

SEE P7-01

24th IAEA Fusion Energy Conference, San Diego, 8th – 12th October 2012

Long-Term Impact of the Fukushima on the Prospect of the Fusion Power in Korea: TIMES Model Approaches for the Electricity Sector

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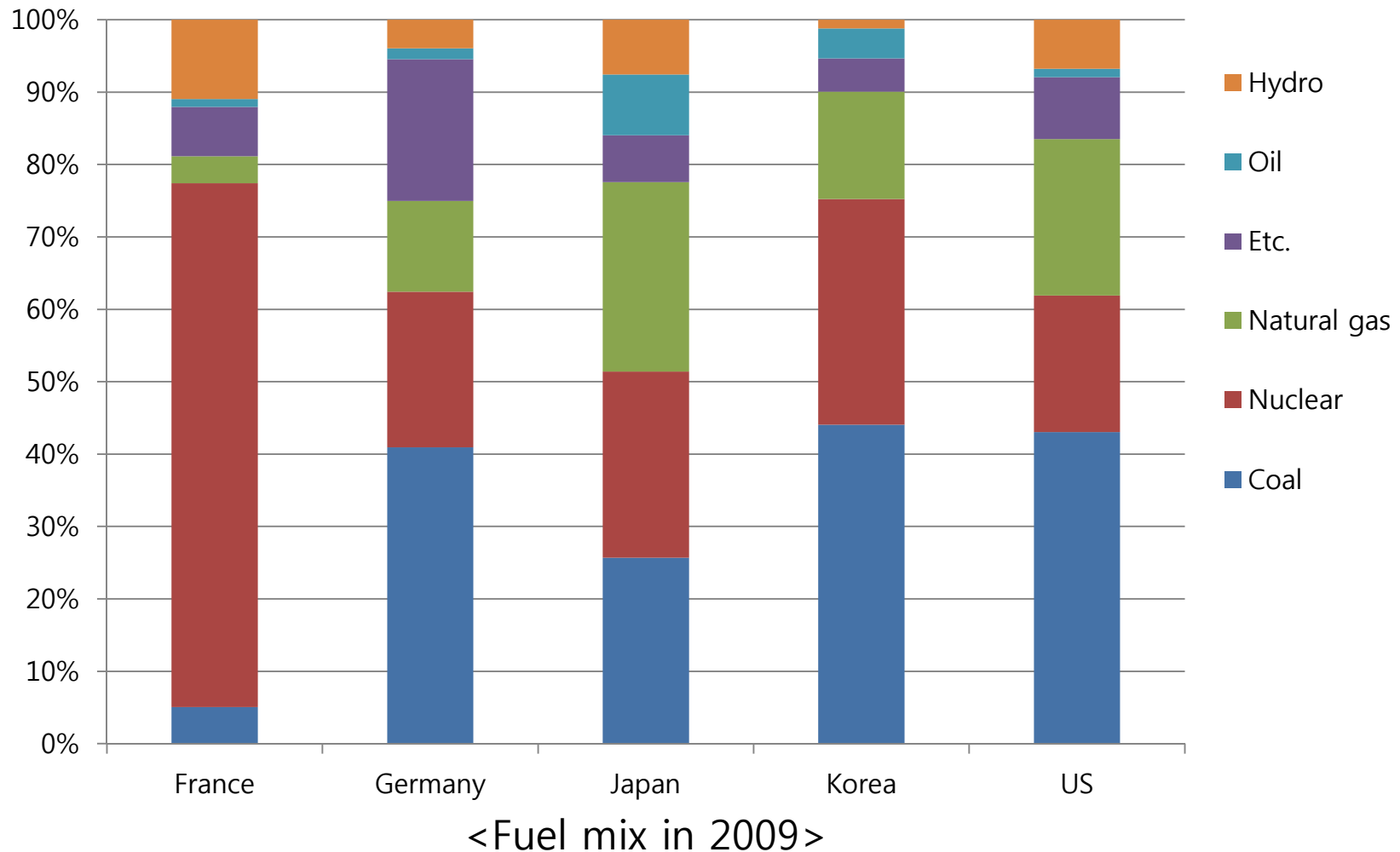


