

The effects of transition to green energy: Implications from Taiwan

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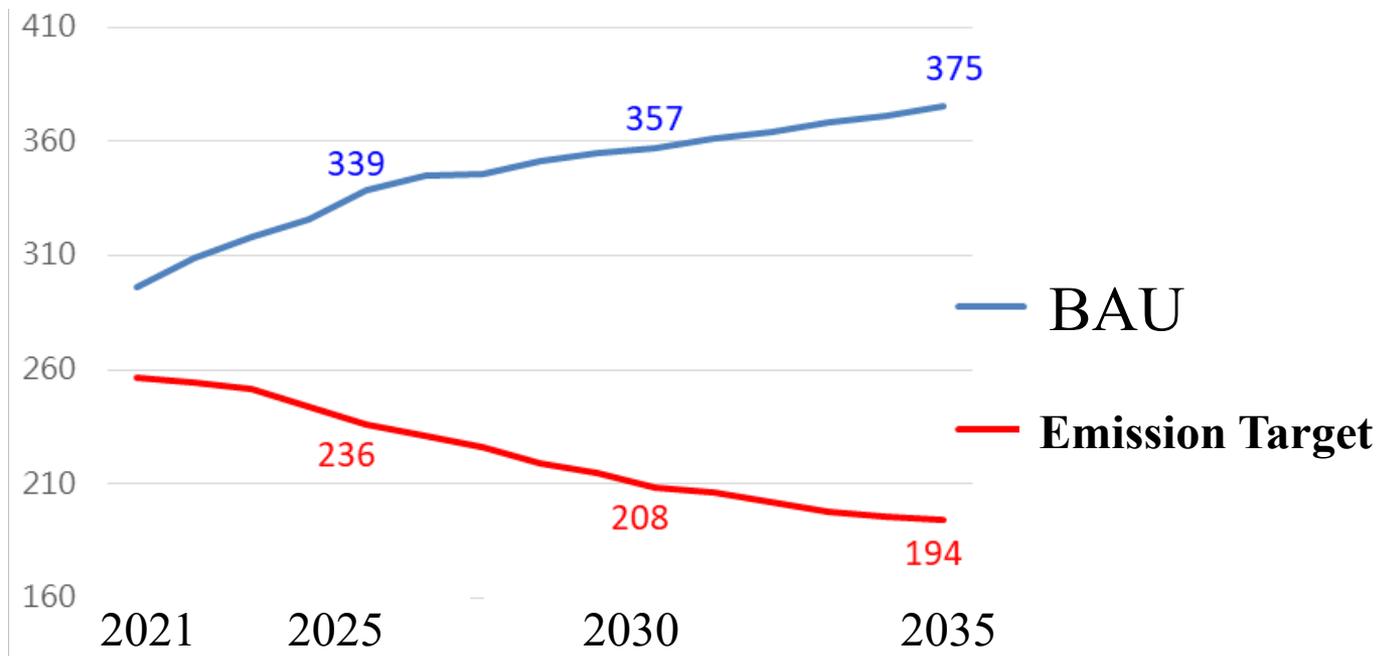
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The emission target in Taiwan, R.O.C.

Background

- ◆ Emission target in **2035**: From BAU of **375** to **194** million tonnes
- ◆ Taiwanese intends to launch **multiple policies** to achieve the target
- ◆ Taiwan will review its emission target **every 5 year**

Million Tonne



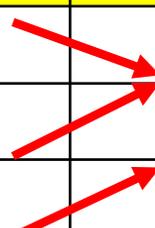
Delayed Deployment of Renewables

Background

- ◆ **Original target: 20%** of power generated by renewables in 2025
- ◆ **Revised target: Due to the COVID-19, the deployment of renewables is **delayed**. The revised target is set to **15%****

Power supply mixed in 2025

| | Original target | Revised target |
|-------------|-----------------|----------------|
| Renewables | 20% | 15% |
| Fired Power | 79% | 83% |
| Other | 1% | 2% |



