

**Challenges of Decarbonization Policies and Technological Innovations  
toward Carbon Neutral Societies in East Asia**

**Panel Discussion**

**Comments and Discussions  
on Dr. Masui`s Presentation  
in Japan**

**Soocheol Lee**

Meijo University

[slee@meijo-u.ac.jp](mailto:slee@meijo-u.ac.jp)



# Comments on the Presentation about Carbon Neutrality in Japan



## On the Macro Framework(slide 13)

● GDP growth rate 1.7%/year (2020-2030)

⇒ This is estimated by Cabinet Office

👉 **I think this might be overestimated.** For example, IEEJ OUTLOOK2021 estimated 0.7% GDP increase(reference case) between 2018~2030.

● GDP growth rate 0.5%/year (2031-2050)

⇒ This is estimated by SSP2

👉 **In my opinion, this might be underestimated** thinking the spread of the decarbonization technological innovations and their stimulation to the economy positively during that period.

## On the Electricity Supply (slide 20)

● Nuclear shares are around 10% both Technology scenario and Tech+Social transformation scenario by 2050 in AIM model

☞ Nuclear power generation tends to be determined politically not by market mechanism. **I wonder how nuclear power generation determined in AIM model.** Endogenously or Exogenously?

☞ **I suggest AIM model simulate scenario with no nuclear power case also** considering the possibility of no nuclear society in the future, although very small possibility in the current political situation in East Asia.

# On the Electricity Production Cost (slide 21)

● The average power generation cost in 2050 will be almost the same as the current level by the simulation of AIM model  
⇒ 11.5 yen/kWh(2018), 11.8 - 12.2 yen/kWh(in 2050)

● I think, there might be two factors to influence power generation cost.

👉 **Factors of pushing cost up** : adding CCS or CCUS to current thermal power generation, new fuel cost of hydrogen and Ammonia and nuclear safety regulation cost

👉 **Factors of pushing cost down** : high speed of technological innovation of renewable and new fuel power sources by the spread of those technologies

👉 Estimation of pathway to pushing cost up or down of electricity properly will be very Important to simulate carbon neutral economy.

## On the Main implication of detailed analysis (slide 26)

● Decarbonization may have a positive impact on reducing the outflow of national wealth. Annual required investment will be estimated to be about 10 - 11 trillion yen.

⇒ This investment will significantly reduce fossil fuel demand. As a result, it is estimated that it will lead to a reduction in net energy imports of about 12 trillion yen in 2050.

👉 I strongly support this point of view!

I think this is one of the biggest winning attributes of carbon neutral society.



# Discussions

-How to model the carbon neutral society?-



## The First Issue

Designing decarbonization policy to stimulate de-carbon technological innovation effectively is crucial to achieve carbon neutrality.

