KAPSARC
مركز الملك عبدالله للدراسات والبحوث البترولية
King Abdullah Petroleum Studies and Research Center

SMOOTH & ORDERLY ENERGY TRANSITION POLICIES TO BALANCE OUT USE OF FOSSIL FUELS

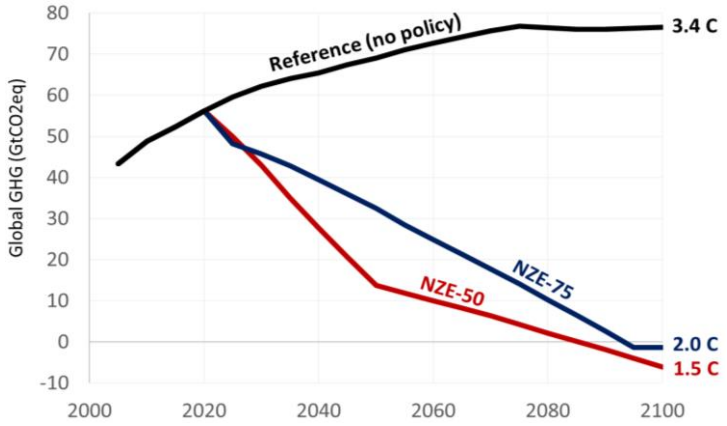
Fahad Alajlan

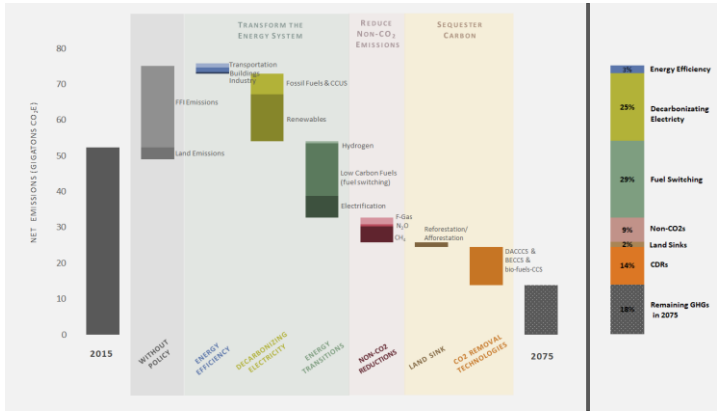
IEEJ/APERC International Energy Symposium
April 27, 2023

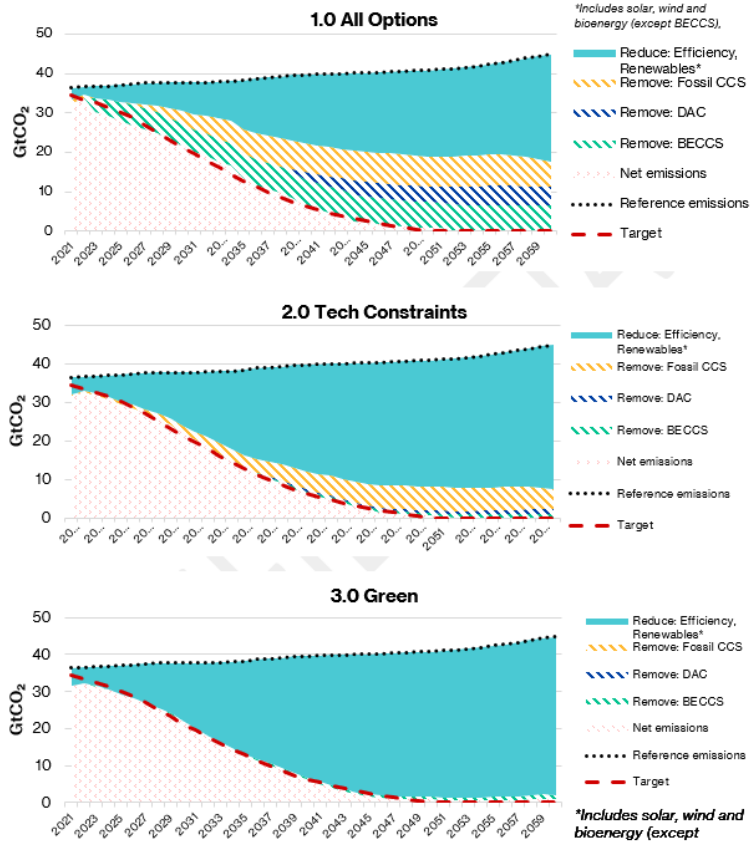
At KAPSARC, we have been developing Circular Carbon Economy (CCE) Scenarios that are compatible with the Paris Agreement

CCE scenarios are less costly than scenarios that limit the suite of technology options.

