Politico-Economic Determinants of Electric Cooperatives' Performance

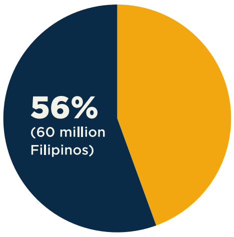
Do political variables affect the quality of service?

By: Professor Laarni Escresa and Adrian Glova

What are Electric Cooperatives (ECs)?

In rural areas, electric cooperatives (ECs) are tasked to distribute electricity to households and consumers.

Performance of ECs can be measured in many ways. Here are some of them:



ECs provide electricity to about 60 million Filipinos, or almost 56% of our population.

System Loss

Refers to the difference between energy input and energy output, indicative of distribution efficiency. More efficient ECs incur lower system losses in distributing electricity to consumers.

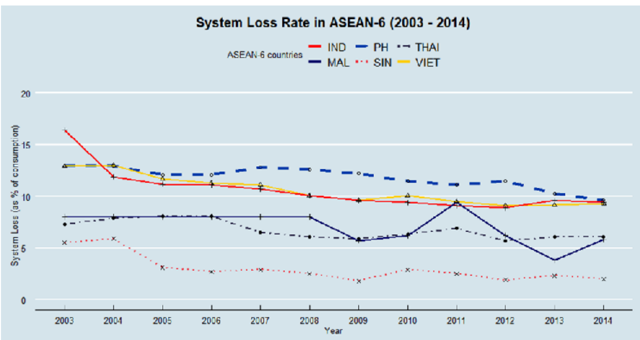
Collection Efficiency

Refers to the rate of accounts receivables collected relative to outstanding accounts receivables of consumers. More efficient ECs are able to collect consumers' payments on time.

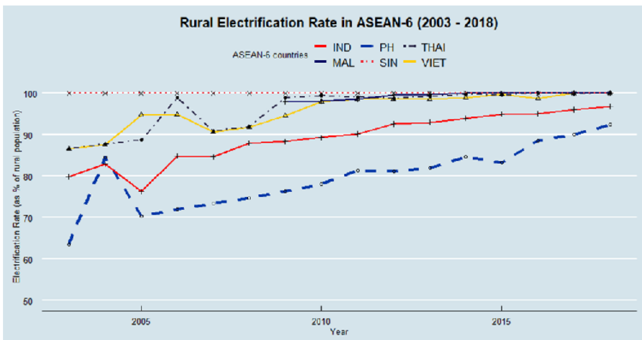
Consumer-Employee Ratio

Refers to the ratio of consumers served by the EC and the number of employees of the EC. The higher the ratio, the "leaner" and more efficient the EC bureaucracy, other things being equal.

The Philippines has lagged behind its ASEAN peers in terms of distribution efficiency and access to electricity.



Source: World Bank Open Data: Electric Power Transmission and Distribution Losses (as % of output)



Source: World Bank Open Data: Access to Electricity, Rural (% of Rural Population)

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What research methods were used by the researchers?

- Statistical tools were utilized by the researchers to gain insights on the performance of ECs in the Philippines. Descriptive statistics provided surface level characteristics of ECs (e.g. technical and financial indicators; spatial and administrative information on their jurisdictions).
- For the modeling procedure, different regression techniques were deployed for the different measures of EC performance. These tools test for statistically significant relationships between explanatory/independent variables (e.g. EC-level characteristics, socio-economic characteristics) and response/dependent variables (e.g. different measures of EC performance). While correlation does not equate to causation, statistically significant relationships between variables provide evidence that said variables move in the same/opposite direction, holding other factors constant.

What factors affect EC Performance?

Based on our findings, the following factors affect EC Performance:

Spatial characteristics
Higher population density and more consumers per circuit kilometer of line correlate to better efficiency for ECs as they drive down the costs of connecting consumers to the grid.

Economic characteristics
Higher area per capita income means more efficient ECs as consumers have higher capacity to pay and will have higher demand for quality service.

EC characteristics
Gigawatt hours (GWh) sold indicates economies of scale, which means ECs become more efficient as they distribute larger amounts of electricity.

