T20 TF3

"Emerging Economies towards Net Zero Emission"

Global Low Carbon Energy Transition

20 July 2022

Economic Research Institute for ASEAN and East Asia

COP26 calling for 1.5 degree goal and coal phase down

- **COP26 agreed to pursue efforts to limit the global average temperature increase to 1.5 degrees Celsius above pre-industrial levels, calling for stronger actions than the Paris Accord of 2015, which had sought to hold the increase to well below 2 degrees Celsius.**
- **It requests countries to review and strengthen their emissions reduction targets for 2030 by the end of 2022 as necessary.**
- **It also urges countries to accelerate efforts towards the "phase-down" of unabated coal power and phase out of inefficient fossil fuel subsidies**

UN CLIMATE CHANGE CONFERENCE UK 2021

IN PARTNERSHIP WITH ITALY

Global Low Carbon Energy Transition (IEA NZE2050)

Stated Policies Scenario (STEPS)

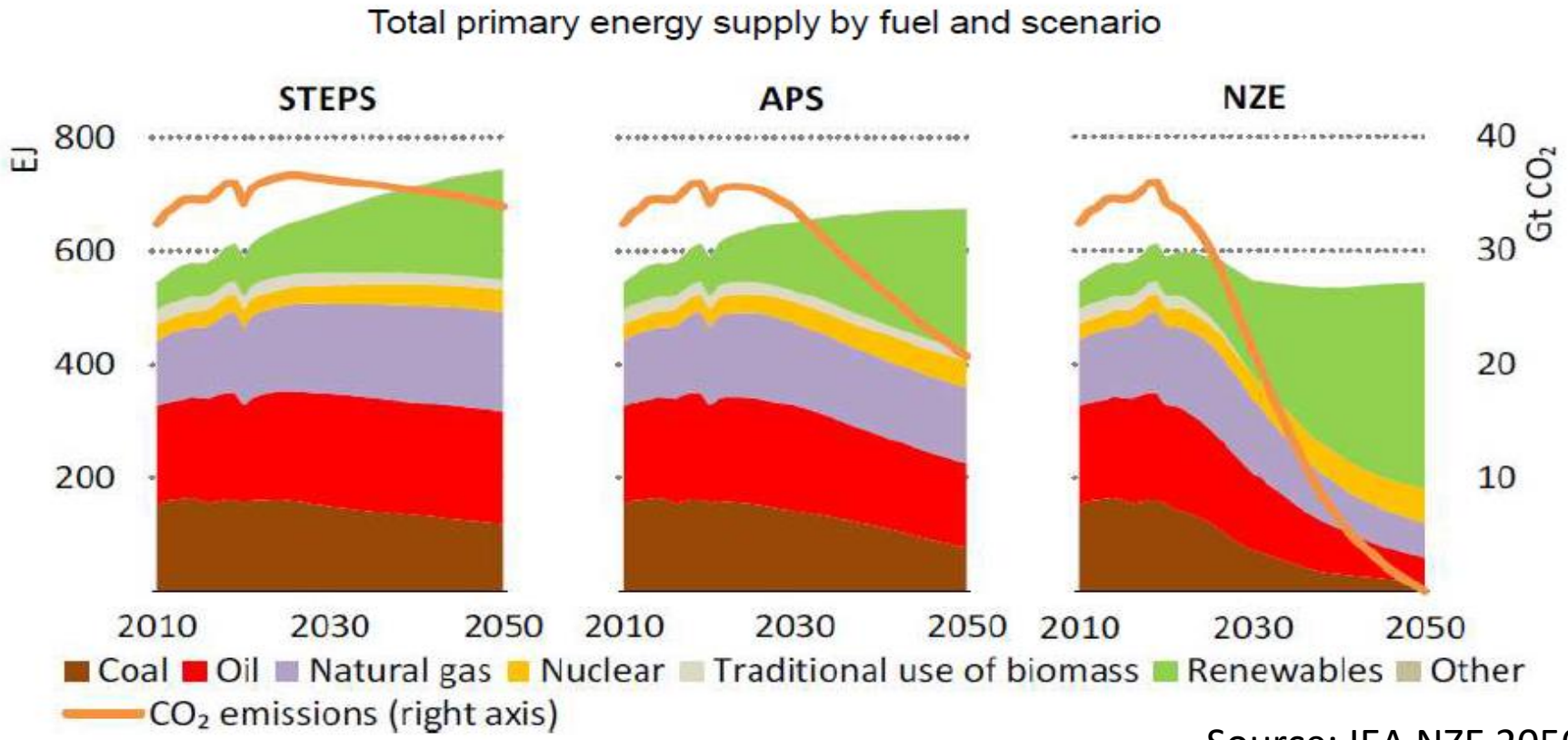
- Not take for granted that governments will reach all announced goals. Instead, the STEPS explores where the energy system might go without additional policy implementation.

Announced Pledges Scenario (APS)

- Take account of all of the climate commitments made by governments around the world, including NDC as well as longer term net zero targets, and assumes that they will be met in full and on time.

Net Zero Emissions by 2050 Scenario (NZE)

- Pathway for the global energy sector to achieve net zero CO2 emissions by 2050, with advanced economies reaching net zero emissions in advance of others.