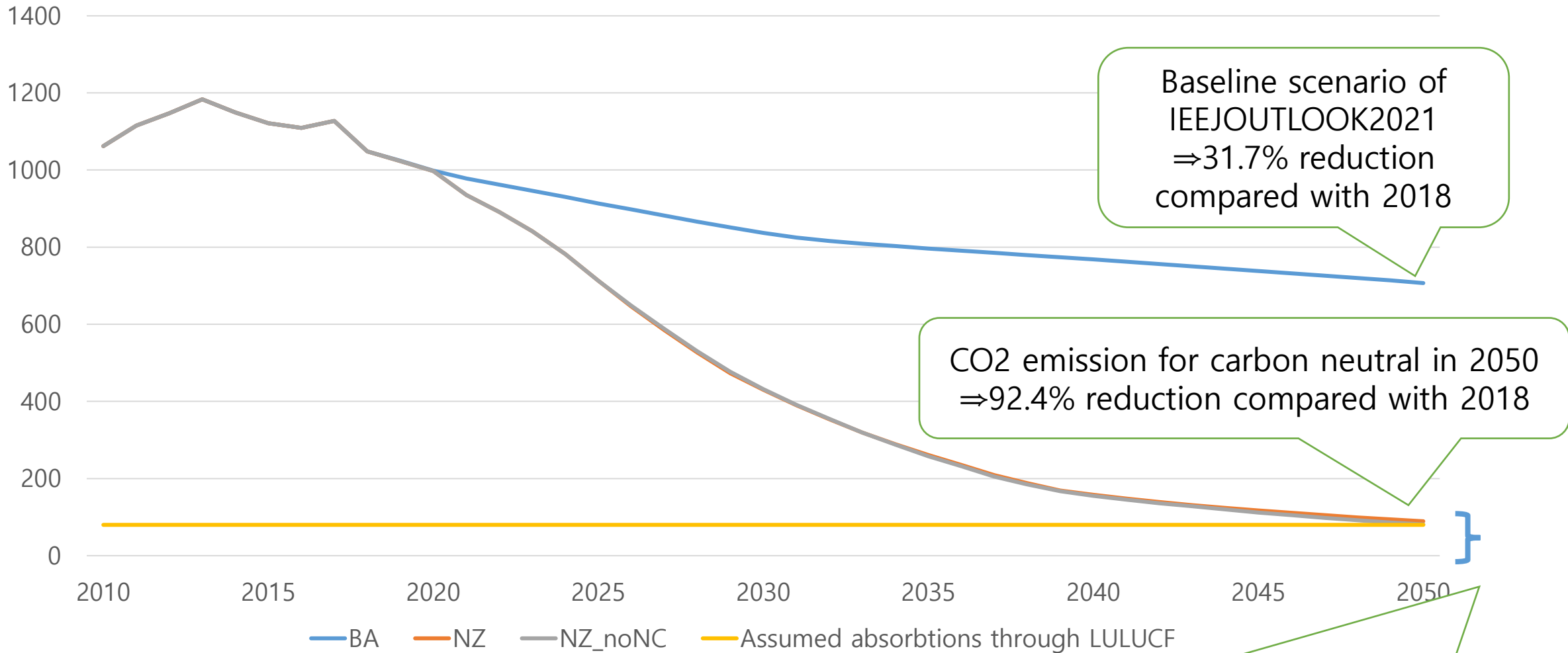
Carbon pricing(as carbon tax) including subsidies and regulations is essential policy instrument for the carbon neutrality

👉 **Keeping tax revenue neutrality, carbon tax revenue could be used to pay for decarbonization investment, renewable subsidies, and the phase-out of thermal power.**

👉 **And policy cooperation with Japan, China and Korea results in 0.1~0.4% GDP increase compared with no policy cooperation(Lee,et al.(2015))** 👉 **See the forth issue.**



