Carving out Coal in the Philippines:

Stranded Coal Plant Assets and the Energy Transition

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Executive Summary

The Philippines has 10,423 megawatts (MW) (US$20.8 billion) of largely imported coal expansion in its current pipeline. This runs on top of a total of 7,419 MW of existing coal-fired capacity. Projections borne of such a pipeline raise vital questions about national energy policy and practices in an era of evolving electricity-generation trends. Stranded coal plant assets—those that are not delivering an economic return in line with the expectations from the project outset—is a growing material and inevitable risk in the Philippines.

In Mindanao, even without retail competition enabled by the presence of a Wholesale Electricity Spot Market, stranding is already taking place due to an oversupply of approximately 700 MW of coal and hydro in an island grid lacking national connectivity. The surplus of coal fired power has led to a downtrend in utilization rates as compared to original expectations. Conservatively, the underutilization cost in Mindanao alone from 2014 to 2016 is Php 3 billion (US$60 million). This cost is being borne by power producers and ratepayers.

The excessive and growing dominance of imported coal in the national generation mix faces challenges by retail competition, the encroachment by imported liquefied natural gas (LNG) into baseload supply, and renewable energy cost deflation. The role of public policy is to ensure that the common citizen—as ratepayers and taxpayers—is shielded from as much risk and cost as possible.

This report seeks to answer whether such concerns are addressed, and whether the ratepayer and/or taxpayer bear a disproportionate amount of risk as compared to financiers, developers, and distribution utilities. It seeks to assess whether the Philippine Energy Regulatory Commission (ERC) and major distribution utilities like Meralco have taken into adequate consideration the turning point at which LNG and renewable energy become competitive enough to address a significantly rising share of demand growth. It seeks to contribute to the energy discourse, particularly as regards the question of whether banks investing in coal-fired projects are conducting sufficient due diligence, taking into account the above challenges and additional risks that will come with the proper implementation of environmental regulation, including a coal tax and a more robust energy competition policy.

As a vital case study, we look at how Meralco, the country's largest distribution utility, is now contracting with its subsidiary, Meralco PowerGen Corporation (MGen), to expand its electricity supply to meet forecasted demand growth. Power generation businesses like MGen, as a result, are proposing the construction of over 10,000 MW of coal fired power.

This report details the risks associated with such projects—a list that is long, significant, and cannot be ignored. The Philippines cannot afford to lag behind the rest of the world in acknowledging such risks at a time of accelerating global electricity market transformation.

If capacities at these plants are not fully contracted, this will leave the plants vulnerable to Wholesale Electricity Spot Market prices, which are now at record lows, owing in part to the merit-order effect, which results in zero marginal cost renewables being dispatched ahead of more expensive marginal cost conventional electricity, eroding utilization rates further.

This report also examines the proposed Atimonan Power Station, one of the 3,351 MW 20-year Power Supply Agreements (PSAs) submitted to the ERC for approval before the

implementation of the Competitive Selection Process (CSP). These proposals have been described in the press as "midnight deals"[1]. The Atimonan proposal illustrates key aspects of the procurement policy of Meralco; its PSA also shows that Meralco has shown some foresight and is moving in the right direction with an improved "carve-out" provision that should protect ratepayers from inevitable stranded assets, shifting stranded costs to the independent power providers and their investors.

But has the utility in question here, Meralco, examined alternatives that could provide firm capacity to address its forecast load requirements with more natural gas and renewable energy at a time of 10-20% annual electricity cost deflation? LNG and renewable energy generation are already cost-competitive for a rising slice of the overall load. Within the right regulatory framework, renewable energy costs can and should continue to fall, and within a well-defined LNG policy, natural gas can already address all slices of load. Meralco does welcome unsolicited offers from variable renewable energy suppliers, as will be discussed later, but renewable energy possibilities in the Philippines remain largely neglected.

While new thermal capacity is clearly justified in the Philippines, exclusive imported-coal-fired power capacity, for base demand, is far from the full answer. Import coal-fired generation exposes the Philippines needlessly to international coal price risk and currency fluctuation risks.

Greater generation system diversity and domestic generation sourcing will enhance national energy security with renewable energy deflation has very positive consumer benefits. Policymakers should move toward that direction now by adopting open-procurement competition.

Highlights

Stranded Coal Assets is a Growing Material Risk and is Inevitable in the Philippines

Stranded coal asset cost is already being realized in Mindanao due to an oversupply of approximately 700 MW of coal and hydro; from 2014 to 2016 stranded costs were conservatively equivalent to Php 3 billion (US$60 million). The 10,423 MW (about US$20.8 billion) of coal expansion in the current pipeline all run the risk of becoming stranded assets.

Stranded Coal Assets Can Lead to Higher Electricity Rates for Consumers or Losses for Investors

Stranded asset risk across the coal-fired electricity-generation sector is rising, driven by an overbuild of coal-fired plants and a trend toward falling power prices, which in turn is driven by the deflationary nature of renewables and accelerating policies on retail competition. These trends may leave ratepayers at risk of having to pay above-market prices or the execution of the carve-out clause which means the project may not deliver an economic

[1] http://news.abs-cbn.com/business/07/04/17/erc-defers-action-on-meralco-midnight-deals

return in line with the expectations from the project outset. This may affect the ability to service debt and return prospects of the equity investor.

ERC Should Ensure that Bank Risk Managers and Underwriters, and Developers Face the Consequences of their Decisions - Risk Should Not be Passed onto Ratepayers

Banks that are investing in coal-fired projects in the Philippines are not taking into account the abovementioned risks.

Projects Reliant on Imported Coal like Atimonan Needlessly Expose Ratepayers to Global Coal Price and Exchange-Rate Risk Shocks

While the automatic pass-through of fuel and operating and maintenance costs assures operators guaranteed returns, ratepayers are left unprotected. More imported coal-fired power capacity aggravates the Philippine electricity system's cost/price volatility, regardless of which foreign supplier it turns to[2]. There are fixed-price contracts available to contestable customers at some incremental cost. This means that it is possible to remove automatic pass-through provisions in PSA's as this is an unnecessary price risk passed onto ratepayers.

Coal Plants like Atimonan are at Risk of a Coal Tax (whether Carbon-Based or not) which will Accelerate the Risk of Stranding

The Department of Finance (DoF) appears committed to put in measures that correct market outcomes, address externalities, and update the 20-year old excise tax on coal, which at present stands at an insignificant Php10 per ton. Government regulations have long ignored the public cost of health impacts borne by taxpayers and the cost of greenhouse gas (GHG) emissions. On a 10-year view, the chance of a coal tax to internalize some of coal's very adverse health and pollution costs is a material financial risk and accelerates the risk of stranding.

[2] It is also important to note that the feed-in-tariff (FiT) installations are also subject to upward price adjustments based on local CPI and volatility based on exchange-rate fluctuations.

Introduction

The 10,423 MW of coal-fired power plants in the current pipeline is emblematic of the Philippines' growing dependence on imported coal.

The long-term resilience of the Philippine economy depends on finding a more practical energy model—one that will shield consumers and businesses from price as well as exchange-risk shocks (coal prices soared last year by 60%, offering a stark example of how coal-import electricity economies are at the mercy of price volatility and uncertainty).

Philippine power generation surged 9% in 2016, from 82.6 TWh in 2015 to 89.9 TWh, with most of this increase coming from coal-fired plants. Electricity consumption grew from 74.8 TWh in 2015 to 81.8 TWh in 2016[3]. This trend is attributed to a 12.7% growth in residential consumption due to unusually hot weather that drove up use of cooling systems; to activity related local and national elections; and to increased production capacity due to strong economic growth[4].

The next phase of generation construction is expected to occur around 2023-2024 in conjunction with the projected shutdown of the Malampaya gas field. This will cause uncertainty around the continued operations of the four combined cycle gas-fired power plants, and a gas-fired open cycle plant, which have more than 3.2 GW of capacity.

To understand the current bias for and dominance of coal in the capacity and generation mix, one has to hark back to the days prior to the restructuring and deregulation of the Philippine power sector. Box 1 provides a brief for the Electric Power Industry Reform Act of 2001 and Box 2 discusses stranded debt and contract costs.

Box 1: The Power Sector after EPIRA

The Philippine power sector has undergone two important phases since formal democracy was reestablished in 1986. Before then, with a few exceptions, generation was monopolized by the National Power Corporation (NPC) which also owned, operated, and maintained the transmission system as a regulated and vertically integrated monopoly.

In 1987, through Executive Order 215, the NPC monopoly in generation was broken when Executive Order 215 allowed the entry of private capital, mostly foreign, into that segment. (This was subsequently buttressed by RA 6957 that encouraged greater private participation in all infrastructure projects). This was propitious because the power crisis that lasted up to 1993 started the following year. At its height, in 1992-1993, outages averaged 7 hours a day (4-8 hours in Luzon, and up to 12 hours in Mindanao). The World Bank estimated economic losses to be as much as 1.5% of annual GDP in those years.[5]

[3] https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review-2017/bp-statistical-review-of-world-energy-2017-full-report.pdf
[4] https://www.doe.gov.ph/electric-power/2016-philippine-power-situation-report
[5] https://www.adb.org/sites/default/files/publication/28334/wp044.pdf

Among the oft-cited causes of the power shortage were: 1) unanticipated surge in power demand from renewed economic growth under a new political dispensation; 2) the mothballing of the Bataan Nuclear Plant without provision for replacement capacity; 3) delays in power plant construction (especially for base load); 4) lack of equity infusion into NPC and the unavailability of long-term debt; 5) the politicization of the tariff setting process, leading to cost underrecoveries and exacerbating 4; and 6) low morale and the reduction of the NPC technical staff base because of low pay.

After the addition of expensive fast-tracked capacity, mainly gas turbines and diesel, the power situation stabilized in 1994, when economic growth resumed. An aggressive program of further capacity expansion was also well underway, with coal becoming the first choice for base load.

The planners from NPC, chastised for the earlier outages, used the most optimistic demand forecasts, based on the high economic growth projections. But then, the Asian financial crisis struck, and though the economy weathered the storm respectably, electricity demand was much weaker than projected, resulting in underutilization of capacity that had to be paid for in any case.

The clamor for reform in the power sector was a worldwide phenomenon. In the Philippines, such clamor was driven more by international ideological forces and financial institutions rather than by a local polity informed by a deep understanding of the power sector. In any case, the Electric Power Industry Reform Act (EPIRA), first discussed in the early 1990's, was finally enacted, after deliberations through four political administrations, in June 2001, through Republic Act 9136.

The main features of the reforms were:

The unbundling of the power sector into transmission, distribution, and generation sectors that entailed the mandated breakup of the monopoly of NPC in generation capacity and the privatization of its generation assets. Relatedly, private sector entry into generation was deregulated, allowing for participation without the imprimatur of the NPC. NPC generation and distribution functions became refocused solely into missionary electrification areas;

The establishment of a wholesale electricity spot market (WESM);

The transformation of the Energy Regulatory Board into the ERC as an independent regulator of the industry;

The mandating of open access to distribution utility lines, to enable retail competition;

The privatization of the operation, maintenance, and expansion of the transmission system as a regulated monopoly;

The continued regulation on distribution utilities as monopolies responsible for least-cost generation supply in their respective franchise areas.

Box 2: Stranded Debt and Contract Costs

In the mandate to privatize the generation and other assets of NPC, and to transfer to private hands the management of generation supply from IPP contracts to make way for free entry into the generation sector, the state was confronted with the reality that 1) proceeds from the sale of the generation assets would not be enough to cover outstanding debt used to finance those assets; and 2) the sale of the electricity from the long-term IPP contracts would not be enough to cover the fixed annual obligations to the IPPs.

Epira caused the creation of the Power Sector Assets and Liabilities Management Corporation (PSALM), which was tasked to "to manage the orderly sale, disposition, and privatization of NPC generation assets, real estate and other disposable assets, and IPP contracts with the objective of liquidating all NPC financial obligations and stranded contract costs in an optimal manner."

In 2008, the net liability of PSALM stood at P73.8 billion (assets at P831 billion, liabilities at P904.8 billion), even after the national government absorbed P200 billion of its outstanding debt of P600 billion in 2004. Psalm's financial obligations peaked at P1,241 billion in 2003 but shrank to P502.7 billion as of the first quarter of 2017.

How did stranded debts and stranded contract costs arise? Studies point to onerous contracts, overbuild, and tariffs not reflecting true costs of provision.6 Whatever the case, EPIRA provided a way to minimize the impact of the reforms on the government's fiscal position by allowing, after the taxpayer subsidy of P200 billion, the recovery by PSALM from ratepayers, via a universal charge, of stranded contract costs for all eligible contracts approved by the then Energy Regulatory Board as of the end of 2000. The law also allowed the recovery of stranded contract costs of distribution utilities, with the same proviso, as a result of open access. The law implied that stranded costs from contracts entered into after 2000 should no longer be recovered from ratepayers.

In current ratepayer bills, there exists a charge of P0.1938/kwhr under the stranded contract costs item under the universal charge. This is to cover the stranded costs of the two biggest coal plants in the Luzon grid (Sual, 1000 MW and Pagbilao, 700 MW) which were contracted by NPC under build-operate-transfer contracts (with an energy conversion agreement, meaning NPC supplied and took the fuel risks) in 1999 and 1997 respectively. The management of generation output and fuel supply for these plants were transferred from IPP administrators in late 2009 to San Miguel Energy Corporation (SMEC) and the Aboitiz group's Therma Luzon, Inc. The winning bids consisted of fixed monthly and generation-based payments to PSALM.

In ERC Case 2014-111-RC filed by PSALM, the regulator established in a decision on July 6, 2017, that payments to PSALM from the IPP administrators were P12.87 billion shy of its gross actual contract cost obligations (fixed and variable) to the BOT owner of the two plants, Team Energy Philippines.

[6] http://www.oecd.org/countries/philippines/36052225.pdf

Earlier, in 2013, the regulator also allowed PSALM to recover P53.85 billion in stranded contract costs for the years 2007-2010.

Meanwhile, PSALM has been awaiting approval for a claim of P85 billion in stranded debts from the regulator.[7]

The Philippines is yet to establish a well-defined LNG policy. Such a policy would require legislation, especially as regards regulation and the recovery of costs for requisite receiving platforms and pipelines for LNG, the logical alternative when Malampaya gas runs out.

Under a market-driven system, capacity procurement is the responsibility of the distribution utilities. The transmission system operator procures only ancillary services and reserve resources. In the Philippines, power generation and distribution companies favor centralized imported-coal-fired power plants. Such plants bring significant and practically guaranteed returns to developers and financiers from the de-risking that current automatic pass-through to consumers for fossil-fired power plants delivers. One result of such a scheme would be an overbuild of imported-coal-fired-plants that lock in high consumer electricity for decades to come.

One could classify such plants as having high stranded-asset risk in the sense that they could eventually be operated and maintained at above-market costs. This possibility can be mitigated by two mechanisms: the spot market and the Meralco group's retail electricity operations, which will be discussed in the section on stranded assets. Refer to Box 3 and Box 4 for an understanding of stranded assets and stranded cost. Any reference to stranded costs in this report implies a stranded asset risk or problem.

Box 3: Stranded Assets and Stranded Costs

Stranded Asset

1. *International Energy Agency (IEA):* "Investments which have already been made but which, at some time prior to the end of their economic life (as assumed at the investment decision point), are no longer able to earn an economic return, as a result of changes in the market and regulatory environment"[8].

2. *Bank of England (BoE):* "Stranded assets are defined as assets that have suffered from unanticipated or premature write-downs, devaluation or conversion to liabilities. In recent years, the issue of stranded assets caused by environmental factors, such as climate change and society's attitudes towards it, has become increasingly high profile"[9].

The IEA definition is more restrictive in that an asset is deemed stranded only at the point where a facility is no longer able to cover its variable operating costs, and thus no longer able to churn out any margins. The BoE definition is broader, and encompasses the IEA

[7] https://www.psalm.gov.ph/universal/stranded

[8] http://www.iea.org/publications/freepublications/publication/WEO_Special_Report_2013_Redrawing_the_Energy_Climate_Map.pdf

[9] https://www.lloyds.com/~/media/files/news-and-insight/risk-insight/2017/stranded-assets.pdf

definition. In the extreme: an asset can be turned into a liability. It is the BoE definition that is adopted in this report.

Stranded Cost

1. *Journal of Regulatory Economics (JRE)*: "Stranded costs are costs electric utilities will not recover as power markets move from protected monopolies to an open, competitive environment…"[10].

2. *Office of Scientific and Technical Information (OSTI)*: Stranded costs are those costs that electric utilities are currently permitted to recover through their rates but whose recovery may be impeded or prevented by the advent of competition in the industry. Estimates of these costs run from the tens to the hundreds of billions of dollars, should regulators permit utilities to recover stranded costs while they take steps to promote competition in the electric power industry"[11].

Box 4: Stranding Explained

The two definitions above refer to costs of electric utilities that the regulatory framework allows them to recover, with stranded costs arising when they are no longer permitted to do so.

In the Philippine context, stranded costs, as defined by EPIRA, fall under two categories: 1) stranded debt, and 2) stranded contract costs. The former "refer(s) to any financial obligations of NPC which have not been liquidated by the proceeds from the sales and privatization of NPC assets (Section 4 vv, EPIRA)." The latter refers to "the excess of the contracted cost of electricity under eligible contracts over the actual selling price of the contracted energy output of such contracts in the market, which contracts shall have been approved by the then Energy Regulatory Board as of 31 December 2000 (Section 4 uu, EPIRA)."[12]

The relationship between stranded assets and stranded costs

Stranded costs from regulatory change are a sufficient but not a necessary condition for the stranding of assets. This is because stranded assets may arise from non-regulatory factors, such as overbuild, or the entry of competition, or other market factors.

In more general usage, the stranding of assets always implies some stranded cost that leads to asset devaluation. Company A can buy a personal device at price X, and the supplier sells stock of the same model at a price Y, much lower than X, a few weeks later. Allowing for some depreciation, Company A cannot sell the device to Company B at a price higher than Y. Company A now holds a stranded asset that has been devalued by (X-Y), the stranded cost, or cost he can no longer recover, through no fault of Company B.

[10] https://rd.springer.com/article/10.1023%2FA%3A1007998128416?LI=true
[11] https://www.osti.gov/scitech/biblio/362273
[12] https://www.psalm.gov.ph/universal/stranded

If the stranding of assets were purely due to market factors, as with the replacement of old technologies by better and cheaper ones, referred to as creative destruction[13], there would be no public policy problem. In part, this report deals exactly with the problem of the use of the regulatory framework to obstruct creative destruction.

Furthermore, this report also extends the scope of stranded cost to include costs the regulator allows to be recovered, but that would otherwise be stranded, if captive ratepayers were empowered to choose. In particular, we refer to 'above-market' rates that are due to low utilization factors from contracted capacity from thermal plants that are not 'carved out.'

As of March 2017, the Philippine government indicated 10,423 MW of upcoming coal capacity expansion, with 4,476 MW of that total under construction[14]. The country already has a total of 7,419 MW of coal-fired capacity and indeed has a coal-fired capacity surplus in some areas, including Mindanao, home to roughly one-fifth of the population.

While advocates of more coal-fired generation argue that it is needed to secure baseload power[15], the Philippines, if it builds out its coal-generation capacity as proposed, will have a significant surplus of coal-fired generation. Such a scenario would lead to the underutilization of coal-fired assets. Appendix 1 explains capacity costs, variable costs, and how low utilization punishes captive ratepayers. The coal-dependent strategy playing out now in the Philippines will inevitably create stranded assets, which are damaging to the unlucky investor who puts money into them or—in the case of the Philippines—damaging to the ratepayers who end up paying for them in the long run.

Even Lawrence Fernandez, Meralco vice president and head of utility economics of Meralco, entertains doubts that all of the forecast coal capacity additions would ever be realized.

A country that relies mostly on coal-fired plants fueled by imported coal will be a country that invests too heavily in one technology and that puts itself at needless risk. Stranded assets on this scale also undermine whole economies as there is opportunity cost. Fernandez has also noted the Philippine banking sector's dwindling allocation for infrastructure loans and the growing need for access to foreign capital markets.

By contrast, marginally larger investments in renewable energy and LNG-fired capacity could be more cost-effective. While natural gas (including LNG) capacity can already address all slices of load, coal plants would be forced to have mid-merit level plant factors when LNG and renewable energy begin to encroach on base demand.

[13] https://economics.mit.edu/files/1785
[14] https://www.doe.gov.ph/electric-power/private-sector-initiated-power-projects-march-2017
[15] IEEFA understands the need to redefine the electricity grid and the operating system in its entirety. In its historical context, a question asked was can solar address baseload demand? If we change that question to a more relevant one, we get a different answer. A more relevant question would be whether the industry system of the future can be designed to be more flexible and more diverse? Does the old archaic baseload rational hold up today?

The Economy-Electricity Nexus

The Philippines has a population of about 100.7 million, making it the 12th most populous country in the world. The World Bank estimated GDP growth at 5.9% in 2015 and 6.8% in 2016, ranking the Philippines as one of the strongest-performing Southeast Asian countries[16]. According to the World Bank's April 2017 Philippines Economic Update (April 2017), the Philippines is likely to grow by 6.8%-6.9% per annum over 2017-2019, remaining a top performer in Asia[17].

The government's credit rating has remained stable. In 2016, Standard & Poor's gave the Philippines a BBB rating for long-term credit, meaning the country can be expected to pay its debt in full and on time, and A-2 for short-term credit. Fitch rated the country BBB- with a positive outlook due to strong underlying growth factors, a robust net external credit position, and low government debt levels[18]. Moody's rated the Philippines at Baa2 with a stable outlook as well[19].

While the Philippine economy is a top performer and shows credit-rating stability, global uncertainty and volatility have caused the balance of payments to weaken and the Philippine peso to depreciate. In November 2016, the Philippine peso depreciated to Php 50 per US$1, its lowest level in 10 years.

The long-term resilience of the Philippine economy depends on finding a more practical energy model—one that will shield consumers and businesses from price as well as exchange-risk shocks.

The Philippines has a budget deficit that, as a percentage of GDP, may increase to 3% (US$10.3 billion) in 2017 as a result of an increase in infrastructure spending. Should the Philippines be unable to compete as effectively in the IT-BPO sector or should its remittances from overseas workers shrink, lower taxable income and higher deficits could lead to stress in the government's bond rating. This may force government to reduce expenditures, including in subsidies that support the electricity system. The current average Philippine central bank lending rate is 3% with an inflation forecast for 2017-2018 at 3.4%[20]. Private sector lending rates range from 4.1% and 6.5% on average[21]. Figure 1 gives an overview of the Philippine economy.

[16] http://www.worldbank.org/en/country/philippines
[17] http://www.worldbank.org/en/news/press-release/2017/04/11/philippine-economy-likely-to-grow-close-to-7-percent-in-next-three-years
[18] https://www.fitchratings.com/site/search?content=research&request=philippines
[19] https://www.moodys.com/credit-ratings/Philippines-Government-of-credit-rating-607410
[20] http://www.bsp.gov.ph/
[21] http://www.bsp.gov.ph/statistics/keystat/quotedrates.htm

Figure 1. Philippines Economic Statistics

2015 GDP (US$ bn, constant 2010)	265.83
2015 GDP (US$ bn, current)	292.45
Real GDP Growth Rate (2016)	6.8%
Real GDP Growth Rate (2015)	5.9%
Philippines Population (m, 2015)	100.7
2015 Per capita GDP (US$)	2,904.2
Current Account Balance (US$ bn)	- 0.4 (deficit)
Average weighted lending rate (%)	4.1 to 6.5
US$/PHP (May 2006)	46.72
US$/PHP (May 2011)	43.24
US$/PHP (as of 18 May 2017)	49.81

Source: World Bank, Philippines Statistics Authority, Philippine Central Bank (BSP)

Figure 2 details growth in electricity production and consumption in the Philippines, which have averaged 4% annually over the past decade. Grid transmission and distribution (T&D) losses have declined to approximately 9% over the same period. Per capita consumption has grown from 582.1 kWh in 2005 to 717 kWh in 2015.

