Comments on Filipino 2040
Energy: Power Security and Competitiveness

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1. Framing the research question-The general question, based on my understanding and on the title of the study itself, is how the energy sector can contribute to attaining the vision of 2040 of raising per capita income to $6,873 (constant 2000 prices) to move the country to upper middle-income status by 2040. The authors operationalize this by conducting a study on how to lower the price of electricity by reducing generation charges, which make up 47 percent of the total electricity bill of households, via changing the generating fuel mix.

   In the abstract of the paper, this general versus specific hierarchy is reversed. The narrower study task is given prominence and forms the basis of the numerical exercises in the paper over the general question. ("This paper *also* provides an assessment of the power sector's performance and suggests broad key reforms and alternative pathways needed for the sector to contribute to the overall vision of a strong-growth economy and improved well-being of Filipinos by 2040", emphasis mine).

   It struck me that the way in which the research question was eventually operationalized in this study, finding ways to lower generation costs by changing the fuel mix, and showing the outcomes in the numerical exercises, is a very complex and technical problem which economists, the team members, do not have a natural comparative advantage in. Engineers and industry players know better than we economists do and I would expect that engineers, for example, can produce all the numerical results produced in this paper without knowing any economics. So what is the value-added of having economists do a study on energy: Power Security and Competitiveness?

   One contribution is to help craft the appropriate regulatory environment to set the right incentive structure facing market participants who act in their self-interest in the different markets in the sector, and seeing the resulting price and output outcomes. I think here we economists have something to contribute to the knowledge that engineers and industry players and experts have in this sector. The authors cite RA 9136, or the EPIRA of 2001, in the Intro. I was struck by what Joy Abrenica said in her 2014 study, that EPIRA "marked the departure from a centrally-managed highly regulated structure to a decentralized market-oriented system, the expected reduction in electricity prices and the investments boost in the sector have not taken place." As an economist, I would have taken my cue from this and tried to find out why this reform act and the resulting regulatory structure have not resulted in lower electricity prices. An economist would have a comparative advantage in this rather than in a purely or mostly technical study.

   Another contribution, as Viking points out, may be to estimate the costs of externalities in power generation and other activities in the sector and charge the appropriate taxes and ensure that prices reflect true social marginal costs.

2. In the previous version of the paper which I was reading until Wednesday, a lower electricity price was stated as being an indicator of well-being, an improvement in well-being being what the authors understand 2040 Ambisyon's aim is. (Not much mention of Ambisyon 2040 in the current version). The intent and understanding of the authors is to link well-being with lower electricity prices achieved via greater efficiency.

   But having a lower price of electricity is not necessarily an indicator of well-being; neither is a high per capita GDP. Yet, remnants of this previous pronouncement remain in the paper. On

p. 3, “Reducing blended charges will improve well-being of Filipinos.” This was slightly weakened on p.37, “Meeting the required installed capacity is a necessary but not sufficient condition for the improvement of the well-being of Filipinos, which is the main objective of this study.” On p. 41 and 49, “To reiterate, our overriding objective is to improve the well-being of Filipinos by lowering the price of electricity in an economically-efficient manner.” Efficiency is not the same as well-being. Furthermore, if the economy grows, one would expect both the demand for electricity and its price to increase.

3. In economics, we know that there are many variables that may affect something we want to explain, e.g., quantity demanded of a good is a function of the price of the good, income, the prices of other goods, tastes, size of the population. We abstract from this complexity and focus on the factor that we think is most important and/or most interesting. On p. 2, Fabella’s 2016 study is cited and states that “Several factors explain the Philippines’ high power costs; these include fuel mix, taxes and subsidies, low reserves and low generation capacity per capita, average size of generation plants, overall efficiency, volatility , and absence of competition in Power Supply Agreement (PSA) contracting.” So my question is: Is the fuel mix the most important factor that affects generation costs?