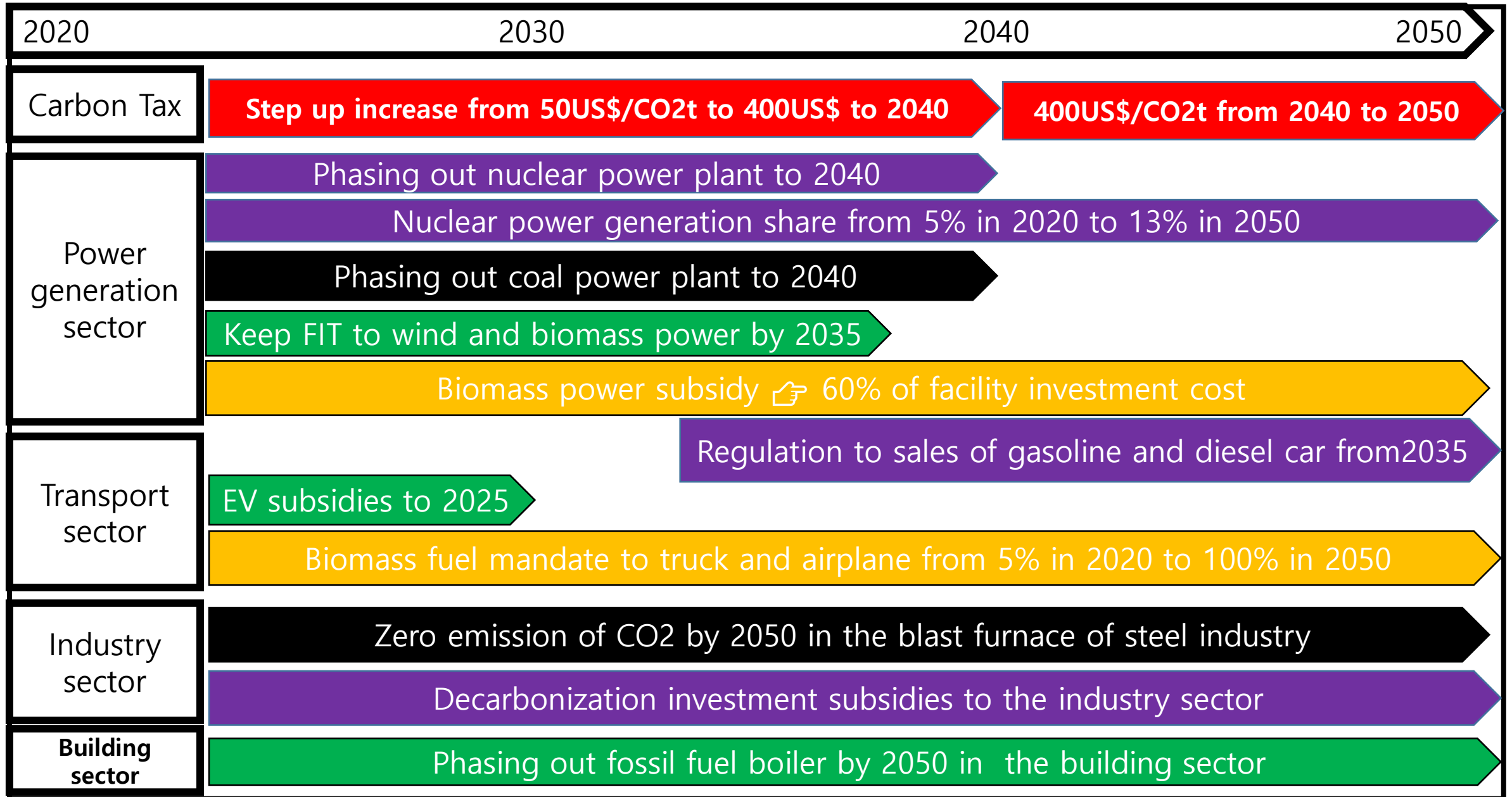
# Pathway of Carbon Dioxide Emissions toward Carbon Neutral in 2050



Source: E3ME model estimates from Lee, S. et al. (2021)