Figure 2. The Philippines' Electricity Production & Consumption (2004-2015)

Philippine Electricity	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2004-2015
Electricity Generation (TWh)	56.6	56.8	59.6	60.8	61.9	67.7	69.2	72.9	75.3	77.3	82.6	-
Electric T&D22 losses (% of output)	12%	12%	13%	13%	12%	12%	11%	11%	10%	9%	9%	-
Electricity Consumption (TWh)	49.8	49.9	52.0	53.1	54.4	59.9	61.5	64.6	67.5	70.0	74.8	-
Growth in electricity consumption	1.0%	0.3%	4.2%	2.2%	2.4%	10.1%	2.6%	5.0%	4.6%	3.7%	6.9%	4%
Per capita consumption (kWh)	582.1	577.5	569.7	584.5	588.5	594.0	673.8	661.0	683.2	703.3	717.3	3.8%
GDP Growth (%)	4.8%	5.2%	6.6%	4.2%	1.1%	7.6%	3.7%	6.7%	7.1%	6.2%	5.8%	6%
Ratio of Electricity Demand Growth to GDP growth	0.22	0.06	0.64	0.53	2.12	1.33	0.71	0.75	0.65	0.59	1.19	0.86

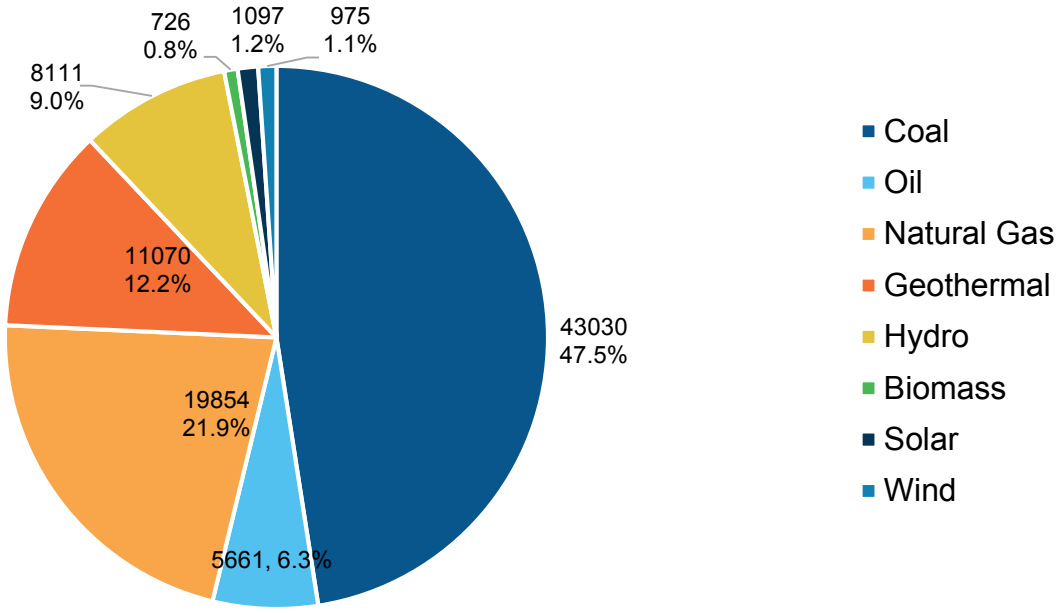
Source: World Bank and BSP Statistics

[22] Transmission and distribution.

Heavy Dependence on Coal-Fired Power and Imported Coal

The Atimonan coal-fired power plant is emblematic of the Philippines' growing dependence on imported coal. Coal makes up 48% of power generation, and this is projected to increase with 15,000 MW of coal-fired generation in the pipeline (Figure 3).

Figure 3. Philippine Power Generation by Source in MWh (2016)



Source: Department of Energy, 2016

According to the Department of Energy, from 2016 to 2019, the Philippines expects to have built 5,687 MW of new capacity with at least 63% of it provided by coal-fired power plants.

The Philippines imports 15 million tons of coal per year (80% of coal requirements), 95% of which comes from Indonesia[23], a source that has not always been reliable. Because of political unrest in the region, Indonesia banned its vessels from entering Philippine territory for four months in mid-2016, affecting coal supplies. In February 2017, disruptions at ports in Kalimantan, Indonesia, again briefly halted coal exports to the Philippines[24].

The Philippines' average coal inventory is 30-40 days. Should a ban on coal exports from any supplier nation be declared, the Philippines would experience coal supply issues in about a month. The other nations the Philippines imports coal from are Australia, South Africa and Russia. In 2016, the Philippines imported more than US$1 billion (Php 50 billion) of coal, at a cost increase of 140.3% from the previous year[25]. Coal prices doubled between May 2016 and

[23] Interview with Giles Puno of First Philippine Holdings, Gerome Cainglet from First Gen Corp.

[24] http://www.reuters.com/article/coal-indonesia-exports-idUSL4N1FS2U6

[25] http://www.worldstopexports.com/philippines-top-10-imports/

December 2016, from US$ 51.20 to US$ 100.69 (Appendix 7)[26]. Such fluctuations can be worrisome for consumers and businesses alike.

Of the 316 million tons of Philippine coal said to be economically recoverable, majority is sub-bituminous coal and lignite[27]. These types of coal have the least carbon content and thus a heating value that is lower than that of imported coal from Indonesia or Australia. Despite being a significant consumer of coal, the Philippines is a very minor producer, producing an average of 8 million tons in the last 6 years[28]. Because the country produces only low-quality coal—which must be burned in larger amounts than higher-quality coal for the same energy output— and because most of its coal-fired power plants are built for imported coal, the country must continue to import from other countries for its coal needs (Appendix 7).

The Philippines Has Some of the Highest Electricity Prices in ASEAN and the Asia-Pacific

The Philippines pays among the highest electricity prices in ASEAN (Figures 4 and 5). It also has the lowest per capita GDP and kWh consumption. It has the highest grid charges in the Association of Southeast Asian Nations (ASEAN). Electricity is a key input for industry and therefore a key factor in driving economic growth.

Figure 4. Power Rates in ASEAN and Asia-Pacific, 2013

Power Rates in ASEAN and Asia-Pacific (USD cents/kWh)				
City	Residential Tariff	Generation Cost	Grid Charges	VAT/GST, %
Sydney	32.32	10.10	15.59	10
Tokyo	30.70	23.19	5.41	5
Manila	28.28	15.75	6.62	12
Auckland	26.66	9.45	9.61	15
Singapore	22.62	17.13	3.88	10
Seoul	17.77	13.25	1.78	10
Bangkok	13.73	10.83	1.86	7
Hong Kong	12.93	10.34	2.50	0
Jakarta	11.31	8.56	1.13	10
Hanoi	9.69	6.30	2.02	10
Shanghai	9.69	5.66	2.34	18
Kuala Lumpur	9.69	6.38	1.53	10
Taipei	9.69	6.54	2.10	5
Beijing	8.08	4.69	1.86	18

Source: Lantau Group, 2013

[26] https://www.indonesia-investments.com/news/todays-headlines/indonesia-s-benchmark-coal-price-extends-drop-in-february-2017/item7584?

[27] https://www.worldcoal.com/coal/26032013/coal_in_the_philippines_iea_clean_coal_centre/

[28] Presentation by former Energy Secretary Vicente S Pérez Jr, September 14, 2017; 19th public hearing on the "Tax Reform for Acceleration and Inclusion" (H. No. 5636 and S. No. 1408) and focusing on the Current Tax Treatment of Coal in the Philippines

Figure 5. Power Rates in ASEAN, 2015

Power Rates in ASEAN (USD cents/kWh)			
Country	Industry	Commercial	Domestic
Philippines	5.84	7.49	8.90
Thailand	5.37	5.37	5.52
Indonesia	1.66	2.15	1.29
Malaysia	4.71	4.97	6.02
Singapore	5.84	7.27	7.27

Source: MERALCO, Philippines as of September 2015; Tenaga Nasional Berhad, Malaysia as of March 2015; Singapore Power, Singapore as of September 2015; PLN, Indonesia as of December 2014; Metropolitan Authority of Thailand, Thailand as of June 2015

The comparatively higher retail electricity prices in the Philippines have been attributed to a number of factors. Among the most significant are: 1) imported fuel and subsidies; 2) surcharges on electricity; 3) archipelagic geography, leading to lack of scale economies in generation, transmission, and distribution; 4) past government investment and regulatory errors.

An independent study conducted for Meralco in 2016 points out that its rates would be relatively more competitive in the Asian region were it not for subsidies in many neighboring countries.[29]

There is as yet no comprehensive study on the effects of the power sector reforms on retail tariffs and on the unbundled components, based on simulations of price trajectories had the reforms not been undertaken. But the price trajectories in themselves would not be taken as a measure of welfare changes, since the fiscal and macroeconomic outlooks would have been radically different.

The Philippine Government's Energy Plan 2012-2030

The Philippine Energy Plan is guided by the principle of "Energy Access for More." It outlines possible scenarios, but significant gaps as regards actual steps and operationalization remain. Regardless of this, its operating imperative is to create greater local productivity by improving access to reliable and affordable energy services.

The plan acknowledges a need to diversify the energy sector so the country become more energy independent[30]. It discusses a potential increase in the use of indigenous energy resources by 2030, and calls for energy efficiency and conservation improvements in critical power infrastructure[31].

[29] http://corporate-downloadables-tips.s3.amazonaws.com/1478573661.68b4d11ba9cb3ccb30e91c6edd66b6c9.pdf
[30] Energy independence is a concept that is not well-defined and is open to political abuse.
[31] https://www.doe.gov.ph/sites/default/files/pdf/pep/2012-2030_pep.pdf

Box 5: Plans Versus Markets

EPIRA offered the promise of competitive markets with the unbundling of the power sector and the transfer of risk to distribution utility shareholders and to independent power producers. Despite this, the responsibility of the NPC to procure least-cost generation supply as a monopoly procurer was merely transferred to the distribution utilities, who have yet to adopt planning practices that minimize cost. Distribution utilities, though now formally required via new rules to competitively procure least-cost supply to captive customers, have little incentive to do so, except via the low price elasticity of demand. To the extent that retail prices are high, demand is slightly affected and so are distribution tariff revenues, which are mainly volumetric.

Power generation and distribution companies favor centralized imported-coal-fired power plants. Such plants bring significant and practically guaranteed returns to developers and financiers from the de-risking that the current automatic pass-through to consumers for fossil-fired power plants delivers. One result of such a scheme would be an overbuild of imported-coal-fired-plants that lock in high consumer electricity for decades to come.

One could classify such plants as having high stranded-asset risk in the sense that they could eventually be operated and maintained at above-market costs. This possibility can be mitigated by two mechanisms: 1) the spot market; 2) and the Meralco group's retail electricity operations, which will be discussed in the section on stranded assets. (Refer to Box 1 for an understanding of stranded assets and stranded costs).

The DoE purports to formulate energy plans (incorporating a power development plan), but without well-defined control levers, such are merely scenarios. However, the Renewable Energy Act of 2008 does provide it some ability to influence the power capacity mix via the feed-in-tariff (FiT) system and the renewable portfolio standards (RPS). FiT implementation has been suspended and the rules for the RPS still remain in limbo.

The EPIRA was crafted on the faith that commercially driven markets, even with lumpy and long-gestation investments in power capacity, and the preponderance of captive ratepayers, would lead to the most efficient outcomes. It remains to be seen whether this faith was well-founded.

The Government's Energy Reform Agenda Stands on Three Pillars: Sustainability, Affordability, and Security

The case for renewable energy has historically been confined to sustainability, but renewables also offer affordability and energy security. Indeed, renewable energy is not only capable of delivering on all three of the country's energy goals—sustainability, affordability, and security—it is key to achieving it.

While proponents of the new proposed coal-fired power argue that it meets the affordability objective, the inherent insecurity of fuel supply for such a plant—combined with the environmental, public health, and safety issues[32] relating to the project—would work to obstruct or even undermine any energy reform agenda that is truly anchored upon sustainability, affordability, and security[33].

In the past, cases of unplanned coal-fired power plant outages due to boiler tube leaks caused the Meralco generation charge of Php 3.44 per kilowatt-hour to increase to Php 9.10 per kWh. This highlights a significant insecurity of supply. The DoE's Power Development Plan 2016-2040 recounts the series of breakdowns that occurred in the last two months of 2013.[34]

[32] That said, we acknowledge that ultra-supercritical technology has less emissions than subcritical technology, but not less emissions than renewable energy technology.

[33] Sustainability is the provision of energy such that it meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable Energy has two key components: renewable energy and energy efficiency. Affordability is total cost relative to the amount that the purchaser is realistically able to pay. Security is a supply of energy in line with economic developments and sustainable environmental needs.

[34] https://www.doe.gov.ph/electric-power/power-development-plan-2016-2040

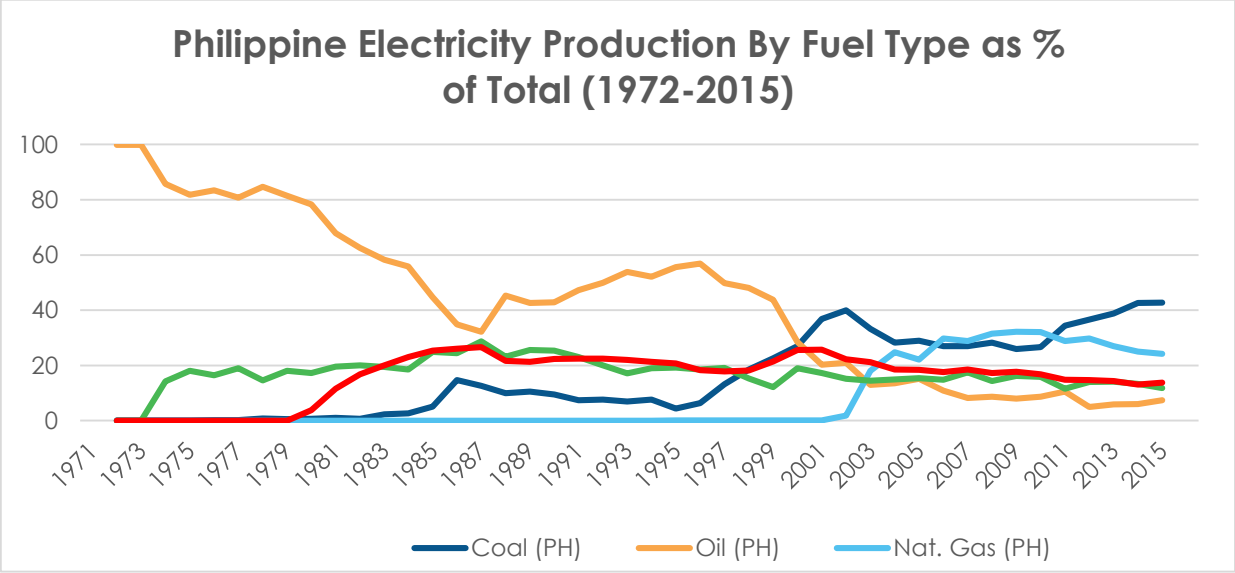
The Rise and Risks of Coal

Brief History

Coal fired power plants from the 1980s remain in operation today. Despite inefficiencies, they remain active and competitive performers in the market. Among these are the 32-year old Calaca (600 MW) power station in Batangas and Toledo (328 MW) power station in Cebu. Units built between 1963 and 1983 are retired. The Calaca power station may be refurbished with the assistance of Toshiba, a Japanese firm. It would require a budget of up to US$190 to refurbish and to effect an increase in its capacity and reduce emissions.

The first grid-connected coal plant (50 MW, PCS) in the country, built for NPC, in Naga, Cebu, went on line in 1981. It was followed by the 300 MW Calaca plant in Batangas, built in 1984.[35] A 55-MW unit was added to the Naga plant in 1986. Before then, the capacity mix of the integrated utility had been dominated by hydro, oil thermal, and diesel plants. A second 300-MW unit was added to the Calaca plant, becoming operational in July 1995. While the first unit was designed for high-grade imported coal, the second unit was designed to be fueled by local coal.

According to Jess Tamang, until recently the planning director of the DoE, the oil crisis in the '70s had prompted the government, with the encouragement of the Asian Development Bank, to diversify the mix and explore coal technology.[36]



Source: https://data.worldbank.org/indicator/

Figure 6 shows the evolution of coal generation as a percentage of country total, and the steady decline of hydro and geothermal generation since 2000.

[35] A Short History of Napocor…; ADB, Electric Utilities Databook, Manila, 1997.
[36] Interview with Jess Tamang, September 15, 2017.

Between 1982 and 1994, the plant load factors of the coal capacity of 350 MW ranged from 14 to 66 percent, owing to maintenance and fuel quality problems. Plant availability was therefore low.[37]

The oldest coal power units that are still operational are Calaca Units 1 and 2. These were sold in December 2009 and refurbished by the new owner, Sem-Calaca, a fully owned subsidiary of Semirara Mining Corporation, to extend their operating life and improve efficiency. Sem-Calaca provided the cheapest base load supply to Meralco in July this year.

Refer to Appendix 12 for an overview of existing coal fired power plants in the Philippines.

The Players

The legacy power stations were built by major power players. With the current chapter of power generation construction, we see the involvement of conglomerates not previously or organically in energy, and with significant liquidity and access to financing. Major players include the following: Alcantara Family (Alsons Consolidated), Ayala family (Ayala Corp.), Andrew Gotianun (Filinvest), George Ty (Metrobank), and Manny Pangilinan (PLDT and First Pacific – representative of the Indonesian-Chinese Salim Group). Other conglomerates include the Aboitiz group, whose primary background is in shipping but has also diversified into energy, along with food, cement, etc. San Miguel is another player and is the quintessential conglomerate in the Philippines. Such a catalogue of players is also, in essence, a catalogue of the major scions and tycoons in Philippine business and industry. Refer to Box 6 for coal ownership categories.

Box 6: Coal Ownership Categories

In terms of original ownership, current ownership, and current operational control, we classify the existing coal plants under these categories:

1. Originally owned by NPC and privatized after EPIRA—Masinloc and Calaca;
2. Independent power producers (IPPs) under contract with NPC but now under IPP administrators that manage the sale of generation output and fuel supply—Sual and Pagbilao;
3. IPPs with NPC but still under NPC control—Mindanao Coal 1 (STEAG);
4. Independent producers under contract with Meralco (legacy)—Quezon Power;
5. Coal plants built by private parties after EPIRA without any contracts with NPC—GNPower and the recent coal plants in Mindanao 2015-2017.

The plants under these different categories face different stranding risks, but this preliminary study does not address the fine points of the differentiated risks. Plants falling under categories 1 to 4 do not face any financial and construction risks and are thus more able to weather market risks. The Masinloc plant appears to be phenomenal, however, in that it was sold in 2008 for $930 million and did not leave any stranded debt. This does not mean,

[37] Electric Utilities Databook. Asian Development Bank. 1997.

however, that new owners will not face stranding risks under the changing circumstances of the generation sector in the country.

Plants to be built under the model of almost full offtake by a distribution utility, like Atimonan, face different risks.

The Financiers

Funding, like many infrastructure investments, is a function of both equity and debt. Most debt is local debt (Philippine peso-denominated). No real need to seek funding overseas exists, given the abundance of banks in the Philippines, which disincentivizes currency exchange risk-taking and expensive currency exchange hedges.

The only reason for players to consider overseas debt or export credit is the lack of linkages with local Philippine banks, or because they have used up their local credit line. The only conglomerate doing this in the power sector at the moment is San Miguel—a well-entrenched entity that observers have noted may be too big to fail.

The capital stack ranges between 80-20 debt-equity to 70-30 debt-equity, with the structure depending on the internal rate of return. Active lenders in the power sector include Security Bank; Rizal Commercial Banking Corporation (RCBC); Bank of the Philippines (BPI, owned by Ayala Group); Banco De Oro Unibank (BDO, owned by Sy Group); China Banking Corp (owned by Sy Group); Asia United Bank Corp. (AUB); and First Metro Investment Corp. That said, it is important to note that international financing institutions such as the World Bank, International Finance Corporation (IFC), Korean Eximbank, and Asian Development Bank fund Philippine banks (intermediaries) such as RCBC, BDO, etc. International Banks involved in direct funding via bond raises for intermediaries include ANZ, BofA Merill Lynch, DBS Bank Ltd, Deutsche Bank, HSBC, ING, Mizuho, UBS, and Sumitomo Mitsui Banking Corporation (SMBC).

Bilateral funding commitment is also a source of coal finance, though this has not materialized yet. In the Duterte Administration, China has committed to finance a 1200 MW coal-fired power plant in the Philippines with local partner Alfredo Yao of Zesto group (a food, beverage, and airline company). Hong Kong-listed Energy China, the leading power engineering construction firm in China, is the partner. The initial phase will cost an estimated $1 billion, which will increase to $2 billion, inclusive of the second phase[38]. Potential Chinese financing institutions include project finance from China State and Bank of China.

[38] http://business.inquirer.net/217295/yaos-energy-china-team-up-for-2-b-power-project

Reforming the Automatic Fuel Pass-Through Model

Observers have noted that the Philippines' traditional thermal contracts structure, with an automatic fuel pass-through model[39], is in need of reform. The structure of power purchase agreements (PPAs) typically breaks down costs to the off-taker into capacity charges (capital recovery, and fixed operating and maintenance charges, both subject to exchange rate and inflation risks in U.S. dollars), and variable operating and maintenance costs (mainly fuel).

This structure creates two main rate risks:

- The capital cost is amortized at a fixed rate, over the cooperation period, regardless of whether the assumed capacity utilization or plant load factor is realized. This results in a guaranteed weighted average cost of capital. The utilization factor can fall because of lower distribution utility demand, resulting from either retail competition, a generalized economic downturn, and/or the grid's absorption of more variable renewable energy. In any of these cases, average rates to ratepayers increase. Prudent reform would hold utilities accountable for their own forecasting errors. (Generation costs owing to U.S. dollar inflation and exchange-rate volatility[40] are also passed on to ratepayers without incentives for utilities to insist on more prudent contracting.)
- Fuel price increase and volatility risks naturally arise from the fact that thermal fuels are traded in world markets, where prices depend in part on exchange-rate swings. In its standard contracts, the Philippine ERC vets only initial fuel costs, a policy mitigated by the spot market. When variable costs are sufficiently higher and a thermal plant is not dispatched, no fuel is burned and the independent power producer (IPP) can take advantage of cheaper power via the Wholesale Electricity Spot Market (WESM). The allocation of "savings" in such cases—whether they go to ratepayers or someone else—depends on the fine print in the contracts. Meralco asserts that its PSA with MGen requires the energy delivered to be sourced from the plant, unless otherwise unavailable due to outages. This should prevent the generator from gaming the WESM, assuming that MGen's Atimonan plant cannot plan outages without the knowledge of Meralco. What Meralco means, however, is that the contracts prevent capacity-withholding, which is contrary to market rules.

A regulator's failure to consider the above-mentioned risks is unfair not only to ratepayers, but also to renewable energy developers who can offer firm levelized costs. If thermal generators were required to offer firm levelized costs, these would include the costs of hedging versus fuel price, exchange rate, foreign exchange, and the resultant increase in project finance costs. Prudent reform would level the playing field for renewable energy.

[39] IEEFA also acknowledges that automatic pass-through includes Malampaya gas which is linked to world crude oil prices, US CPI and Peso-Dollar exchange rate. The price of geothermal steam is also affected as it is denominated in US$/kWh and is linked to global coal prices, as determined by the Barlow Jonker Index and Japanese Power Utilities (JPU). IEEFA acknowledges that wind and solar have no fuel input and therefore no fuel price.

[40] According to Section 2.10 ERC Resolution No. 16, Series of 2010, "The ERC shall adjust the FITs annually for the entire period of its applicability to allow pass-through of local inflation and foreign exchange (FOREX) rate variations." PSAs for renewable energy do not have fuel costs and thus do not require FOREX protection.

The Philippines' fuel-cost pass-through model is no anomaly (refer to Box 7), as it is inherent in standard project-financing practices in regulated markets. Automatic pass-through also has deep historic roots in developing countries, where underinvestment in generation capacity has adversely affected electricity-sector development. Since Philippine electric utilities automatically pass costs on to ratepayers, any change in fuel costs leaves ratepayers absorbing all of the risk; there is no incentive for utilities to transition away from coal or for generators to hedge against price-change risk and currency risk. Generators are best positioned to hedge against the price-change risk of coal.[41] Box 8 highlights the lack of incentives to hedge and hedging options.

Box 7: Fuel Pass-Through Definition

World Bank: A pass through arrangement is one where "the price charged for the power will consist of a charge (availability charge) to cover the project company's fixed costs (including a return on equity for the project company) plus a variable charge to cover the project company's variable costs. The availability charge relates to the availability of the power plant and the variable charge is calculated according to the quantity of power supplied. The purchaser will want a guaranteed long-term output from the project and so the availability charge is typically the minimum that it will be paid, provided that the plant can be shown to make sure power available[42]."

Box 8: Coal Contracting and (a Lack of Incentives for) Hedging

Meralco claims it mitigates price volatility faced by ratepayers by applying a 3-month rolling average for fuel cost recovery.[43] In actuality, the 3-month rolling average does not mitigate price volatility as it still passes on the price impact to the consumers albeit at a slower pace and a more moderate level. In essence, Meralco is merely moderating the effect of volatility and is not actually enhancing any value for the consumers.

The PSA between the utility and the IPP's stipulates that fuel cost adjustments charged to ratepayers are indexed against the Australian Newcastle Coal Price Index. The IPPs, in turn, in agreements with its own coal suppliers, whether miners or traders, face the same Newcastle-indexed coal costs. Thus, neither the utility nor the IPP have any incentive to get the best deals.[44]

According to Mark Lim[45], fuel supply manager of Team Energy (TE), it is possible to offer fixed-price fuel offers in PSA's, but Meralco has not requested this. TE already offers fixed-

[41] Fuel cost adjustments are via indexation. In the Philippine case, mainly New Castle. Fuel cost are automatic pass-through, subject to the following: If the IPP's coal supplier does worse than the index adjustment, it shoulders the difference between the index-adjusted cost and its actual cost. If it does better than the index, it pockets the savings. Further, fuel costs are capped by a heat rate cap, to protect ratepayers from poor maintenance and operations by the IPP. The heat rate is an indicator of plant efficiency.

[42] https://ppp.worldbank.org/public-private-partnership/sector/energy/energy-power-agreements/power-purchase-agreements

[43] Indeed, the coefficient of variation for a rolling average series versus that of a monthly series would be lower.

[44] It is the coal suppliers that have the incentives to reduce costs. If they do better than the index, they pocket the savings, if they do worse, they are penalized.

