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## **The Analysis of Taipower Unit Dispatch under the Impact of Kyoto Protocol**

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### **Abstract**

This paper simulates the effects of CO<sub>2</sub> mitigation policy options (CO<sub>2</sub> tax and demand side management) on dispatch and pricing and the level of CO<sub>2</sub> emission, based on the Regional and Real-time Pricing System (RRPS).

The RRPS provides the ability for the user to model the real time dispatch and pricing of the Taiwan electricity network as well as analyze the impact caused by energy or environmental policies .As noted the dispatch and pricing includes:(1)Least cost dispatch including co-optimization of the energy and reserve markets. (Co-optimization can be turned off by setting the reserve requirement to zero). (2)Modeling of transmission flows. (3)Modeling of transmission losses. (4)Modeling of transmission limits. (5)Modeling of generator capacity limits. (6)Modeling of generator ramp rate limits.

The proposed regional pricing methodology is to calculate the time and load weighted average of nodal prices within a region. I.e. For each real time period within a bilateral contract period a nodal price would be calculated for each node. The zonal price would be the load weighted average of each nodal price for that real time period (assumed to be 1 hour).

The simulations show that the main reason that a CO<sub>2</sub> tax does not effectively reduce the level of CO<sub>2</sub> emission is the high cost of natural gas relative to other fuels. While it generates less pollution and lower CO<sub>2</sub> emission, the price of imported LNG for electricity generation stays high, causing the generation costs of the gas units to be significantly higher than other types of generation. Under the current LNP price structure, the level of the CO<sub>2</sub> tax would have to be excessively high to discourage the use of coal generation to reduce the CO<sub>2</sub> emission level.