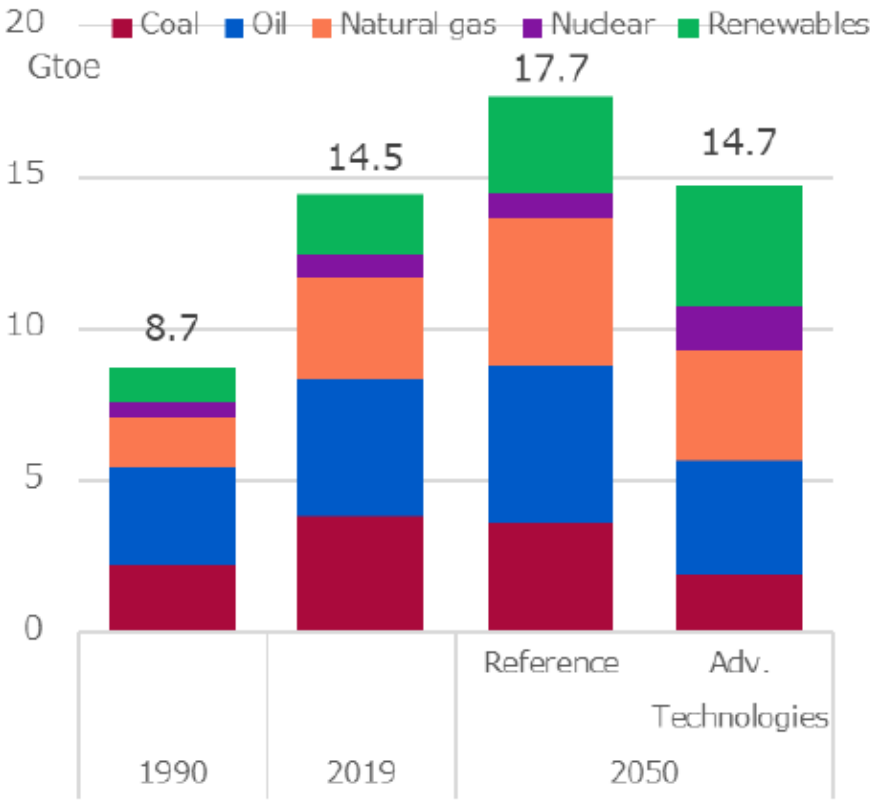
Source: IEA NZE 2050

Global Low Carbon Energy Transition (IEEJ Outlook)

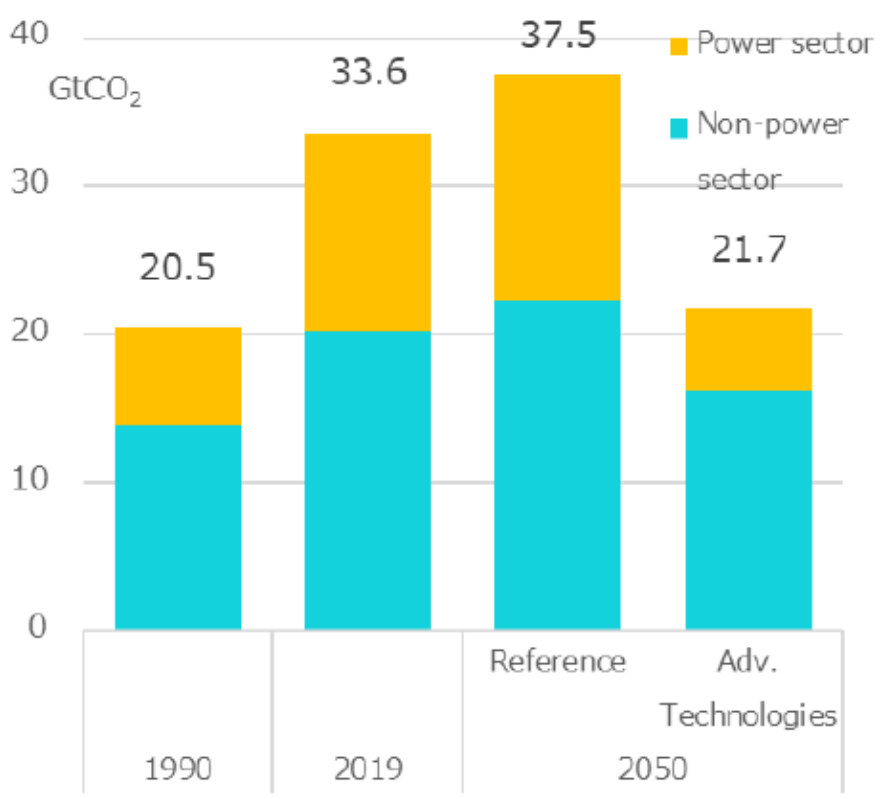
[Reference Scenario (REF)]
A scenario in which trends and changes continue while reflecting current energy and environmental policies.

[Advanced Technologies Scenario (ATS)]
A scenario in which energy and environmental technologies are introduced to the maximum extent in order to secure a stable energy supply and strengthen climate change countermeasures.