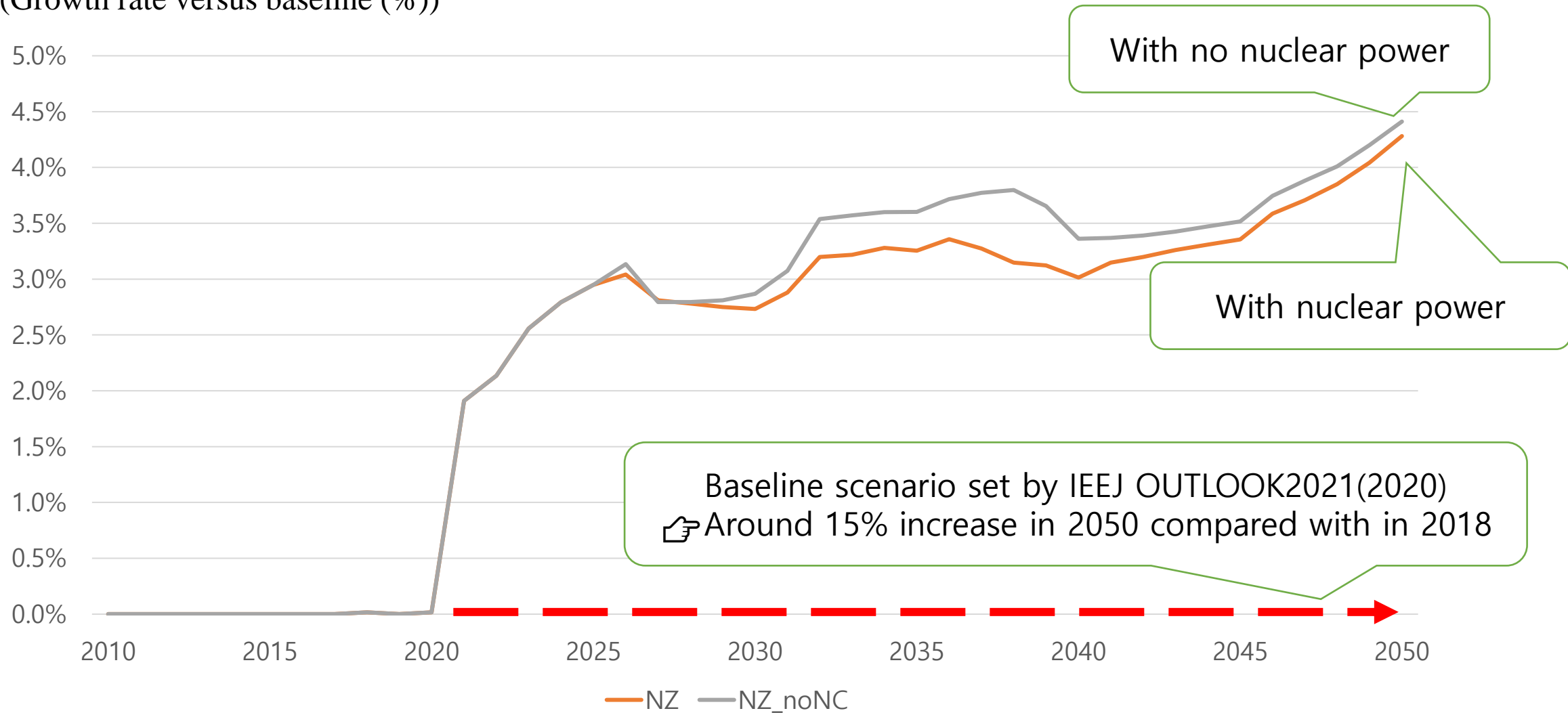
Remains (80 million ton) will be absorbed by LULUCF