[45] The views of Mark Lim are his personal opinions on the subject and does not represent TeaM Energy's views. TeaM Energy itself currently does not have an active contract with Meralco although Meralco does offtake from TeaM Energy-owner power stations Sual and Pagbilao through SMEC and TLI, respectively. They are, however, in a position to provide fixed-price PSA to Meralco should they request it.

price contracts to contestable customers at no incremental cost. This shows the possibility of removing automatic pass-through provisions in PSA's—an unnecessary price risk passed onto ratepayers. In the morning of August 31, 2017, the spot price for coal was $99 per ton, because of an Australian mining strike—almost double the price indicated in the Atimonan PSA. Lim expected the price to stabilize at $80 per ton by December.

Other markets provide concrete models for reform. In India, for example, PPAs are now awarded according to how much a utility or IPP is willing to step back from the traditional cost pass-through model and shoulder more fuel-price risk. Many such deals in India now have IPPs agreeing to limit fuel-price pass-throughs to 30%. The Indian regulatory framework differs from that of the Philippines in that Indian Energy Minister Piyush Goyal's energy transformation plan stresses lower dependence on fossil fuel imports, and includes a target to end thermal coal imports by the end of the decade. India's state owned National Thermal Power Corporation (NTPC) intends to cease importing thermal coal in FY2016-17, three years ahead of schedule, and will only source coal domestically henceforth. NTPC plays a significant role in shaping India's power sector. Privately-owned companies such as Meralco play a significant role in the Philippine regulatory field.

Moreover, doubts are growing as to the viability of some import-coal-fired power stations in India. Adani Power and Tata Power have recently been denied a compensatory tariff for higher-than-expected costs of importing coal from Indonesia. (In the Philippines, power generation companies are guaranteed the compensatory tariff for higher-than-expected costs from coal imports via automatic pass-through to ratepayers). Adani Power's 4.6-GW Mundra coal-fired power plant is essentially unviable, as it runs 100% on imported coal. Both Tata Power and Adani Power have approached the Gujarat State Government for bail out, proposing that the government purchase a majority stake in the Mundra plants for a token Rs1 (1.6 US cents) each[46]. In some cases, IPP proposals are also being presented with fuel hedge contracts, which reduce exposure to fuel-cost volatility. Such contracts are already widely used by airlines, cruise lines, and trucking companies, and can certainly be tapped by the electric power industry if it so chooses.

On the renewable energy front, India has a strong, clear, and transparent policy framework, which provides a more predictable, investor-friendly environment. Moreover, India has a learning by doing approach as Indian Energy Minister Piyush Goyal is also taking lessons from each solar tender and replicating the factors that are driving down tender prices. For example, land acquisition, grid connections, and payment certainty are all major risk factors affecting power sector investment in India, the latest solar tenders provide clarity on all of these before bidding. Tenders also have 12-18-month time limits and performance requirements to ensure that state governments get clarity and on-time project delivery of power[47].

[46] http://economictimes.indiatimes.com/industry/energy/power/adani-power-urges-gujarat-government-to-bail-out-mundra-power-plant/articleshow/59008598.cms

[47] http://ieefa.org/ieefa-extra-sustainable-indias-solar-boom/

Inherent Risks for Ratepayers, Equity Investors and Lenders

The current regulatory environment has few scenarios where the independent power producer (IPP) loses, but IPPs should have more procurement and operational efficiencies. Further, it is important for players to have a robust forecast model that takes into account potential retirement of coal-fired power plants and declining storage costs. The risks discussed below are already inherent in the regulatory framework and are mostly passed on to ratepayers.

Coal-Import Price

Because the Philippines produces only low-quality coal, the country turns elsewhere for its needs. 95% of coal in the country is imported from Indonesia. The proponents of the Atimonan plant, for example, say that the coal will be sourced from Indonesia, Australia, or the U.S.

Imported-coal-fired power capacity exposes the Philippine electricity system to international coal price and currency fluctuations. Moreover, because part of the tariff payments is pegged to the U.S. dollar, electricity costs, and therefore prices, also depend on exchange rates. Renewable energy, by contrast, has lower currency and zero commodity price risk.

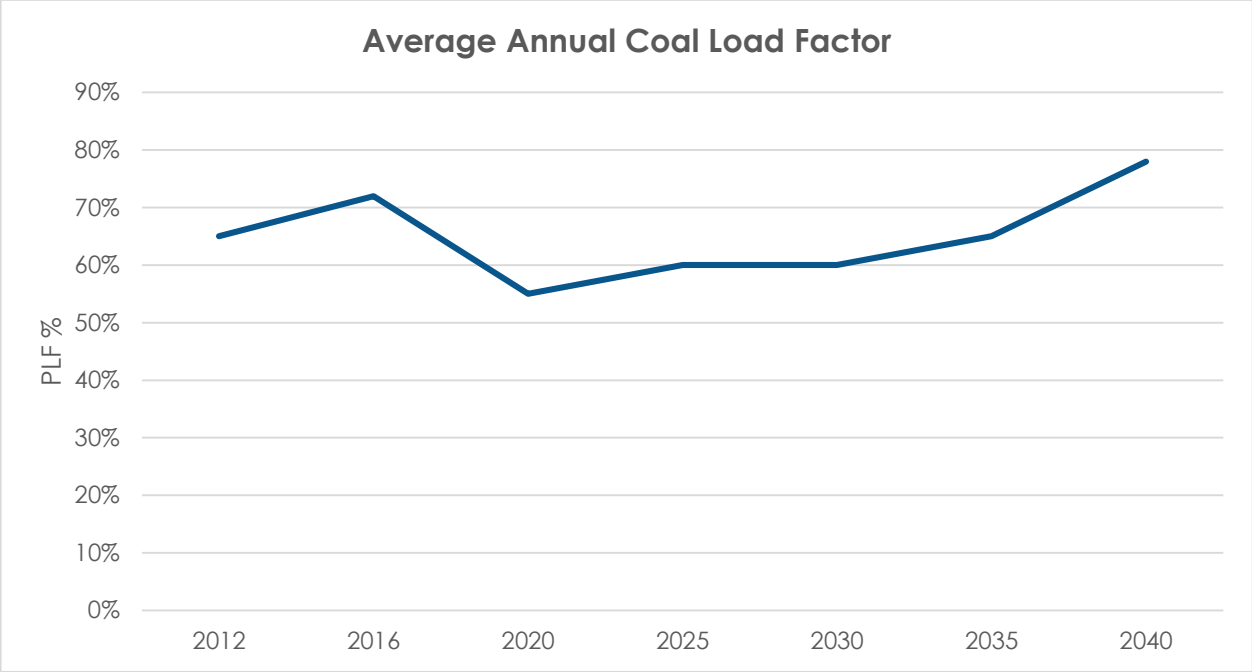
Renewable Energy Cost Deflation

The cost deflation of solar affects peaking and mid-merit plants before coal-fired power plants. Renewable energy capacity stands to encroach on the base demand that plants such as Atimonan are meant to address. Coal operations, historically a 24/7 affair, may experience a significant decrease in activity. Further, to the extent that coal plants have generation in excess of bilaterally contracted capacities, their peak values can be shaved by the merit-order effect even before encroachment from renewable energy happens.

Existing coal plants cannot ramp up and down quickly enough to deal with the variability of renewables capacity that is absorbed by the grid, either through additional FiT quotas, renewable portfolio standards, or independent distribution utility contracting.

These problems highlight the flaw of assuming an 80% PLF, a number that will surely decrease with the challenge from LNG and higher renewable energy capacity. Bloomberg New Energy Finance (BNEF) sees the entry of renewable energy driving average coal PLF levels to between 55% and 60% from 2021 to 2025, then escalation from 2025 onwards'60% and 61% from 2025 to 2030, 61% and 65% from 2031 to 2035, and 70% and 78% from 2036 to 2041, due to less coal capacity in the energy mix (refer to Figure 6). It is important to note that even rising PLFs do not preclude stranding: average PLF below 80% implies that many plants have low numbers compared to the standard PLF of 80% on the PSAs, and are therefore already stranded to an extent.

Figure 7. Average Annual Coal Load Factor



Source: BNEF, 2017

Utilities can dampen this trend by blocking the expansion of solar and wind, by specifically requesting fossil fuel capacity, or by retaining archaic grid infrastructure to reduce renewable energy absorption capability—all anti-competition practices.

In India, where the government has pledged to end expansive coal imports, the construction of 275GW of renewable energy by 2027 is on track. In May 2017, costs for solar fell to a record low, dropping a remarkable 45% since January 2016. Solar power tariffs in India dropped to Rs 2.44 (3.9 U.S. cents) per kWh, which is below the average coal-fired generation tariff of Rs 3.20 (5.1 U.S. Cents) per kWh of Indian state-owned generator NTPC. Under a recent 1GW wind power auction, tariffs dropped to a record low Rs 3.46 (5.5 U.S. Cents) per kWh[48].

As a result of renewable energy cost deflation, the electricity transition taking root in countries around the world is attracting large investors. In 2016, acquisition activity in the renewable energy sector rose by 17% to US$110 billion. New investment in solar and wind totaled US$113 billion and US$112 billion, respectively[49]. By way of example, Taiwan has recently attracted US$60 billion in foreign capital commitments to renewable-energy projects from Denmark's Dong Energy, Australia's Macquarie, and Canada's Northland Power. This more than triples the quota set by Taiwan's government.

[48] http://timesofindia.indiatimes.com/business/india-business/no-impact-of-gst-on-renewables-no-need-for-lower-taxes-piyush-goyal/articleshow/58751107.cms

[49] http://fs-unep-centre.org/sites/default/files/publications/globaltrendsinrenewableenergyinvestment2017.pdf

Stranded-Asset Risk

Stranded-asset risk is the hazard of an asset suffering from an unanticipated write-down, devaluation, or conversion to liability. Stranded-asset calculation of power plant assets is equivalent to the nominal value (capital expenditure minus accumulated depreciation)[50]. Stranded assets or costs arise for a variety of reasons:

1. Fuel and/or technology becoming uneconomical or obsolete;
2. A power plant being built in the wrong location and unable to dispatch;
3. Excess capacity due to inaccurate demand forecasts or a surplus of reserve power;
4. Higher than anticipated construction costs;
5. Operational inefficiency of the power plant;
6. Long-term fuel contracted supply exceeding demand[51];

Stranded assets may arise as a result of an overbuild of coal-fired power and renewable energy cost deflation, which would pave the way for more utility-scale solar built under a feed-in-tariff system or by the adoption of renewable portfolio standards, utility-scale bilateral contracts, and non-utility solar (via net metering or solar rooftop power purchase agreements), or wind.

These can be mitigated by two mechanisms: the spot market using the Wholesale Electricity Spot Market (WESM) and the Meralco group's retail electricity market operations via MPower, or a subsidiary retail electricity supplier (RES). The WESM allows coal-fired power like Atimonan to dispatch capacity to the open market while MPower is able to sell power from Atimonan via the new retail competition and open access (RCOA) rules, which Meralco previously opposed. Retail supply, however, will not provide MGen as much certainty with regard to capital cost-recovery because supply contracts have shorter durations.

Stranded contracts may arise if underlying demand falls due to the implementation of RCOA. Through RCOA, customers like industry can choose not to be supplied by their local distribution utility; they can opt to buy electricity from a retailer. In due time, RCOA-empowered retail electricity suppliers (RES) can aggressively cover more of the demand. RCOA is the fastest way to an efficient market as it bypasses the ERC approval process. This means RCOA might cause a reduction in contracted capacity required by a distribution utility like Meralco. In other words, RCOA might trigger the 'carve-out' clause in the PSA, which Meralco added to the PSA, adding renewables to any electricity system will erode utilization rates of coal power. Meralco, in essence, had the foresight to put a carve-out clause in the PSAs, recognizing the inevitability of stranded asset risk.

A carve-out clause exempts the distribution utility, in this case Meralco, from the consequences of reducing contracted capacity from the Atimonan coal-fired power plant. Section 10.3.1 of the PSA states that "*subject to the provisions of the Section 10.3.2 below, Meralco shall, from time to time, be entitled to a reduction in the Contract Capacity and Associated Energy equivalent to the reduction in the demand of its captive customers by reason of the enforcement of Retail Competition and Open Access, the Renewable Energy Law and other Laws and Legal Requirements.*" Section 10.3.2 states that "*Meralco shall give a written notice to*

[50] http://www.irena.org/DocumentDownloads/Publications/IRENA_REmap_Stranded_assets_and_renewables_2017.pdf
[51] In Philippines, there are rarely any long term fuel contracts with the exception of airliner and shipping industries.

the Power Supplier of such reduction at least five (f5) Days prior to the first Day of the next Billing Period. Upon receipt by Power Supplier of such written notice, Meralco shall cease to have any rights and obligations under this Agreement in respect of such Reduction in Contract Capacity and Associated Energy."

As mentioned previously, Meralco has recently lost 20% of sales from the loss of half of its contestable load because of retail competition (Box 9).

Box 9: Retail Competition

Retail competition lessens the certainty of recovery of generation investment costs, and can thereby raise required returns on capital invested in generation relative to the returns needed in markets in which capital recovery is "guaranteed" by cost-of-service regulation.[52] It enables ratepayers, depending on level of demand and consumption, to be served by least-cost generation supply along with other value-added services.

Retail competition was envisioned to have started not later than three years after the effectivity of EPIRA. It had certain preconditions: 1) the establishment of the WESM; 2) the setting of unbundled transmission and distribution wheeling charges; 3) implementation of the cross-subsidy removal program; 4) the privatization of at least 70% of total NPC generation assets in Luzon and the VIsayas; and 5) the transfer of the management and control of at least seventy percent (70%) of the total energy output of power plants under contract with NPC to IPP Administrators.

All the preconditions had been met by late 2009, but the final enabling rules for retail competition were completed only in 2013. After administrative and institutional delays, retail competition was finally implemented by the ERC in December 2013, starting with commercial and industrial ratepayers with an annual peak demand of 1 MW. The ERC timetable was for the threshold to decline to 750 kw (voluntary contestability) by June 26, 2016, and for those with peak demand greater than 1MW to be subject to mandatory contestability by February 26, 2017. The threshold was to go down further to 500 kw by the middle of 2018 and to the household level five years hence.

From guaranteed to market returns. As of July 2017, out of 1157 contestable customers with peak demand greater than 1 MW, and with total demand of 3.456 GW, 516 (45%) in Luzon—mostly in the Meralco franchise area—already had retail supply contracts (RSCs) covering 1.56 GW. Among those in the second bracket of contestability (999KW>demand>750KW) only 15 or 4% had RSCs covering a mere 16 MW availed of retail competition. Most of these contestable customers are industrial (with 24/7 operations) and commercial establishments. Even without knowing their exact load profiles, one can safely estimate that close to 800 MW of base load supply, mostly coal capacity, is now subject to competitive market risks, to which it was hitherto not exposed. More market risks undoubtedly face coal and other thermal plants as the retail market matures further.

On the supply side of the competitive retail electricity market (CREM) are 30 RES's licensed by the ERC and 24 local RES's which do not require a license because they are affiliates of

[52] https://sites.hks.harvard.edu/hepg/Papers/2016/Retail%20Choice%20in%20Electricity%20for%20EMRF%20Final.pdf

the distribution utilities and serve only the respective DU franchise areas. Of the RES's, 14 have coal capacity interests, suggesting their coal plants have merchant exposure.

In May 2016, the ERC issued a series of resolutions that 1) 'forced' contestable customers to choose an RES and 2) directed the local RES's to wind down their business and corresponding RSC's.

Upon the instance of some contestable customers in the Meralco franchise area who stood to suffer penalties for failure to be forced to choose a non-local RES, the Supreme Court issued a temporary restraining order (TRO) on February 21, 2017 versus the ERC resolution requiring mandatory migration of contestable customers to retail electricity suppliers (RES). The ruling also suspended the implementation of the following issuances related to RCOA:

1. DoE Circular 2015—06-0010 which provided policies to facilitate the full implementation of RCOA;
2. ERC Resolution 5-2016 which issued rules governing the issuance of RES licenses;
3. ERC Resolution 10-2016 that revised the rules for contestability and also defined the qualifications for contestable customers and the RCOA implementation schedule;
4. ERC Resolution 11-2016 that restricted DU and RES operations under RCOA; and
5. ERC Resolution 28-2016 revising ERC Resolution 10-2016.

The TRO, in effect, put the whole program in limbo[53], and 1) made eligible customers hesitant to search for competitive supply, and 2) caused the ERC to stop issuing licenses to new RES applicants, thus constricting competition.

This is unfortunate because preliminary market results as indicated by ERC statistics show that, based on 2nd quarter reports, 13 of 25 RES's reporting charged prices lower than the weighted average, and 5 lower than the Meralco rate for July, suggesting vibrant competition at this early stage.

Renewable energy and retail competition. The nature of generation supply entails fixed costs to address a customer's peak demand (capacity) and variable costs to provide the electricity the customer requires. The relationship of these two quantities is known as the load factor, or the ratio between actual electrical energy used and the theoretical output at 100% utilization of capacity needed to meet peak requirement. The higher the load factor, the lower the average cost of addressing its requirements (See Appendix 2). The likelihood of a customer getting a cheaper rate than that provided by the utility increases with the load factor and the absolute electricity consumption. Non-fossil-fuel sources such as solar energy, whether from rooftop or utility-scale installations, shaves the peak demand requirement; this makes retail competition provides one more driver for renewable energy. Already, solar rooftops, whether under a net-metering program or not, already competes for a slice of the loads of households and business establishments, regardless of contestability.

[53] https://www.doe.gov.ph/press-releases/advisory-sc-issued-tro-doe-erc-issuances-pertaining-implementation-rcoa

The captives and competitive procurement. In an electricity market with low per capita consumption, it is expected that a large segment of the ratepayer base will remain captive for a long time. This is why the ERC, in consultation with the DoE, enacted a rule for competitive procurement by the distribution utilities to protect captive ratepayers.[54] In Japan, where retail competition is universal, stranded coal risks are entirely borne by private developers.[55]

Carve-out clauses in power supply agreements. To protect captive customers from the burden of high average rates resulting from low capacity utilization that in turn results from the migration to other suppliers by contestable customers, Meralco, as early as 2012, started inserting 'carve-out clauses' in its PSA's with IPP's. These clauses give the utility the right to transfer capacity and energy supply to affiliates or other third parties at the same price conditions. At the time these clauses did not mention any capacity requirement diminution from the encroachment of renewable energy generation. If the utility cannot find parties to transfer the contract obligations, it absorbs the stranded contract cost, as implied by EPIRA.

The carve-out clause prevents a stranded contract cost for Meralco and its ratepayers, and passes the burden on to MGen. The Atimonan plant can sell to a Meralco-affiliated RES, another bilateral off-taker, and the excess from the first two to the spot market. It will most likely enjoy full dispatch of capacity in the WESM, a mandatory gross pool where all capacity must be declared or nominated. However, there is no guarantee that spot prices can cover capital recovery costs. Thus, uncontracted capacity leads to stranded asset-risk. Such risks are further aggravated if the plant is not dispatched at all. In other words, even with the options to mitigate against stranded assets, competition from renewables may still cause the stranding of the remaining contracted capacity.

The growth of renewables has led to lower wholesale electricity prices[56] in Luzon, and should DoE and the ERC call for open competition via reverse auctions[57] to address RE absorption targets for FiT and RPS, one can expect lower margins for coal-fired power in excess of bilaterally contracted quantities—a development that would reduce valuations.

Carve-out clauses are not automatically implemented or triggered and it might be unlikely for Meralco to act promptly on them because of interlocking interests as both distributor and

[54] ERC Resolution 13-2015, October 20, 2015.

[55] http://www.smithschool.ox.ac.uk/research-programmes/stranded-assets/satc-japan.pdf

[56] Meralco argues that storage is needed for firm capacity. Coal is not necessarily 24/7, and an energy system is stronger with diversity. Adding solar to any electricity system will erode the utilization rates of coal power at a certain level, irrespective of whether battery storage is present. Solar is a low cost source of marginal supply, which leads solar to being dispatched first. This is the merit order impact. The fact that coal cannot compete on a short run variable cost basis is an inherent problem of coal, not solar. This also highlights a system problem where it needs to take into account of a low or zero cost source of marginal supply. In IEEFA's view, it is misguided to argue that solar should be allowed to compete with coal only if it comes with a 100% battery backup. Meralco has suggested that during the second half of 2016, additional new thermal capacity is a short-term alternative explanation for low prices on the WESM. IEEFA understands that prices have remained weak in 2017 and stands by the merit order effect as observed in the Philippines and many markets around the world. However, it cannot be claimed that low spot prices are exclusively due to merit impacts of renewables. Mr. Fernandez has pointed out that plants under testing/commissioning distort spot prices.

[57] Reverse auction: The sellers, such as generators, are the ones bidding their products, as they are interested in selling power contracts to large consumers or distribution companies, with the bidding process designed in part to select the lowest price. "Reverse Auction" is where the lowest offer is the winner. (Source: World Bank)

generator[58]. In other words, the group is purchasing from itself and passing the risk to captive consumers. This means that regardless of economic conditions, there is no guarantee that ratepayers are protected from "above-market" costs. This is an issue the ERC must revisit as this may be considered an abuse of market power and may hamper the promotion of competition and market development. During an interview with Meralco, they claim that they will not hesitate to act promptly on the carve-out clause for both Meralco-owned and non-Meralco-owned generation[59].

Moreover, there may be new regulation to make carve-outs automatic. During a Cagayan De Oro Public Consultation on the 13th of February 2017, Attorney Atty. Debora Layugan of the ERC stated the following:, "Visayas are facing the problem of carving out the provisions of contracts already entered into. As what Dir. Capongcol said, we included provisions in our rules which gives certain mechanisms for carving out provisions. You are also right that they cannot sell the contracts that are priced higher than the retail rates. In the recent approval of ERC of bilateral contracts, we have looked into automatic reduction clauses in the PSAs; such that, if there is a particular Contestable Customer which will be mandated to migrate to an RES, there will be an automatic reduction in the PSA. We are set to discuss this again to the ERC because we realized that this provision may not be enough"[60].

Regulators can and should determine who pays for stranded costs—power plant owners, distribution utility shareholders, or ratepayers. The burden can also be passed on to taxpayers via legislation, as happened with EPIRA. The following scenarios can be argued:

1. Stranded cost should be paid for by taxpayers, because government policies allowed for or created said stranded cost.
2. The stranded cost should be paid for by the power plant owners. The private agents are taking risks and should thus be allowed to take them and either prosper or pay for them.
3. The stranded cost should be paid for by ratepayers as they have the most ability to pay. Since this solution has been accepted in the past, it may be simpler to carry on with the status quo.

Stranded-asset risk is a consequence that only matters from a public policy perspective if the burden is shifted to ratepayers and/or tax payers. However, one can argue that this takes up financing capacity and does so in a way that hinders investment in higher-value economic activity. It is thus imperative, from a strategic and nation-building perspective, for regulators and policymakers to focus on preventing stranded asset costs from being borne by ratepayers and/or taxpayers.

For investors/lenders, it is important that they redefine risk to reflect the value at risk from potential stranded assets or contracts based on probability of future scenarios rather than previous benchmarks. They should estimate the stranded cost by calculating the difference between the discounted net present values of revenue minus total costs under a no regulatory reform scenario and a regulatory reform scenario such as limiting fuel risk to ratepayers, which may drive up operating costs.

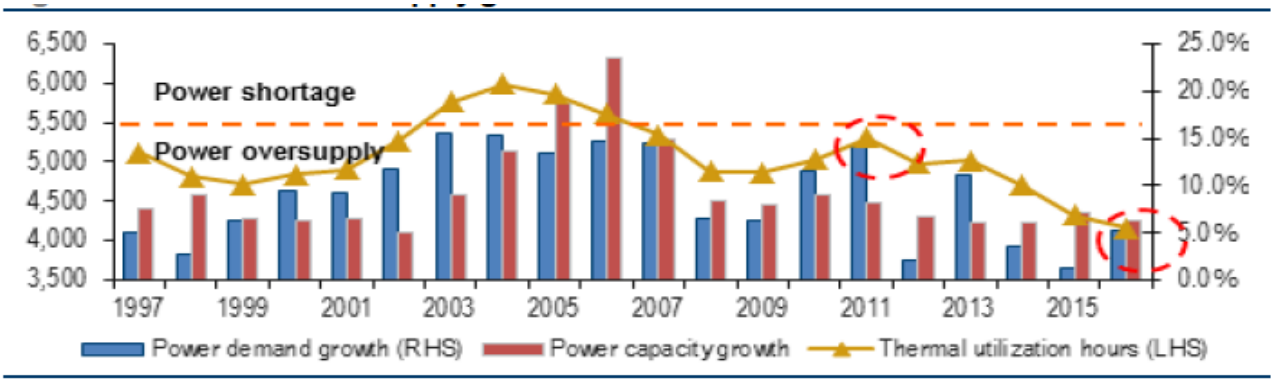
[58] For example, if a generation company that is a subsidiary of Meralco (ex. MGen) is subject to the carve-out clause, it will not likely deliver an economic return in line with the expectations from the project outset. An important question for shareholders to ask is if this will have a negative impact on share price.

[59] Lawrence Fernandez, Meralco vice president and head of utility economics of Meralco.

[60] https://www.doe.gov.ph/sites/default/files/pdf/announcements/highlights_pubcon_wesm_mindanao_cdo_zamboanga_davao_butuan_gensan.pdf

On the international front, the global transformation of the power sector as a result of falling power prices supported by renewables has caused massive utility write-downs in Europe and

Figure 8. Supply/Demand Growth



Source: CEIC

China. From 2010 to 2014, a total value of €86 billion was written off in Europe, with €30 billion written off from the top 16 European utilities in 2014 alone[61].