Limiting ourselves at the outset to a narrower set of technologies by restricting DAC, BECCS, fossil fuel CCS and nuclear power carries a significant risk.



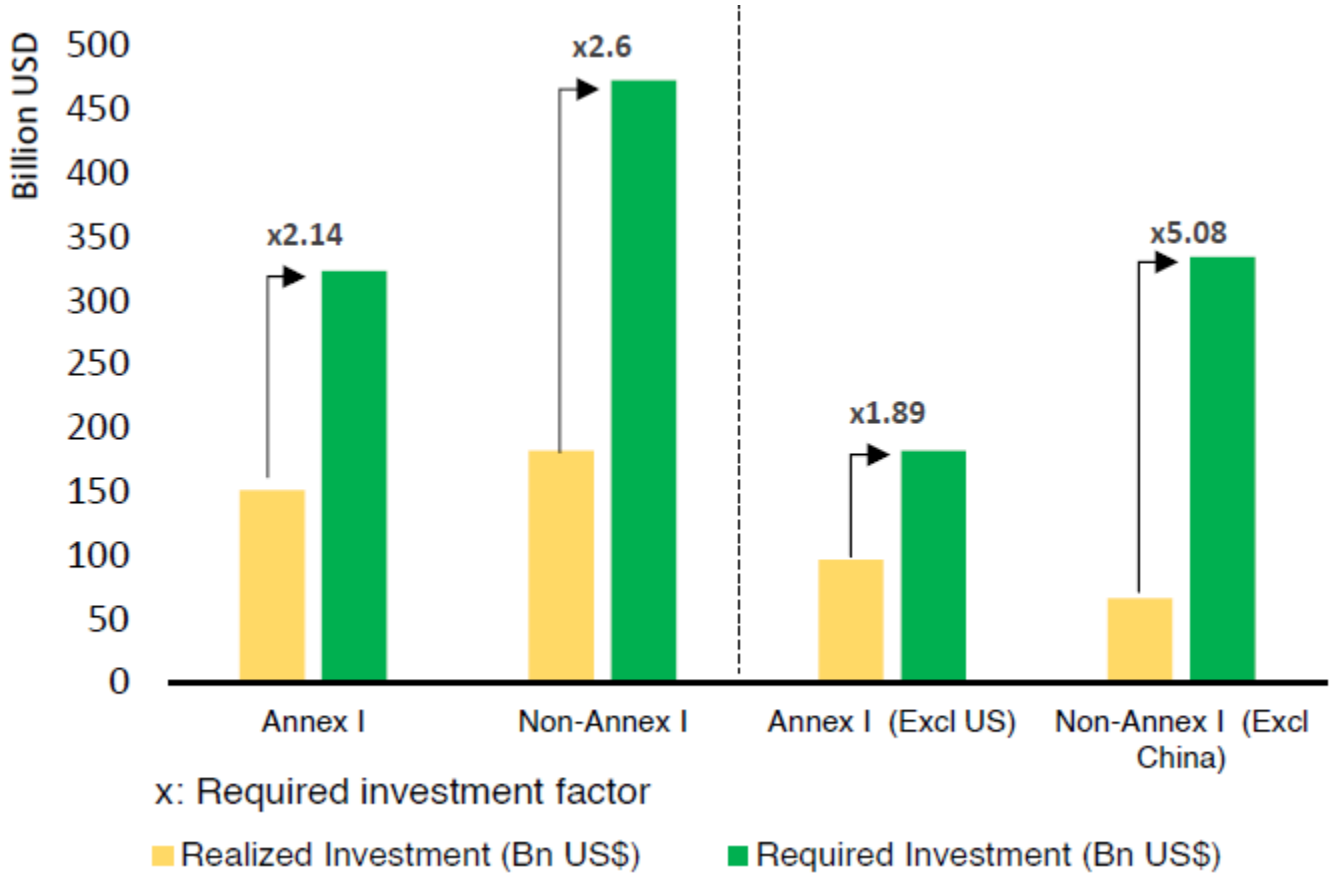




CCE Scenarios that are consistent with the NZE targets using GCAM-KSA and MOCCE

Sustainable Energy Investment Gaps

Sustainable energy investment gaps by country groups

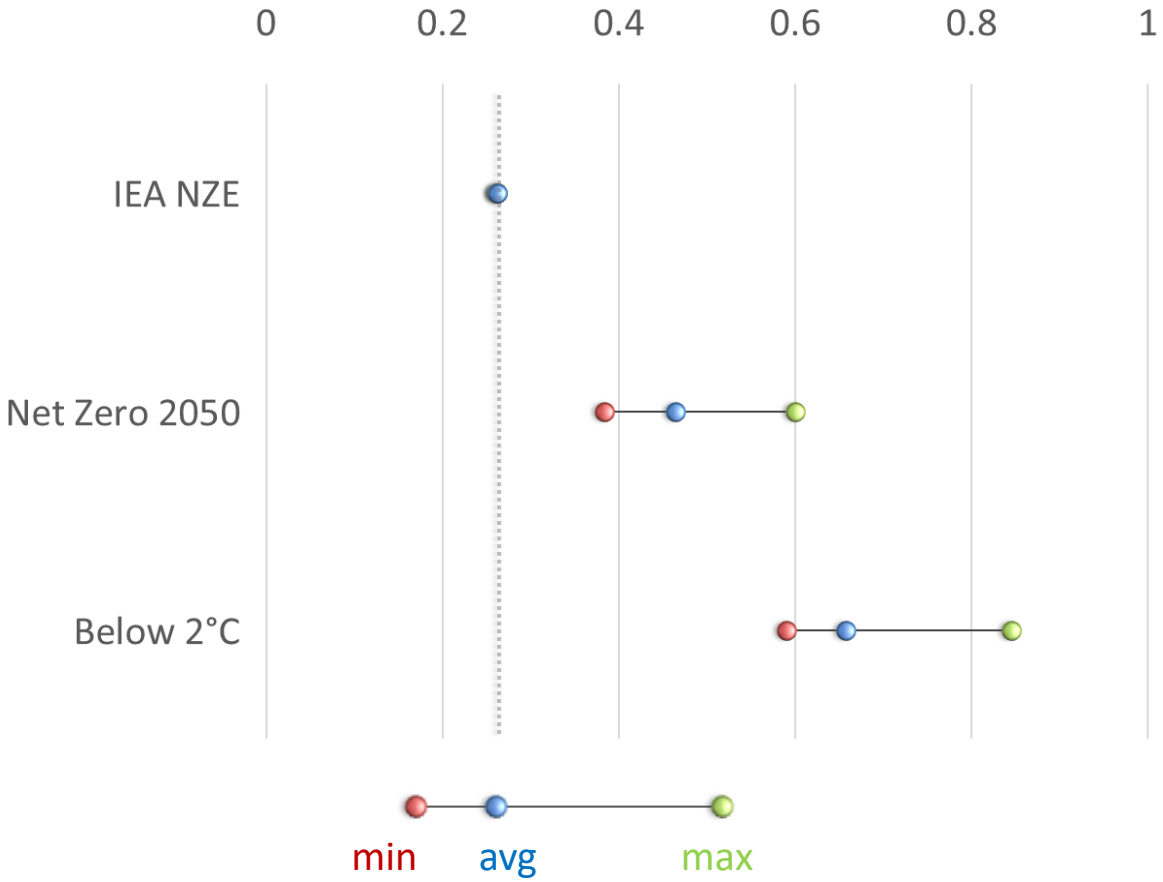


Source: KAPSARC calculation from Bloomberg, World Bank and Ou et al. (2021).

Note: Realized investment is the average sustainable energy transition investment flows into the power sector between 2019 and 2021, from Bloomberg. The required investment is the average investment flow needed to achieve the Paris Agreement-compatible scenario in the model. "x" is the additional investment needed to achieve the required level. Annex classification is based on the UNFCCC. Sustainable energy transition investment numbers in the figure include hydro, geothermal, bioenergy, solar, wind and nuclear investments. CCUS investments are not included due to data shortages.

