

Electricity Sector Reforms for Wind Penetration through Electricity Liberalization

- New Factors from the Experiences of EU Cases

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Key Word: Electricity Liberalization, Electricity sector reform, Wind Power, EU

1. Research background

With growing concern on climate changes, more and more countries started to promote renewable energies, of which wind power is the one grew most rapidly. More wind power in the electricity market and system will exaggerate variability and uncertainty and consequently threat supply security. Instead of separated adaption policies in the conventional electricity sectors, reforms in the electricity market and system scale is proven to be more efficient and economic on dealing with these problems. This thesis is going to discuss whether the ideal electricity market and system reforms can be achieved in the phase of electricity liberalization by theoretical analysis and case studies of electricity liberalizations in EU.

2. Research questions & Methodology

The research question of this thesis is: Could the ideal electricity market and system reforms needed for wind penetration be achieved through electricity liberalization. Two steps are done to solve the problem. Framework of factors needed for an ideal electricity market that could adopt high ratio of wind power as well as ensuring electricity supply security will be summarized and then EU cases will be discussed based on this to see whether electricity liberalization satisfies the factors needed for wind penetration.

3. Research results

Extensive and macro-level framework of factors of electricity market and system changes needed for wind penetration is summarized. It consists: (1) Vertical unbundling of electricity sector; (2) Infrastructure reinforce; (3) Grid operation rule reforms; (4) Market rule reforms and (5) Independent grid operation.

Survey on EU electricity liberalization cases based on the framework showed that all five factors are satisfied in the phase of implementing electricity liberalization, meaning that the pattern the EU liberalization have positive influences on wind penetration. 5 special characteristics making the changes are: (1) Promoting cross-border exchanges; (2) Magnificent centralized power of EU level; (3) Ambitious and detailed Electricity Directives; (4) Cooperation of regional initiatives; and (5) EU-level regulators and monitoring institutions, of which promotion of cross-border exchanges is the most important factor making EU cases different from formal liberalization that provides a friendly environment for wind penetration. This experience shows a good example of electricity market reform for wind penetration through electricity liberalization.