Political characteristics
Higher political dynasty index is associated with poorer EC quality of service providing evidence that lack of political competition may adversely affect the performance of ECs.

Policy Recommendations

1. Independence of the EC, particularly of the Board of Directors, must be ensured.

2. Member consumers should also be encouraged to play a more proactive role in the election of their representatives to the EC. The use of technology and social media could serve to lower the costs of acquiring information and streaming of membership assemblies.

3. The management of the ECs should be shielded from political lobbying. Recruitment and retention of highly competent general managers, top managers and employees should be prioritized.

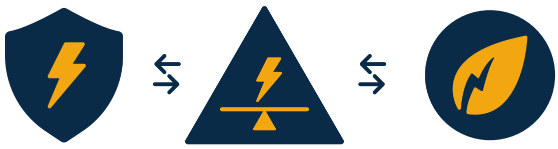
4. Institutional reforms to increase political competition should be pursued to improve energy service delivery.

Access the full study via this link.

Managing the Energy Trilemma Using Optimal Portfolio Theory

By: Joyce Lagac and Dr. Josef Yap

Context: What is the Energy Trilemma?



The energy trilemma refers to the competing objectives of energy security, environmental sustainability and energy equity. For policymakers, balancing the trade-offs among the three dimensions is crucial in the transition from carbon-reliant energy to a sustainable energy system.

Energy Security

Effective management of energy supply from domestic and external sources, reliability of energy infrastructure, and the ability of the energy sector to meet current and future demand.

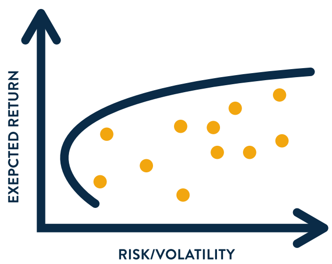
Energy Sustainability

Achievement of supply and demand-side energy efficiency and development of energy supplies from low-carbon sources.

Energy Equity

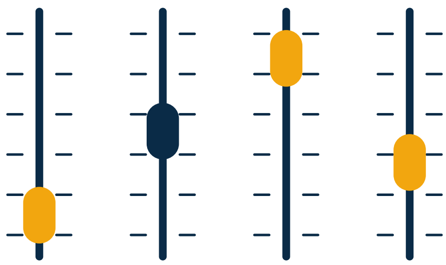
Accessibility and affordability of energy supply across the population.

What research methods were used by the researchers?



The researchers utilized modern portfolio theory, which seeks to minimize the cost or risk function of a portfolio subject to constraints. In this case, a welfare function was posited to be a combination of rate of return, risk, and the amount of carbon emissions. Return and risk were measured based on the amount of energy generated per PhP1 of investment (i.e. daily power price ratio) of the respective generation technologies.

Simulations were conducted to model the various preferences of energy planners (e.g. equal preference for risk, return and carbon emissions; preference for lower risk; preference for lower emissions; preference for higher returns).

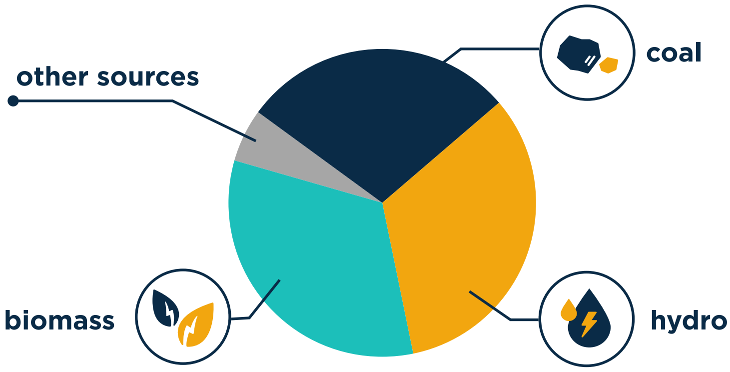


- Constraints related to generation technology were incorporated in the simulations to reflect the need to have a reliable baseload capacity, and to consider the availability of renewable energy sources in the Philippines.
- To perform the simulations, publicly available market operations data from the wholesale electricity spot market were used. The data covers the period of February to May 2020, the most recent data available at the time of the analysis.

