THE POWER SECTOR COST OF CO_2 EMISSIONS REDUCTION IN ASIA AND THE PACIFIC – TOWARD ESTABLISHING LOW-CARBON SOCIETIES

Naoko Doi, Institute of Energy Economics, Japan, Phone +81 3 5547 0231, E-mail: doi@edmc.ieej.or.jp

Overview

Electricity demand of Asia and the Pacific region is increasing rapidly as this region entails those countries of which economy are growing rapidly such as China and India. The 15 countries in Asia and the Pacific (including Australia; People's Republic of China; India; Indonesia; Japan; Kazakhstan; Korea; Malaysia; the Philippines; Singapore; Taipei,China; Thailand; Pakistan; Russia; and Viet Nam) account for 40% of total electricity generated in the world, and their combined total electricity generation grew at an annual rate of 6.2% between 2000 and 2008 – compared with that of world average at 3.4%.

This region historically relied on coal for power generation. It is because of the resources availability within the region and cost competitiveness against the other energy sources. The resulting impact on CO_2 emissions is substantial, with the power sector accounting for 60% of growth in CO_2 emissions of the 15 countries between 2000 and 2005.

Nevertheless, a policy shift is observed in Asia and the Pacific to promote the use of low-carbon emitting power sources such as renewables, hydro and nuclear power. This shift is aff ected by a number of factors, including (1) sustained high energy price and prospects for expanding fossil fuel imports, (2) global warming issues and possible impacts on climate change, and (3) economic crisis and economic stimulus measures.

This paper tries to assess the future potential for CO_2 emissions reduction in the power sector of 15 countries in Asia and the Pacific and analyze the corresponding investment requirements for the time period until 2035 (2009 as the base year). At least two scenarios are developed to compare the investment requirements and potential for CO_2 emissions reduction in both scenarios. The power sector is leading CO_2 emissions growth across the region, and understanding over what plans these countries have, what barriers they face to implement those plans and how much investment is required will be useful for the long-term planning. After the Fukushima Nuclear power accident in March 2011, some of the countries in Asia and the Pacific re-evaluate their respective power development plan, particular on nuclear power. In this regard, the paper tries to reflect the recent policy changes in the power sector, and considers their costs and effectiveness in terms of CO_2 emissions reduction.

Methods

Based on the electricity demand outlook from the IEEJ (2010), reference scenario is determined. The power sector policy and plans of respective economies are surveyed to apply the planned generation mix to the alternative scenario. Investment requirements are estimated through considering (1) total required capacity by type, (2) total additional capacity and (3) total retired capacity. Using the unit cost information from the Nuclear Energy Agency (2010), the investment requirements for each scenarioi are calculated.

Expected Results

Cost of CO_2 emissions reduction will be calculated as additional investment needs for the alternative scenario – divided by the avoided CO_2 emissions in the alternative scenario (compared with the reference scenario). The estimated cost of CO_2 emissions reduction should differ depending on each country's power generation mix. The paper explores in-depth about the factors affecting the difference in the cost and suggests cost effective options for CO_2 emissions reduction within the countries in Asia and the Pacific. Implications for establishing low-carbon societies within Asia will be drawn to consider the policy shifts resulting from the Fukushima accident.

References

Energy Information Administration. (2010). Annual energy outlook 2010. Washington D. C.

The Institute of Energy and Economics, Japan (IEEJ). (2010). Asia/World energy outlook 2010. Tokyo.

International Energy Agency. (2011). Energy balances of OECD and Non-OECD countries. Paris.

International Energy Agency. (2010). Energy technology perspectives. Paris.

Nuclear Energy Agency. (2010). Projected costs of generating electricity: 2010 edition. Paris.

Mills, A., Wiser, R., and Porter, K. (2009). The cost of transmission for wind energy: a review of transmission planning studies. Ernest Orlando Lawrence Berkeley National Laboratory, LBNL-1471E.

Poterba, J. M., and Summers, L.H. (1995). A CEO survey of U.S. companies' time horizons and hurdle rates. *Sloan Management Review*, **37**(1), pp. 43-53.

Sagawa, N. (1982). Methodologies for energy demand and supply projection (in Japanese). *Institute of Energy Economics, Energy Economics*, 8(1), pp.4-10.

United Nations Economic and Social Commission for Asia and the Pacific. (2008). Energy security and sustainable development in Asia and the Pacific. Bangkok.