Since 2002, during China's earlier power shortages, its power generation companies competed on capacity expansion. Since 2007, China turned from an undersupply to an oversupply situation with a structural downtrend in coal-fired utilization. 2016 set one of the lowest marks in years (Figure 9). It is important to note that in 2015, China launched the second step of its power reform agenda, moving prices from regulated to market-based, allowing renewables to openly compete. This has delivered a positive impact as market-based transactions (mostly via direct supply sales to customers). Price liberalization reduced electricity prices.

China's transition, driven by renewable energy cost deflation is also a result of government policy to reduce pollution from heavy coal use.

India, under its National Electricity Plan, aims to have 175 GW of renewable capacity by 2022, adding approximately 100 GW of solar and doubling wind installs to 60 GW by 2022.

According to the IEA, coal produced 40% of the world's electricity in 2016. By 2040, this number will drop to 28%[62]. In short, the progressively lower cost of renewables, the falling cost of LNG, and rising renewable portfolio standards will continue to drive the reduction of the global demand for coal.

Cancellation of new coal-fired power plants has become a global trend. China's National Energy Administration has cancelled 103 projects that were planned or under construction, removing 120 GW of coal-fired capacity. The cancellations include projects in 13 coal-rich provinces[63]. China and Pakistan agreed to revise the China–Pakistan Economic Corridor (CPEC) Energy Cooperation Project by removing 3,470 MW of mostly coal-fired projects[64]. The Indian government has cancelled a proposed 4 GW coal power ultra-mega power project in the state of Gujarat[65]. India has also cancelled its proposed 1320 MW coal plant at Bhapur

[61] http://www.ey.com/gl/en/industries/power---utilities/ey-benchmarking-european-power-and-utility-asset-impairments-2015
[62] https://www.eia.gov/outlooks/ieo/pdf/0484(2016).pdf
[63] https://www.nytimes.com/2017/01/18/world/asia/china-coal-power-plants-pollution.html?_r=0
[64] http://nation.com.pk/national/19-May-2017/pakistan-china-drop-5-cpec-energy-projects
[65] https://cleantechnica.com/2017/05/16/gujarat-cancellation-4-gw-power-plant-line-indias-goals-reduce-reliance-upon-coal/

and 1000 MW coal plant in Sambalpur. Government officials said the plants were cancelled because of issues of securing coal allocations and a shift to increasingly cheaper renewables[66]. In 2016, Vietnam cancelled 13.9 GW of coal-fired electricity projects[67].

It is widely understood by the world's largest institutional investors that renewable energy is deflationary and will only get cheaper over time. In 2014, Mark Carney, governor of the Bank of England and chairman of the G20 Financial Stability Board, warned investors of the stranded-asset risk inherent in fossil fuel projects[68]. In 2015, the Norwegian Government Pension Fund, which has assets under management of US$900 billion and is the world's second-largest sovereign wealth fund, sold off more than US$8 billion in coal assets, which included the Philippines' Aboitiz Power. In May 2017, BlackRock, the world's largest investment group with US$5 trillion in assets under management, announced that it was wary of coal assets. Jim Barry, the global head of BlackRock's infrastructure investment group, said, "Anyone who's looking to take beyond a 10-year view on coal is gambling very significantly.[69]"

Philippine purchase power agreements (PPAs) on coal-fired power plants typically go for 20 years, qualifying them clearly as looming stranded assets. It is sensible for both Meralco and the ERC to consider the 10-year view as the turning point at which renewable energy for firm capacity is competitive. Stranded coal assets is a growing material risk and inevitable in the Philippines due to cost-effective liquefied natural gas (LNG), systematic renewable energy cost deflation, and retail competition and open access (RCOA).

Environmental-Regulation Risk

The modelling assumptions do not take into account penalties for violating the provisions of the Clean Air Act of 1999 (Republic Act No. 8749) and Clean Water Act 2005 (Republic Act No 9275). See Appendix 10 for more details on the environmental regulations.

So far, the Clean Air Act has resulted in the implementation of fuel standards but has yet to put in place an emissions-charge system. (Unfulfilled mandates are the responsibility of the Environmental Management Bureau[70] under the Department of Environment and Natural Resources.)

Tighter policies may create even more financial risk. For example, the new South Korean national electricity plan includes the immediate suspension of licenses for eight end-of-life imported-coal-fired power plants.

Coal Tax Risk

The Department of Finance (DoF) appears committed to put in place measures that correct market outcomes, address externalities, and update the 20-year old excise tax on coal of its insignificant Php10 per ton. Government regulations have long ignored the public cost of

[66] http://www.business-standard.com/article/economy-policy/bgr-kalinga-energy-follow-tata-power-shelves-thermal-projects-in-odisha-117051000913_1.html
[67] https://issuu.com/charlton_media/docs/ap_mayjun2016_lowres
[68] https://www.theguardian.com/environment/2014/dec/01/bank-of-england-investigating-risk-of-carbon-bubble
[69] http://www.afr.com/business/mining/coal/blackrock-says-coal-is-dead-as-it-eyes-renewable-power-splurge-20170524-gwbuu6
[70] http://emb.gov.ph/

health impacts borne by taxpayers and the cost of greenhouse gas (GHG) emissions. The DoF has a coal tax proposal in the Comprehensive Tax Reform Program. On a 10-year view, the chance of a coal tax[71] is a material risk.

The coal tax will definitely lower the load factors of coal plants because it shifts the dispatch merit in favor of natural gas and firm and variable renewable energy. A coal tax will further accelerate the risk of stranding.

The 'Moral Hazard' Inherent in Ignoring Stranded-Asset Risk

Banks will lend to power plant developers on the credibility of the off-taker. Bank financing terms are a function of market risk, supply situation, capital structure, duration, liquidity, and exchange-rate risk. Banks in the Philippines do not incorporate stranded-asset risk in project finance underwriting, either through negligence or by design, based on policies ensuring risks are transferred to ratepayers and/or taxpayers.

This is classic definition of "moral hazard," which boils down to an acceptance of risk with the understanding that someone else will suffer the consequences. Moral hazard was on vivid display a decade ago with government bail-outs of large financial institutions deemed too large to fail. Those institutions, ultimately, were protected from the consequences of risky behavior and poor decisions. These protections undermined accountability.

Banks that are investing in coal-fired projects in the Philippines are not taking into account the challenge from retail competition, natural gas, and renewable energy cost deflation, the overbuild of coal, retail competition, the risks that will come with the proper implementation of environmental regulation, a carbon tax, events that would otherwise affect the business (such as the off-taker losing customers, etc.). The question then becomes who really bears such risk —the financier, the developer, the distribution utility, or the ratepayers and/or taxpayers?

In project finance, one transfers the risk to the party who is best able to pay for said risk. However, it is prudent for the government to redistribute the risk equitably to avoid moral hazard.

Stranded Coal Plant Costs in Mindanao

The most recent coal plants in the Philippines were installed in in Mindanao, with their actual PLF's calculated based on actual generation. The surplus of coal fired power has led to low utilization rates from the expected 80% (on the PPA) to 62% in 2014, 61% in 2015, and 52% in 2016. The table below (Figure 9) quantifies the stranded cost in Mindanao based on capacity payments. The stranded costs were calculated using capacity payments of Php 7.2 million per MW per year (a very conservative number compared to Atimonan's Php14.5 million per MW per year) multiplied by the coal capacity and then multiplied by the difference in PLF between the actual PLF and 80% PLF (standard in PPAs). The conservative stranded cost estimate in Mindanao from 2014 to 2016 is Php 3 billion (US$60 million). However, a main caveat is that capacity is not time-weighted so coal plants may have been installed towards

[71] There is a coal tax in the form of an excise tax at 10 peso per ton.

the end of the year. That said, it would be prudent for government to investigate whether these costs are borne by ratepayers and/or taxpayers, the financier, the developer, or the distribution utility.

According to Mylene Capongcol, former director for the electric industry management bureau of the DoE, "Once we have WESM in Mindanao, RCOA will follow but will not immediately be implemented, because ERC will have to declare if RCOA will be implemented in Mindanao. There [are] pre-conditions that need to be satisfied before its implementation"[72]. One can thus ascertain that the reduction in utilization rates is not due to the carve-out clause.

Figure 8. Stranded Coal Costs in Mindanao

	Coal MWh	Coal Capacity	100% PLF	80% PLF (Standard)	Actual PLF	Stranded Value (Capacity Fee) in Php	in USD
2006	476,254	210	1,839,600	1,471,680	26%	818,158,356	16,363,167
2007	1,570,872	232	2,032,320	1,625,856	77%	45,192,329	903,847
2008	1,499,380	232	2,032,320	1,625,856	74%	103,952,877	2,079,058
2009	1,562,753	232	2,032,320	1,625,856	77%	51,865,480	1,037,310
2010	1,725,839	232	2,032,320	1,625,856	85%		-
2011	1,628,848	232	2,032,320	1,625,856	80%		-
2012	1,686,314	232	2,032,320	1,625,856	83%		-
2013	1,635,380	232	2,032,320	1,625,856	80%		-
2014	1,257,542	232	2,032,320	1,625,856	62%	302,723,836	6,054,477
2015	2,037,738	382	3,346,320	2,677,056	61%	525,466,849	10,509,337
2016	4,889,542	1070	9,373,200	7,498,560	52%	42,144,398,356	42,887,967

Source: DOE, IEEFA Calculations

The low utilization rates from 2014 to 2016 are due to uncontracted capacity, and due to the fact that utilization depends on water or hydro availability, of which Mindanao has historically been dependent. Droughts provided the impetus for the overbuild of coal in the island. Currently however, stranding is already taking place in Mindanao even without retail competition and/or the presence of a WESM because of an oversupply of approximately 700 MW of coal and hydro. 600-MW more of capacity expected to come on line in Mindanao from next year to 2020.

[72] https://www.doe.gov.ph/sites/default/files/pdf/announcements/highlights_pubcon_wesm_mindanao_cdo_zamboanga_davao_butuan_gensan.pdf

Legal and Regulatory Risks for Equity Investors and Lenders

Even though the regulatory environment provides few scenarios by which IPPs lose, causing ratepayers to carry most of any loss or cost, new coal plants like the Atimonan project comes with other legal and regulatory risks.

Meralco and affiliated generation companies submitted seven applications during the window allowed by the ERC in a process that exempted companies from Competitive Selection Process (CSP). The ERC defines CSP as "the process wherein a Generation Company is selected through transparent and competitive bidding undertaken by the distribution utilities (DU) to secure supply of electricity at the least cost."

The competitive procurement rules issued through ERC Resolution 13, series 2015, took effect on Nov. 4, 2015. But on March 15 of that year, the commission suspended the rules through April 30, 2015. The seven Meralco-affiliated PSAs were filed on April 29, 2016 at 5 p.m. The media reports that these "midnight" submissions[73] cover 3,551 MW of negotiated 20-year PSAs—a significant portion of Meralco's generation contracting, which will thus have a significant impact on Meralco's generation rates, most of which are automatically passed through to captive ratepayers.

If ratepayers seek a restraining order with the Supreme Court to prevent the ERC from acting further on Meralco's PSA applications, project risk is created. Citizens' groups have already filed a graft-allegation case against ERC commissioners.

In addition, should the aforementioned pipeline proceed, if a generation company that is a subsidiary of Meralco (e.g., MGen) is subject to the carve-out clause, it is not likely to deliver an economic return in line with the expectations from the project outset. Shareholders would be within reason to ask whether this will have a negative impact on share price.

[73] Meralco had 3,551MW out of the 4,500MW in aggregate supply covered by all the 93 PSA applications filed with the ERC. (Source: http://business.inquirer.net/226136/solons-rap-alleged-midnight-deals-erc-favor-meralco)

The Challenge from Natural Gas and Renewables

Electricity-generation trends are moving away from coal and toward cheaper fuel sources.

Solar-powered electricity costs have fallen by 99% since 1976 and by 90% since 2009, while the cost of wind-powered generation has fallen 50% since 2009. The Philippines has almost 1 GW of installed solar PV with over 2 GW of pending solar applications. It leads Southeast Asia in installed wind energy capacity with 400MW in operation and 1,600MW of capacity to be added over the next two to three years.

During the public consultation conducted as part of the process for review of the Environmental Compliance Certificate (ECC) of the Atimonan coal-fired power plant, the viability of solar, wind, or other renewable energy was not considered.

The DoE responds to this omission by reasoning that, "We need a stable source of energy. The renewables are only intermittent sources of energy." Atimonan's developers argued that "the cost of solar energy is double the price of coal."

Neither assertion is correct.

Significant variable renewable energy capacity[74] will reduce the need for 24/7 baseload power, a reality that makes the large total capacity sought in the seven submissions imprudent and short-sighted.

Further, the Philippine electricity grid is now ripe for modernization—and grid modernization in this day and age necessarily means renewables. If one assumes 7% GDP growth per annum, the Philippines will need to double its electricity capacity in the next decade. The Philippine electricity grid will require massive capital investment to keep up; without such investment, blackouts will result and the economy will suffer.

Reconfiguring the grid toward better energy security, better domestic sourcing, more diversification, less pollution, and lower emissions will require strong uptake of renewables. It will also require an electricity market free of subsidies and one that allows for technology-agnostic procurement policies. A level playing field like the one that will result from such policy reform will create broad economic benefit by driving electricity rates lower.

Distribution utilities are built on central planning models that can and should strive for least-cost electricity. Has Meralco examined alternatives that could provide firm capacity to address forecast load requirements with more renewable energy? Renewable energy generation is already cost-competitive for most slices of the load curve; within the right regulatory framework[75], its costs will continue to fall.

[74] Ancillary service markets are changing due to variable renewable energy. Meralco believes that attendant costs of ancillary services should be paid for by renewable energy. IEEFA believes that it is important to balance responsibility and costs. Ancillary services including balancing energy offers significant flexibility to the system.

[75] IEEFA considers the right regulatory framework to ensure the least cost price for consumers via reverse auctions. To enable this, there must be a level playing field, including technology neutral procurement and no pass-throughs that could result in higher prices than the agreed upon tariff price. IEEFA believes that the government should guard against abuse of market power and anti-competitive agreements such as RPS. The FIT via reverse auctions is the most competitive way forward to encourage least cost option.

The Atimonan plant PSA estimates a cost of over Php 767 billion (US$ 15.3 billion) over 20 years. Meralco can and should assess their firm capacity needs and the other slices of the load curve requirements. With wind covering day and night-time demand, pumped storage covering mid-merit to peaking, and solar power reducing noon-time peak, Meralco would do well to also entertain competitive bids from renewable energy developers for all segments of its load curve to expand system diversity.

Reverse Auctions and the Importance of Competitive Selection Procurement

IEEFA shares and supports Energy Secretary Alfonso Cusi's call for stronger competition and Senate Energy Committee Chairman Sherwin Gatchalian's advocacy of reverse auctions to spur renewables growth and bring electricity prices down.

An auction mechanism is a "selection process designed to procure (or allocate) goods and services competitively, where the award is made to a pre-qualified bidder and is based on a financial offer… In most cases involving electricity auctions, the sellers, such as generators, are the ones bidding their products, as they are interested in selling power contracts to large consumers or distribution companies, with the bidding process designed in part to select the lowest price. This is the so-called 'reverse auction,' where the lowest offer is the winner"[76].

In the renewable energy context of the Philippines, reverse auctions can be used for FiT and RPS quotas. One can design a reverse auction mechanism by which a large set of winning bidders could be accommodated in the interest of meeting a certain quota. Such a mechanism can allow more variable absorption to the grid for certain slices of load. Indian tariffs, for example, have been in freefall as a result of reverse auctions[77]. The lowest price recorded in May 2017 was the 200MW Bhadia Phase III-Solar Park in Rajasthan at a rate of INR 2.44 per kWh (3.8 US cents). This record-low price was a 7% reduction from a tariff price one week earlier of INR 2.62 (4.05 US cents) for the 250 MW Bhadla Phase-IV Solar Park (the cost of solar panel components over the course of that week experienced only incremental change)[78].

Enforcement of a Competitive Selection Process (CSP) would be a step toward open competition for the procurement of the lowest-cost option for the power capacity and generation in question. It would bring an end to self-negotiated generation rates; while amendments to EPIRA should be implemented to reduce the percentage of allowable self-generating capacity of the kind Meralco has been allowed. To ensure a least-cost option, Meralco can and should entertain more imaginative proposals[79] incorporating more LNG and renewable energy.

Meralco itself has shown some acknowledgment of the potential for renewables. In February 2017, two solar PSA applications with two solar companies were jointly submitted by Meralco and Solar Philippines Tanauan Corp., and PowerSource First Bulacan Solar Inc., respectively.

[76] http://www.ifc.org/wps/wcm/connect/8a92fa004aabaa73977bd79e0dc67fc6/Electricity+and+Demand+Side+Auctions.pdf?MOD=AJPERES

[77] It is important to note that the price per kWh of solar is also a function of insolation resource which encompasses intensity and duration of sunlight.

[78] https://www.pv-magazine.com/2017/05/15/solar-tariffs-in-india-tumble-to-another-new-record-low/

[79] Imaginative proposals: transparent and competitive technology neutral bidding to secure supply of electricity at the least cost; could entertain hybrid/mix of technologies.

The first was 50MW of variable renewable energy in Tanauan, Batangas, at a tariff rate of PHP 5.59 (11 US cents) for 20 years, resulting in a reduction of Meralco's generation charge by approximately Php 0.12 per kWh[80]. The second was 50MW of variable renewable energy in San Miguel, Bulacan, at a tariff rate of 4.69 (9 US cents) for 20 years, resulting in a reduction of Meralco's generation charge by approximately Php 0.017 per kWh. On both PSAs, Meralco emphasized that "based on Meralco's foreseen high demand during the summer months of 2017 and succeeding years, there is urgent need for the final approval of the PSA considering a significant peaking capacity deficit, as well as possible occurrences of scheduled maintenance shutdowns and forced outages of power plants." As a result of renewable energy cost deflation and competitive reverse auctions, we can expect tariff prices to go down from Php 4.69. In August 2017, Solar Philippines indicated prices of Php 2.99 per kWh[81].

The Challenge from LNG

In a presentation at the University of the Philippines School of Economics on August 31, 2017[82] First Philippine Holdings Chief Operating Officer, Giles Puno, presented the newly commissioned 414-MW San Gabriel Combined Cycle Gas Turbine (CCGT) as an alternative power supply option to new coal plants, particularly those that have yet to be constructed. He stressed that new and existing natural gas plants can, and in fact, have already offered prices that are competitive for both baseload and mid-merit segments.

The comments gathered above as well as other similar views beg the question: Why would a utility favor coal plants that have yet to be built over existing competitive alternatives with no construction risks?

While the DoE has stated its support for LNG as a way to transition toward a greener power system and to replace Malampaya supply once it is depleted, the expected next steps will be to develop clearer legislative and policy initiatives. The DoE even supports the establishment of an LNG hub to include floating storage and regasification units (FSRUs) and small-scale LNG applications.

Even prior to completion of the foregoing legislative and policy initiatives, First Gen is proceeding with a ~US$1 billion LNG facility near its four gas-fired plants in Batangas to meet own demand and those of existing and future users, including the Ilijan power plant and potentially other industries beyond the power sector. Similarly, Energy World[83] has been working on its LNG terminal facilities in Pagbilao, but has yet to complete construction of its 650 MW CCGT in the area, among others, because of transmission and other issues. It likewise faces other challenges, including being hundreds of kilometers away from the existing market—the gas-fired facilities in Batangas—currently being supplied by the soon-to-deplete Malampaya field.

These developments are game-changing, and have to be considered by utilities and regulators.

[80] ERC Case No. 2017-014 RC
[81] http://rtvm.gov.ph/main/?tag=inauguration-of-the-solar-philippines-factory
[82] Under the auspices of the USAID-funded Energy Policy Development Program (EPDP).
[83] http://www.energyworldcorp.com/ud-phil.html

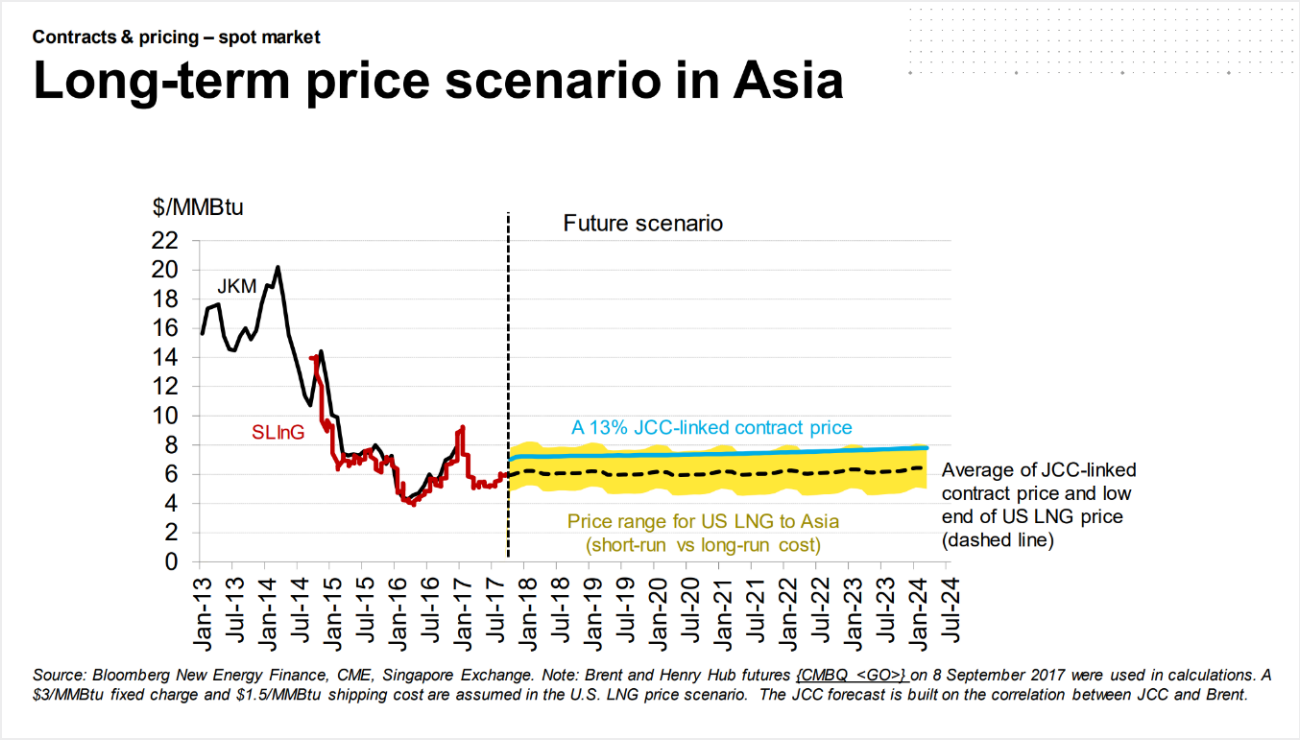
Box 10: The Challenge from LNG

Worldwide trends show an increasing recourse to natural gas for electricity generation. In the United States, natural gas displacement of coal is mainly owed to fracking. Excess supplies have led to pressure for the export of LNG. Figure 9 below shows the long-term trend for LNG CIF in Asia in semi-annual point forecasts by BNEF, with the high slightly below $8/MMBtu, and the lows of about $5/MMBtu.

What is significant for the Philippines is that the actual price of natural gas from the Malampaya field used by the Sta. Rita and San Lorenzo CCGT plants operated by FirstGen and supplying Meralco hit a low of $6.6/MMBtu in the first half of 2016 but went up to $7.4/MMBtu in the corresponding period in 2017.

In the first half of 2016, the dispatch of the two plants was at 83.9% (above base load level) and was at 69.3% in the corresponding period in 2017. The 2017 figure, however, is also partly explained by scheduled major maintenance of a unit of the Sta. Rita plant and the temporary shutdown of all natural gas plants due to the earthquake that hit Batangas in April.[84]

Figure 9. Long-term price scenario in Asia



Source: Bloomberg New Energy Finance, CME, Singapore Exchange. Note: Brent and Henry Hub futures {CMBQ <GO>} on 8 September 2017 were used in calculations. A $3/MMBtu fixed charge and $1.5/MMBtu shipping cost are assumed in the U.S. LNG price scenario. The JCC forecast is built on the correlation between JCC and Brent.

The two tables below are simulations undertaken by Chrysogonus Herrera of MGen, and reproduced with permission. Table 1 shows, in the bordered row with 80% capacity factor, how low the price of natural gas has to be to have the equivalent electricity price of base load coal at a given coal price. Conservatively, we have used the $7.44/MMBtu price for the first half of 2017. The green background means that at the given coal and natural gas

[84] First Gen Corporation disclosure to the Philippine Stock Exchange for the second quarter of 2017, June 30, 2017.

prices, at any given capacity factor, natural gas trumps coal. At high capacity factors but below 80%, natural gas will decrease needed coal capacity. At factors of 80% and higher, natural gas will displace coal for base load demand. Note that the BNEF price forecasts support the latter conclusion.

Table 1.