Contributions and Policy Implications

Contributions

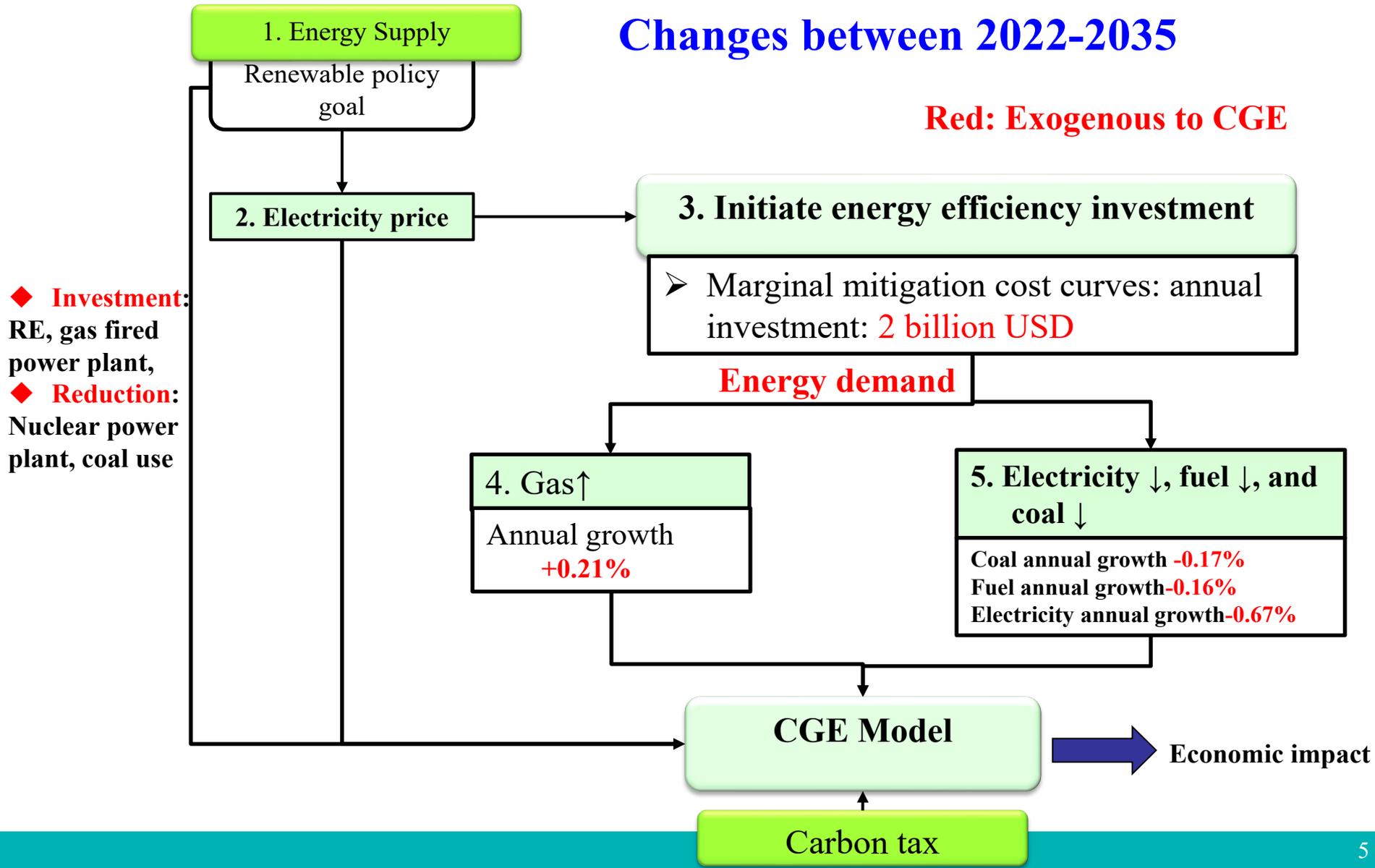
- ◆ **Relevant literature:** Renewables and carbon price to achieve the target by Dai et al. (2018)
- ◆ **This paper:** We consider more policy effects
 - ✓ **Positive Effects:** Renewable investment, investments in gas-fired power plants and energy efficiency improvements
 - ✓ **Negative Effects:** higher electricity price and carbon tax
- ◆ The development of **Renewables** is essential to determine the **carbon price** and **economic impacts**

Future Policy Implications

- ◆ The analysis might be used for the **negotiation between Ministry of Economic Affairs** (economic development) and **Environmental Protection Agency** (environmental regulation) **in Taiwan**
- ◆ The development of **RE** is **essential** to achieve the emission target with **lower carbon tax**