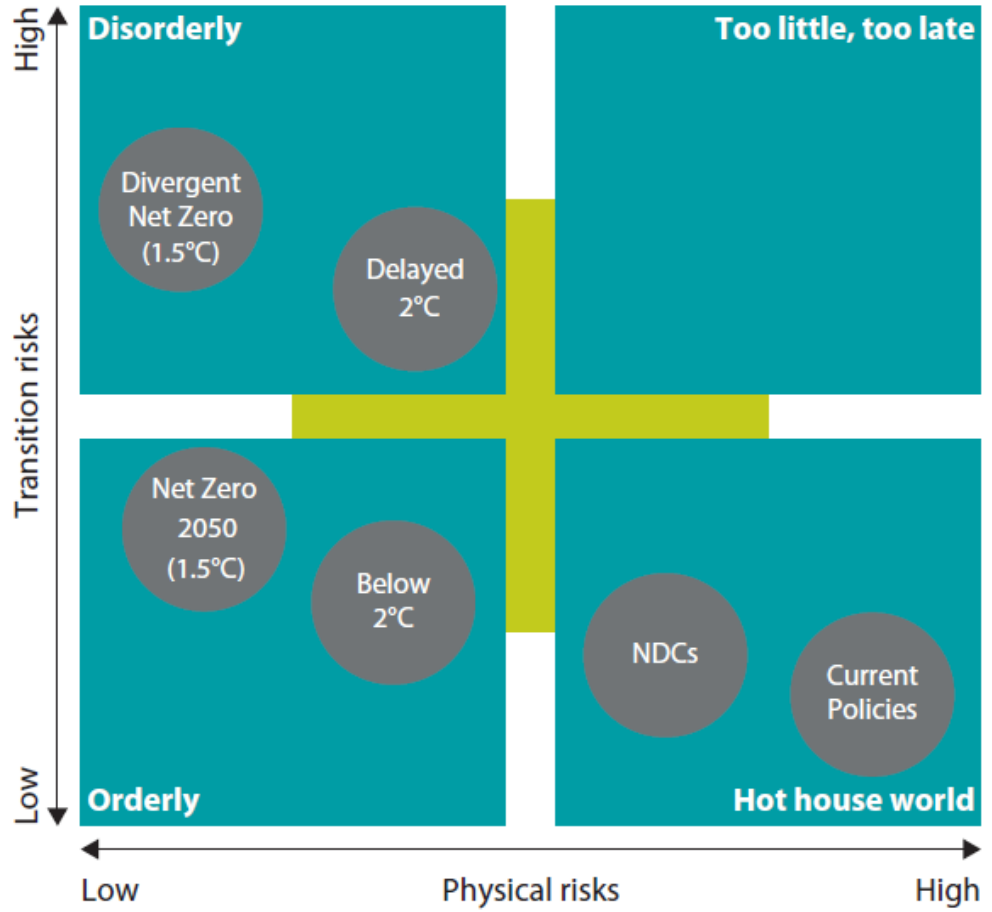
IEA NZE 2050 Adopts a Pessimistic Outlook for Global Oil Demand in Comparison to Other Scenarios

Global oil demand in 2050/Oil Demand in 2020



Source: Richters et al., 2021 (NGFS)