Primary energy demand

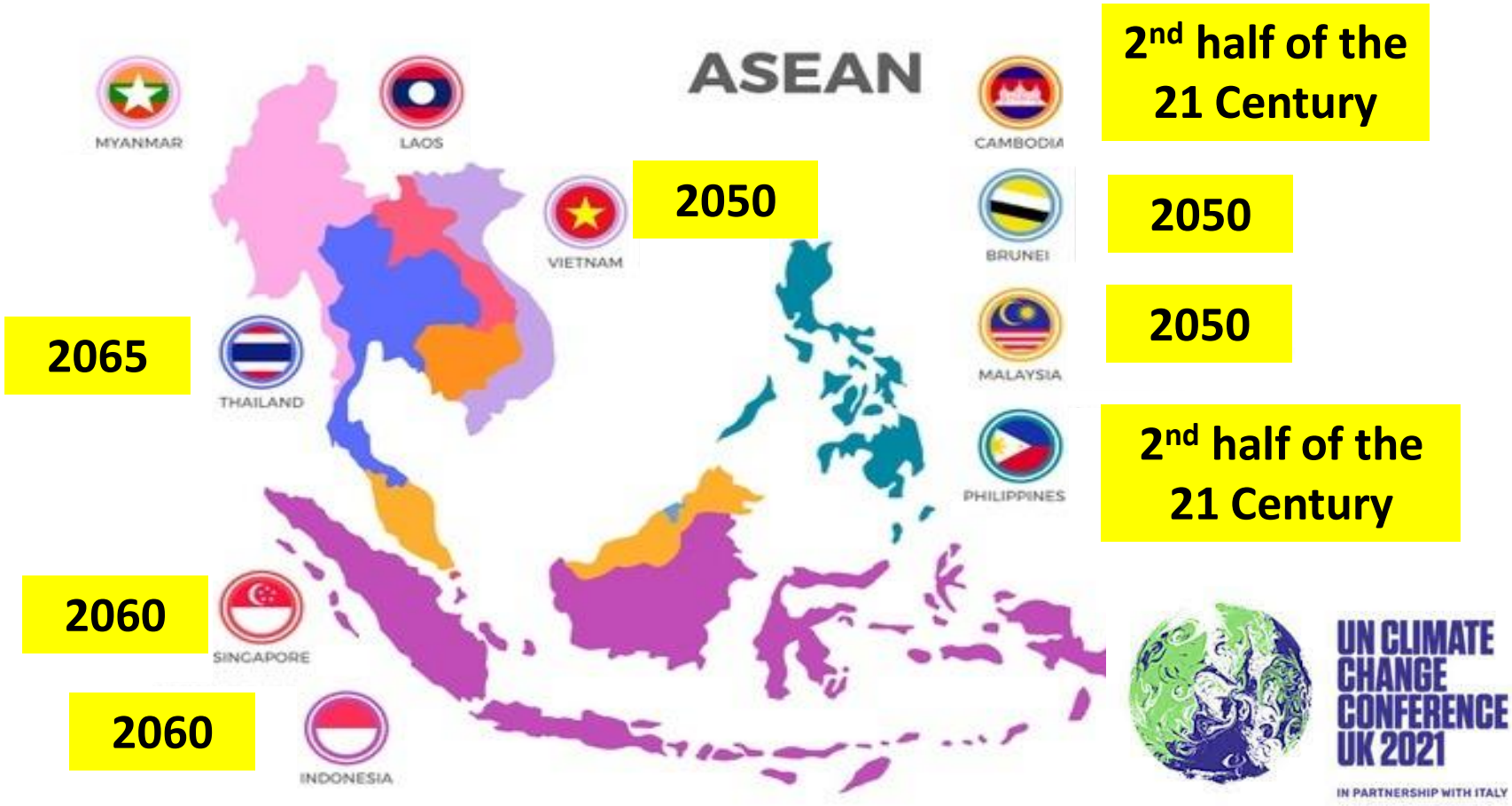


Energy-related CO_2 emissions



Source: IEEJ Outlook 2022

ASEAN Countries' Carbon Neutrality Goals



ASEAN Carbon Neutrality Scenario (1)

Baseline does not assume any emission constraints by 2060.

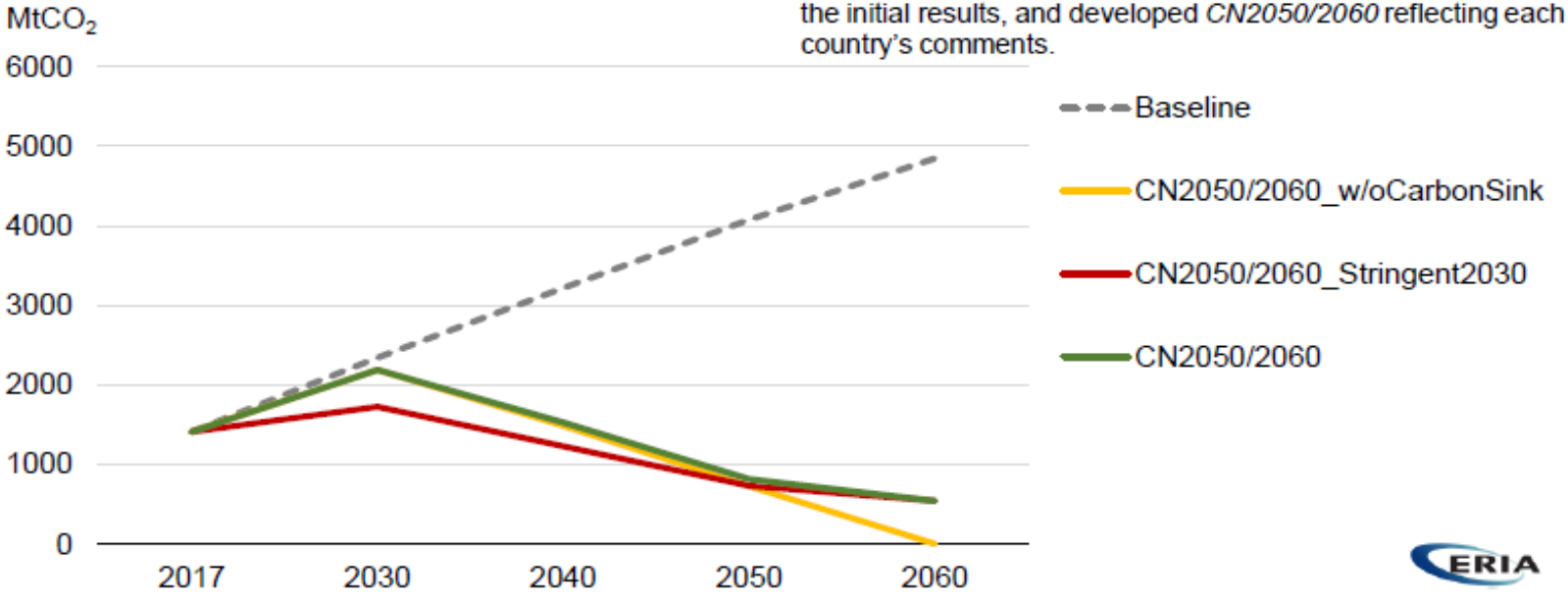
CN2050/2060 assumes energy-related CO_2 emission constraints by country and achieves net zero CO_2 emissions with natural carbon sink by 2060 in ASEAN.

- ***CN2050/2060_Innovation cases*** are for evaluating the impact of technological innovation in the *CN2050/2060*. **(sensitivity analysis 1)**
- ***CN2050/2060_Stringent2030*** puts more stringent emission constraints by 2030 in the *CN2050/2060*. The emission in 2030 is consistent with IEA SDS. **(sensitivity analysis 2)**

CN2050/2060_w/oCarbonSink assumes net zero energy-related CO_2 emissions by 2050 in BRN and SGP and by 2060 in the rest of the countries. This is the case we initially assumed.