Model framework

Scenarios and CGE



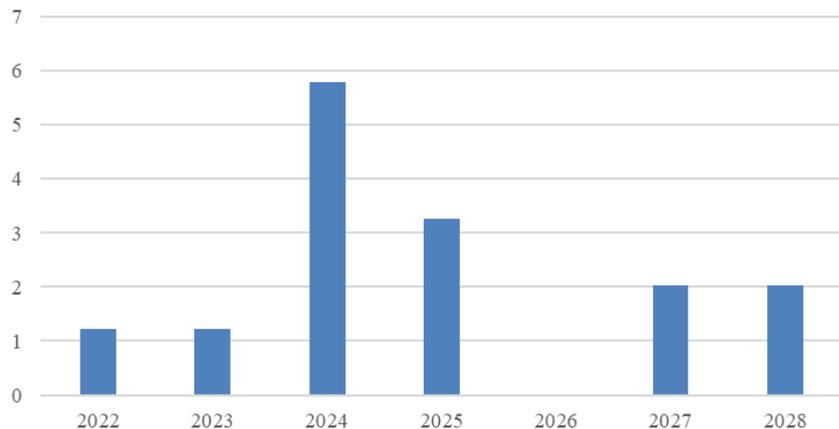
Scenario settings



Input for CGE model

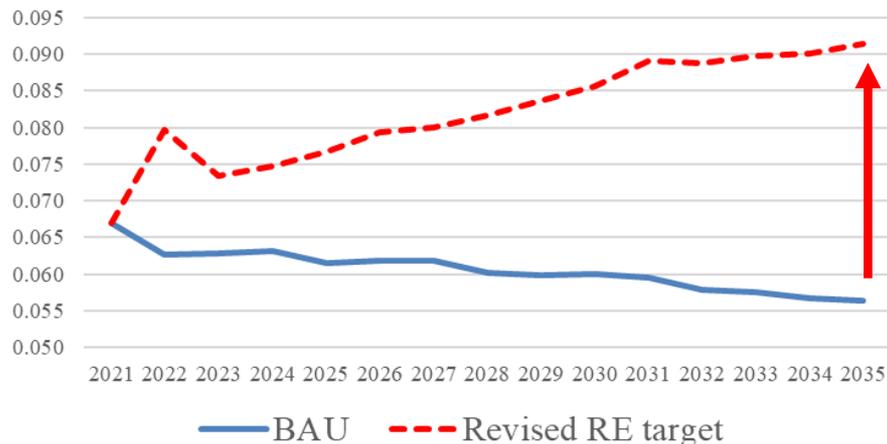
Investment on gas-fired power

Billion USD