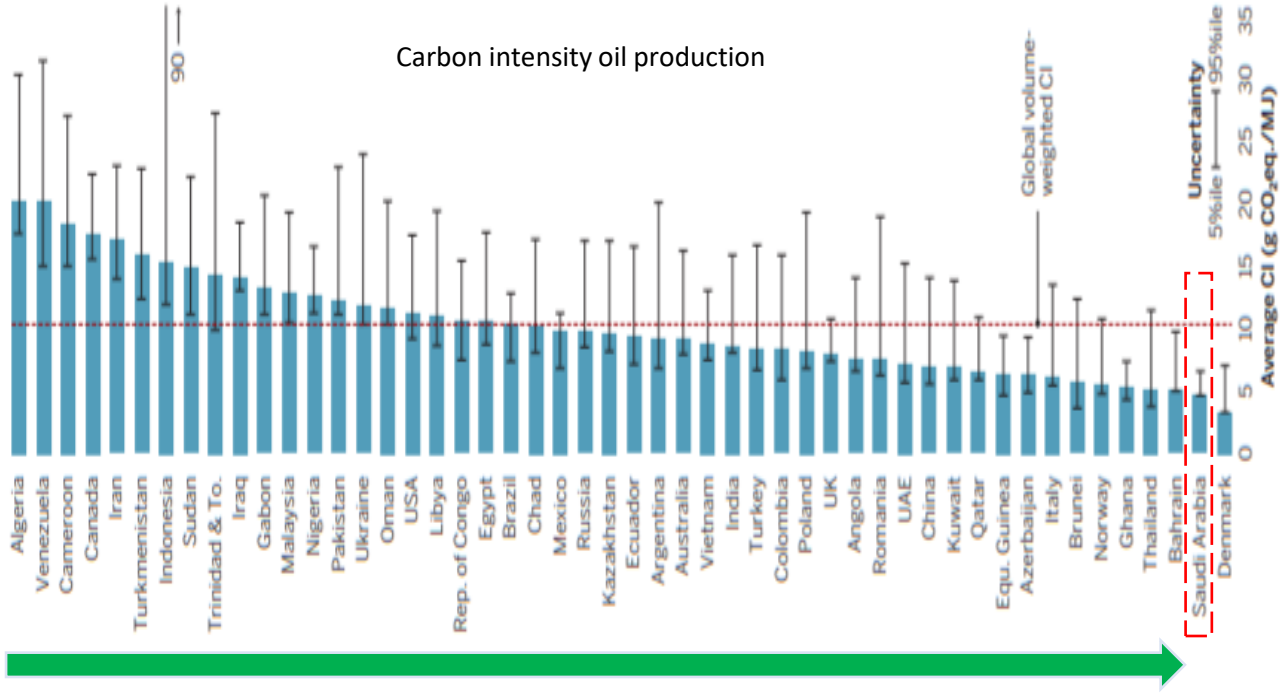
NGFS scenarios framework



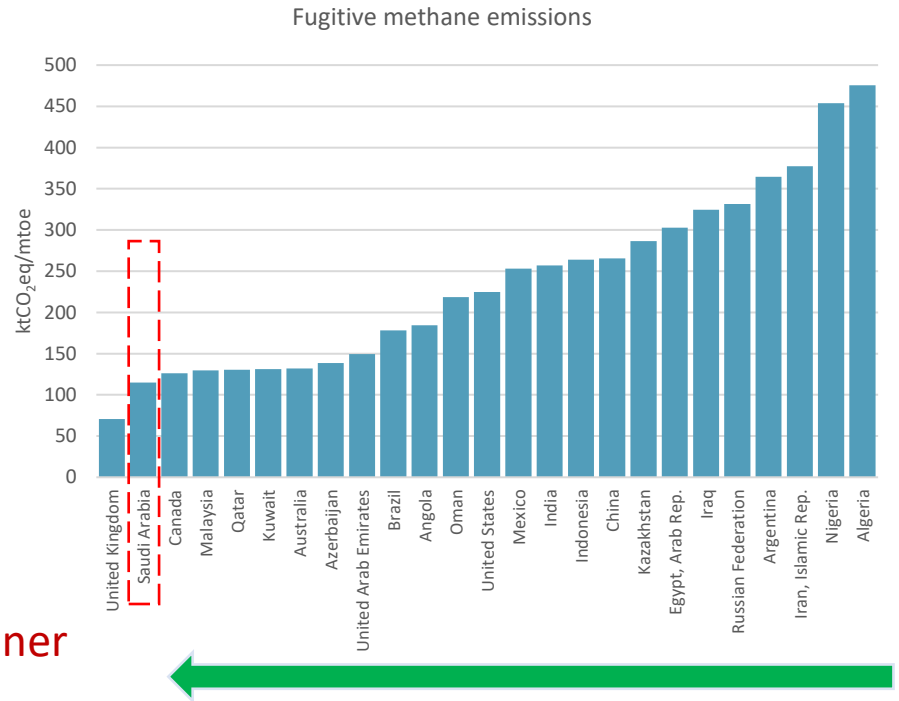
Positioning of scenarios is approximate, based on an assessment of physical and transition risks out to 2100.

