for improvements



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