What is the optimal energy portfolio mix based on the simulations?

Using unconstrained optimization, most scenarios yielded an energy mix of 90% hydro, 3.9% biomass, 3.1% geothermal and 1.9% natural gas. Said results are unrealistic so additional constraints were introduced to the optimization problem to reflect the available energy sources in the Philippines.

For the constrained optimization, additional constraints were added such as a 30% minimum for coal to reflect baseload requirements. For resource availability, a cap of 30% for hydro and 12% for geothermal energy sources were introduced. The simulations yielded optimal energy portfolios with large shares of electricity generated from biomass, coal and hydro.



Policy Recommendations

1. The methodology can be used to assess the impact of policies on the welfare of energy consumers. For example, the methodology can be applied to assess the impact of the Feed-in-Tariff (FiT). The FiT affects the expected rate of return of the generation assets and will therefore affect the welfare function. The Feed-in Tariff is an acceptable policy if its introduction translates to a net-increase in consumer welfare.

2. An assessment of the Renewable Portfolio Standard (RPS), a policy that requires market players to source a certain portion of their energy supply from renewable energy facilities, can be made using modern portfolio theory. The impact of RPS can be simulated with the estimated changes in the consumer welfare function under different sets of preferences and constraints. This will enable the government to develop roadmaps that will help achieve the maximum level of welfare, subject to the priorities of energy policymakers.

Access the full study via this link.

Access to Sustainable Energy in the Philippines: Market Failure and Political Economy Considerations

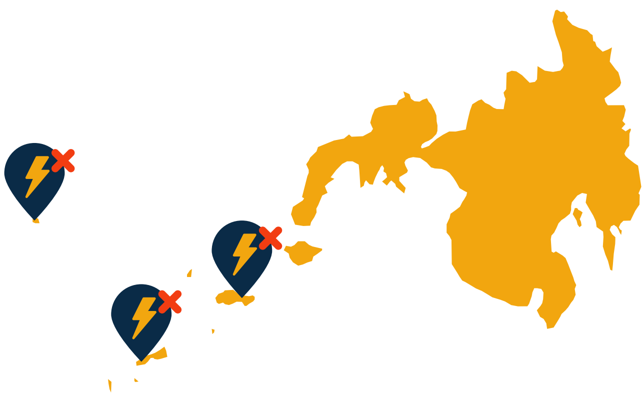
By: Dr. Josef Yap, Dr. Laarni Escresa-Guillermo, and Atty. Yla Paras

The Philippine energy sector, characterized with one of the lowest electrification rates in Southeast Asia; the second highest electricity tariff in Asia; and a stagnant share of renewable energy over the last two decades, has lagged behind its regional peers.

One can readily argue that the underdeveloped energy sector has constrained economic growth. Such problems have occupied the attention of policymakers, culminating in the passage of key reforms such as the Electric Power Industry Reform Act of 2001 (EPIRA) and the Renewable Energy Act of 2008. Despite efforts to reform and restructure the energy sector, much work has to be done to ensure that it will play a key role in sustainable development.

In this context, ASEP-CELLs posits a framework to explain and justify the need for policy interventions in the energy sector (Yap et.al., 2020). The framework is centered on market failures and political economy factors that have hindered progress in government-led initiatives. Economic reasoning and insights on politico-economic bargaining are used to assess and recommend measures that would enhance the welfare of the general public.

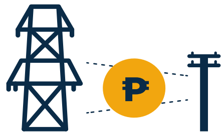
Some Market Failures in Access to Electricity



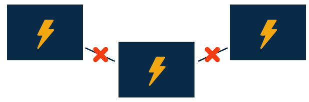
Missing markets can be observed in communities that remain unconnected to the grid, mostly in Mindanao. Remote islands are not connected to the main grid because it is not profitable to do so. This is a market failure as electricity is not being produced although needed.