Energy-related CO_2 emission constraints in ASEAN

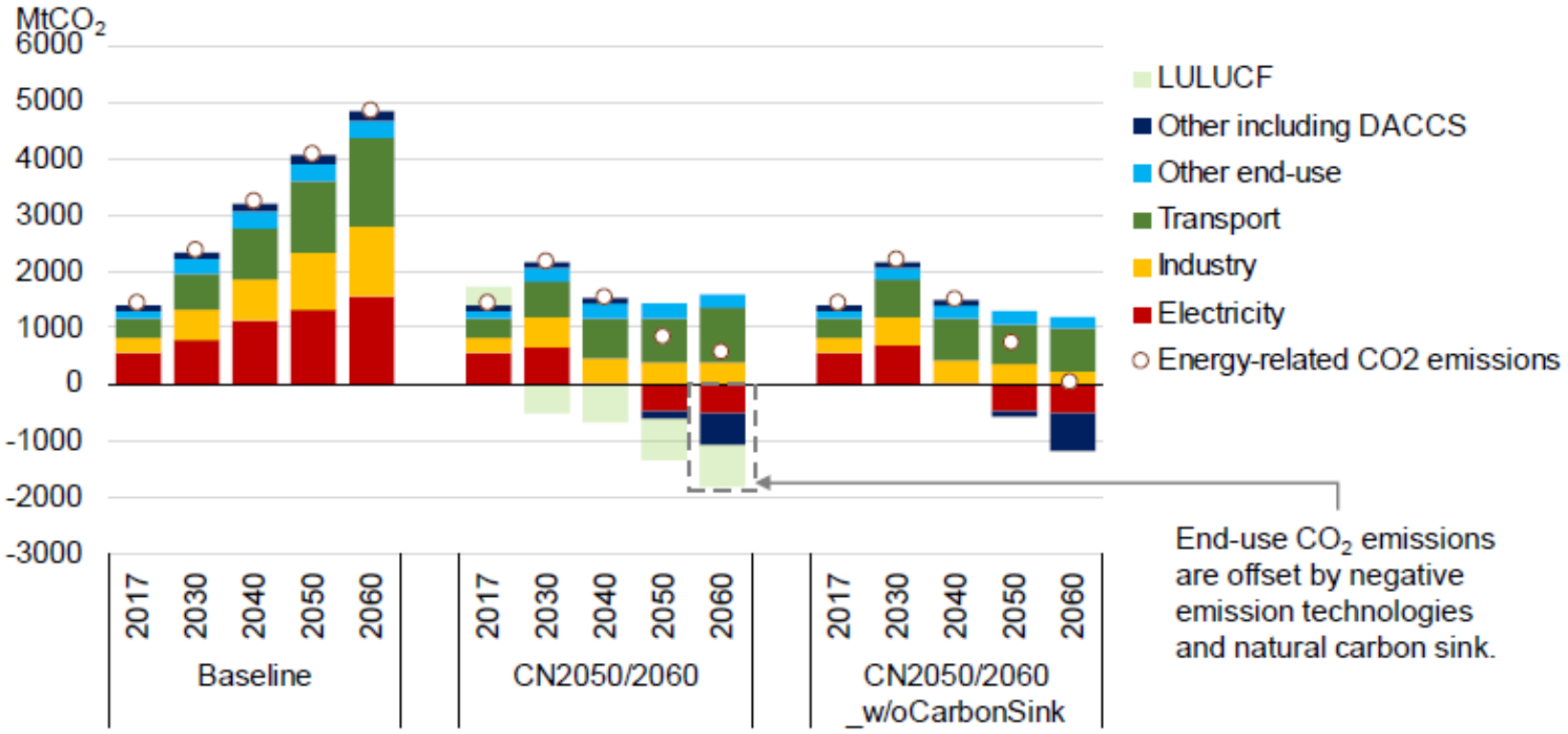
Note: *CN2050/2060_w/oCarbonSink* is the case we initially assumed. We had discussions with ASEAN countries based on the initial results, and developed *CN2050/2060* reflecting each country's comments.



ASEAN Carbon Neutrality Scenario (2)

- **ERIA and IEEJ is simulating cost-optimal deployment of energy technologies for achieving 2060 carbon neutrality in the ASEAN region.**
- **Solar PV, onshore and offshore wind, hydro, geothermal, biomass, nuclear, CCUS, hydrogen, ammonia, DACCS and BECCS are incorporated based on various assumptions.**