Nat Gas Price: 7.4 Gas Parity Price vs Coal, US$/MMBtu (with Carbon Tax at $0/MT)										
		Coal Prices, $MT								
	6.8802	60	65	70	75	80	85	90	95	100
Capacity Factor	65%	7.23	7.49	7.75	8.01	8.27	8.53	8.79	9.05	9.31
	70%	7.09	7.35	7.61	7.88	8.14	8.40	8.67	8.93	9.19
	75%	6.94	7.21	7.47	7.74	8.00	8.27	8.54	8.80	9.07
	80%	6.78	7.05	7.32	7.59	7.85	8.12	8.39	8.65	8.92
	85%	6.61	6.88	7.15	7.41	7.68	7.95	8.22	8.48	8.75
	90%	6.43	6.69	6.96	7.22	7.49	7.76	8.02	8.29	8.55

The second table[85] merely adds a carbon tax of $1.25 per metric ton of CO2 to the price of coal and shifts the advantage to natural gas further. Other simulations would shift the natural gas advantage even further.[86]

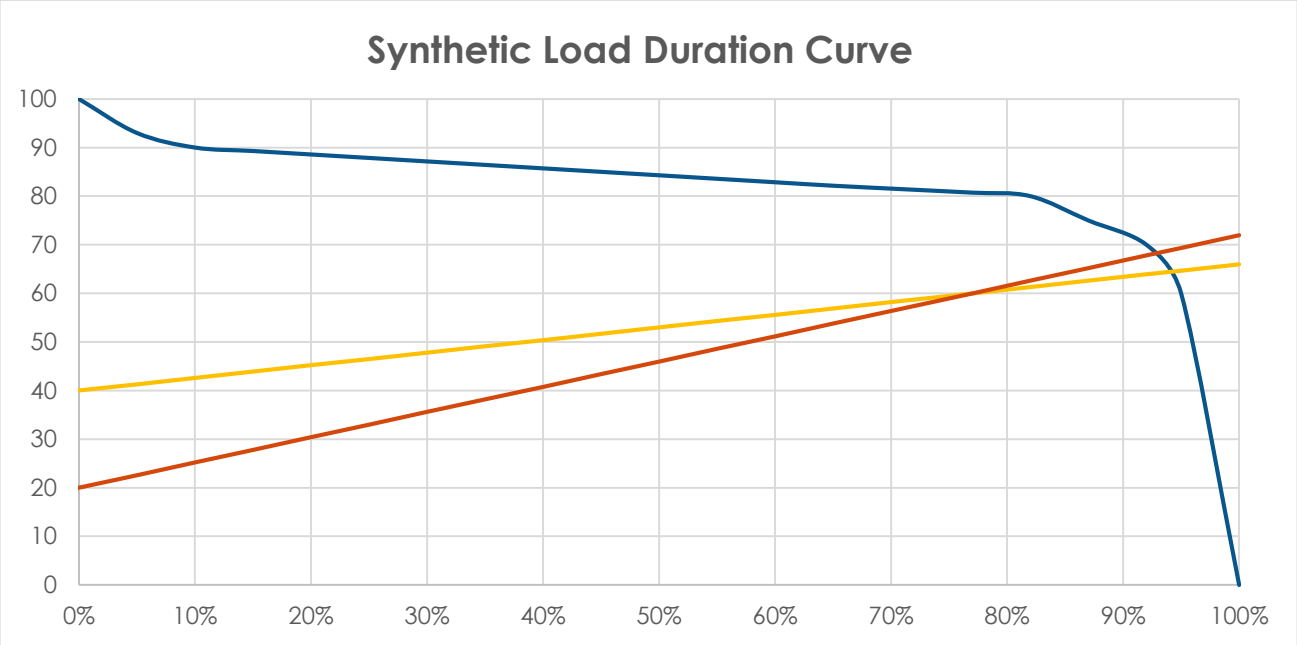
Table 2.

Gas Parity Price vs Coal, US$/MMBtu (with Carbon Tax at $1.25/MT)										
		Coal Prices, $MT								
	6.7979	60	65	70	75	80	85	90	95	100
Capacity Factor	65%	7.12	7.41	7.71	8.00	8.29	8.59	8.88	9.18	9.47
	70%	6.94	7.23	7.53	7.82	8.12	8.41	8.71	9.00	9.29
	75%	6.78	7.07	7.37	7.66	7.96	8.25	8.55	8.84	9.14
	80%	6.64	6.93	7.23	7.52	7.81	8.11	8.40	8.70	8.99
	85%	6.50	6.80	7.09	7.39	7.68	7.98	8.27	8.57	8.86
	90%	6.38	6.67	6.97	7.26	7.55	7.85	8.15	8.44	8.74

The MGen tables are derived in the following manner: Fixed capacity costs are assumed for coal and natural gas. These are the Y intercepts in the chart below. The slopes of the total cost curves under a stylized load duration curve are the variable costs—mainly fuel—

[85] Herrera, Chrysogonus. Submission to the Senate Ways and Means Committee, September 14, 2017.
[86] Logarta, De los Angeles, Koon. ICSC submission to the Department of Finance and the Senate Ways and Means Committee, September 14, 2017.

for the two competing technologies. Each cell number in the yellow-bordered rows is the ceiling price at which natural gas displaces coal for base load supply.



Case Study: Meralco and the Atimonan Power Project

The proposed 1200-MW Atimonan Power Station would be among the first ultra-supercritical coal-fired power plants[87,88] in the Philippines. This case study highlights Atimonan to illustrate key aspects of the procurement policy of Meralco as well as project risks inherent in coal-fired power projects in general. It would be built in two 600-MW phases in Quezon province, which has two existing coal plants (Pagbilao and Mauban).

Atimonan is one of the 25 coal-fired power plants indicated to meet the projected 13,167 MW of additional power the government projects will be required by 2030[89]. Proponents and supporters of these imported-coal-fired power plants describe them as "easy and affordable."[90] It would cost Php 111.15 billion in debt [91] and approximately Php 38.85 billion in equity (a total of US$3 billion), equivalent to US$ 2.5 million per MW[92]. The proposed plant is to be a joint venture (JV) of Meralco PowerGen Corporation (MGen) and a yet-to-be-determined partner. The Atimonan project is one of the coal-fired power plants that would contribute to MGen's 3,000 MW capacity target.

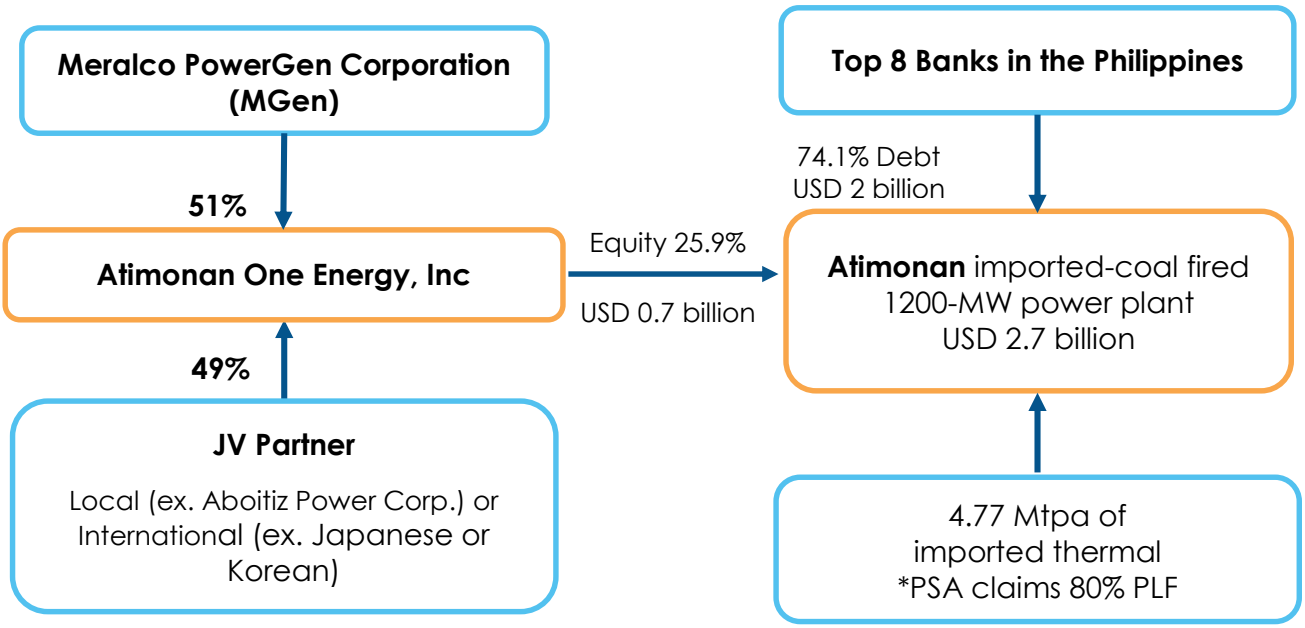
MGen President Oscar Reyes asserts that this ultra-supercritical pulverized-coal station is "the most fully efficient, most environmentally friendly technology as far as coal-fired power plants are concerned. It is more expensive, but more efficient."[93]

Project Background

MGen is still choosing a JV partner between Aboitiz Power Corp. and two international companies as well as waiting to close financing from some local banks (such as BPI, RCBC, Union Bank) and international banks (such as JP Morgan). The proposed project would have two stages of build-out. The first stage would be for 600 MW of capacity with the most recent commission date being early 2021. Refer to Figure 10 for an overview of the corporate structure. Appendix 2 gives a detailed project overview.

[87] http://thestandard.com.ph/business/power-technology/230830/meralco-building-modern-coal-plant.html
[88] San Buenaventura Power Ltd. (SBPL) is building a 500-MW (gross) supercritical coal-fired power plant in the town of Mauban in Quezon Province.
[89] http://newsinfo.inquirer.net/773681/why-is-ph-building-25-more-coal-powered-plants
[90] http://www.businessmirror.com.ph/meralco-to-raise-p110-billion-for-quezon-coal-plant/
[91] https://business.inquirer.net/228414/meralco-unit-subsidiary-seen-closing-p100-b-loan-soon
[92] Presentation by Chrysogonus Herrera (MGen), September 14, 2017; 19th public hearing on the "Tax Reform for Acceleration and Inclusion" (H. No. 5636 and S. No. 1408) and focusing on the Current Tax Treatment of Coal in the Philippines
[93] http://www.businessmirror.com.ph/meralco-to-raise-p110-billion-for-quezon-coal-plant/

Figure 10. Atimonan Power Plant Corporate Structure (US$ 3 bn, 1.2GW)



Source: Project Documents, IEEFA Estimates[94]

Coal-fired power projects are able to obtain project financing at 5% over 15 years. The Atimonan project has yet to reach financial close; MGen hopes to achieve that goal by the second half of 2017. The official estimate of the total capital cost of the project has escalated over time, from US$2 billion in February 2015 to US$2.7 billion as of September 2017. This increase reflects the inflationary nature of thermal power projects worldwide in distinct contrast to the deflationary nature of renewable energy.

Equity capital is proposed at 25.9% of the total with 51% of the equity owned by MGen and 49% by a local or international JV partner. Debt is proposed to cover 74.1% of the capital cost. All the debt financing would be provided by loans from local banks (Figure 11).

[94] http://www.cea.nic.in/reports/others/planning/tpod/coal_cons_norms.pdf

Meralco's Evaluation Process for the Execution of PSAs

Meralco realizes that its dealings with suppliers (e.g. MGen) should be at arm's length. Below is an overview of Meralco's evaluation process for the execution of PSAs verbatim from Meralco:

a. The process starts with receipt of Power supply proposal/s/ from proponent/s.

- *In preparation for evaluation of such proposal/s, MERALCO's power supply-demand outlook is kept updated to have readily-available information on the magnitude and timing of needed capacity for captive customers.*

- *MERALCO's data files used for evaluating PSA proposals (e.g., data based on Philippine Consumer Price Index [CPI], United States of America CPI, foreign currency exchange rates, New Castle Indices, oil and gas prices, line rental, etc.) are likewise updated.*

Figure 11. Atimonan Power Plant Capital Structure (US$ m)

Capital Structure	USD m	Split	Split	USD m
Local Currency	3, 000			
Foreign Currency				
Bank Financing	3,000			
Buffer				
Debt Required	2, 220		74.1%	2,220
MGen	397.8	51%		
JV Partner	382.2	49%		
Total Equity	780		25.9%	780
Total Cost				2,700

Source: Project Documents, IEEFA Estimates

b. Technical aspects of the proposal are perused to determine if it will make a feasible addition to MERALCO's power supply portfolio (e.g., whether it will meet MERALCO's baseload, mid-merit, or peaking requirements).

- *If the proposal after initial evaluation is technically feasible or acceptable to MERALCO, then we proceed to initial evaluation of the offered price.*

- *On the other hand, if the proposal does not look technically feasible or acceptable, the proponent is informed in writing of the technical unacceptability of its proposal and end the evaluation.*

c. During the Initial evaluation of the offered price, the following activities are performed.

- *Determine if the offered price is equal to or less than the rate of comparable power plant/s under MERALCO's supply portfolio, which has already secured the imprimatur of the Energy Regulatory Commission. If so, proceed to the next step.*

- *If the offered price is only marginally higher than the rate of comparable power plants under MERALCO's supply portfolio, evaluate any redeeming feature of the proposal (e.g., negative escalation over time of a rate component).*
  - *If there is any, proceed to the next step.*
  - *If there is none, inform the proponent of non-competitiveness of its proposal and conclude the evaluation.*

- *If the offered price is significantly highly than the rate of comparable power plant/s under MERALCO's supply portfolio, notify the proponent of the non-competitiveness of its offer and conclude the evaluation.*

d. Proposal is evaluated in greater detail (e.g., implication/s of location of the power plant; line rental valuation; possible impact of the PSA on MERALCO's blended Generation Charge over possible term of the PSA; etc.)

e. Schedule an internal (MERALCO) meeting among concerned offices to prepare for and start the contract negotiations with the proponent.

In contrast, an open and competitive supply procurement policy should start with the utility firming up its forecasts of load growth, in peak capacity and energy requirements. It should then publish these for open bidding.

Location and Land

The proposed 140-hectare plant site (coordinates: 14, 121.916667) is in Barangay Villa Ibaba, Atimonan Municipality, Quezon Province, about 114 aerial kilometers southeast of Quezon City (National Capital Region) and about 30 aerial kilometers east-northeast of Lucena City[95]. The site sits approximately 3 meters or 10 feet above sea level[96] and is in very close proximity to a river basin (Figure 12), an obvious key financial and operational risk factor. Historical storm tides at the site were reported to be 2.4 meters in 2013[97] and potential storm surges ranged from 2.2 meters to 3.2 meters in 2014[98]. According to the Nationwide Operational Assessment of Hazards (NOAH), a 3.4-meter storm surge could damage 308 of the 648 buildings in Atimonan Municipality. Moreover, illegal sand quarrying in the area could hasten the destruction of the nearby bay's natural condition, accelerating rising sea levels and increasing the frequency of storm surges[99]. See Appendix 3 for risk map showing the plant's susceptibility to landslides[100].

A key construction requirement is to raise the average site elevation by at least 2 meters, to 5 meters, but even with that change the site would remain at risk of flooding should sea levels continue to rise or should an extreme weather event occur. Sea level risk from slow-onset climate change events over the coming years will only increase this financial and operating risk. Meralco has updated plan documents to say that the Atimonan project will work on the basis that site elevation shall not be lower than 10 meters above average sea level to address flooding and tsunami risk; this will likely drive up costs of construction. Meralco also claims the following:

- Ash pond is designed to be furthest from the sea to minimize ash contamination risk.
- Perimeter and subsurface drainage systems (to collect any seepage or runoff from the ash storage facility) is part of the design.
- Ash stack shall utilize a zoned earthfill embankment constructed from locally obtained materials designed to store ash in slurry form and water level managed via decanting.

[95] http://www.meralcopowergen.com.ph/our_business/view/5
[96] https://www.freemaptools.com/elevation-finder.htm
[97] https://www.researchgate.net/publication/267456455_Devastating_storm_surges_of_Typhoon_Haiyan
[98] http://www.gmanetwork.com/news/story/391329/scitech/weather/project-noah-69-areas-under-threat-of-storm-surge
[99] http://newsinfo.inquirer.net/435425/illegal-sand-quarrying-back-in-quezon
[100] https://www.sheltercluster.org/sites/default/files/docs/Risk%20Map%20Region%20IV%20A%20Quezon%20Atimonan%20Landslide.jpg

- Regular monitoring of surface and ground water near the facility shall be done to be mindful of ash contamination

Coal ash contains arsenic, mercury, lead, and a catalogue of other toxic metals that pose health and livelihood dangers to fishing communities. Seeing how the economy of Atimonan is sustained by fishing and agriculture, any coal ash spilled from the plant will materially threaten the productivity levels of the area's fishing and agriculture industry.

Figure 12. River Basin Boundaries

Source: Nationwide Operational Assessment of Hazards (NOAH)

Most (85%, or 1,200 hectares) of the proposed 1,400-hectare site is currently used for rain-fed agriculture. Other economic activity includes fishing. The present condition of the local infrastructure ranges from poor to good.

IEEFA sees the site's location and elevation as presenting extreme risks[101] over the medium to long term, in that ash ponds and infrastructure could be washed away, damaging farming and fishing livelihoods in Barangay Villa Ibaba[102] (Appendix 3). Ash ponds can sometimes also be located by design to facilitate otherwise illegal disposal into a downstream area, a reasonable possibility given the high potential for storm surges and rain events in the region.

Further, the plant site stands in close proximity (14 kilometers) to the Quezon Protected Landscape area. The area (13°59'22"N 121°48'59"E) is in Pagbilao, Padre Burgos, and Atimonan in Quezon, covering 9.38 km^2 (4 square miles) of land. The 5350 hectare (2,430 acres) area became a national park on Oct. 25, 1934, under Proclamation No. 740[103]. On August 5, 1940, Proclamation No. 594 enlarged the area to 983 hectares (2,430 acres)[104]. In 1992, Republic Act 7586 established the National Integrated Protected Areas System (NIPAS),

[101] Nationwide Operational Assessment of Hazards (NOAH) – refer to Appendix 2
[102] http://www.atimonan.gov.ph/atim_bsep/BSEPVILLAIBABA2015.pdf
[103] http://www.chanrobles.com/proclamationo740.htm#PROCLAMATION%20NO.%20740
[104] http://www.gov.ph/1940/08/05/proclamation-no-594-s-1940/

which reclassified the park as a protected landscape[105]. On June 2, 2003, the park was re-established as the Quezon Protected Landscape by Proclamation No. 394, with a total area of 983 hectares (2,429 acres)[106].

Fuel and Resources

Should the Atimonan plant become operational, 4.77 million tons per annum (Mtpa) of imported coal (272.4 MT/h for each boiler) would be required to keep it running at an 80% PLF. The plant is being developed to utilize coal with a calorific value of 4,500 to 4,900 Kcal/kg imported from Indonesia, Australia, or the U.S. Powder River Basin.

In addition to imported coal and operating costs, the Atimonan plant would require waste management and water use systems. The plant has two categories of water use—the boiler or process steam water coming from the Sapaan River, from groundwater, or from desalinated water, and the cooling water coming from the Sapaan River or Lopez Bay/Lamon Bay.

Coal Transportation

Imported coal would be transported to the Atimonan Port from either Indonesia, Australia, or the United States via shipping vessel. The imported coal would likely be transshipped from vessel to truck. Included in the proposed project is a coal unloading jetty with an approximately 600-meter-long, single berth for an 80,000 DWT Panamax Vessel. The marine offloading facility is approximately 300 meters long, with a 35-meter-by-25-meter pad at the end of the facility for vessels with up to a 4-meter draft requirement.

Coal transport in general is susceptible to risk due to the chemical composition of coal. Coal contains sulfur and emits methane, carbon dioxide, and carbon monoxide. Air mixtures containing between 5% and 16% of methane create an explosive environment that can be ignited via electrical sparks, matches, frictional sparks, or a lighted cigarette. Carbon monoxide is an odorless gas with flammable limits between 12% and 75% of volume. It is also toxic if inhaled. Methane and carbon monoxide are lighter than air and may be able to accumulate in the upper region of cargo or adjacent spaces. Coal can oxidize, which results in depletion of oxygen and an increase in carbon dioxide in cargo spaces. It is also susceptible to spontaneous combustion as a result of its self-heating capabilities. In May 2017, a vessel carrying 28,000 tons of thermal coal in India caught fire.[107]

[105] http://www.gov.ph/1992/06/01/republic-act-no-7586/
[106] http://www.gov.ph/2003/06/02/proclamation-no-394-s-2003/
[107] http://www.newindianexpress.com/states/odisha/2017/may/10/ship-transporting-coal-catches-fire-1603217.html

Community Relocation

MGen asserts that the project will require the displacement of 70 families. The company has resettled 50 families so far with the recent intention of completing full resettlement by the end of March 2017[108]. This assertion has yet to be verified.

Current Plant Status

Meralco's Distribution Development Plan says that "from 2015 to 2024, energy sales are forecasted to grow by a compounded average growth rate of 3.7%."

The company says it wants to ensure continuous and reliable electricity for customers. Meralco further asserts that as a way to mitigate exposure to the Wholesale Electricity Spot Market (WESM), it is seeking to source additional capacity through bilateral power supply contracts. This is legal under Republic Act No. 9136 (EPIRA), which states that "Distribution utilities may enter into bilateral power supply contracts subject to review by the Energy Regulatory Commission (ERC)."

The monthly power bill (MPB), exclusive of the applicable Value Added Tax (VAT), is equivalent to an annual effective rate of Php3.76 per kWh (at plant gate), rising over time due to cost inflation. This rate does not take into account fluctuations in fuel price. The simulated delivered price under PSA would result in the reduction of Meralco's generation charge by about Php 0.78 per kWh.[109] The rate impact information from the PSA can be found in Appendix 4.

According to the PSA, "the Plant offers greater reliability compared to existing plants that are past their expected plant life, at a price competitively at par with the rates of the existing plants despite its newness." Meralco also asserts that the plant is part of the DOE's planned indicative power projects, contributing to achieving the government's target of available capacity as per the DoE's Philippine Development Plan.

Profile of Main Corporate Entities

Meralco PowerGen Corporation (MGen)

Meralco PowerGen Corporation (MGen) was established as a power generation company in 2010. It is a wholly-owned subsidiary of the Manila Electric Company (Meralco), the largest electric distribution utility in the Philippines. Appendix 5 has more detailed information on MGen's ownership structure, which is similar to that of Meralco's.

In addition to the Atimonan power station, MGen has deals on two other coal-fired electricity-generation proposals:

- A shareholder agreement with Therma Power Inc., a wholly-owned subsidiary of Aboitiz Power Corp. and Taiwan Cogeneration Corporation, signed in 2011 for majority control of

[108] http://www.businessmirror.com.ph/meralco-to-raise-p110-billion-for-quezon-coal-plant/
[109] http://www.erc.gov.ph/Files/Render/issuance/17762 (2016-092-RC_MERALCO_A1e)

Redondo Peninsula Energy, Inc. (RP Energy). RP Energy is developing a $1.2Bn 600MW power plant within the Subic Bay Freeport Zone (SBFZ) using circulating-fluidized-bed technology (CFB), a technical term for more coal technology that purports to meet stringent health, safety and environmental protection standards but that is still significantly more polluting than any renewable energy project.[110]

- A partnership with New Growth B.V., a wholly-owned subsidiary of EGCO of Thailand to develop a 460MW (net) coal-fired power project in Mauban, Quezon, that will be the first power generation facility in the country to utilize supercritical boiler technology. MGen has a 51% stake in the project with New Growth B.V. owning the remaining 49%. The facility will be located beside the existing 460MW (net) power plant of Quezon Power (Philippines) Ltd. that is majority-owned by EGCO of Thailand. The project aims to be in commercial operation by the first half of 2019.[111]

All of the new coal-fired plants under consideration in the Philippines, including two other coal-fired plants proposed by MGen, would be ultra-supercritical.

Meralco, the Off-Taker

Meralco is the largest electric distribution company in the Philippines with a coverage area of 36 cities and 75 municipalities, including Metro Manila, the capital region of the Philippines. Its franchise area covers over 9,685 km^2 across the country's main industrial, commercial, and population centers.

Meralco has more than five million customers, accounting for nearly 75% of electricity sales in Luzon, the island that accounts for about 70% of the country's gross domestic product. Meralco has 55% of total electricity sales in the Philippines, and it supplies factories that account for 50% of the total manufacturing output in the Philippines[112].

In June 2017, coal generation accounted for 30% of the utility's dispatch. The rest of the supply was from natural gas (CCGT), bunker, and the spot market (13%). Renewable energy accounted for an insignificant 0.5GWh[113]. The amount of variable renewable energy in the spot market (FiT-enabled) is also insignificant[114].

According to utility economics VP Lawrence Fernandez[115], Meralco has a current system load factor of 70%, a number that has remained stable over recent years. It has recently lost 20% of energy sales from the loss of half of its contestable load. Its captive market is said to be 60% and this will continue to decline as the peak demand threshold for contestability further decreases to household-level demand.

They are expecting approximately 3 GW of contracts to expire by 2025.

[110] http://www.meralcopowergen.com.ph/our_business/view/3
[111] http://www.meralcopowergen.com.ph/our_business/view/4
[112] http://www.meralcopowergen.com.ph/about
[113] http://corporate-downloadables-rates-archive-generation.s3.amazonaws.com/1500431603.806fecc9bdfb50d2a9e2b324880ff1db.pdf
[114] Meralco Generation Report for March 2017.
[115] Interview conducted July 14, 2017.

IEEFA's Financial Calculations

IEEFA has developed a financial calculation to assess the cost of the electricity that would be produced by the Atimonan plant. The calculation uses data from the DoE, the ERC, and information from other published sources, news articles, and interviews. It aims to stimulate public discourse by bringing together relevant financial information. Appendix 8 has the detailed project components.

