Assessment of economic and environmental impacts of low-carbon investment on renewable energy sectors in Yokohama

Topic: Carbon Emissions
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In March 2011, Fukushima Daiichi nuclear plant accidents occurred led by earthquake and tsunami. The accident reveals the vulnerability of current energy system to natural disasters, and the economic, social and environmental risks of the centralized energy generation facilities and the dependency on particular energy generations (Vivoda, 2012; Moriarty and Honnery, 2012). On the other hand, after the Fukushima nuclear accident, the public awareness on sustainable energy supply and energy security has been enhanced in Japan. In order to develop sustainable and resilient energy sources, the role of renewable energy has been highlighted. In this point, the Fukushima nuclear accident provided the following important lessons; renewable energies are not only less emission energy sources but also decentralized energy sources that enable to generate energy in various locations and more flexible manners and may give lower environmental impacts and improve the security of energy supply; and energy reduction alone cannot lead a solution to reduce CO2 emissions triggered by such an exogenous shock (Wakiyama et al, 2014). Since 2010, Japanese government supported renewable energy expansion as one of key sectors for green innovation through low carbon investment. On July 2012, feed-in-tariff (FIT) had been initiated to increase the installation capacity of renewable energy mainly solar PV. As the result, the installation capacity of solar PV had increased up to 8.954 GW within 2 years from 2012 to 2014 (ANRE, 2014). The expansion of renewable energy sectors have been also strengthened at city level.

Some previous researches have been done to examine the economic impacts of renewable energy in Japan at national level. However, only few studies have been done at city level. This study intended to examine the economic and environmental impacts of low carbon investment on renewable energy sectors at Yokohama city level using input-output analysis. In this study, we utilized the 2005 Yokohama input-output table with the extensions of renewable energy sectors. In this study, we disaggregated renewable energy sectors in Yokohama into solar PV residence, solar PV non residence, hydro power, wind, geothermal and biomass. To disaggregate renewable energy sectors from the 2005 Yokohama input-output table, we used two following steps. First, we calculated the ratios between domestic intermediate input and value added for each of renewable energy sectors. Second, we identified the main input sectors of domestic intermediate inputs for each renewable energy sectors (e.g. non-ferrous metal is one of key input sectors for solar PV).

Three main findings of this study are as follows. First, the backward analysis shown that electricity wind power, solar PV residence and solar PV non-residence are three sectors that have strongest backward linkage multiplier. In addition, non-ferrous metals, financial services and repair of construction are three main input sectors that contribute to strongest output multiplier for solar PV residence. Second, the economic assessment analysis shown that low carbon investment on renewable energy sectors in Yokohama significantly increased the economic output of Yokohama city since 2005 to 2011. Third, the environmental analysis of low carbon investment on renewable energy sectors in Yokohama city examines the reduction of CO2 emission in Yokohama.

References

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