# Decarbonization policy package toward carbon neutrality(set by Lee,S. et al.(2021))



# Impact on GDP from carbon neutrality in 2050

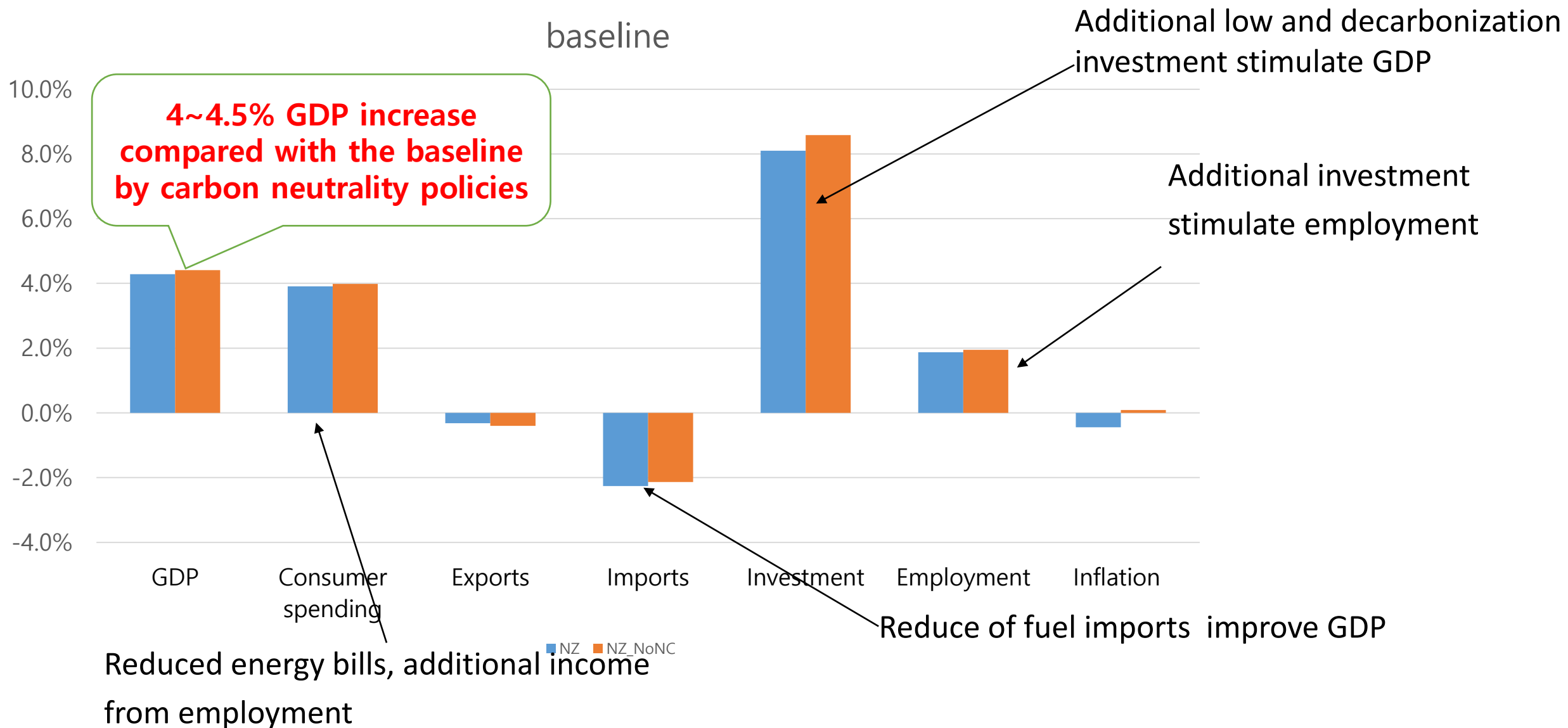
(Growth rate versus baseline (%))



Source: E3ME model estimates from Lee,S. et al.(2021)