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Motivations



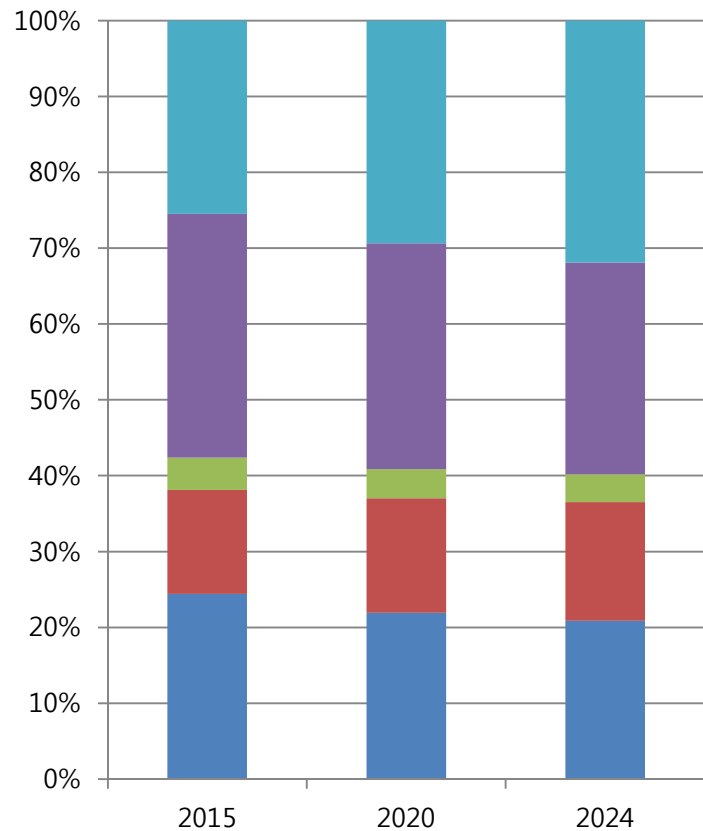
- ✓ The fuel mix of each countries depend on their circumstance.



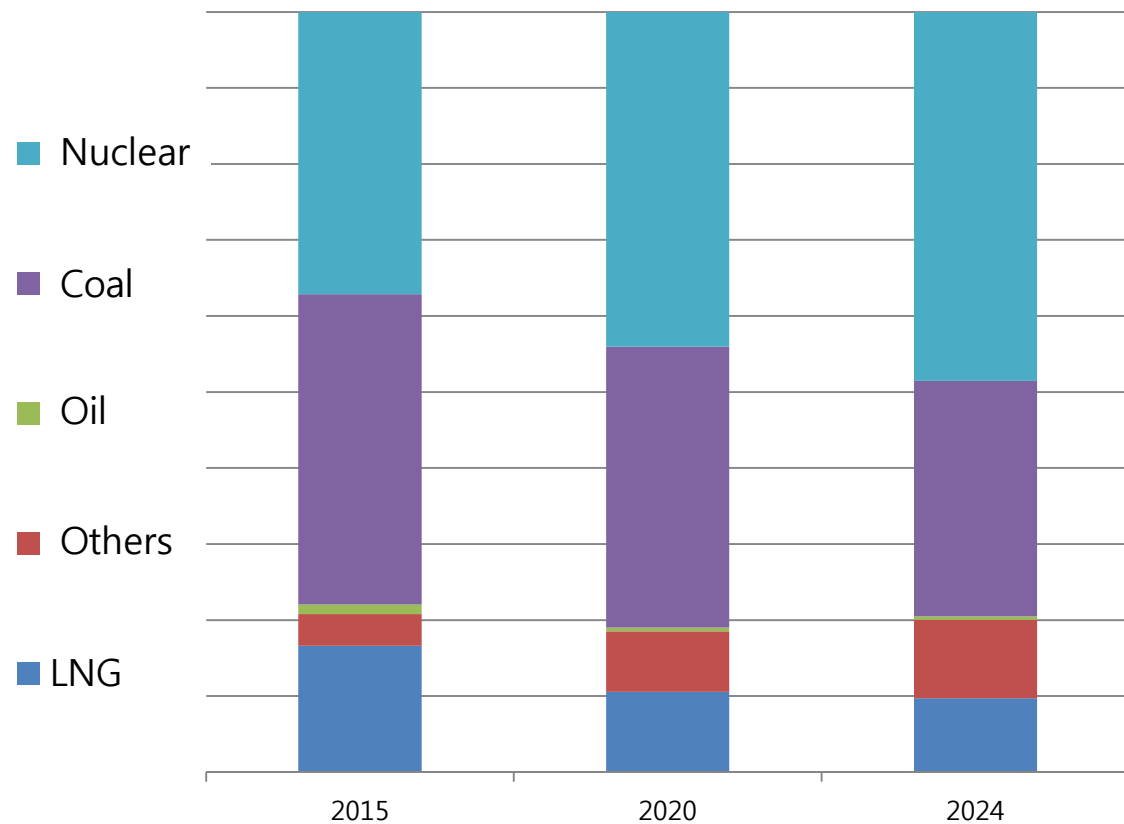
Motivations



- ✓ Nuclear 48.5%, coal 31%, LNG 9.7% and renewable 8.9% in 2024(Korean government forecast)



