12-2023

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POLICY BRIEF
YOUNG ECONOMISTS' PERSPECTIVE
2023-12-020, DECEMBER 2023
ISSN # 2094-3342

De La Salle University
AKI
Angelo King Institute
for Economic and Business Studies

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Can the Philippines Achieve its CO2 Reduction Commitment with Renewable Energy?

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The Philippines always aims to achieve economic growth, which requires expanding economic activities, resulting in increased pollution (Stern, 2017). The country signified its intention to reduce carbon dioxide (CO2) emissions by 75% in COP26 (United Nations Framework Convention on Climate Change [UNFCCC], 2021). Part of its strategy to combat CO2 emissions is by increasing its share of renewable energy (RE) sources to at least 35% of the total energy matrix (Department of Energy [DOE], 2021). The Philippines' ability to reach its COP26 commitment through a scenario approach on the effects of increasing GDP and share of RE to CO2 emissions using Kaya Identity and EKC was investigated. Geometric growth and target-oriented forecasting were performed to generate the forecast period. The Kaya Identity computed the total factor CO2 emissions of the country. The EKC investigated whether increases in GDP, incorporated with the share of RE, result in declining CO2 emissions. Results showed that in scenarios 5 to 7, where GDP and share of RE are increasing based on targets, the Philippines enters post-industrialization stage 3 of environmental responsibility, wherein increases in GDP result in declining CO2 emissions. Evidence suggests the Philippines must remain aggressive in its RE investments to reach its COP26 carbon dioxide emissions reduction commitment.

Policy Recommendations

1. **Aggressively invest in RE generation projects by increasing expenditure on RE.** Determining the relationship between income per capita, augmented with the increasing share of RE, and CO2 emissions per capita, this policy brief identified that with its firm commitment to reach and exceed the 35% RE share in the total energy matrix, the

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Philippines will be able to exceed its CO2 emissions reduction targets in COP26. That is, the Philippines enters stage 3 of its environmental responsibility should it invest more in RE generation and ensure it reaches the same consumption target. Thus, the Philippines must aggressively allocate investments in renewable energy generation projects and increase its expenditures on RE. The Department of Energy (DOE) must ensure strict compliance with the national renewable energy program and prioritize expanding the Philippines' RE network through investments.

2. **Allow full foreign ownership of RE projects to boost FDI on RE.** Allowing foreign key players in the RE industry may help the Philippines secure its 35% target of RE in the total energy mix. To increase FDI, the Philippines should liberalize its policies regarding foreign ownership for RE projects, allow 100% full ownership, and realize its effects on better environmental quality, improved economic growth through increased income, and better employment opportunities for the people.
3. **Reduce system loss.** This policy brief focused on the energy consumption side as a primary determinant of total factor CO2 emissions. Thus, reaching 35% of RE generation does not equate to reaching 35% of consumption. This policy brief implies that the Philippines must exceed its generation targets for much higher consumption. Another way of achieving a higher consumption rate is by reducing system losses. Currently, the Philippines' solution for system loss is to reduce its maximum cap, which only solves the problem of high electricity costs. To solve the system loss problem, per Qureshi and Mahmood (2009), to reduce system losses, changes in the conductor size in different systems may reduce system losses.

Introduction

Incorporating renewable energy sources in the energy matrix effectively reduces CO2 emissions while generating electricity. The DOE introduced the National Renewable Energy Program (NREP) in pursuit of increasing the share of RE in the energy mix to at least 35% by 2030, then 50% by 2040. The study worked under the assumption that the rise in energy generation will also increase energy consumption. In 2020, the Philippines consumed 81.81% of the total energy supply, and the energy generation and consumption gap is traced to system losses (DOE,

2021). Intending to reduce CO2 emissions, the Philippines committed to reducing greenhouse gas emissions across industries by 75% in the COP26 (UNFCCC, 2021). This policy brief aims to determine whether the Philippines can achieve its CO2 reduction commitment with renewable energy by identifying the effects of increasing GDP and share of RE to the Philippines' CO2 emissions through a scenario approach using the Kaya Identity and EKC.

Model Specification and Results

Utilizing Chien and Hu's (2008) GDP model, incorporating the share of RE, the study performed a seemingly unrelated regression (SUR) to determine the coefficients of GDP, investments (I), trade balance (TB), consumption (C), energy imports (E_Imp), and renewable energy (RE). From its coefficients, the year-on-year GDP growth rate targets, and the share of RE targets, the study generated the forecast period from 2021-2028.

The study identified seven scenarios. The baseline (P-BS) scenario utilized the geometric growth rate for GDP and RE. Scenario 2 (P-SC2) used the pessimistic (upper limit) GDP growth rate. Scenario 3 (P-SC3) utilized the most likely (midpoint) GDP growth rate. Scenario 4 utilized the optimistic (lower limit) GDP growth rate. Scenarios 2, 3, and 4 applied geometric growth rates for RE share. Scenarios 5, 6, and 7 utilized the GDP growth rates of scenarios 2, 3, and 4, respectively. In scenarios 5, 6, and 7, the share of RE grows at the computed year-on-year growth rate based on the 35% target.

The study computed the total Kaya Identity CO2 emissions. Results showed that the lowest CO2 emissions at the end of the forecast period are when the GDP increases at the upper limit rate, with an increasing share of RE. Following Robalino-López et al. (2014), the study utilized this linear EKC model:

$$ln\_CO2PC\_it = \mu\_o + \mu\_1\, ln\_GD\ \llbracket PPC \rrbracket\ \_it + \varepsilon\_it \qquad (1)$$

The study utilized the Autoregressive Distributed Lag (ARDL) to determine the stage of environmental responsibility the Philippines enters in the short and long run. Results showed that in both the short and long run, the Philippines enters stage 3 of environmental responsibility in scenarios 5, 6, and 7, which are incorporated with increasing RE share. That is, as the GDP per capita increases, the CO2 emissions decline. It implies that the Philippines has reached the highest level of environmental responsibility through its firm commitment to increase its RE consumption

by 35%. Furthermore, as per DOE (2021), only 81.81% of the total primary energy supply was consumed in 2020. Thus, the results of this study imply that the Philippines must exceed the generation target to realize 35% consumption. Mathematically, should the Philippines become aggressive in achieving its 35% target, the Philippines will exceed its 75% COP26 CO2 emissions reduction target.

Conclusion

Findings suggest that the RE share increase and GDP increase result in the reduction of CO2 emissions in the Philippines. Raihan (2023) confirms similar findings wherein RE diminishes CO2 emissions in the Philippines. Under the assumption that the Philippines uphold its commitment to reaching its RE share targets, it is implied that the national targets reduce CO2 emissions effectively despite the growth in economic activities. Furthermore, the statistically significant negative EKC relationship in the Philippines was confirmed, aligned with Muoneke et al.'s (2022) study. Aggressive CO2 reduction targets, robust RE programs, and sustained investments in RE will help the Philippines meet the 35% RE share by 2030 while retaining GDP growth. This policy brief confirms that the country can reduce CO2 emissions by 77% by 2028, thus verifying that the Philippines can achieve its CO2 reduction commitments in COP26 with an increased share of renewable energy.

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*This publication is based on an undergraduate thesis for the Economics program of the School of Economics of De La Salle University.