Sectoral energy-related CO_2 emissions in ASEAN

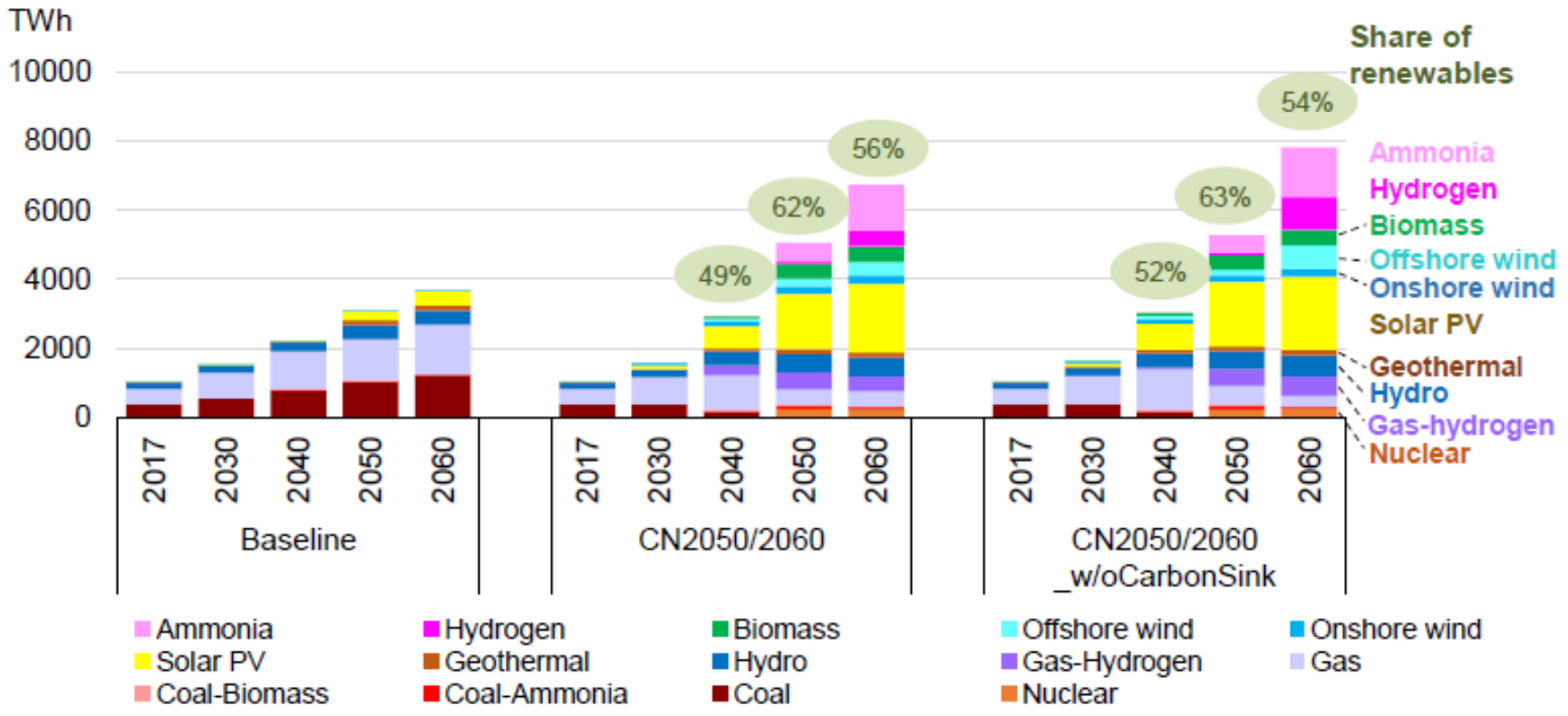


Source: ERIA/IEEJ Decarbonization of ASEAN Energy Systems

ASEAN Carbon Neutrality Scenario (3)

- **RE becomes the main power source in the CN 2060 accounting for 54-56% in 2060**
- **Hydrogen and ammonia including cofiring will be a part of decarbonization of power sector after 2040.**

Power generation in ASEAN

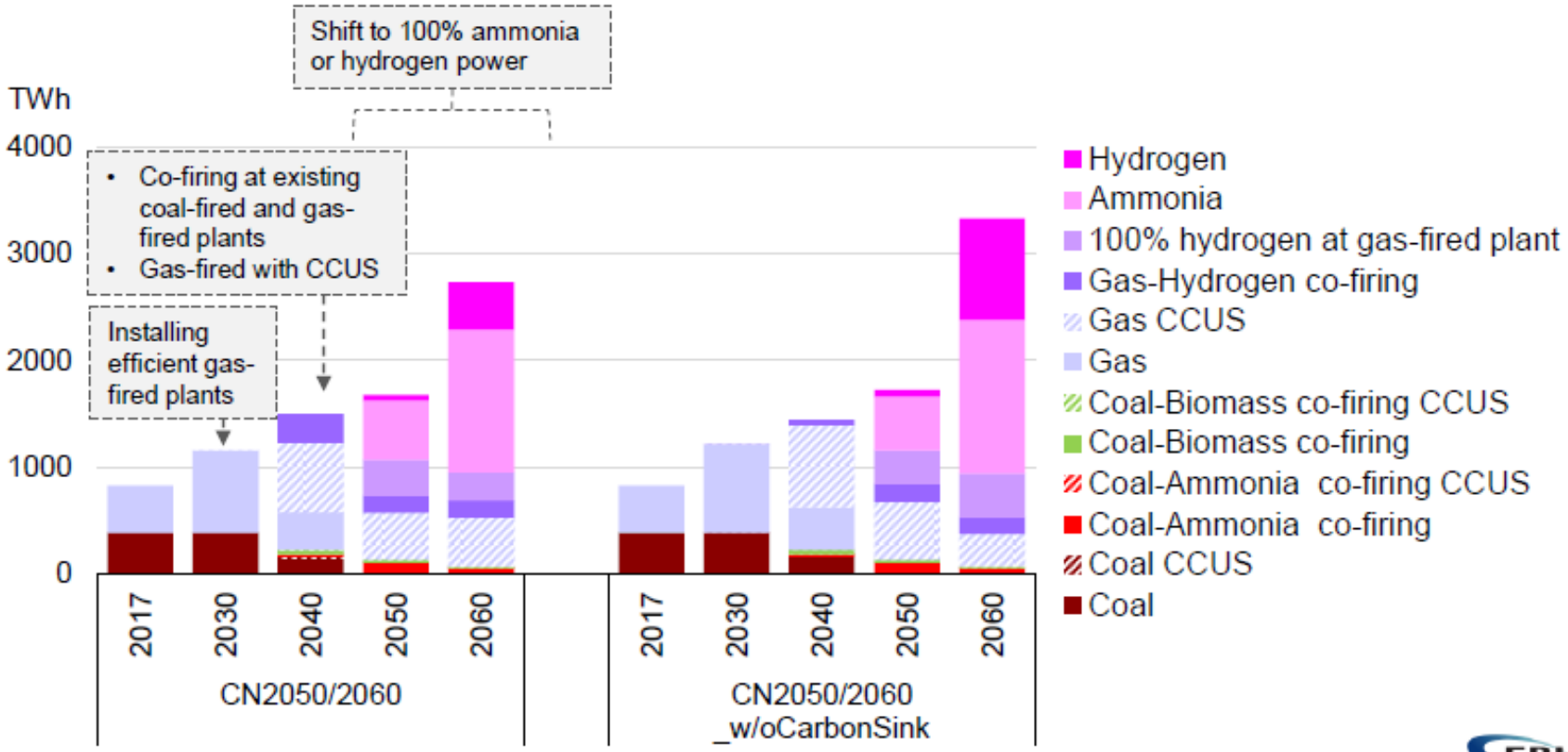


Source: ERIA/IEEJ Decarbonization of ASEAN Energy Systems

ASEAN Carbon Neutrality Scenario (4)

- In the short-mid term, efficient gas fired plants will curb CO2 emissions from fossil fuel power generation.
- In the longer-term, CCUS, cofiring with ammonia or hydrogen and 100% ammonia and hydrogen will play vital role.

