ANALYSIS OF ECONOMIC FEASIBILITY OF OFFSHORE WIND POWER −FOCUSING ON CHINA AND SOUTH KOREA-

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Overview

This paper conducted an analysis of Economic effects of offshore wind power in China and Korea with benefit/cost analysis. China has the biggest wind capacity accounting for over 20% of world total capacity in 2010 while Korea is one of the followers of the market. Since the trend towards large-scale wind turbines in continuing and the offshore wind energy resources are plentiful in China, the development of offshore wind power has accelerated and the first offshore wind farm in Asia is already finished in Shanghai.

The existing feed-in tariff, which was too low to support wind power development, was recently replaced with a Renewable Portfolio Standard(RPS), effective from 2012. According to the new regulatory policy, The Korean government has announced a strategy to draw investments worth for offshore wind farms with a total capacity of 2.5GW over the next eight years, which is expected the change of cost and benefits.

After overview the offshore wind power development status in China and Korea, examination will be done with their strategic approaches such as the size of investment, the ratio of government investment and Policy. At the end, the evaluation of economic effects of offshore wind farms in the southwest coast in Korea is conducted. The effects on cost can be divided by economic, environmental and social factors. Each factor will be calculated and combined by using Quantification methods considering total cost of power generation, government investments and financing, increase of employment, the reduction of greenhouse gas emission contrast to fossil fuel and qualitative or technical effect. Economical efficiency, particularly does in standard of develop total unit cost, equipment value and life, politic support cost, interest ratio and utilization factor.

This study builds, in particular, with the wind capacity database developed with GWEG.

Methods

There are a variety of methods of economical efficiency evaluation such as IRR(Internal Rate of Return), NPV(Net Present Value), Payback Period and B/C Analysis. Benefit-cost analysis is a method of evaluating economic viability of projects. It compares the total benefits of a project with its total costs and recommends the implementation of the project if benefits exceed the costs. Contrast that with the following equation, which illustrates the three factor relationship among the construction cost in tc year $(IV_{t.c})$, the investment of sites and the tax rate of consumption $(CC_{t.c})$.

$$CC_{t,c} = \frac{IV_{t,c}}{1 + tax} + RT_{t,c}$$

Although the above equation can be applied in the case of land-wind power, there are more factors that affect investment such as the cost of electricity system including the submarine cable cost and the one of the electric power network interface.

$$CC_{t,c} = \frac{C_{t,p}}{1 + tax} + C_D$$

$$C_{t,p} = C_{WT} + C_f + C_{CS} + C_{TS} + C_{IS} + C_{RPS} + C_{SE}$$

$$C_D = n_{WT} \times R_{WT} \times c_{RD}$$

$$C_{t,p}$$

__D_Dd_________ǑĻ88_______________22222222222222222222222222222222222222222 222222222222222222222222222222222222222222222222222222222222222222222222 n_{WT} is the number of wind turbines. Total cost will be calculated also considering the distance from the coast and the size of the offshore wind farms.

Expected results

Result yield whether the offshore wind power has the economic feasibility via two cases; China and South Korea. Through the cost comparison of the offshore wind energy and the evaluation of the economic effect, the implications of the results indicate that institutional policy play an important role for offshore wind power to active cost changes and further market adoption. It also will be good examples to planning the policy of offshore wind power in the other countries for the future.

References

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