One of IEEFA's key findings is that the levelized cost of electricity required to build and operate the Atimonan plant would be 5% higher than what is claimed on the Atimonan Power Supply Agreement (PSA). Appendix 9 highlights Atimonan's PSA modeling assumptions and IEEFA's assumptions.

The discrepancy between IEEFA's and the PSA calculations on the Atimonan Power Plant result from different coal price assumptions. The PSA assumes a price of US$50.38 per ton of coal based on the global COAL Monthly Index for Newcastle (NEWC Index). That outlook was published before coal prices doubled between May 2016 and December 2016, from US$51.20 per ton to US$100.69 per ton. IEEFA nonetheless conservatively assumes a coal price of US$60.

Our calculations suggest that, to ensure capital recovery, the ERC would do well to take another thorough look at its assumptions and its calculation of the equity internal rate of return.

Underestimating generation cost will result in a miscalculation, and this, along with the guaranteed full cost recovery for project proponents, would burden ratepayers.

MGen declined a request for an interview to discuss these findings.

The Allocation of Stranded Risk

The risks of stranded power plant assets is rearing its head more brazenly. It is clear that stranded risks arise from four main challenges: 1) retail competition; 2) the encroachment into base load of LNG; 3) renewable energy cost deflation; and 4) environmental regulations and other risks.

Under the current power system structure and regulatory framework, stranded assets and costs arise mainly through the underutilization of capacity. In the main, utilization is indicated by plant load factors or PLFs.

The key public policy question is the allocation of stranding risks. If a private developer, with debt finance, proceeds to construct a plant without guaranteed offtake and cost recovery, such risks are borne exclusively by them. If a distribution utility contracts with an IPP with firm capacity factors, and actual utilization of capacity falls below those, average costs rise for captive ratepayers. (See Appendix 1).

Conclusion

The Philippine economy is outgrowing its electricity system, bringing to the fore the need for a diverse, secure, and sustainable supply. Adding too much imported-coal-fired power capacity runs against this imperative. Such a strategy only exposes the Philippines to more international coal price and currency fluctuations. Natural gas, solar, wind, run of river hydro, and biogas are attractive, viable options that can be combined to create less risky supply portfolios.

The greatest challenge is for the country's legislature to ensure that the transition to a cleaner power sector is fair, and shields all ratepayers from unnecessary risks. Capacity and electricity generation markets can and should be served by transparent, competitive bidding that allows for technology-neutral procurement of all energy sources.

This report focused on stranded-asset risks arising from the challenge posed by natural gas, renewable energy cost deflation, and the widening scope of retail competition and open access (RCOA). These three risk sources are interrelated and reinforce each other. Renewable energy cost deflation increases the scope and variety of business models that accommodate distributed generation. Distributed generation, in turn, poses risks to thermal plants modeled on high load factors for cost recovery; it also poses risks to old distribution-utility models and associated infrastructure planning methods.

Coal-fired power comes with externalities that have historically been ignored but that today mean stranded-asset risk. Governments worldwide are adopting policies that price in such externalities, and these are driving rapid changes in energy markets. Investors and governments that once supported unfettered expansion of coal no longer do. While electricity generation in the Philippines for the foreseeable future will continue to include conventional fuel sources, the government can and should adopt policies that encourage the deployment of a more diverse electricity-generation portfolio.

The Meralco procurement strategy does not fully address the core elements of the country's stated energy reform agenda—sustainability, affordability, and security. Given coal supply risk, exchange rate risk, renewable energy cost deflation, stranded-asset risk, and future enforcement of the Clean Air Act and Clean Water Act, IEEFA recommends that new coal-fired power capacity additions, including the Atimonan plant, be subject to a more detailed review.

Under current law, IPPs in the Philippines are allowed to pass most risks on to captive ratepayers, a practice that is archaic and long due for reform. That said, Meralco is moving in the right direction by adding a "carve-out" provision that should protect ratepayers from stranded assets by shifting stranded costs to the independent power providers and their investors.

Both the ERC and distribution utilities like Meralco should take into serious consideration the turning point at which renewable energy for firm capacity is competitive. They can and should maximize absorption of variable renewable energy for other slices of its load.

Appendix 1: Low Utilization Punishes Captive Ratepayers

The standard power supply agreement between a thermal electricity supplier and a distribution utility breaks down the supply cost into a fixed capacity cost (local and foreign denominated), fixed operation and maintenance cost (also foreign and local currency denominated), and variable cost—mainly fuel. The standard contract specifies capacity and a load factor, the latter being mainly superfluous. In the analytical exposition below, we simplify total cost as constituted merely by fixed and variable cost.

Without the carve out provisions pushed by retail competition, the equations below illustrate how the ratepayers pay for above-market costs, as explained in Box 1 in the text.

The capacity cost component per kilowatt-hour of generation increases as capacity utilization decreases.

Let C_C be the cost for capacity C, and VC be the variable cost for each kWh of generation x.

Total Cost

$$TC = C_C + V_C x$$

Average Cost

$$AC = \frac{C_C}{x} + V_C$$

If $x' < x$

$$AC' = \frac{C_C}{x'} + V_C > AC$$

The last equation simply means that underutilized but contracted capacity that is not carved out promptly by the distribution utility would mean higher rates for captive ratepayers.

Appendix 2: Atimonan Project Detail and Timeline

Name of Project	Atimonan One Energy, Inc. 2x600MW (net) Coal-Fired Power Plant	
Project Location	Brgy. Villa Ibaba, Atimonan, Quezon	
Project Area	Approximately 139 hectares	
Nature/Type of Project	Thermal Power Plant	
Combustion Technology	Ultra-Supercritical-pressure Pulverized Coal	
Source of Fuel	Coal to be sourced from Indonesia and/or Australia	
Scale of Production	2x600MW (net)	
Summary of Major Components		
	Major Components	**Brief Description**
	Jetty	1 single berth for 80,000 DWT panama vessels
	Coal handling system	2 sets coal unloader – 1,000 to 1,800 tons/hr Single line conveyor – 1,000 to 1,800 tons/hr
	Coal stockyard	2 sets coal unloader – 1,000 to 1,800 tons/hr Single line conveyor – 1,000 to 1,800 tons/hr
	Coal stacker/ reclaimer	2 coal piles, 30-day capacity Area: 6.26 hectares
	Boilers	2 units x 600 MW (net) – PC Boiler
	Steam turbine and generators/ electrical	2 units x 600 MW (net)
	Fuel Oil Tank	Nominal capacity: 910 m3
	Cooling water intake	Length of pipe: 500m from the shore Depth: 14m Flow rate: 60.21 m3/s
	Cooling water outfall	Length of pipe: 490m from the shore Depth: 14.1m Flow rate: 60.22 m3/s
	Stack	Single stack, 2 flues Height: 250m
	Electrostatic precipitator	1 set per boiler
	Seawater Flue gas desulfurizer	1 set per boiler
	Water supply system	Service/Fire water tank – 5,600 to 7,400m3 Demineralized water tank – 1,400 to 2,400 m3
	Ash handling and disposal system	Ash handling (max. 32 tons/hr) Long-term storage (~25 years with ash offtake) Area: 19.36 hectares
Project Cost	Approximately Php 135 billion (US$ 2.7 billion)	
Construction Period	Approximately 3.5 years	
Commercial Operation Date	2021	
Operation	20 years in PPA; useful life of 40 years	

Source: Project Documents, IEEFA Estimates

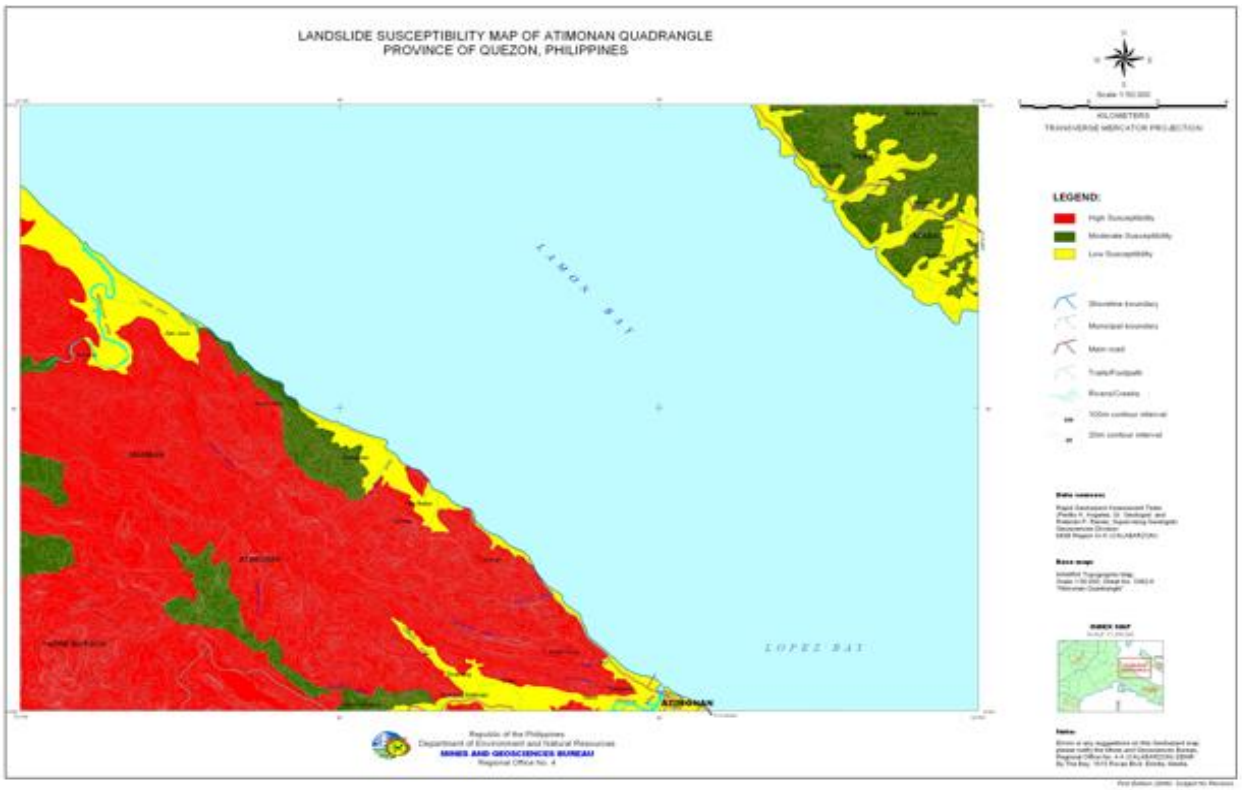
Project Timeline

Event	Date
Meralco, through its wholly owned subsidiary Meralco PowerGen Corp., and Japanese electric utilities provider Chubu Electric Power engage in talks on a partnership to put up an LNG power facility that could generate 1200-MW to 1750-MW. Meralco PowerGen and Chubu Electric were given clearance by the DoE to conduct a grid impact study (GIS) for the proposed power plant. The transmission network operator, National Grid Corporation of the Philippines (NGCP), conducts the GIS for the group by. The issuance of a clearance also came with a letter of endorsement from the DOE to NGCP.[116] Target start date of Construction: End of 2013	August 2012
Meralco PowerGen Corp undertakes studies for the construction of a coal plant instead of 1500-MW LNG-fired facility. DOE claims that though LNG is less expensive than imported coal in other markets, it is more expensive in the Philippines due to logistic costs.[117]	July 2014
Meralco begins seeking environmental compliance certificate.[118]	February 2015
Meralco claims MGen will solely develop Atimonan, without a JV partner. EPC tender process commenced. Tender responses end of 2015 with selection of preferred EPC contractor in 2016. [119]	July 2015
MGen looks for partners for Atimonan. 30-70 equity-project finance and two projects that MGen is taking majority in is estimated at $1.2 billion in equity, minus debt.[120] Grid impact study completed.	July 2015
Environmental compliance certificate secured.	October 13, 2015
Early works such as site access road and resettlement site construction targeted to start in early 2016. Target completion of unit 1 is late 2020.[121]	November 2015
Certificate of Land Use Conversion secured.	February/March 2016
PSA agreement reached	April 26, 2016
PSA submitted to ERC	April 29, 2016
Construction and handover of resettlement site completed	End of March 2017
MGen looks to offer up to a 49-percent share to a partner investor. In terms of financing, the Atimonan coal-fired power plant is projected to cost a total of approximately Php 135 billion[122]. Evaluation of the engineering, procurement and construction (EPC) bids for the power plant project received from contractors ongoing.	April 2017
The Philippines' top 8 banks participate in the senior debt of the deal.	May 2017

[116] http://business.inquirer.net/76511/meralco-japan-firm-in-talks-to-build-lng-plant-in-quezon
[117] http://interaksyon.com/business/92257/meralco-mulls-conversion-of-atimonan-natural-gas-project-to-coal
[118] http://www.bworldonline.com/content.php?section=Corporate&title=meralco-plans-to-seek-foreign-partner-in-coal-power-project-in-atimonan-quezon&id=103356
[119] http://www.manilatimes.net/meralco-to-invest-1-2b-in-3-power-projects/204380/
[120] http://www.businessmirror.com.ph/meralco-powergen-corp-to-spend-1-2-billion-for-three-power-projects/
[121] http://thestandard.com.ph/business/190844/meralco-readies-3-new-power-plants.html
[122] http://www.manilatimes.net/mgen-receives-proposals-atimonan-power-project/324274/

Appendix 3: Atimonan Risk Maps

Susceptibility to Landslides



Source: Nationwide Operational Assessment of Hazards (NOAH)

Landslide Hazard Map

Source: Nationwide Operational Assessment of Hazards (NOAH)

Unstable Slopes Map

Source: Nationwide Operational Assessment of Hazards (NOAH)

Appendix 4: Rate Impact Information from the Atimonan PSA

The monthly power bill (MPB), exclusive of the applicable Value Added Tax, is equivalent to MCP + MFOM + MFP + MVOM + MEEP + MIFP + RCP. The sample calculation of the base contract price under the PSA given a certain set of assumptions results in an annual effective rate of PhP3.76 per kWh (at plant gate), rising over time due to cost inflation. The simulated delivered price under PSA would result in the reduction of Meralco's generation charge by about Php0.78 per kWh.[123]

According to the PSA, "the Plant offers greater reliability compared to existing plants that are past their expected plant life, at a price competitively at par with the rates of the existing plants despite its newness." Meralco claims that the plant is part of the DoE's planned indicative power projects, contributing to achieving the government's target of available capacity as per the DoE's Philippine Development Plan.

Rate Impact (Year 2021)

BILLING COMPONENT	UNIT	BASE RATE[a]	CPI ADJ. FACTOR[h]	BILLING DETERMINANT[i]		AMOUNT (PHP)
A. Capacity Payment (MCP)						
Peso Portion	(Php/kW-yr)[b]	14,486.0000		1,200,000	(kW)	17,383,200,000.00
B. Fixed O&M Payment (MFOM)						
US Dollar Portion	(USD/kW-yr)[b]	30.3644	1.000000	1,200,000	(kW)	1,678,665,489.60
Peso Portion	(Php/kW-yr)[b]	1,594.3749	1.000000	1,200,000	(kW)	1,913,249,880.00
C. Fuel Payment (MFP)						
US Dollar Portion	(USD/kWh)[c]	0.0207		8,409,600,000	(kWh)	8,011,098,700.79
D. Variable O&M Payment (MVOM)						
Peso Portion	(Php/kWh)	-		-	(kWh)	936,829,440.00
E. Excess Energy Payment (MEEP)						
Peso Portion	(Php/kWh)	-		-	(kWh)	-
F. Interconnection Facilities Payment (MIFP)						
Capital Recovery	(Php/kW-yr)[b]	204.0530		1,200,000	(kW)	244,863,600.00
Fixed O&M	(Php/kW-yr)[b]	10.5123	1.000000	1,200,000	(kW)	12,614,760.00
G. Reimbursable Cost Payment (RCP)[d]						1,428,791,040.00
TOTAL PAYMENT	(Php)					31,609,312,910.39
Effective Rate at Plant Gate	(Php/kWh)					3.7587
WESM Line Rental Rate[e]	(Php/kWh)					3.8498
Effective Cost at WESM Price[f]	(Php/kWh)					7.0640
Increase/(Decrease) over WESM Price	(Php/kWh)					(3.2143)

[123] http://www.erc.gov.ph/Files/Render/issuance/17762 (2016-092-RC_MERALCO_A1e)

Meralco Captive Energy Demand[g]	(kWh)	34,658,621,088
Increase/(Decrease) in Generation Cost	(Php)	(27,030,635,881.69)
Increase/(Decrease) in Generation Cost	(Php/kWh)	(0.7799)

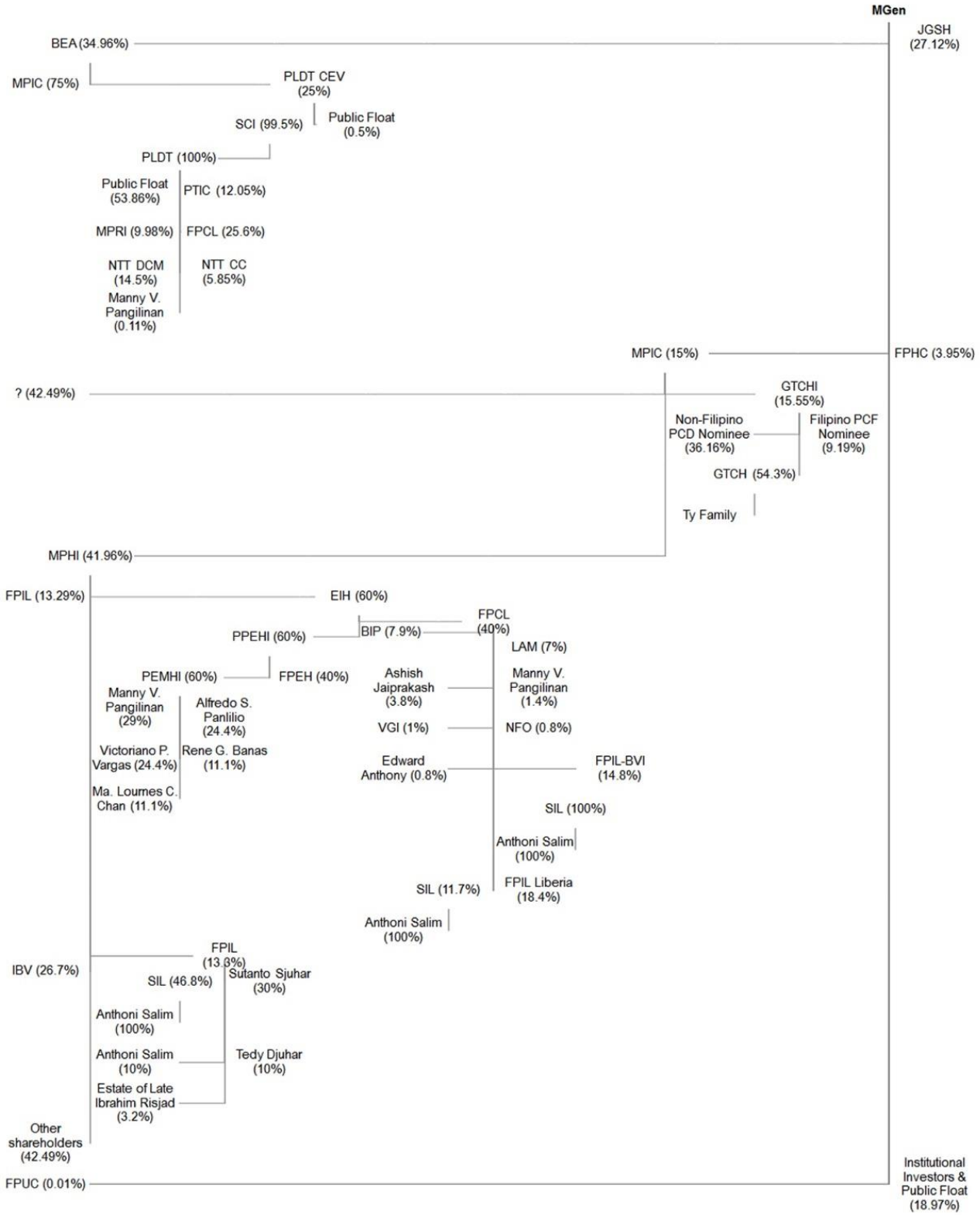
NOTE:

[a] Base Rates as set forth in Schedule 1 of Appendix E of the PSA
[b] Annual Capacity Rate, Annual Fixed O&M Rate, and Annual Interconnection Facilities Rate are converted into monthly rates by applying formulas shown in Appendix E of the PSA
[c] Fuel Payment calculated based on Guaranteed Net Plant Heat Rate at 91.25% plant load factor, Newcastle index = USD50.38/MT, Freight Price = USD5.90/MT, and Forex rate at PHP46.07/USD (current prices as of Mar 2016)
[d] Reimbursable Payments (pass through costs) based on estimated taxes
[e] Assumed estimated A1E line rental rate
[f] Cost if equivalent volume of A1E was sourced from WESM based on forecast average Jan-Dec 2021 hourly prices
[g] Meralco Captive Energy Demand based on 2021 forecast
[h] Assumed no CPI escalation
[i] Energy Payments based on 80.00% plant capacity factor

Note: All values are exclusive of Value Added Tax of 12%

Appendix 5: MGen Ownership

Below is an overview of the MGen's controlling stakeholders. MGen is a 100% subsidiary of Meralco so the ownership of MGen is the same.



Acronym	Company Name	Other Information
BEA	Beacon Electric Asset Holdings	
MPIC	Metro Pacific Investments Corporation	
PLDT CEV	PLDT Communications and Energy Ventures, Inc.	
JGSH	JG Summit Holdings, Inc.	
FPHC	First Phil. Holdings Corp	
MPHI	Metro Pacific Holdings, Inc.	
EIH	Enterprise Investment Holdings, Inc.	Philippine-based.
FPCL	First Pacific Company Limited	Incorporated in Bermuda and listed in Hong Kong.
FPIL	First Pacific International Limited	FPIL is a subsidiary of FPCL.
IBV	Intalink B.V.	Amsterdam-based. IBV is a subsidiary of FPCL.
GTCHI	GT Capital Holdings, Inc.	
GTCH	Grand Titan Capital Holdings	
FPUC	First Phil. Utilities Corp.	
FPIL-BVI	First Pacific Investments (B.V.I.) Limited	Incorporated in the British Virgin Islands.
FBIL (Liberia)	First Pacific Investments Limited (Liberia)	Incorporated in Liberia.
SIL	Salerni International Limited	Incorporated in the British Virgin Islands.
PPEHI	Pilipinas Pacific Enterprise Holdings, Inc.	
PEMHI	Pilipinas Enterprise Management Holdings Inc.	
BIP	Brandes Investment Partners, L.P.	
LAM	Lazard Asset Management, LLC	
VGI	Vanguard Group, Inc.	
NFO	Nordea Funds Oy	
SCI	Smart Communications, Inc.	SCI is a subsidiary of PLDT.
PLDT	Philippine Long Distance Telephone Company	
PTIC	Philippine Telephone Investment Corporation	
MPRI	Metro Pacific Resources, Inc.	
NTT DCM	NTT DoCoMo, Inc.	Japanese company.
NTT CC	NTT Communications Corp.	Japanese company.

Note: Anthoni Salim bought one of Rio Tinto's remaining coal mines for US$224 million[124]. The Philippines will lift the import tax on Australian coal by 2018.