# Key Findings in GDP

Macroeconomic indicators in 2050, % differences from baseline



## The Second Issue

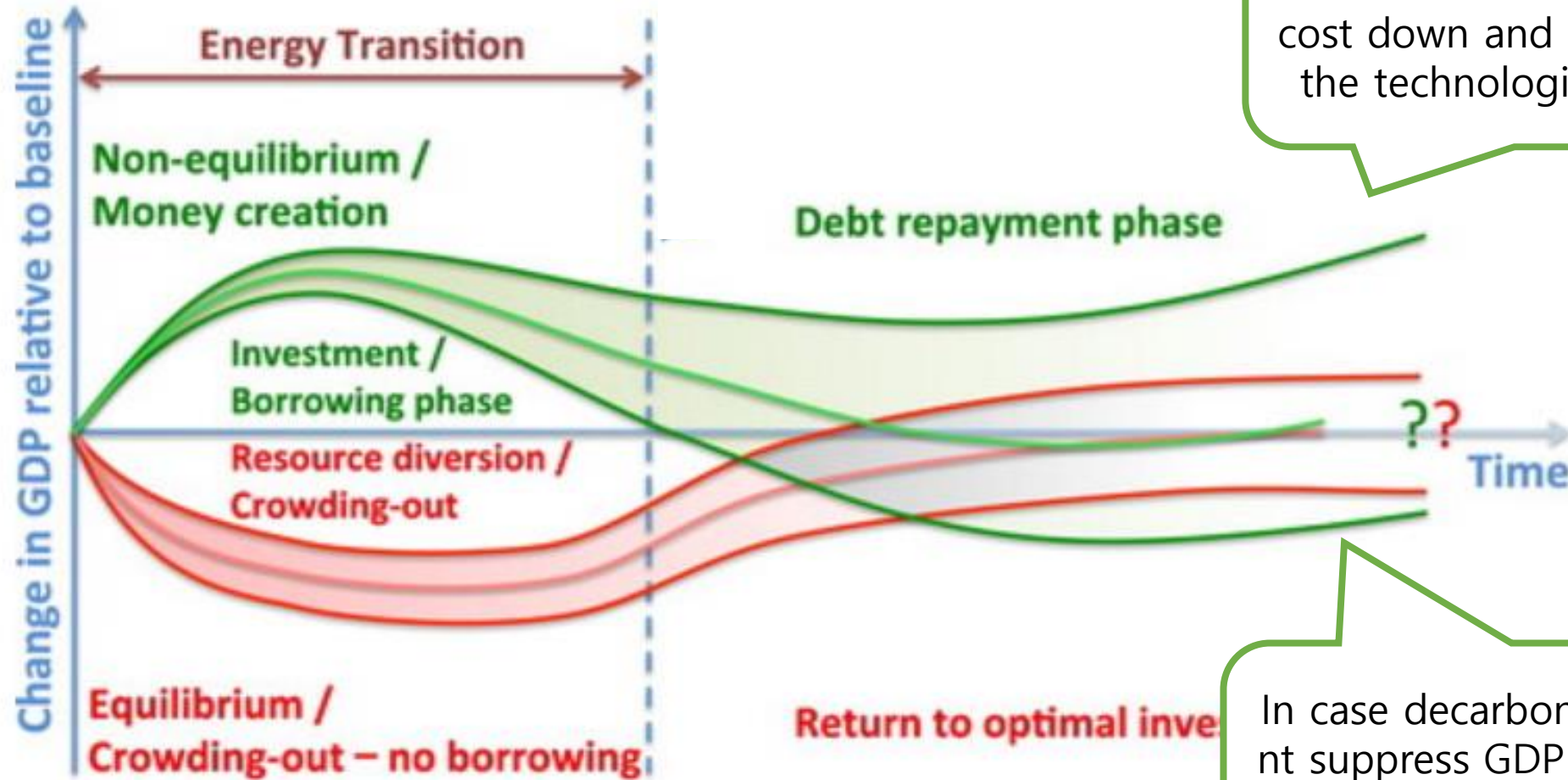
In simulating the impact of achieving carbon neutrality by 2050 on the economy and the energy mix, it is extremely important that the model properly reflects the speed of innovation in a variety of decarbonization technologies (speed of cost down and spread of the technologies).

👉 **However, most of the current E3 (Energy-Economy-Environment) models tend to rely on conventional learning curves.**

⇒ **This might underestimate desirable impact on the economy of carbon neutrality**

**Adjusting the learning curves of these technologies to reflect future speed of technological innovation accurately is a topic for future challenges in most of the E3 models.**

# Optimisation vs Simulation approach



In case decarbonization investment stimulate GDP by the cost down and spread effect of the technological innovation.

In case decarbonization investment suppress GDP by the crowding out and cost up effect of the Investment.

