THE OPPORTUNITY COST OF CLIMATE MITIGATION POLICY BY PROMOTING RENEWABLE POWER GENERATION IN THE PHILIPPINES

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Overview

The Philippines economy has started to maintain strong growth in the past few years after long slackening economic growth for decades. This exciting opportunity however, is confronted with a challenge on how the country will meet its future energy demand to support the growing economy. Power sector plays central role in this regard. It provides essential input to not only industrial and service activities that have become the engine of growth, but more importantly electricity has become part of the basic good to all Filipino living today and more over in the future.

Past experience has shown that the country needs to make strong investment in the power sector across the country to allow the supply catch up with the soaring demand (Cham 2007, USAID 2013, TIME 2013). Given the country's aim of achieving energy security and strong effort to fight the climate change, moving towards more renewable in the power sector has become the government's target (RA 2008, DOE 2011, UNFCC 2016). Reduction in greenhouse gas (GHG) emissions is expected to provide environmental and health externalities under this green growth strategy. Energy dependence on foreign country will also decline creating more stability to the growing economy. Furthermore, green job growth in the renewable power sector will also rise as the fossil-fuel based power plants development are replaced. Finally, financial compensation from carbon emission reduction provided by developed nations is another potential benefit the country would gain from this climate mitigation policy (UN 1992, UNFCC 2009).

All these benefits however will only come at a cost that has to be paid in advance. The Philippines has to be ready to bear higher cost of electricity from renewable sources compared to the fossil-fuel based like coal. Allocating more investment into renewable also creates an opportunity cost of investing in other sectors that could have been more profitable and allowed for more labours to move into industrial sectors. On top of that, higher price of electricity is expected to deter production of manufacturing sectors decelerating industrialization process. As a consequence, there will be less labour who able to move into the manufacturing sectors reducing their potential to earn higher income in the future. Increase in commodity price is also expected, which eventually reduces the household welfare. This effect could become more serious among the vulnerable households who spend much of their income on basic necessities.

Understanding the trade-off between emission reduction and economic growth is crucial to inform policy process in the Philippines. This study assesses the opportunity cost of promoting investment in renewable power generation against the dominated fossil fuel based power plants by considering the potential benefit of knowledge spillover and market competition that could further reduce investment cost in renewable technologies We approach this issue by understanding the energy mix of electricity generation based on the least cost way that maximizes benefit to the society. It first explores the optimal energy mix to target fifty percent renewable power generation based on country's energy resource potential and investment cost across different technologies. Then, economy-wide impact assessment is conducted to understand the implication of this green growth strategy as more capital investment are allocated to support renewable power plants following the optimal energy mix. Finally, the cost of carbon mitigation is estimated by calculating how much foreign transfer is needed to compensate the welfare loss from this green growth strategy. The health co-benefit from reduction of GHG emission is also calculated to estimate the externalities benefit that the society will gain in the future.

Methods

This study employs a novel approach in assessing the opportunity cost of energy transition in the power sector by linking up two complementary models of bottom-up TIMES energy assessment model with top-down Computable General Equilibrium (CGE) model. The two models are solved dynamically by running the simulations from year

2014 to 2040. We build soft-linkage approach to communicate the two models by setting up the electricity demand and price trend following the TIMES model, while the electricity demand follows the CGE results. Iterations between the two models is conducted until both models reach similar parameter values of electricity supply and demand growth rate.

Results

The optimal energy mix on electricity generation in the Philippine points to higher investment on solar and wind, while reduction on coal power plant. However, this investment allocation could potentially reduce the GDP by 0.5 percent in 2040. Under more optimistic view, the GDP only reduces by 0.3 percent given the lower cost of solar investment cost. Capital movement into the power sector is followed by reallocation of labour across sectors. This condition will affect structural transformation process as the country starts producing more advanced commodities and moving more labour into the manufacturing sectors. Promoting renewable power plant may disturb this process as more capital has to be allocated to electricity sector, reducing output of other manufacturing industries. However, we observe growing demand of green job opportunities as more labour are released from fossil-fuel based power plants into renewable electricity sectors.

We also found that carbon emission in the country could be reduced by 60 million tons in 2040 compare to the reference scenario. This also means that health externality cost from air pollution bear by the society could be reduced at least by USD 0.73 billion (PHP 32 billion) up to USD 13.68 billion (PHP 616 billion). Transfer from abroad as payment or assistance to reduce carbon emission is introduced by compensating total welfare loss, which amounts between 236 to 376 billion pesos in 2040. Given the strong financial inflow from abroad, reals exchange rate would appreciate, hurting the export sector, especially manufacturing exports. Dutch disease effect is expected to take place, pushing the economic activity towards producing non-traded goods. This trend consequently affect the industrialization process that eventually slows down labour movement into the industrial sector. Policy response that promotes future investment activity could potentially reverse the negative impact by funnelling foreign financial inflow into domestic investment activity. We found export sector performance improved and the country could avoid Dutch Disease effect from receiving large financial inflow. On top of that, we observe welfare gain by PHP 155 billion pesos supported mainly by higher investment activity and stronger government consumption.

Conclusions

The cost of energy transition in the Philippine power sector is not too damaging to the economy. It also has small negative impact on the vulnerable household group. Lower economic growth coupled with deindustrialization process could drive the household income down. However, given the commodity price changes, welfare reduction in lower income group is much less compare the higher income group. The Dutch disease effect could potentially hit the country through real exchange rate appreciation given the large financial inflow from abroad as the country receive compensation from carbon emission reduction. Increasing investment activity in the future could help the economy absorb most of the financial inflow from abroad to finance productive activities in the traded sector. Simulation results show that manufacturing exports increases, while import demand declines as more goods can be supplied by domestic activities fuelled by higher investment. As a result, more labour could move into the manufacturing sector, which speed up the industrialization process and improve economic growth. In total, the net welfare reflected by total absorption increases by PHP 155 billion.

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