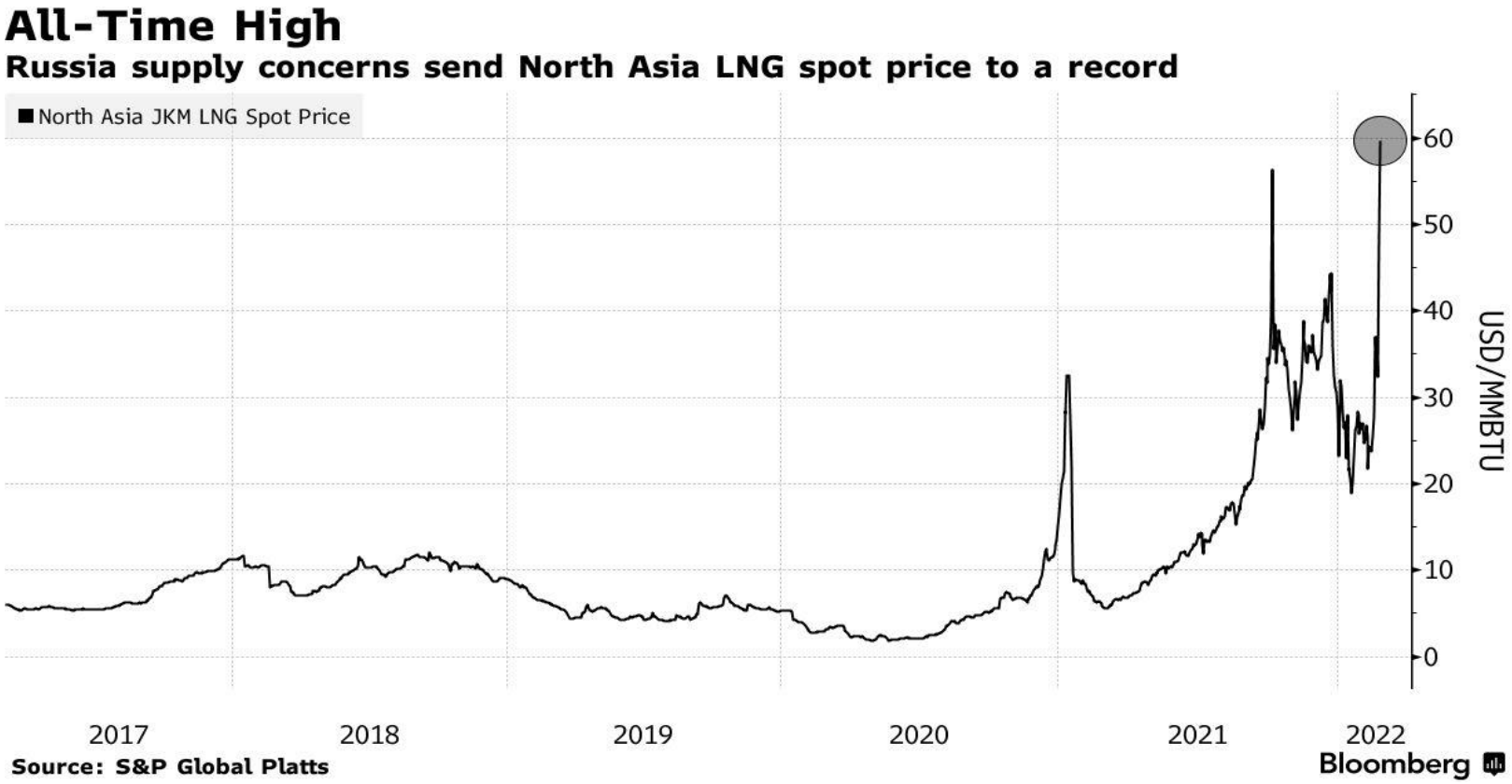
Power generation from coal, gas, ammonia and hydrogen in ASEAN