   I ask because Abrenica (2014) states, “Part of the explanation why electricity rates are obstinately high is the paucity of investments despite growing demand and liberalization of entry into the generation business. As prices rise due to tightening of supply, investments in new generation capacity should have been forthcoming if the policy environment is in shape. But extensive licensing requirements and bureaucratic red tape are dampening the appetite of investors. Thus from 2001 to 2013, only 652 MW was added to installed capacity in Luzon.”

   I ask because the current version of this paper under I. Baseline Assessment of Power Sector Performance on p. 4 now discusses the importance of investment and the fact that investment targets are not being met. “On the other hand, the private investment rate will not rise to desired levels unless the known hurdles to investment are cleared: the almost unbearably lengthy, costly licensing procedures, the highly uncertain and sometimes inconsistent nature of regulation, the high cost of doing business; and the closing off of many areas (agriculture and mining) to large-scale investment projects.” On p. 17, “For the energy sector, the power subsector in particular, long-term visioning is of prime importance as investments in most new facilities for generation and transmission are lumpy in nature. It takes several years to put up a base load power plant, especially when environmental and social impact studies are required. Thus, it is *critical* to plan ahead and coordinate the power requirement and the corresponding generation and transmission that will support the vision of strong growth.” One of the epdp consultants, Professor Del Mundo, states in his slide presentation, “Key to significantly reducing the price of electricity in the Philippines is to prioritize security of supply through: a) long-term power supply contracting for new generation capacity which avoids the high-priced privatized legacy power plants and IPP contracts of NPC and allows GENCOs to seek least cost. Existing power plants must be given only short-term contracts (1 to 5 years) while long-term contracts (10-25 years) must be reserved only to new power generation capacity; and b) competitive power supply procurement process.

   My next question is why this lack of investments in power generation cited by Abrenica in 2014, del Mundo, and the current version of the study under no. 1 Baseline Assessment did not seemingly figure into the research question and methodology of the study, and why the study focused on lowering generation costs via the search for an optimal fuel mix.

   Abrenica’s 2014 paper on p. 9 further states, "To produce electricity at the least cost, the system should have the right mix of base load, mid-merit, and peaking plants to accommodate peaks and troughs in demand. So this plant mix is different from fuel mix. On p. 28 of the

current paper, “The next step is to compute the percent share of installed capacity for each load for the three grids. For simplicity, we lumped together midmerit, peaking, and ancillary loads as one.” Does this make sense to do in view of Abrenica’s point?

4. The methodology used in the study is problematic because there is a simultaneity problem. There are many endogenous variables but the study was divided into different studies rather than having variables estimated simultaneously. Output growth rates were first derived based on the requirement to have per capita income of $6873 by 2040.

   Next, these required annual growth rates in output, as well as the price of electricity, were used as explanatory variables in a study which estimated energy consumption demand all the way to 2040. The projected trend in electricity prices and temperature in the equation used to estimate electricity consumption demand is based on a logarithmic trend of historical prices. Changing the modeling of the historical trend could well change the price trend and resulting consumption demand forecasts as it might be sensitive to the time trend used. Of course, if the estimates of consumption demand forecasts change, then all the projections in the numerical exercises will also change.

   The point is that output growth and the price of electricity are exogenous in the modelling of energy consumption demand, but we know that the price of electricity and energy consumption affect output growth.

   The estimated consumption demand for electricity is then used in the numerical exercises to get the necessary supply of power generated or produced under different assumptions on fuel mixes which then gives us the generation costs. The aim is to lower generation costs so that electricity prices decline. But electricity price affects the consumption demand for electricity. In the numerical exercises, output growth is exogenous so it is unclear how generation costs and electricity prices affect output growth. I have sketched out a simple model of the energy sector that can be embedded in a more general macro to show how this simultaneity problem can be dealt with and which accounts for the relationship between electricity price or energy costs and output growth. (See model at the last page)