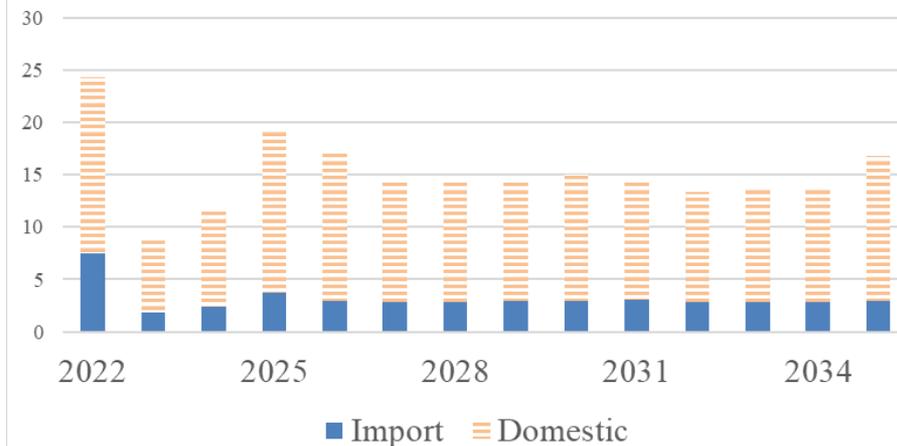
Power generation costs

USD/kWh



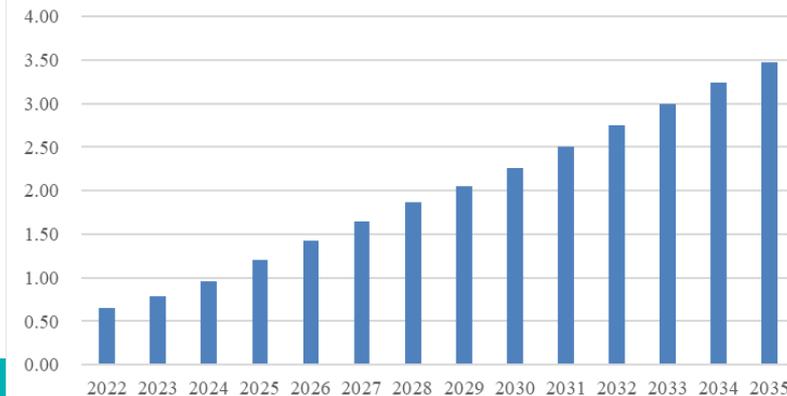
Renewable Investments

Billion USD



Induced investments in energy efficiency