Source: ERIA/IEEJ Decarbonization of ASEAN Energy Systems

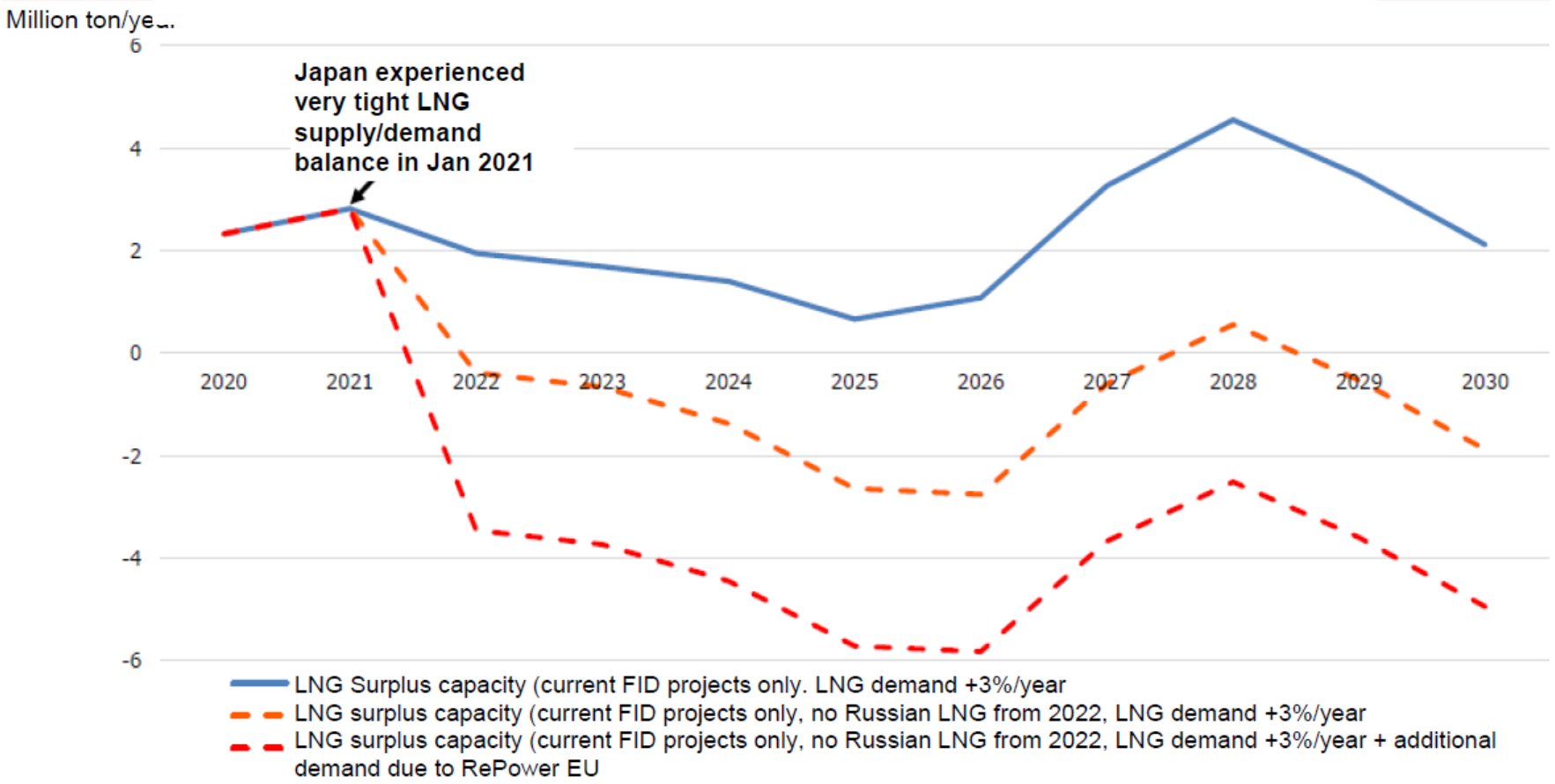
Gas Price Hike Could Delay Fuel Switching

- On-going gas price hike amid Ukraine War could discourage fuel switching from coal to natural gas, which is low-hanging mitigation opportunity for the region.
- Coal could stay longer than previously anticipated in the Asian energy mix



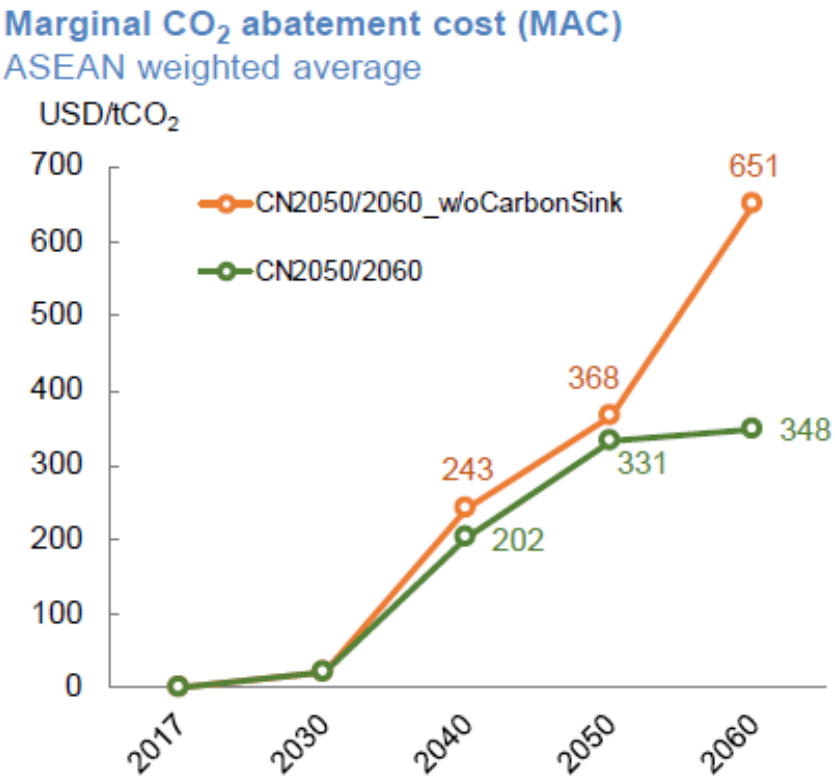
LNG Surplus Capacity at Risk

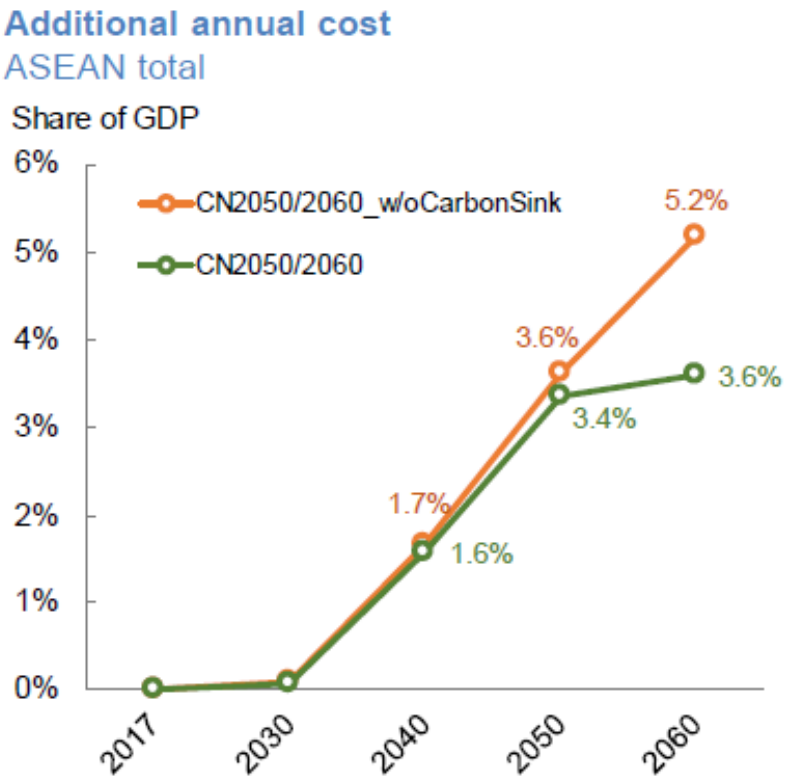
- Declining LNG surplus capacity could lead to harsh competition over limited amount of LNG and high LNG price.
- Upstream investment in LNG is absolutely necessary. Financial institutions' hesitant posture to fossil fuel investment due to decarbonization could discourage fuel switching from coal