[124] https://www.bloomberg.com/news/articles/2016-01-26/rio-to-sell-australian-coal-assets-to-mach-for-224-million

Appendix 6: Meralco's Generation Supply Cost Data

Generation Charge per Month

(In Philippine Pesos)	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
SEM-Calaca Power Corp. (SCPC) COAL	2.953	2.9868	2.9789	3.0072	2.5170	3.5619	3.2713	3.4516	3.7462	4.1144	3.6297	4.3805	4.5154	3.6112
Masinloc Power Partners Corp. (MPPC) COAL	3.2314	3.2264	3.2644	3.2902	3.4887	3.8290	3.8740	4.6176	5.6093	7.0135	5.2257	5.4567	4.2577	4.4747
Therma Luzon Inc. (TLI) COAL	3.7632	3.5193	3.5454	2.5673	3.6106	3.8971	3.9331	3.8412	2.2681	5.6814	5.2219	4.7737	-	4.6121
San Miguel Energy Corp. (SMEC) MIX	3.8071	3.7494	4.2967	3.7558	3.8102	4.0944	4.7015	-	5.0765	5.4120	5.3238	4.8195	4.6503	4.8525
South Premiere Power Corp. (SPPC) NATURAL GAS	3.6633	3.7596	3.5265	3.6509	3.6259	3.8071	3.8881	4.0849	2.8991	4.5099	5.1800	4.3806	4.3482	4.2664
Therma Mobile Inc. (TMO) OIL	6.6815	6.7483	5.3989	7.8678	6.3399	8.1375	9.8940	13.4956	-	-	-	-	-	-
Panay Energy Development Corp. (PEDC) COAL	-	-	-	-	-	-	-	-	-	-	5.0634	2.2499	3.6721	5.6823
Others	-	-	-	-	-	-	-	-	-	-	6.0284	7.3427	9.8300	11.2959
Quezon Power Phils Ltd. Co. (QPPL) COAL	4.3751	3.7672	4.1117	4.0147	4.2629	4.1186	3.9557	4.0466	4.4177	4.7838	-	13.0591	3.7477	3.8034
First Gas Power Corp. (FGPC) Sta. Rita NATURAL GAS	3.5481	3.4106	3.3461	3.6723	3.9507	4.2660	4.0451	4.7919	4.3963	4.6798	4.4436	5.3943	5.1210	4.4017
FGP Corporation (FGP) San Lorenzo NATURAL GAS	3.5871	3.4399	3.4556	3.4739	3.4484	3.6311	4.3558	4.0536	4.1892	4.3378	4.3228	4.3957	5.4457	4.1148
WESM	4.9533	3.9730	8.4647	3.7003	4.6635	3.1888	2.9132	2.5398	2.5665	2.3134	2.3134	5.6234	5.4538	4.2063
Others	49.2282	18.7180	8.9027	4.9821	8.1109	15.1464	32.9160	18.7948	41.0999	74.1107	-	-	-	-
Renewable Energy											4.7872	4.7707	4.9559	4.9429
Generation Charge	4.0966	3.8817	3.7207	4.0604	3.8560	3.9439	3.8938	3.8436	3.9351	3.7000	4.3212	4.8795	5.0686	4.8542

Source: Meralco, 2016

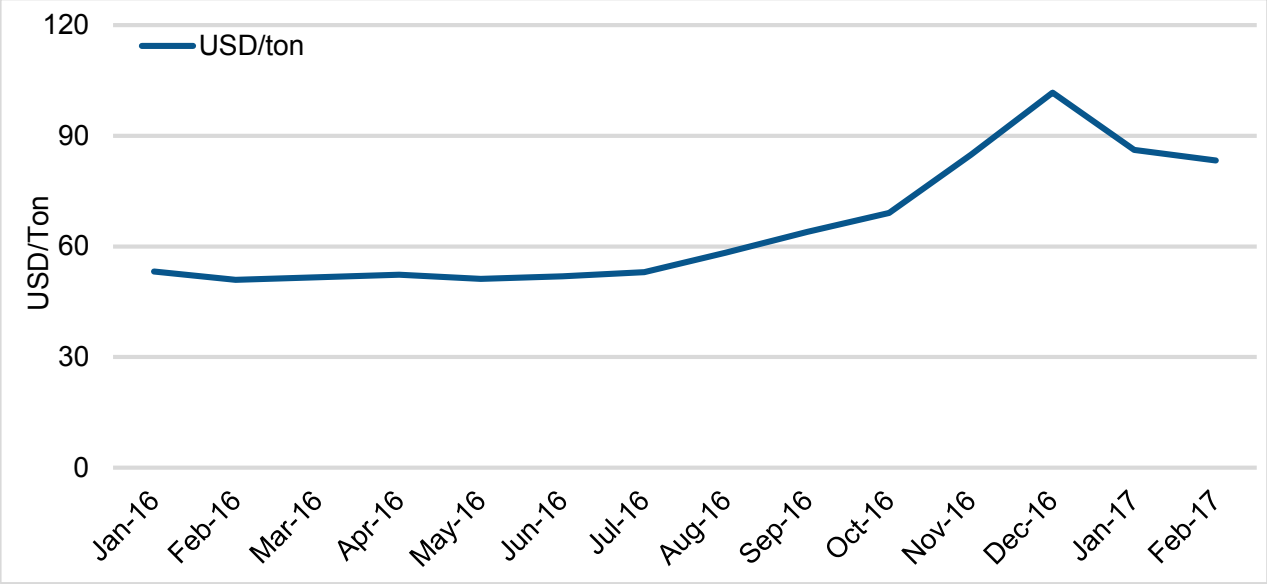
Dispatch – Load Factors/Capacity Factors in Relation to Actual Supply for the Month

	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
SEM-Calaca Power Corp. (SCPC) COAL	40.10%	100.00%	100.00%	100.00%	90.30%	100.00%	100.00%	99.50%	96.20%	67.00%	64.60%	47.60%	38.30%	91.10%
Masinloc Power Partners Corp. (MPPC) COAL	99.30%	99.90%	100.00%	99.70%	100.00%	99.80%	99.40%	88.30%	68.90%	43.20%	68.80%	79.10%	93.00%	91.70%
Therma Luzon Inc. (TLI) COAL	95.00%	47.50%	100.00%	99.20%	100.00%	100.00%	100.00%	96.60%	84.90%	71.90%	80.90%	89.00%	0.00%	80.20%
San Miguel Energy Corp. (SMEC) MIX	97.80%	99.10%	99.50%	94.90%	99.70%	99.30%	15.80%	0.00%	34.20%	76.50%	61.90%	86.70%	77.50%	82.60%
South Premiere Power Corp. (SPPC) NATURAL GAS	78.70%	78.00%	75.00%	77.10%	52.60%	66.50%	76.00%	75.10%	66.70%	1.00%	44.10%	80.10%	74.80%	77.40%
Therma Mobile Inc. (TMO) OIL	26.50%	24.80%	24.20%	20.90%	32.30%	17.70%	15.20%	8.80%	-	-	-	-	-	-
Panay Energy Development Corp. (PEDC) COAL	-	-	-	-	-	-	-	-	-	-	36.30%	80.40%	80.80%	74.90%
Others	-	-	-	-	-	-	-	-	-	-	22.80%	25.50%	16.30%	13.30%
Quezon Power Phils Ltd. Co. (QPPL) COAL	62.20%	77.50%	95.00%	83.90%	72.00%	88.40%	87.50%	88.10%	82.30%	73.20%	-	22.00%	98.00%	98.10%
First Gas Power Corp. (FGPC) Sta. Rita NATURAL GAS	86.40%	86.00%	82.70%	72.50%	59.70%	56.30%	70.40%	53.10%	63.90%	56.50%	68.70%	61.30%	65.40%	72.10%
FGP Corporation (FGP) San Lorenzo NATURAL GAS	90.30%	82.40%	82.40%	81.80%	81.70%	78.90%	58.00%	76.30%	67.00%	67.30%	76.40%	91.20%	54.00%	83.80%

Source: Meralco, 2016

Appendix 7: Coal Price Fluctuations

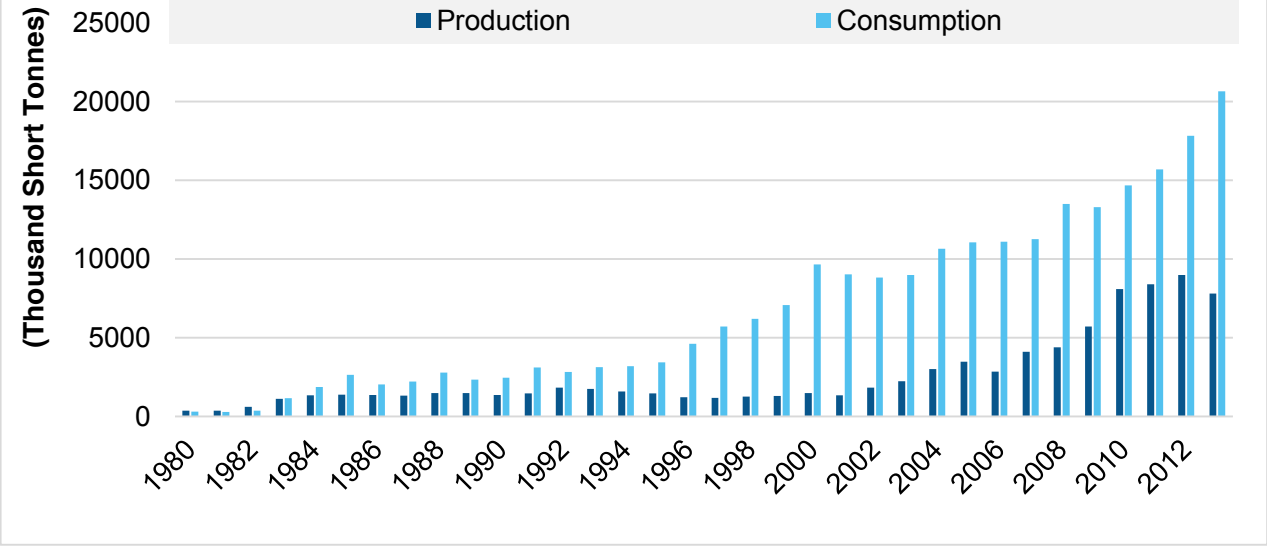
Indonesian Government's Benchmark Thermal Coal Price (HBA)



Source: Ministry of Energy and Mineral Resources (Indonesia)

According to BNEF, the Philippines' domestic coal is 15% of total coal use.

Philippines Coal Production and Consumption by Year



Source: EIA

Appendix 8: Detailed Information of the Atimonan Project Components and Support Facilities

Major Components

- 2 units x 600 MW pulverized coal (PC) boiler
- 2 units x 600 MW steam turbine
- 2 units x 600 MW generator
- Electrical systems (lighting, distributed control system, transformer and substation, emergency diesel generator)
- Fuel oil tank
- Coal handling system with enclosed conveyors
- Coal stockyard with wind fences
- Coal stacker/reclaimer
- Ash handling and disposal system
- Cooling water system
- Fire protection system
- Auxiliary Steam System (Auxiliary Boiler)

Support Facilities

- Pollution control system: Electrostatic precipitator, seawater flue gas desulfurizer, stack, continuous emission monitoring system, wastewater treatment plant
- Access road
- Buildings
    - Offices and quarters (BOQ)
    - Workshop, warehouse and motor pool
    - Administration building, car parking area and gatehouse/guardhouse
    - Temporary housing facility
    - Sampling laboratory
- Coal unloading jetty approximately 600-meter-long, single berth for 80,000 DWT Panamax Vessel
- Marine offloading facility approximately 300-meter-long, with a 35-meter-by-25-meter pad at the end of the facility for vessels with up to 4-meters draft requirement

Appendix 9: PSA Assumptions vs. IEEFA's

Atimonan's PSA Assumptions

The key agreement on which project finance is structured is the 20-year PPA contract between Atimonan One Energy and Meralco. The PPA is structured as a take-or-pay deal based on a minimum availability factor of 80% over the 20-year contract period. Meralco is not exonerated from making the monthly payments stipulated in the contract even in case of a force majeure event. Consequently, for 20 years, Atimonan would be obliged to deliver (put-or-pay), and Meralco to receive and pay, for at least the minimum guaranteed quantity of electricity every month as established in the PPA.

The components of the fee paid to Atimonan One Energy by Meralco ratepayers are as follows:

- *Capacity Fee:* USD 0.0413 per kWh, which would be gauged as a function of variations in the U.S. consumer price index from the date that the PPA was finalized.
- *Operating Fee:* One portion of this fee is stated in local currency and another in U.S. dollars. The fixed operating fee is set at USD 0.0085 per kWh; the variable operating fee per kWh has not been disclosed. These per-unit amounts can be adjusted to variations in the U.S. and Philippine consumer price indices, respectively, as measured from the date the PPA was signed.
- *Fuel Cost:* Fuel costs are automatically passed through to consumers with base at USD 0.0191 per kWh, subject to change based on the prevailing index coal price.
- *Energy payments:* These payments are a multiple of the costs incurred for procuring fuel per million British thermal units (BTUs), multiplied by the product of the net output in kWh at USD 0.0022 per kWh. As such, the cost of coal input includes fuel cost and additional energy payments.
- *Interconnection Facilities Payment:* This is to recover the cost of interconnection facilities at USD 0.0006 per kWh.
- *Reimbursable Cost Payment:* This includes the recovery of the plant's real property tax payment, fuel costs incurred by any start-up and shutdown of the plant, energy and environmental taxes, local business taxes, energy charges based on landed fuel cost, variable operation and maintenance payments, and the replacement of power before the commercial operations date due to an unexcused delay. This cost is estimated at US$0.0034 per kWh.

IEEFA's Assumptions

The Atimonan plant has a proposed capacity of 1,200 MW. Reports suggest that the plant would be commissioned by 2021. It has an estimated useful life of 40 years, extending to 60 years should the proponents decide to refurbish the plant.

IEEFA assumes that 8% of the total power generated will be auxiliary power required to run the plant. The calculation estimates a coal price fuel cost of $US60, although it is important to note that fuel costs are not fixed and will likely increase above the $60 price. We agree that Atimonan is likely to realize 80% PLF because it displaces mid-merit and old peaking plants in its early years, while displacing other inefficient coal fired power plants in its later years. China's coal-fired generation fleet averages less than 50% PLF[125] while India's averages less than 60% PLF[126] even though all their models and economic planning called for 70%-80% PLF.

[125] https://www.bloomberg.com/news/articles/2016-09-13/china-seen-investing-too-much-in-power-plants-that-burn-coal
[126] http://economictimes.indiatimes.com/industry/energy/power/thermal-power-plants-capacity-utilisation-to-drop-to-48-by-2022/articleshow/56073709.cms

CONTRACTED CAPACITY	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	12-month average
SEM-Calacy Power Corp. (SCPC) - COAL	100.00%	100.00%	90.30%	100.00%	100.00%	99.50%	96.20%	67.00%	64.60%	47.60%	38.30%	91.10%	83%
Masinloc Power Partners Corp. (MPPC) - COAL	100.00%	99.70%	100.00%	99.80%	99.40%	88.30%	68.90%	43.20%	68.80%	79.10%	93.00%	91.70%	86%
Therma Luzon Inc. (TLI) - COAL	100.00%	99.20%	100.00%	100.00%	100.00%	96.60%	84.90%	71.90%	80.90%	89.00%	0.00%	80.20%	84%
Quezon Power Phils Ltd. Co. (QPPL) - COAL	95.00%	83.90%	72.00%	88.40%	87.50%	88.10%	82.30%	73.20%	0.00%	22.00%	98.00%	98.10%	74%

*These dispatch levels are relative to capacities contracted to Meralco and thus do not reflect PLFs.

The figure below gives an overview of the comparable key power plant assumptions and outcomes.

Key Power Plant Assumptions and Outcomes

	PSA	IEEFA
Power Plant Life (Years)	20 to 40	
Power Plant Capacity (MW)	1,200	
Plant Load Factor (PLF, %)	80	80
Project Cost (US$ bn)	3.00	
Cost per MW (US$ m)	2.5	
First Full Year of Commercial Operation	2021	
Auxiliary Consumption (%)	4.76	8
Fuel Cost (US$)	50.38	60.00
Equity	25.9%	
Debt	74.1% Interest Rate: 5% Term: 15 years	
Tariff PHP per kWh at Plant Gate	3.7587	3.9492

Source: IEEFA Estimates

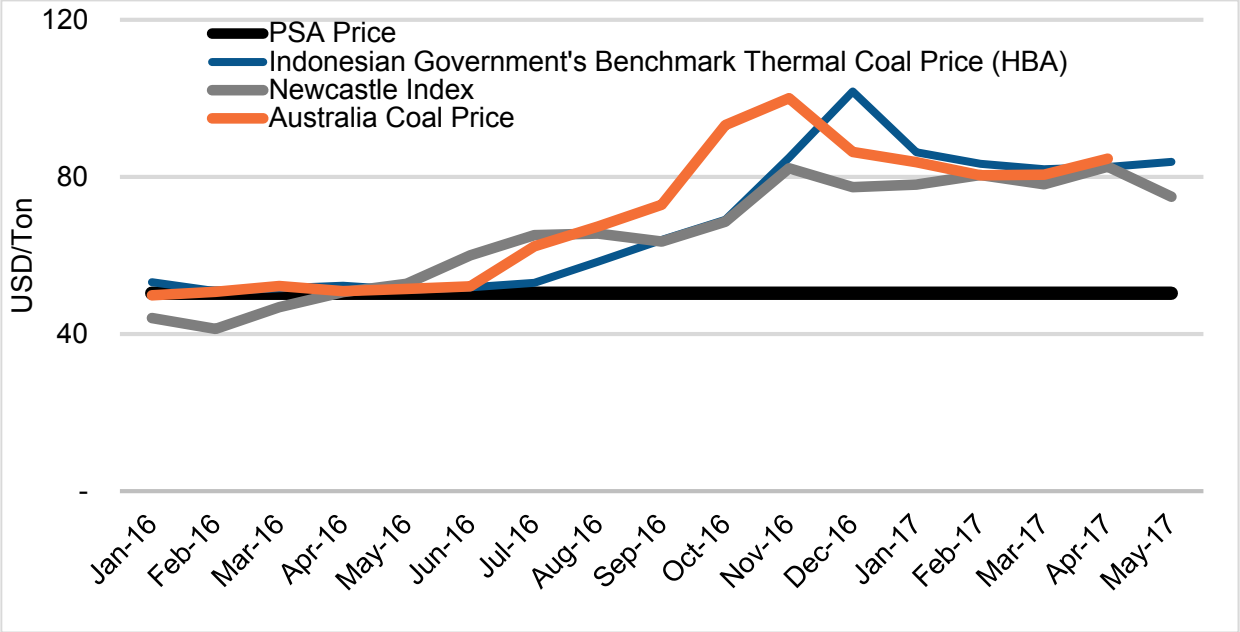
The calculation assumptions do not take into account penalties for violations from the proper implementation of the Clean Air Act and Clean Water Act.

Local bank financing typically accounts for 70% of project finance. In Atimonan's case, project finance is at 74.1%. Usual practice for local rates are for a 15-year loan with straight-line amortization at 6%. Financing structures can also be for a 15-year, bullet, sub-5% rate. This is a result of high liquidity as regards local banks in the Philippines.

Fuel cost is not factored into the financial viability model because of automatic pass-through to consumers. Coal purchase power agreements are composed of three components: fuel cost, O&M, and the capacity fee. Fuel cost and O&M are automatic pass-through to ratepayers while the capacity fee is set in the PPA. Our calculation assumes zero escalation to ensure that it is conservative from a revenue and expenses perspective. Moreover, it excludes the value-added tax of 12% and variable O&M, which is passed through to rate payers. Using the assumptions from the PSA, the calculation illustrates that the equity IRR is equivalent to 15.72%. Should the ERC decide that the equity IRR can be reduced to 14% because of a lower weighted average cost of capital, this would mean that the capacity fee on the PSA can also be reduced. It may be best for the ERC to use a capital recovery factor rather than IRR's. This can incentivize the private sector to be operationally and financially efficient.

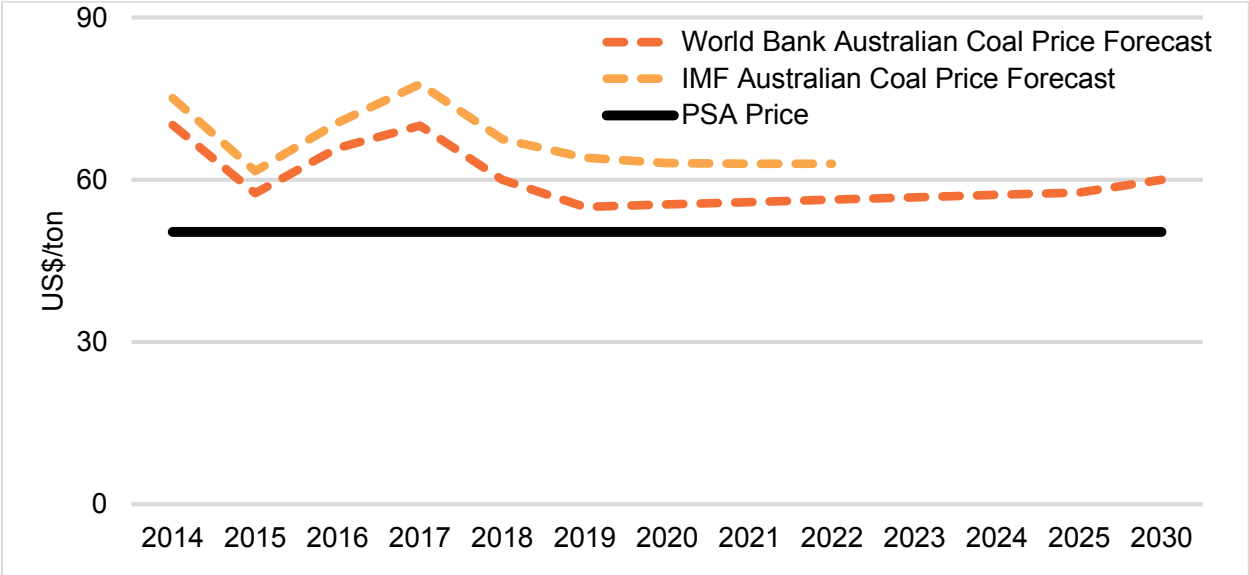
The Atimonan Power Supply Agreement (PSA) assumes coal costs of US$ 50.38 per ton, a risky assumption at best. Coal prices doubled between May 2016 and December 2016, from US$ 51.20 per ton to US$ 100.69 per ton. Below is an overview of coal benchmarks and future spot rates.

Coal Benchmarks vs. PSA Price Assumptions



Source: Ministry of Energy and Mineral Resources (Indonesia), Newcastle Index, World Bank, ERC

Spot Rate Forecasts



Source: World Bank, IFC, ERC

In aiming for capital recovery through a maximum equity internal rate of return, the ERC must ensure that it does not underestimate generation cost. By guaranteeing full price recovery for project proponents, any miscalculation would ultimately burden consumers. Using PSA assumptions, including the $US 60 per ton coal price of IEEFA, we see the tariff price increasing to Php 3.94 per kWh, a 5% increase.

Appendix 10: Environmental Issues

MGen claims to be compliant with environmental regulation. A way to ensure this is to include an Integrated Gasification Combined Cycle (IGCC), which converts coal into synthetic gas or syngas to extract more energy. However, it was reported that capturing carbon dioxide (CO_2) reduces plant efficiency and increases water usage. An Electric Power Research Institute study found CO_2 capture equipment decreased plant output by at least 25% and increases water consumption by approximately 23%.

In addition to producing considerable amount of greenhouse gas emissions and air pollutants, coal-ash leachate is known to affect groundwater quality[127]. Coal-fired power plants also use a significant amount of water to turn turbines and cool thermoelectric plants.

Environmental Impact	Issue
Carbon dioxide (CO2) emissions	Potential violation of the Clean Air Act
Black carbon	Potential violation of the Clean Air Act
Coal dust	Potential violation of the Clean Air Act
Coal sludge and ash have toxic substances such as arsenic, mercury, chromium, and cadmium.	Potential violation of the Clean Water Act
Greenhouse gas emissions	Potential violation of the Clean Air Act
Loss or degradation of groundwater	Potential violation of the Clean Water Act
Mercury	Potential violation of the Clean Water Act
Particulate matter (PM)	Includes the tiny particles of fly ash and dust that are expelled from coal-burning power plants. Studies have shown that exposure to particulate matter is related to an increase of respiratory and cardiac mortality.[128] Potential violation of the Clean Air Act

[127] https://nepis.epa.gov/Exe/ZyNET.exe/9101FPKG.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1976+Thru+1980&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C76thru80%5CTxt%5C00000030%5C9101FPKG.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL

[128] http://www.psr.org/resources/coals-assault-on-human-health.html?referrer=http://www.sourcewatch.org/index.php/Environmental_impacts_of_coal

Radioactivity	Coal contains minor amounts of the radioactive elements, uranium and thorium. When coal is burnt, the fly ash contains uranium and thorium "at up to 10 times their original levels".[129]
Sulfur dioxide	Largest human-caused source of sulfur dioxide, a pollutant gas that contributes to the production of acid rain and causes significant health problems. Coal naturally contains sulfur, and when coal is burned, the sulfur combines with oxygen to form sulfur oxides. Potential violation of the Clean Air Act
Thermal pollution – the degradation of water quality.	Potential violation of the Clean Water Act
Toxins	Potential violation of the Clean Air Act
Soot	Coal is often transported via trucks, railroads, and large cargo ships, which release air pollution such as soot. Potential violation of the Clean Air Act
Water consumption	Power generation has been estimated to be second only to agriculture in being the largest domestic user of water.
Water pollution	Potential violation of the Clean Water Act

[129] https://www.scientificamerican.com/article/coal-ash-is-more-radioactive-than-nuclear-waste/

Appendix 11: Letter from Meralco

MERALCO

ORTIGAS AVENUE, PASIG CITY
0300 PHILIPPINES

24 August 2017

Sarah Jane Ahmed
Simon Nicholas
Institute for Energy Economics
and Financial Analysis (IEEFA)

Re: Comments on the August 2017 draft of IEEFA's Paper *"Atimonan: Looming Stranded Asset Risks in the Philippines' Power Sector"*

Dear Ms. Ahmed and Mr. Nicholas:

We write in connection with IEEFA's August 2017 draft of its paper entitled *"Atimonan: Looming Stranded Asset Risks in the Philippines' Power Sector"* (the "Paper").

We consider the Paper defamatory and libelous under Article 353 to 355 of the Revised Penal Code of the Philippines. The Paper is replete with expression of opinions based on mere conjectures or false suppositions, thus, brazenly impeaching the reputation and discrediting the persons identified in it, particularly the Manila Electric Company (MERALCO). While we present our comments below and in the attached matrix, MERALCO and other identified persons in the Paper reserve the right to pursue criminal and civil remedies upon publication of this Paper.

First, MERALCO and the Atimonan One Energy, Inc. (A1E) will be exposed to public discredit and contempt by starting the report description with the following opening salvo: "The Project Was Approved Without Open Competitive Selection. The plant is proposed as part of the 'midnight' submissions by which Meralco won regulatory approval for 3,551 megawatts (MW) of 20-year power supply agreements, bypassing open competitive selection."[1] Identifying MERALCO as a participant of "midnight" submissions of power supply agreements (PSAs) to skirt open competitive selection process, without factual basis and in order to paint an imputation to the public eye that MERALCO connived with the Energy Regulatory Commission (ERC) to "win regulatory approval" of its PSAs, is clearly a defamatory imputation of malicious nature.