5. Output growth is exogenous in this study. It only enters the equation for estimating consumption demand. But there is a difference in the reasoning about what leads to economic growth along the 2040 path. In the earlier version of the paper, on p. 4, “This high growth trajectory will be achieved through the demographic dividend. A demographic dividend is an improvement in economic productivity due to increased number of people in the workforce relative to the number of dependents.” Further, “Reducing fertility rate is *the critical element* for the demographic transition.” In the current version, however, on p. 14, “*Accompanying* this high economic growth is the well-known demographic dividend.” No longer a causal relationship. Again, “Reducing the fertility rate is the critical element for the demographic transition.” (Emphasizing mine) I think there is a desire here to impute a role to factors like lower electricity prices in attaining the 2040 GDP per capita goal. There is reference to Daway and Fabella’s paper on development progeria but that paper, I believe, attributed development progeria to a Dutch disease effect (currency overvaluation) and the role of institutions, not to power costs and their deleterious effects on the growth of the manufacturing sector. There seems to be only anecdotal evidence of the latter. And nothing more is made of this asserted link from power costs to growth in the methodology in the paper.

6. “The Key Reforms and Alternative Pathways Needed for the Sector to Contribute to the Overall Vision” policy recommendations section have recommendations that economists can

legitimately make but which are not naturally derived from the numerical exercises and the narrow goals of the paper.

What do competitive outcomes look like in the electricity market? Abrenica (2014) says, "Price greater than industry marginal cost is a sign of lack of market competition but not in electricity as this serves to compensate the capacity of plants that are seldom used. Without this compensation, there is no incentive to build peaking plants which are necessary to maintain an optimal mix of generation and hence produce electricity at least cost." So the electricity market appears to be a really difficult market to analyze even from an economic perspective.

Abrenica further continues, "A number of factors are critical for effective competition in the electricity market including the adequacy of reserve margins and number of competing generators. Distributors should manage their portfolios well. Customers should counter the market power of generators through demand responses. There should be effective monitoring and surveillance."

7. Abrenica's (2014) policy note should be cited in the References. In general, the paper should have a proper review of the literature on the price of electricity in the Philippines. If one googles the words "Philippine electricity price competition", one sees that there are papers that have been done by others including Adora Navarro for PIDS, Lingling Patalinghug, even someone from NCPAG.

8. I would also suggest that certain statements not germane to the paper and which have political undertones be deleted. For example, on p. 4, "On the one hand, the government will be hard-pressed to try to reach this level of government capital outlay unless it addresses the causes of the spending gridlock and miserable absorptive capacity. This problem cannot be addressed by simply creating facile corruption-prone programs of entitlements, e.g, PDAF." The problems alluded to pre-date PDAF. One cannot impute a causal relationship here. Other factors, including cumbersome government procurement laws, lack of expertise in the preparation of technical proposals etc., which have been cited elsewhere, might also be mentioned.

Reference:

Abrenica, Joy (2014). "Designing a Competitive Electricity Market." Policy Note PN2014-2, UP School of Economics.

Sectoral production/supply functions (coal, geothermal, hydro, RE, etc)

$$q_i = q_i(technology, input\ prices, P_s, GDP) \quad ; \quad i = 1, \dots, n$$

Sectoral demand:

$$p_i = p_i(q_i, p_{-i}) \quad ; \quad i = 1, \dots, n$$

Aggregate energy production

$$Q_s = Q_s(q_1, \dots, q_n; \alpha_1, \dots, \alpha_n)$$

Example: Armington aggregation function

$$Q_s = \left(\alpha_1 q_1^{\rho} + \cdots + \alpha_n q_n^{\rho}\right)^{1/\rho}$$

Price index for energy (from Armington above):

$$P_s = P_s(p_1, \dots, p_n)$$

Supply of electricity:

$$p_e = p_e(P_s, Q_s, exogenous\ vars)$$

Demand for electricity:

$$q_e = q_e(p_e, GDP, exogenous\ vars)$$

Equilibrium GDP (part of main macro model):

$$GDP = GDP(Pdeflator, P_s, Potential\ Output, P^e, r, fxr, G, T)$$