ASEAN Carbon Neutrality Scenario (5)

- **Marginal abatement cost would be 348 USD per tCO_2 in the *CN2050/2060*, and 651 USD in the *CN2050/2060_w/oCarbonSink*, implying economic challenges for net zero emissions.**
- **Additional annual cost from the *Baseline* to the *CN2050/2060* and the *CN2050/2060_w/oCarbonSink* is estimated to be about 3.6% and 5.2% of ASEAN GDP in 2060.**



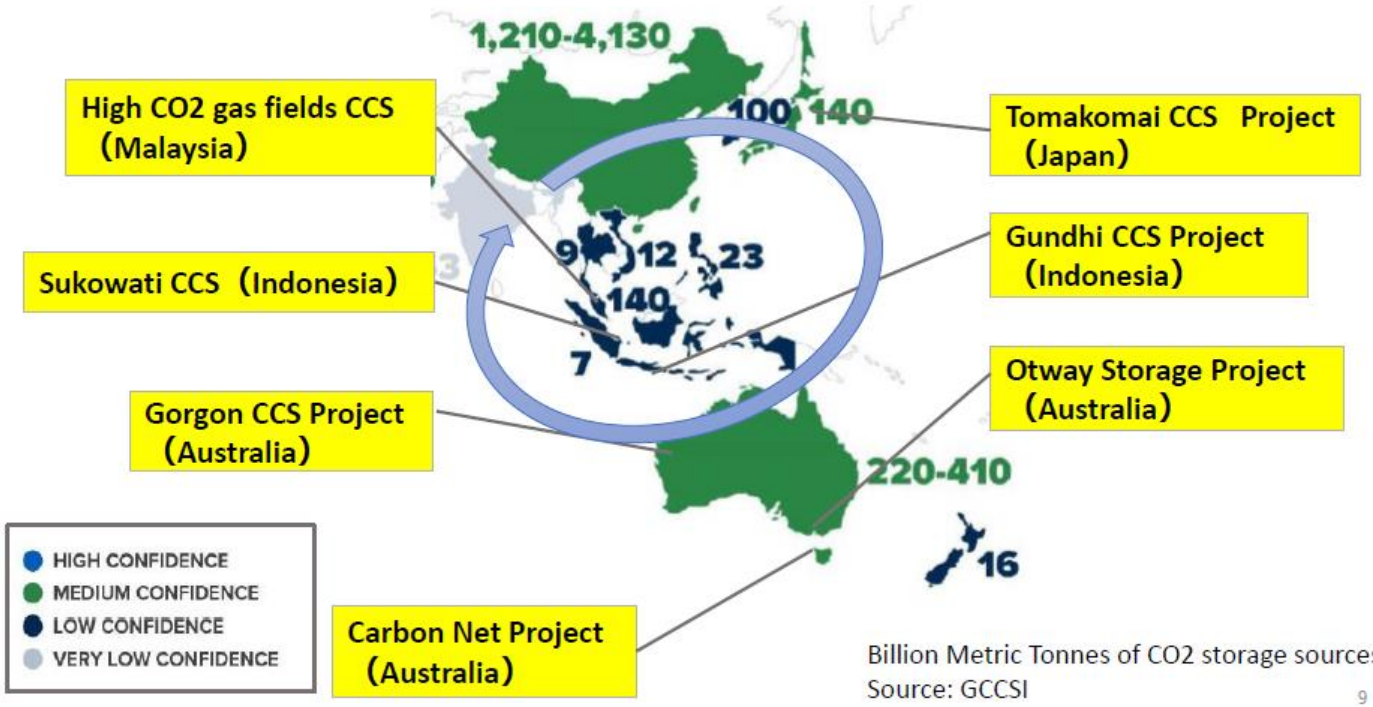


Note: The costs presented here do not include costs to enhance emissions reductions in the LULUCF sector.

ERIA

Asia CCUS Network

- **CCUS is indispensable component of regional carbon neutrality. ASEAN region has abundant storage capacity.**
- **Asia CCUS Network aims at (1) CCUS knowledge and experiences sharing, potential survey, (2) common rules and developing projects and (3) realizing storage network throughout Asia**
- **Following the First Asia CCUS Network Forum on 22-23 June 2021, co-hosted by ERIA and METI Japan, 4 Workshops, capacity building course, research work have been conducted**



Conclusion

- **Global scenario is useful exercise but may not be relevant for individual region or country.**
- **Following the Glasgow Climate Pact, the ASEAN countries are making vigorous efforts for energy transition towards carbon neutrality.**
- **Pathways towards carbon neutrality could be diverse among countries. One size does not fit all. Each country's specific national circumstances must be taken into account.**
- **Availability, accessibility and affordability of energy supply is the most fundamental requirement for the ASEAN countries**
- **In pursuing their respective carbon neutrality goals, the ASEAN countries need to explore a variety of options and utilize all fuels and all technologies. Their decarbonization pathways also needs to ensure other policy objectives, namely, availability, accessibility and affordability.**
- **Global energy crisis due to the Russia-Ukraine War is making simultaneous achievement of energy security, affordability and decarbonization more challenging. Gas price hike could delay fuel switching. Timely investment for alleviating energy supply crunch is essential.**
- **ASEAN region should advocate the necessity of step-wise and pragmatic energy transition and underpinning finance.**