This defamatory imputation was further bolstered by stating in page 30 of the Paper that:

> "The competitive procurement rules issued through ERC Resolution 13, series 2015, took effect on Nov. 4, 2015. But on March 15 of that year, the commission suspended the rules through April 30, 2015, at the behest of large utilities, including Meralco,

[1] p.5 of the Paper.

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which claimed they had supply risks owing to expiring PSAs. The seven Meralco-affiliated PSAs were filed on April 29, 2016 at 5 p.m. These 'midnight' submissions cover 3,551 MW of negotiated 20-year PSAs. The capacity is a significant portion of Meralco's generation contracting and will thus have a significant impact on Meralco's generation rates, which are automatically passed through to ratepayers."

The PSAs were timely filed pursuant to Resolution No. 1, Series of 2016 issued by the ERC extending the effectivity of the requirement for competitive selection process. The false supposition or allegation that the competitive selection process (CSP) was suspended "at the behest of large utilities, including Meralco" is simply without factual basis and clearly made with the intention to discredit MERALCO and other persons identified in the Paper in order to expose it to public contempt. Nowhere in any record of the ERC or any other public hearings will identify MERALCO (and other persons identified in the Paper) as the ones who asked for the suspension of the effectivity of the CSP, yet the Paper still includes this false allegation without factual substantiation.

Note that even prior to the issuance of DOE Circular No. DC2015-06-0008; ERC Resolution No. 13, Series of 2015; and, ERC Resolution No. 1, Series of 2016, which all relate to mandatory CSP, MERALCO had already been directly negotiating for the execution of its PSA with A1E.

As early as the 3rd and 4th quarters of 2014, A1E discussed with MERALCO on the possible execution of a PSA. After presenting its proposed terms of reference to MERALCO, the negotiations that followed were extensive as they involved a series of meetings spanning several months, wherein the parties discussed the terms and conditions of the PSA.

In other words, even before the conduct of CSP became a mandatory requirement, MERALCO was already undergoing negotiations with A1E for the execution of a PSA. Thus, it is misleading to make it appear that the PSA was a mere "midnight deal" that connotes that it was hurriedly entered into in order to evade the conduct of mandatory CSP.

Contrary to the allegation in the Paper, MERALCO undergoes a thorough, fair and objective evaluation process for the execution of a PSA, as follows:

a. The process starts with receipt of Power supply proposal/s from proponent/s.

- In preparation for evaluation of such proposal/s, MERALCO's power supply-demand outlook is kept updated to have readily-available information on the magnitude and timing of needed capacity for captive customers.

- MERALCO's data files used for evaluating PSA proposals (e.g., data based on Philippine Consumer Price Index [CPI], United States of America CPI, foreign currency exchange rates, NewCastle Indices, oil and gas prices, line rental, etc.) are likewise kept updated.

b. Technical aspects of the proposal are perused to determine if it will make a feasible addition to MERALCO's power supply portfolio (e.g., whether it will meet MERALCO's baseload, mid-merit, or peaking requirements).

- If the proposal after initial evaluation is technically feasible or acceptable to MERALCO, then we proceed to initial evaluation of the offered price.

- On the other hand, if the proposal does not look technically feasible or acceptable, the proponent is informed in writing of the technical un-acceptability of its proposal and end the evaluation.

c. During the Initial evaluation of the offered price, the following activities are performed.

- Determine if the offered price is equal to or less than the rate of comparable power plant/s under MERALCO's supply portfolio, which has already secured the imprimatur of the Energy Regulatory Commission. If so, proceed to the next step.

- If the offered price is only marginally higher than the rate of comparable power plant/s under MERALCO's supply portfolio, evaluate any redeeming feature of the proposal (e.g., negative escalation over time of a rate component).
  - If there is any, proceed to the next step.
  - If there is none, inform the proponent of the non-competitiveness of its proposal and conclude the evaluation.

- If the offered price is significantly higher than the rate of comparable power plant/s under MERALCO's supply portfolio, notify the proponent of the non-competitiveness of its offer and conclude the evaluation.

d. Proposal is evaluated in greater detail (e.g., implication/s of location of the power plant; line rental valuation; possible impact of the PSA on MERALCO's blended Generation Charge over possible term of the PSA; etc.)

e. Schedule an internal (MERALCO) meeting among concerned offices to prepare for and start the contract negotiations with the proponent.

Consequently, the negotiations conducted with generation companies before a particular PSA is signed, finalized, and filed for approval with the ERC take months or years. The arduous process is necessary to ensure that the terms and conditions of the PSAs comply with what is mandated by law on MERALCO, *i.e.*, that electric power supplied satisfies all the criteria of "quality," "reliability," "security," "affordability", and most importantly, "least cost".

Through the years and until the present, MERALCO has been successful in carrying out its least cost obligation by ensuring that it has adequate bilateral supply agreements *(i.e.*, PSAs) to supply electricity in the least cost manner to its customers, and at the same time, ensuring the quality,

reliability, security, and affordability of its supply of electric power. By way of example, in Dr. John Morris' report on behalf of the Australia-based International Energy Consultants (IEC), MERALCO's average tariff[2] has declined 28% since January 2012 as compared to an average decline of 19% in the survey. MERALCO's average tariff now ranks 16th out of 44 and 11% above the average of the survey (as compared to 9th highest and 24% above the average in 2012). If subsidized markets are excluded, then MERALCO's tariff is just 4% higher than the average. IEC's report found the reduction in non-fuel generation charges as a major contributor to the lower tariffs of MERALCO, due to its program of negotiating new PSAs in 2012 at competitive rates (despite not undergoing the conduct of a mandated CSP).[3]

In view of the foregoing, if proper research was conducted, there would have been factual basis to avoid making a libelous and defamatory statement that the PSA was a mere "midnight deal," when the preceding negotiations took a considerable length of time before the parties agreed on the terms and conditions thereof. To impute the PSA as an overnight and rushed product by MERALCO and A1E is extremely unfair for the parties involved and simply made with malice or bad faith.

It is also extremely careless to conclude that: "[t]he capacity is a significant portion of Meralco's generation contracting and will thus have a significant impact on Meralco's generation rates, which are automatically passed through to ratepayers."[4] If there has been careful study of how the ERC approves (or disapproves) PSAs, it will be noted that the ERC evaluates PSAs using cost-based analysis and benchmarking, and any pass-through rates of MERALCO will only be implemented after ERC approval of the PSAs.

Second, the Paper will similarly expose MERALCO and other persons identified in the PSA to public discredit and contempt by blindly pitting baseload coal power plants against renewable energy (RE) plants and claiming that:

> "The utility in question here, Meralco, has not examined alternatives that could well provide firm capacity to address its forecast load requirements with more renewable energy. Renewable energy generation is already cost-competitive for a rising slice of the overall load. Within the right regulatory framework, its costs can and do continue to fall. Meralco does welcome unsolicited offers from variable renewable energy suppliers, as will be discussed later, but renewable energy possibilities in the Philippines remain largely neglected."[5]
>
> xxx xxx xxx
>
> "During the public consultation conducted as part of the process for review of the Environmental Compliance Certificate (ECC) of the Atimonan coal-fired power plant, the viability of solar, wind, or other renewable energy was not considered.

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[2] For all customers, and exclusive of VAT.
[3] Regional/Global Comparison of Retail Electricity Tariffs - Executive Summary; May 2016, INTERNATIONAL ENERGY CONSULTANTS
[4] p.30, Paper.
[5] p.6, Paper.

> The response to this omission by the Department of Energy: "We need a stable source of energy. The renewables are only intermittent sources of energy." Atimonan's developers argued that "the cost of solar energy is double the price of coal."
>
> Neither assertion is correct.
>
> Significant variable renewable energy capacity will reduce the need for 24/7 baseload power, a reality that makes the large total capacity sought in the seven "midnight" submissions imprudent and short-sighted."[6]

RE plants in the Philippines, as of present time (or even at the time the PSAs were executed in 2016), are not in parity with the prices of coal-fired plants for basic reasons. RE plants such as wind and solar are variable and intermittent sources of energy, thus simply not yet comparable to the stability and reliability of baseload coal-fired power plants. Contrary to allegations in the Paper, MERALCO examined and continues to examine its load requirements and profile when contracting for additional capacity, ultimately mindful of its least-cost mandate under Republic Act No. 9136 (or the "Electric Power Industry Reform Act of 2001" or "EPIRA") and its franchise.

Note that not all RE generation is cost-competitive. If at all, at present, only solar power plants are cost-competitive with coal-fired plants, but only if the attendant costs of ancillary services to address the obvious variability or intermittency of solar plants is not considered. Also, assuming for the sake of argument that solar power plants are cost-competitive with coal-fired plants, with the solar power plant's variability, it can only provide stable and reliable supply if it has battery storage. But what is the cost of battery storage today in the Philippines? And if the solar power plant has battery storage, what will its price be compared to coal-fired plants? Without going into great detail in discussing the additional capacity cost and charging cost for the batteries, it will obviously be no longer cost-competitive. Again, the least-cost mandate of the DU under the EPIRA will have to prevail and these solar plants with battery storage cannot compete cost-wise. Given MERALCO's load profile, prudence dictates that MERALCO should not gamble and risk outages brought about by intermittency of solar plants for its baseload requirements.

Verily, in the 2016-2030 Philippine Energy Plan update presented by the Department of Energy (DOE) on 5 October 2016 to the House Committee on Energy, the DOE projects Luzon demand to grow annually at a rate of 4.9% from 2017 to 2030 under a high Gross Domestic Product (GDP) growth scenario that is in line with the objectives of the 2017-2022 Philippine Development Plan. For electricity supply to support increasing demand for electricity, the DOE estimates that Luzon will need additional capacity of about 7,320 MW, on top of the capacity from committed and indicative power projects. If the A1E Plant, together with other coal-fired plants identified by DOE as committed and indicative power projects, are prevented or delayed in achieving commercial operations, then the government may fall short of achieving its medium-term

[6] pp.30-31, Paper

economic goals due to recurring power interruptions. In a policy brief[7] published on 30 January 2017 by the Office of Senator Sherwin T. Gatchalian, it was estimated that a one-hour outage that affects Luzon, which accounts for around 72% of the country's GDP, would cost the Services and Industry Sectors at least PhP 1.66 Billion.

Alternatively, said policy brief shows that should MERALCO rely on intermittent solar plants for its power requirements, a failure by such solar plants to produce energy for a single hour would translate to economic cost of at least PhP1.66 Billion. Evidently then, it is simply not prudent for a public utility like MERALCO to do so, especially since the intermittency of such RE-source dictates that any agreement to purchase supply therefrom would also be accompanied by additional costs of ancillary services. Also, it should be considered that even RE facilities need connection to transmission and/or distribution wires for delivery of energy to the power grid/network. Intermittency of RE sources would mean such wires will not be fully/optimally utilized, but the cost of putting up, operating, and maintaining such wires would still have to be borne by the RE developer or customers. Such cost should also be considered when evaluating the cost of purchasing power from intermittent RE sources. These are some reasons why MERALCO is circumspect in contracting with solar power plants, cannot rely heavily on such plants to meet its power requirements, and has since contracted with such plants only to address its peaking requirements.

In terms of location, the Paper claims that A1E plant location is susceptible to flooding or storm surges. To address flooding and tsunami risks, A1E is working on the basis that site elevation shall not be lower than 10 meters above mean sea level, which is more stringent than requirements mentioned in the Paper. Moreover, the Paper's 2 to 5 meter requirement for elevation implies that other plants are also susceptible to forces of nature. The bias manifests repeatedly in the Paper and clearly prevents the authors to claim comments were made in good faith on a public matter.

Also, the Paper falsely claims without supporting facts that "Meralco can and should assess their firm capacity needs and the other slices of the load curve requirements. With wind being able to cover baseload requirements during the daytime and nighttime, pumped storage to cover mid-merit to peaking, and solar power reducing noon-time peak, Meralco would do well to entertain competitive bids from renewable energy developers for all segments of its load curve."[8] We would like to seek clarification on the basis for saying that wind will cover baseload during the daytime and nighttime, as well as pumped storage to cover mid-merit to peaking; solar to cover noon time peak.

More importantly, we would like to seek clarification on the price that is competitive to prices of coal-fired plants contracted in 2016. If the authors have information on this, kindly reveal this to the public or all interested parties as MERALCO is surely interested in these cost-competitive prices that you allege are available options at present. Otherwise, the statements provided in the

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[7] Office of Senator Sherwin Gatchalian. "Policy Brief on Energy: The Cost of Power Outages in the Philippines." 9 August 2016 Volume 1 Issue 1. http://wingatchalian.com/wp-content/uploads/2017/01/Policy-Brief_Cost-of-Power-Outages.pdf. 30 January 2017.

[8] p. 31, Paper.

Paper are misleading and mere conjectures made in bad faith, in order to mislead and deceive the public, to the detriment of the identified persons in the Paper by exposing them to public discredit and contempt.

Finally, it is simply deceit in bad faith and malicious defamation to associate the pricing structure of the MERALCO and A1E PSA with identified rate risks in the Paper, to wit:

> "This structure creates two main rate risks:
>
> • The capital cost is amortized at a fixed rate, over the cooperation period, regardless of whether the assumed capacity utilization or plant load factor is realized. This results in a guaranteed weighted average cost of capital. The utilization factor can fall because of lower distribution utility demand, resulting from either retail competition, a generalized economic downturn, and/or the absorption by the grid of more variable renewable energy. In any of those cases, average rates to ratepayer increase. Prudent reform would hold utilities accountable for their own forecasting errors. (Capacity costs owing to U.S. dollar inflation and exchange-rate volatility are also passed on to ratepayers without incentives for utilities to insist on more prudent contracting.)
>
> • Fuel price increase and volatility risks naturally arise from the fact that thermal fuels are traded in world markets, where prices depend in part on exchange-rate swings. In its standard contracts, the Philippine ERC vets only initial fuel costs, a policy mitigated by the spot market. When variable costs are sufficiently higher and a thermal plant is not dispatched, no fuel is burned and the independent power producer (IPP) takes advantage of cheaper power from the spot market via the Wholesale Electricity Spot Market (WESM). The allocation of "savings" in such cases—whether they go to ratepayers or someone else—depends on the fine print in the contracts."[9]

If the authors truly read and understood the terms and conditions of the MERALCO-A1E PSA, including its tariff structure, the authors would have easily determined that these allegations on capacity costs owning to the foreign exchange volatility and gaming of the market by IPPs are adequately addressed in that PSA. Also, it should be noted that efficiency caps on fuel are mandated by the ERC when approving a PSA.

This simply goes to show that false accusations and expression of opinions based on mere conjectures or false suppositions are malicious, in bad faith and with obvious intent to discredit to the public the MERALCO-A1E PSA, such that the said PSA will be disallowed by the ERC, causing irreparable damage to not only the persons identified in the paper but also the electricity consuming public as well. The biased discussion and baseless allegations of the authors are clearly unnecessary and inapplicable to the MERALCO-A1E PSA, as the capacity cost is purely Philippine Peso denominated and it is required that energy delivered be sourced from the A1E plant (unless otherwise unavailable due to outages, etc.), precisely to prevent the Generation Company (GenCo) from gaming in the WESM, as you carelessly impute against GenCos.

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[9] pp. 12-13, Paper.

In view of the foregoing, we strongly recommend that the authors correct and properly substantiate the Paper by fairly and truthfully presenting accurate, relevant and material facts to the subject matter of the paper, as well as presenting comments and opinions without bias, bad faith or malicious intent. Otherwise, MERALCO shall be constrained to institute the necessary criminal and civil actions against the authors to protect our legal rights under the applicable laws. In such an event, we shall also hold the authors liable for damages, attorney's fees and for the costs of litigation.

Very truly yours,

ATTY. JOSE RONALD V. VALLES
Head, Regulatory Affairs Office

Appendix 12: List of Existing Coal Plants in the Philippines and Average Annual Load Factors

Facility Name	Type	Region	Installed	Dependable	Location	Operator	IPP Administrator	Year	Age	Remaining Life Without Refurbishment	Remaining Life With Refurbishment
MINDANAO COAL U1	PCS	M	116.0	105.0	PHIVIDEC, Villanueva, Misamis Oriental	STEAG State Power Inc.	PSALM Corporation	2006	11	28	48
MINDANAO COAL U2	PCS	M	116.0	105.0	PHIVIDEC, Villanueva, Misamis Oriental	STEAG State Power Inc.	PSALM Corporation	2006	11	28	48
THERMA SOUTH U1	CFB	M	150.0	130.0	Davao City/ Sta. Cruz, Davao Del Sur	Therma South Inc (TSI)	Therma South Inc (TSI)	2015	2	37	57
THERMA SOUTH U2	CFB	M	150.0	130.0	Davao City/ Sta. Cruz, Davao Del Sur	Therma South Inc (TSI)	Therma South Inc (TSI)	2016	1	38	58
FDC MISAMIC U1	CFB	M	135.0	120.0	PHIVIDEC, Villanueva, Misamis Oriental	FDC Utilities, Inc.	FDC Utilities, Inc.	2016	1	38	58
FDC MISAMIC U2	CFB	M	135.0	120.0	PHIVIDEC, Villanueva, Misamis Oriental	FDC Utilities, Inc.	FDC Utilities, Inc.	2017	0	39	59
SMC MALITA U1	CFB	M	150.0	135.0	Brgy. Culaman, Malita, Davao Occidental	San Miguel Consolidated Power	San Miguel Consolidated Power	2016	1	38	58
SEC U1	PCS	M	118.0	105.0	Brgy. Kamanga, Maasim, Sarangani	Sarangani Energy Corporation	Sarangani Energy Corporation	2016	1	38	58
										39	59
PAGBILAO U1	PCS	L	382.0	382.0	Pagbilao, Quezon	TeaM Pagbilao Corporation	Thermal Luzon Inc. (TLI)	1996	21	18	38
PAGBILAO U2	PCS	L	382.0	382.0	Pagbilao, Quezon	TeaM Pagbilao Corporation	Thermal Luzon Inc. (TLI)	1997	20	19	39
CALACA U1	PCS	L	300.0	240.0	Calaca, Batangas	SEM Calaca Power Corp.	SEM Calaca Power Corp.	1984	33	6	26
CALACA U2	PCS	L	300.0	240.0	Calaca, Batangas	SEM Calaca Power Corp.	SEM Calaca Power Corp.	1985	32	7	27
MASINLOC U1	PCS	L	315.0	315.0	Masinloc, Zambales	Masinloc-Power Partners Ltd.	Masinloc-Power Partners Ltd.	1990	27	12	32
MASINLOC U2	PCS	L	315.0	315.0	Masinloc, Zambales	Masinloc-Power Partners Ltd.	Masinloc-Power Partners Ltd.	1999	18	21	41
SUAL U1	PCS	L	647.0	647.0	Sual, Pangasinan	TeaM Sual Corporation	San Miguel Energy Corp. (SMEC)	1999	18	21	41
SUAL U2	PCS	L	647.0	647.0	Sual, Pangasinan	TeaM Sual Corporation	San Miguel Energy Corp. (SMEC)	1999	18	21	41
QUEZON POWER	PCS	L	511.0	460.0	Mauban, Quezon	Quezon Power Phils. Ltd (QPPL)	Quezon Power Phils. Ltd (QPPL)	2000	17	22	42
APEC	PCS	L	50.0	42.0	Mabalacat, Pampanga	Asia Pacific Energy Corp.	Asia Pacific Energy Corp.	2006	11	28	48
MARIVELES U1	PCS	L	325.8	302.0	Mariveles, Bataan	GN Power Mariveles Coal Plant Ltd.Co	GN Power Mariveles Coal Plant Ltd.Co	2013	4	35	55
MARIVELES U2	PCS	L	325.8	302.0	Mariveles, Bataan	GN Power Mariveles Coal Plant Ltd.Co	GN Power Mariveles Coal Plant Ltd.Co	2013	4	35	55
PETRON RSFFB	PCS	L	70.0	50.0	Limay, Bataan	Petron Corp	Petron Corp	2013	4	35	55
PETRON RSFFB	PCS	L	70.0	50.0	Limay, Bataan	Petron Corp	Petron Corp	2014	3	36	56
SLTEC PUTING BATO U1	CFB	L	135.0	122.0	Calaca, Batangas	South Luzon Thermal Energy	South Luzon Thermal Energy Corporation	2015	2	37	57
SLTEC PUTING BATO U2	CFB	L	135.0	122.0	Calaca, Batangas	South Luzon Thermal Energy	South Luzon Thermal Energy Corporation	2016	1	38	58

SLPGC U1	CFB	L	150.0	140.0	Calaca, Batangas	Southwest Luzon Power Generation	Southwest Luzon Power Generation	2016	1	38	58
SLPGC U2	CFB	L	150.0	140.0	Calaca, Batangas	Southwest Luzon Power Generation	Southwest Luzon Power Generation	2016	1	38	58
ANDA	CFB	L	83.7	72.0	Brgy. Bundagul, Mabalacat, Pampanga	Anda Power Corporation	Anda Power Corporation	2016	1	38	58
CEDC Coal U1	CFB	V	82.0	82.0	Toledo City, Cebu	GBPC - Cebu Energy Development	GBPC - Cebu Energy Development	2010	7	32	52
CEDC Coal U2	CFB	V	82.0	82.0	Toledo City, Cebu	GBPC - Cebu Energy Development	GBPC - Cebu Energy Development	2010	7	32	52
CEDC Coal U3	CFB	V	82.0	82.0	Toledo City, Cebu	GBPC - Cebu Energy Development	GBPC - Cebu Energy Development	2011	6	33	53
KEPCO Coal U1	CFB	V	103.0	103.0	Naga, Cebu	KepCo-Salcon	KepCo-Salcon	2010	7	32	52
KEPCO Coal U2	CFB	V	103.0	103.0	Naga, Cebu	KepCo-Salcon	KepCo-Salcon	2011	6	33	53
PCPC	CFB	V	135.0	135.0	Concepcion, Iloilo	Palm Concepcion Power Corporation	Palm Concepcion Power Corporation	2016	1	38	58
PEDC Coal U1	CFB	V	83.7	83.7	Iloilo City, Iloilo	GBPC - Panay Energy Development	GBPC - Panay Energy Development	2010	7	32	52
PEDC Coal U2	CFB	V	83.7	83.7	Iloilo City, Iloilo	GBPC - Panay Energy Development	GBPC - Panay Energy Development	2011	6	33	53
PEDC Coal U3	CFB	V	150.0	150.0	Iloilo City, Iloilo	Global Business Power Corp. (GBPC)	Global Business Power Corp. (GBPC)	2016	1	38	58
TPC TG4 (Sangi Station)	PCS	V	26.3	22.0	Toledo City, Cebu	- TPC	- TPC	1993	24	15	35
TPC TG5 (Sangi Station)	PCS	V	40.0	40.0	Toledo City, Cebu	- TPC	- TPC	1993	24	15	35
TPC 1A Expansion	CFB	V	83.7	83.7	Toledo City, Cebu	- TPC	- TPC	2015	2	37	57
TOTAL			7418.7	6970.1							

LUZON				
Year	**Power Generation (In MWh)**	**Installed capacity (in MW)**	**80% PLF (Standard)**	**Actual PLF**
2003	14,351,121	3,769	26,413,152	43%
2004	15,548,335	3,769	26,413,152	47%
2005	14,653,275	3,769	26,413,152	44%
2006	14,099,158	3,769	26,413,152	43%
2007	14,417,796	3,783	26,511,264	44%
2008	13,503,727	3,783	26,511,264	41%
2009	14,091,376	3,849	26,973,792	42%
2010	20,046,584	3,849	26,973,792	59%
2011	19,681,127	3,879	27,184,032	58%
2012	21,877,501	4,531	31,753,248	55%
2013	25,755,945	4,531	31,753,248	65%
2014	27,346,492	4,671	32,734,368	67%
2015	29,679,511	4,812	33,722,496	70%
2016	33,143,458	5,294	37,100,352	71%

VISAYAS				
Year	**Power Generation (In MWh)**	**Installed capacity (in MW)**	**80% PLF (Standard)**	**Actual PLF**
2003	587,626	189	1,324,512	35%
2004	646,077	198	1,387,584	37%
2005	603,903	198	1,387,584	35%
2006	718,663	198	1,387,584	41%
2007	848,428	198	1,387,584	49%
2008	745,686	198	1,387,584	43%
2009	822,007	196	1,373,568	48%
2010	1,528,682	786	5,508,288	22%
2011	4,032,202	806	5,648,448	57%
2012	4,701,053	806	5,648,448	67%
2013	4,689,683	806	5,648,448	66%
2014	4,449,483	806	5,648,448	63%
2015	4,968,437	769	5,389,152	74%
2016	5,270,242	1,054	7,386,432	57%

MINDANAO				
Year	**Power Generation (In MWh)**	**Installed capacity (in MW)**	**80% PLF (Standard)**	**Actual PLF**
2006	476,245	210	1,471,680	26%
2007	1,570,872	232	1,625,856	77%
2008	1,499,380	232	1,625,856	74%
2009	1,562,753	232	1,625,856	77%
2010	1,725,839	232	1,625,856	85%
2011	1,628,848	232	1,625,856	80%
2012	1,686,314	232	1,625,856	83%
2013	1,635,380	232	1,625,856	80%
2014	1,257,542	232	1,625,856	62%
2015	2,037,738	382	2,677,056	61%
2016	4,889,542	1,070	7,498,560	52%

Souce: DOE, 2016 Power Statistics

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