Fabella (2018)[1] also describes possible market failures related to Power Supply Agreements (PSA). Noteworthy of these are:

Possible abuse of market power as generation companies (Gencos) may dictate the terms of the PSA on small distribution utilities (DUs) and electric cooperatives (ECs).



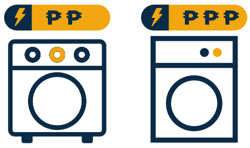
Possible transfer pricing since the law allows DUs to procure up to 50% of power purchases from propriety/affiliated Gencos.



Coordination failure: small fragmented ECs and DUs cannot aggregate their demands into bid-attractive volumes.

Some Market Failures in Energy Efficiency

Environmental externalities are a common source of market failure in energy efficiency. Without policy interventions, there may be an overuse of energy relative to the social optimum. At the same time, lack of government support may result in underinvestment in energy efficiency and conservation.

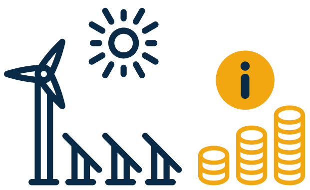


Consumers face information asymmetries such that they do not have information on the operating costs between more-efficient and less-efficient goods (e.g. appliances). This hampers the investment decision-making of consumers.

Behavioral failures are also associated with energy efficiency. Prospect theory of evaluating gains and losses based on a reference point, risk-aversion such that welfare losses are weighted more than gains, and bounded rationality can be tied to the decision-making of agents, leading to under or overinvestment in energy efficiency.

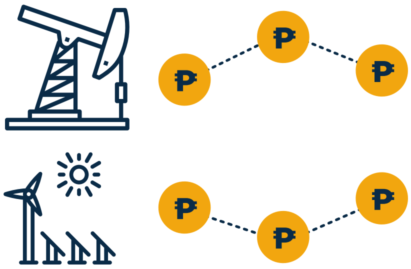
Some Market Failures in Renewable Energy

Environmental externalities primarily motivate the interest in renewable energy. The pollutants caused by the combustion of fossil fuels are not adequately priced without a policy intervention. This can lead to overuse of fossil fuels and underuse of substitutes like renewable energy sources. Similarly, there will be no incentive for firms to find technologies that reduce emissions absent policy measures.



Imperfect information may lead to coordination failures, particularly in coordinating investment decisions between generation and transmission. This is particularly true for variable renewable energy, like wind and solar, as they are location-specific.

[1]Fabella, R. V. 2018. The Market Testing of Power Supply Agreements: Rationale and Design Evolution in Powering the Philippine Economy: Electricity Economics and Policy, edited by M. V. Ravago, J. A. Roumasset, and R. A. Danao. Quezon City: University of the Philippines Press.



Market power and uncompetitive behavior play a role in the adoption of renewable energy technologies. Firms exercising market power may choose to raise the price of energy, making investments in renewable energy more profitable. On the other hand, predatory pricing by incumbent market players can discourage the development of renewable energy by driving down prices.

On Political Economy Considerations

Different actors with different or opposing interests all exert influence on the crafting of policies. Their incentives are shaped by monetary and non-monetary benefits, transactions costs, formal and informal institutions that shape the interaction of stakeholders, level of economic development, and other personal interests (e.g. electoral aspirations of politicians).

Political economy considerations influence whether or not policy interventions will be carried out or if they will be effective. Understanding the process of policy change can lead to suggestions in dealing with policy impasse in the Philippine energy sector.

Some Relevant Policy Issues in the Energy Sector

- Technology-neutral policy of the Department of Energy (DOE) and how it relates to the energy trilemma
- Implementation and review of EPIRA
- Regulatory framework and overlaps between the Energy Regulatory Commission (ERC) and the Philippine Competition Commission (PCC)
- Ancestral domain use and the free, prior, informed consent (FPIC) process related to the utilization of renewable energy sources
- Supplying energy to off-grid areas
- Technology leapfrogging and the role of a renewable portfolio standard

The working paper on "Access to Sustainable Energy in the Philippines: Market Failure and Political Economy Considerations" by Yap, Escresa-Guillermo, and Paras (2020) may be accessed through this link