The Middle East Region (& KSA) Will Play A Key Role In Supplying A Bigger Fraction The Needed Oil

Saudi Arabia and other Middle East Producers is among the lowest GHG emissions intensity for oil production in the world



Cleaner



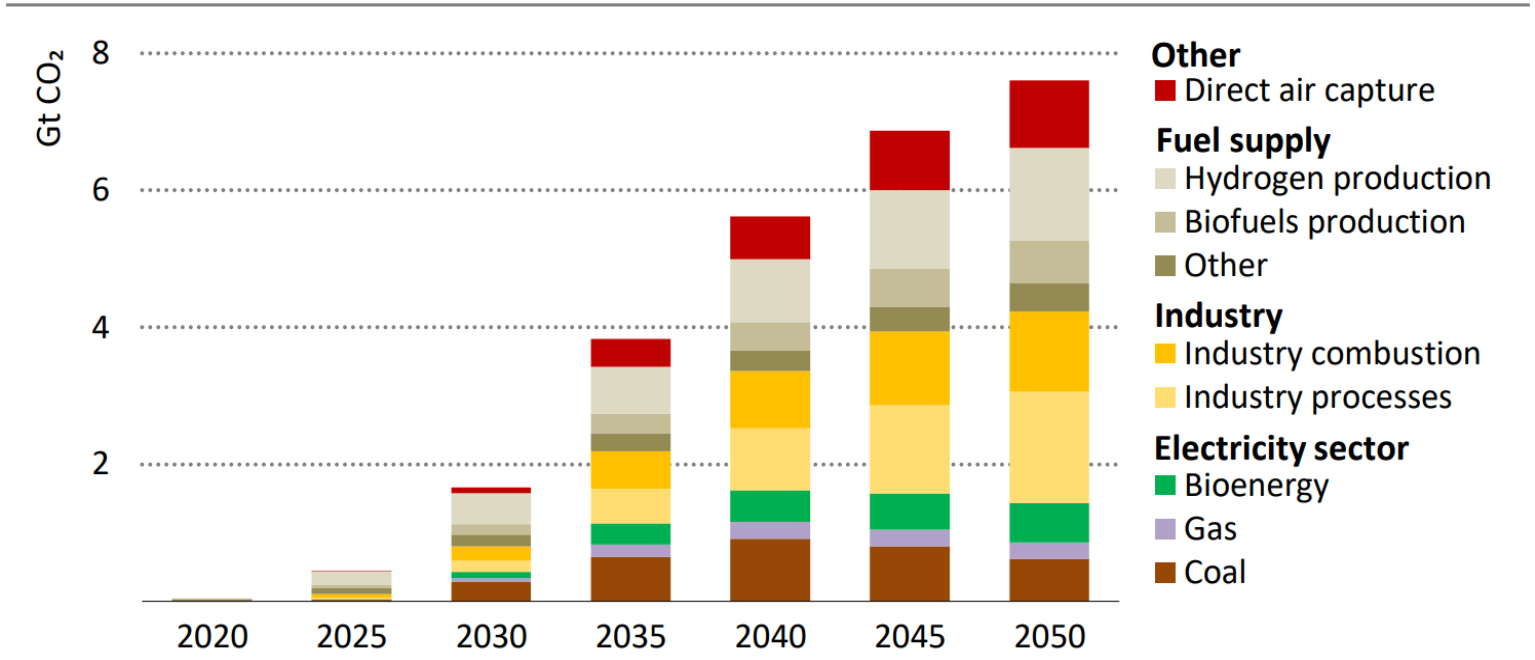
Crude Carbon Intensity
Source: SCIENCE Magazine

Source: IEA, 2022

CCUS is a critical component of IEA's NZE scenarios

According to the IEA Report on "NZE by 2050" released in 2021

- CCUS is listed among the seven pillars of a successful energy transition, particularly critical for the decarbonization of hard-to-abate sectors and producing clean hydrogen
- Cost-effective interim solution for the decarbonization of current infrastructure that can also mitigate transition risks for financial stability
- Without CCUS technologies, an additional US$15 trillion investment would be needed in renewable energy to achieve the same level of emission reductions.



The **Figure** shows that by 2050, under the NZE scenarios, total CO2 captured capacity will reach to of 7.6 Gt:

- 50 % from fossil fuel combustion
- 20% is from industrial processes
- 30% is from bioenergy use with CO2 capture and DAC

Source: IEA (2021)

Thank you
for your attention

Contact : report@tky.ieej.or.jp