## The Third Issue

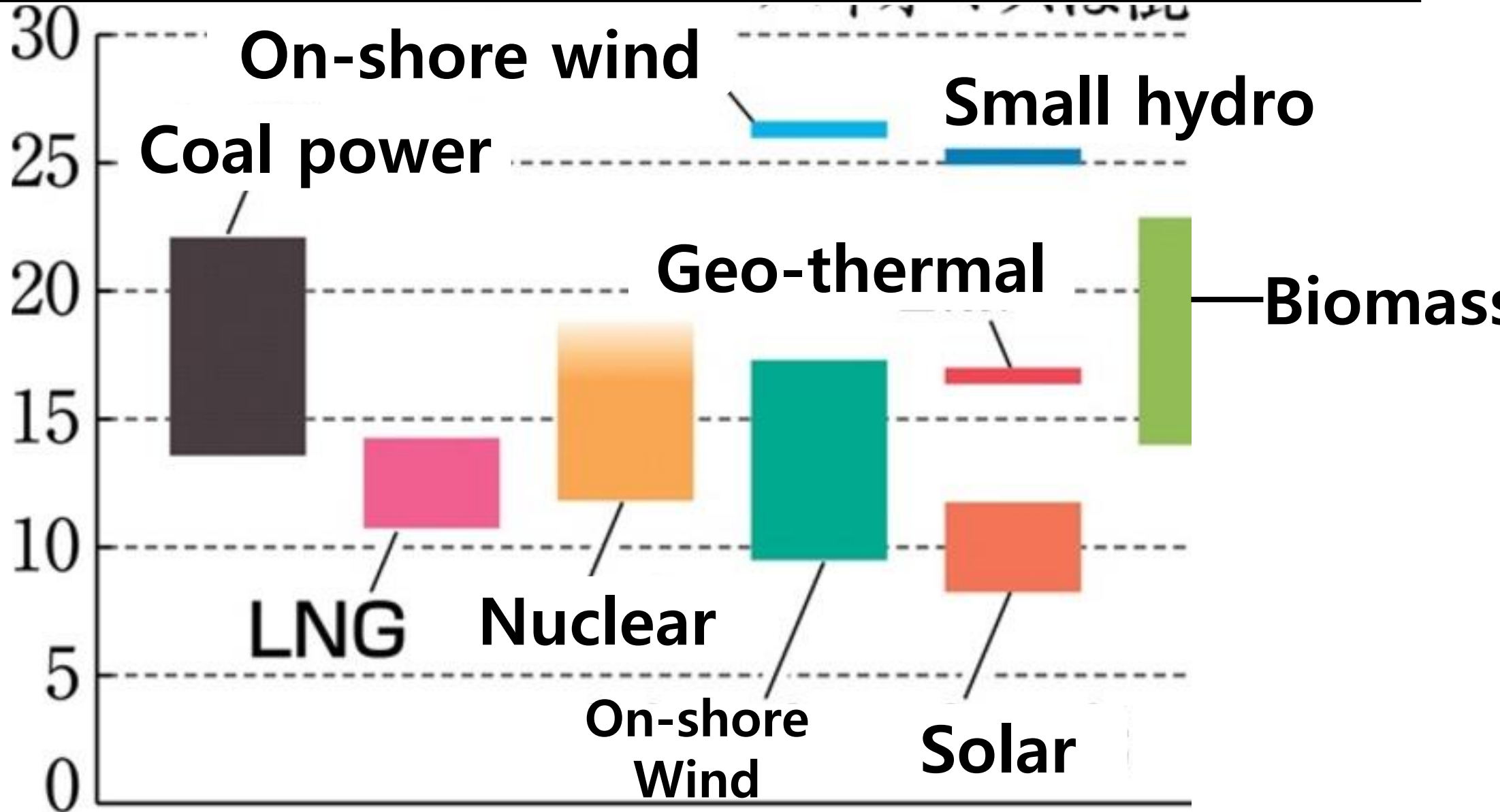
The third issue is most of the E3 models use the nuclear power generation cost data before the Fukushima accident. This means that the existing E3 models do not reflect initial construction costs and operation costs under strengthened safety.

 **Reflecting stricter safety regulation cost of nuclear power generations properly in the model is very important to simulate future energy mix.**



# 2030 electricity cost outlook by METI, Japan (July, 2021)

Unit:  
Yen/kWh



## The Forth Issue

As already told at [the purpose of this conference], policy cooperation and strategy in East Asia would maximize the benefits and minimize the costs associating with carbon neutral climate policies. Successful policy design, supporting of new technologies, and cooperation in East Asia will not only lead to climate neutrality but will also strengthen future industries and businesses in the regions.

👉 **For the first step of the decarbonization policy cooperation in East Asia, I suggest to build common carbon market in this region.**

👉 **In the first stage, indirect link(soft link) with China ETS, Korean ETS and Japanese regional ETS, like link with EU-ETS and those of Swiss, Norway and Australia. In the second stage, direct link(hard link) like EU-ETS itself.**

👉 **East Asia Super Grid⇒using cheaper renewable power in NEarea**

👉 **Benchmarking EU` 「Effort Sharing Regulation」**



**Thank you very much!**

**Soocheol Lee**

Meijo University

[slee@meijo-u.ac.jp](mailto:slee@meijo-u.ac.jp)