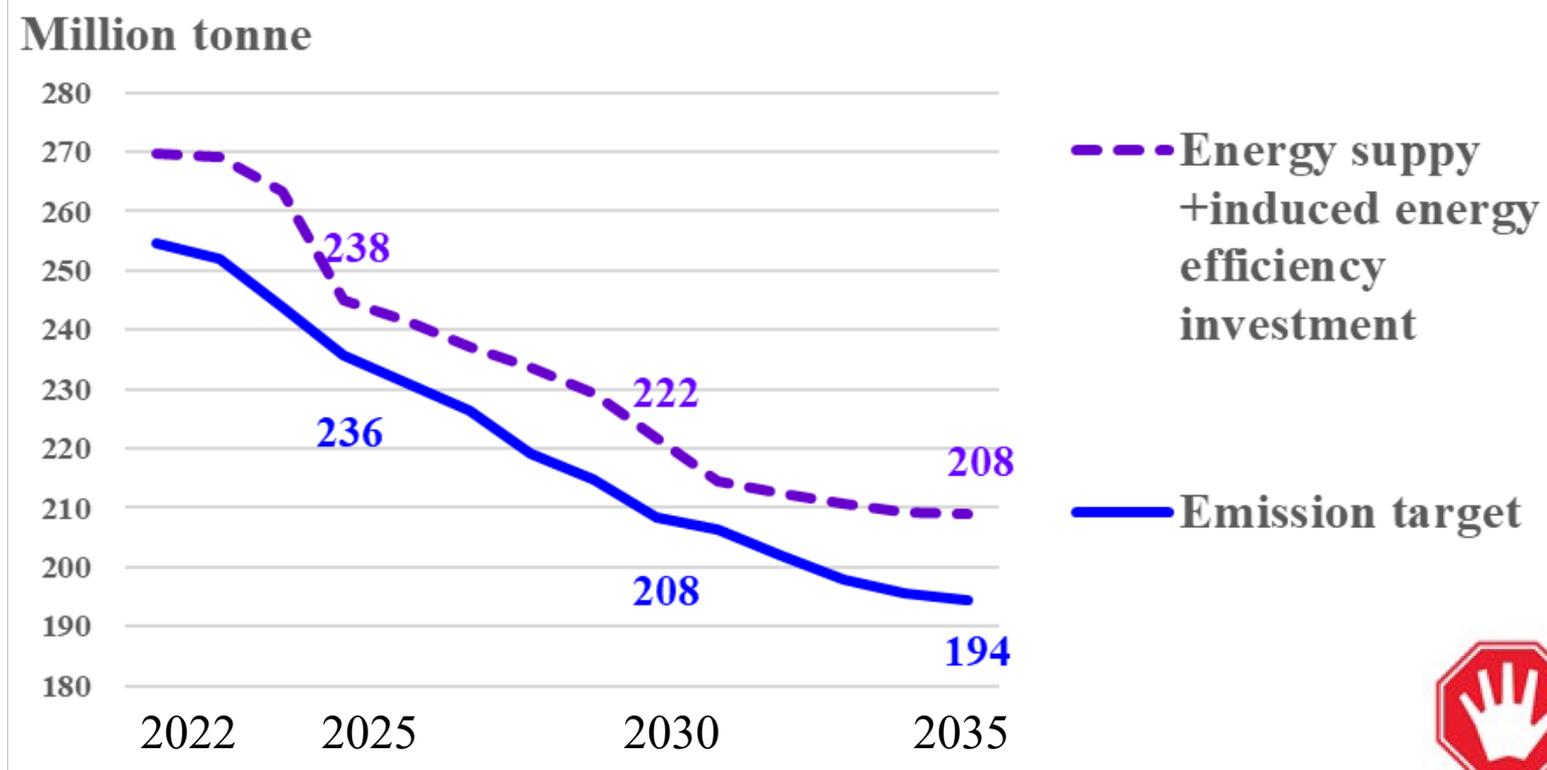
Billion USD



Emission gap

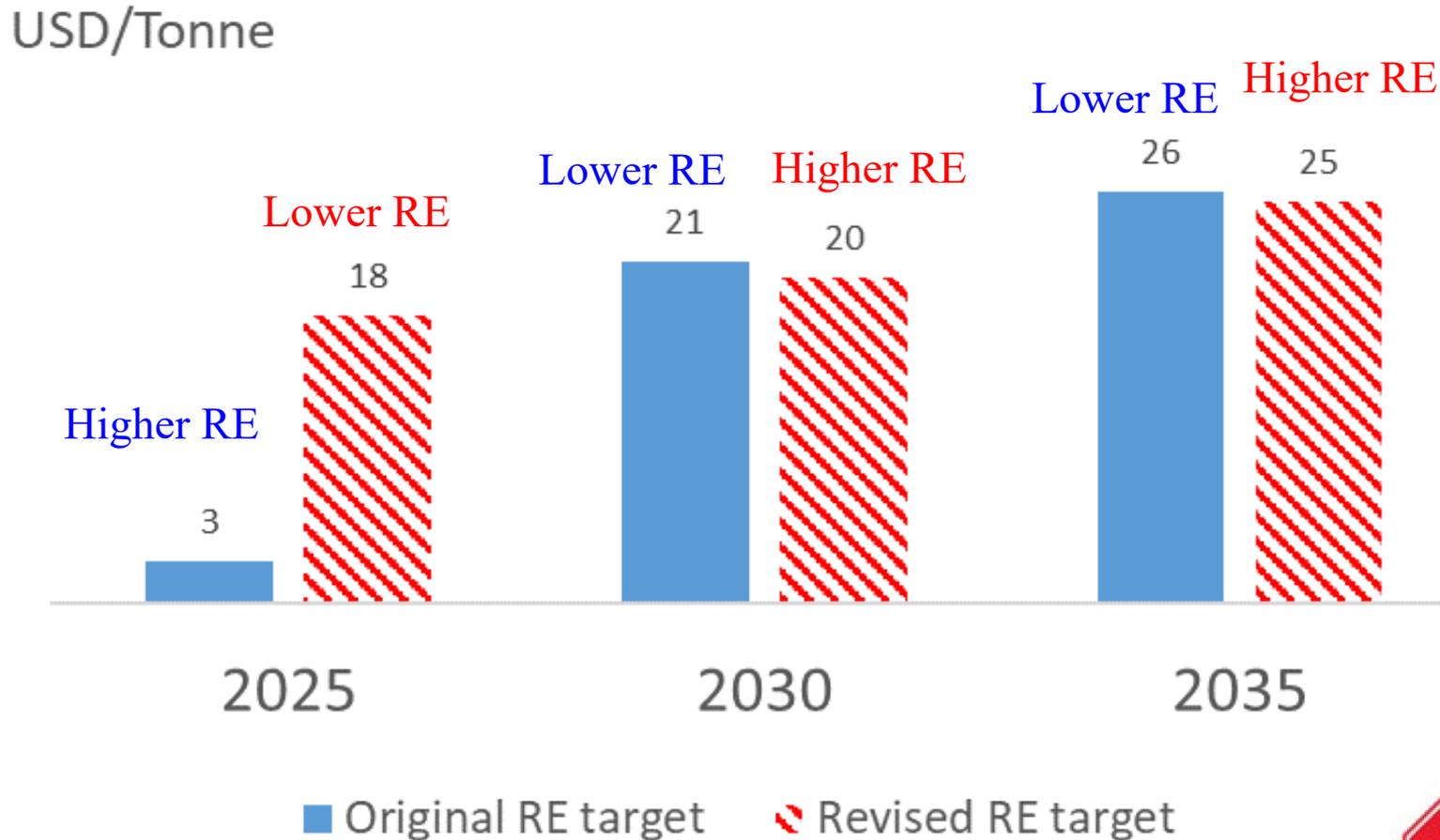
- ◆ Energy supply (revised target) + induced energy efficiency investment: We cannot achieve the emission target

