

## The Analysis of the Interaction Between Carbon Trading and Energy Saving Trading Systems and Energy Efficiency Policy Recommendations for Taiwan's Industrial Sector

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Carbon trading and energy-saving (or white certificate) trading systems are important and common policy tools for improving energy efficiency internationally. However, energy conservation and carbon reduction are often two sides of the same coin. Therefore, when some countries promote carbon trading and energy conservation trading systems at the same time, there is a double counting problem. That is, businesses can obtain energy savings and carbon emission reductions at the same time by executing an energy efficiency plan. It is equivalent to an energy-saving product being bought and sold twice in a row, resulting in an increase and waste in transaction costs, administrative costs and supervision costs.

In order to avoid duplication of regulation and transactions, there are generally three main methods of competition in system design (Silvia Rezessy *et al.*, 2006). First, directly design different regulated in the two trading mechanisms such as industries, targets and thresholds, or have exclusive terms, so there is no competition problem; secondly, the excess carbon emission permits and white certificates can conversion transactions be carried out only when both trading mechanisms are in compliance the law; thirdly, two systems are not required complying with the regulations in completely competitive market means you can freely carry out energy saving and carbon reduction conversion transactions. For example, businesses can choose the carbon trading market according to the current market price to meet the standards or resell them. If businesses didn't meet the requirement of white certificate, they will directly pay a fine. Therefore, it all depends on the marginal cost of the obligor, market prices, fines, and market design of the two systems.

For countries that implement both carbon trading and energy-saving trading systems internationally, although there are differences in obligors, regulatory targets, industry coverage, etc., most regulations can only choose one or the other, and if there is overlap, it is following free market principles, businesses are allowed to choose the more advantageous option.

In Taiwan, in order to strengthen energy management and improve energy efficiency, the Ministry of Economic Affairs announced "Energy Users Set Energy Conservation Goals and Implement Plan Regulations" that any entities of power contract capacity exceeding 800 kilowatts have to reach the average energy saving rate more than one percent per year during 2014 to 2024. The current "Regulations for Charging of Carbon Fees" (draft) proposed in accordance with the "Climate Change Response Act" is based on the power industry whose total annual direct and indirect greenhouse gas emissions of the entire plant (site) exceeds 25,000 tons of carbon dioxide equivalent. The manufacturing and electricity industry are subject to carbon fees. Therefore, Taiwan's Energy Management Law and Climate Change Response Law overlap in terms of control objects.

Considering the relationship between Taiwan's energy and environmental systems, this article suggests that the obligators of electricity conservation should be set as energy suppliers and large energy users with an power capacity contract more than 800 kilowatts, and an energy-saving trading system should be established. At the same time, the average annual savings rate of each obligor under the one percent target, we can refer to the experience of France to include energy suppliers or large energy users to assist small energy consumers in implementing energy saving tasks, and they can also meet the one percent requirement.

Furthermore, since each industry and manufacturer has different energy-saving obligations, the setting of goals is also related to the energy consumption, capacity utilization, energy efficiency of the energy-saving obligors. Therefore, it is necessary to rely on credible measurement and verification professionals to realize the effectiveness, cost-effectiveness and fairness of the energy-saving trading market.

In addition, to create an economically beneficial trading market, the energy saving goals need to be clear, reasonable, and long enough. Besides, the measurement and verification need to be independent, standardize, and a penalty mechanism must also be included to encourage businesses to actively participate in energy saving work. But at the same time, the buffer system should be designed with reference to Italy.

Taiwan is committed to realizing the country's net-zero transformation goal, and there is huge pressure on industrial energy conservation and carbon reduction. Therefore, if we can refer to international experience and design an appropriate electricity-saving trading mechanism, combined with Taiwan's annual electricity saving rate of 1% policy, it should be able to effectively improve corporate energy conservation and carbon reduction incentives.

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