We still need carbon price to achieve the emission target



Carbon tax to achieve the target

◆ Higher renewable (RE) share induces lower carbon prices



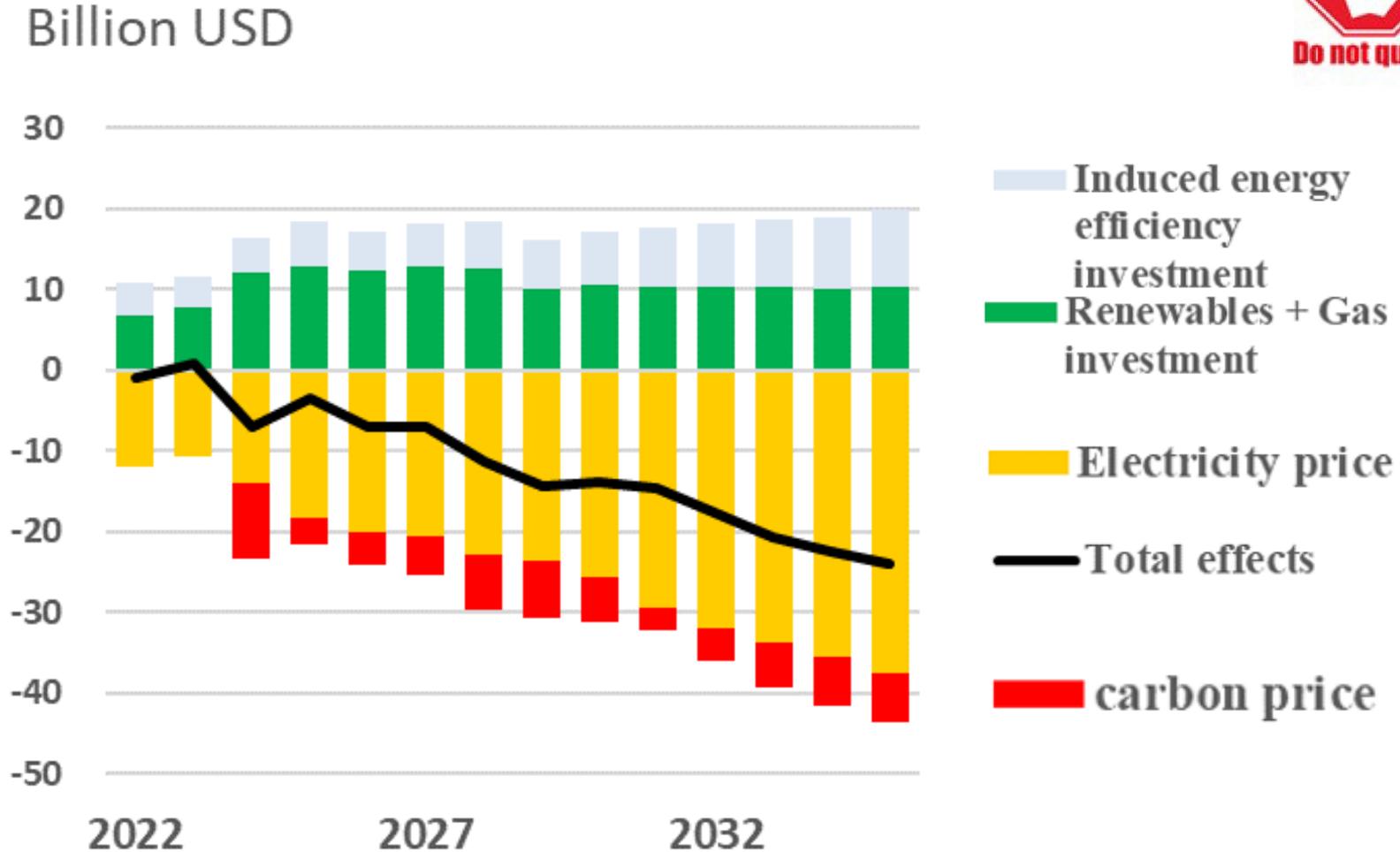
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Impacts on GDP (Revised target)

- ◆ **Positive effects:** Renewable + gas fired power plants investments + induced energy efficiency investment
- ◆ **Negative effects:** higher electricity price + carbon price



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Conclusions

- ◆ More renewable investments can initiate low electricity emission factor → lower carbon tax to achieve the emission target
- ◆ Carbon price is a necessary policy to achieve emission target for Taiwan
- ◆ Some policies (RE investment, efficiency investment) can bring positive effects to economy

Thank You for Your Attentions