<Ratio of generation capacity>



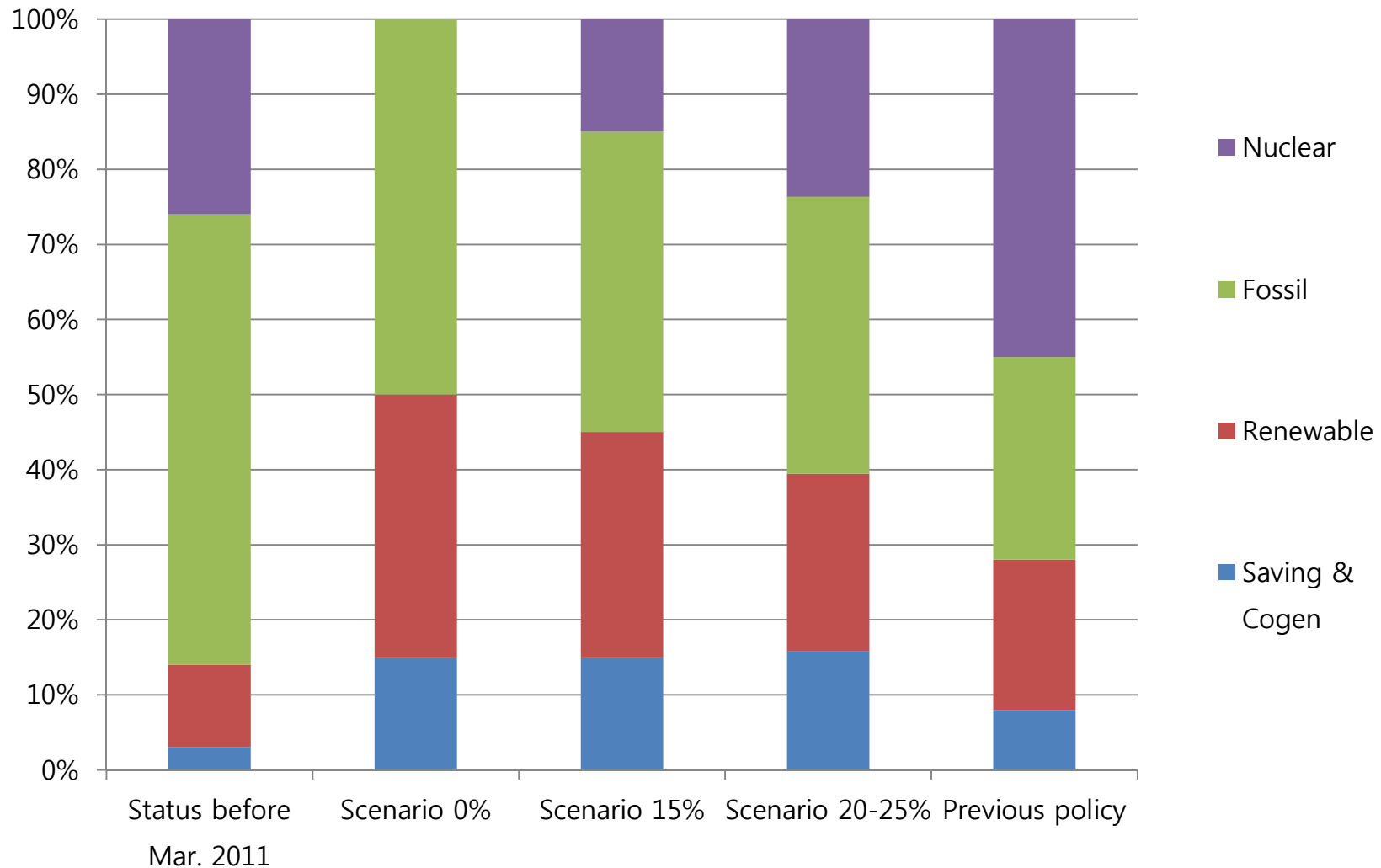
<Share of electricity generation>

- ✓ What will happen in 2040 and beyond?

Motivations



✓ Though it was not cleared, public of Japan wants to move 0 nuclear.



Motivations



- ✓ Main assumptions of OECD/IEA (2011; WEO)
 - ❖ No new nuclear reactors are built beyond those already construction in OECD countries.
 - ❖ 50% of planned nuclear power capacity are added in non-OECD countries.
 - ❖ No life time extensions of nuclear power plant.

Motivations

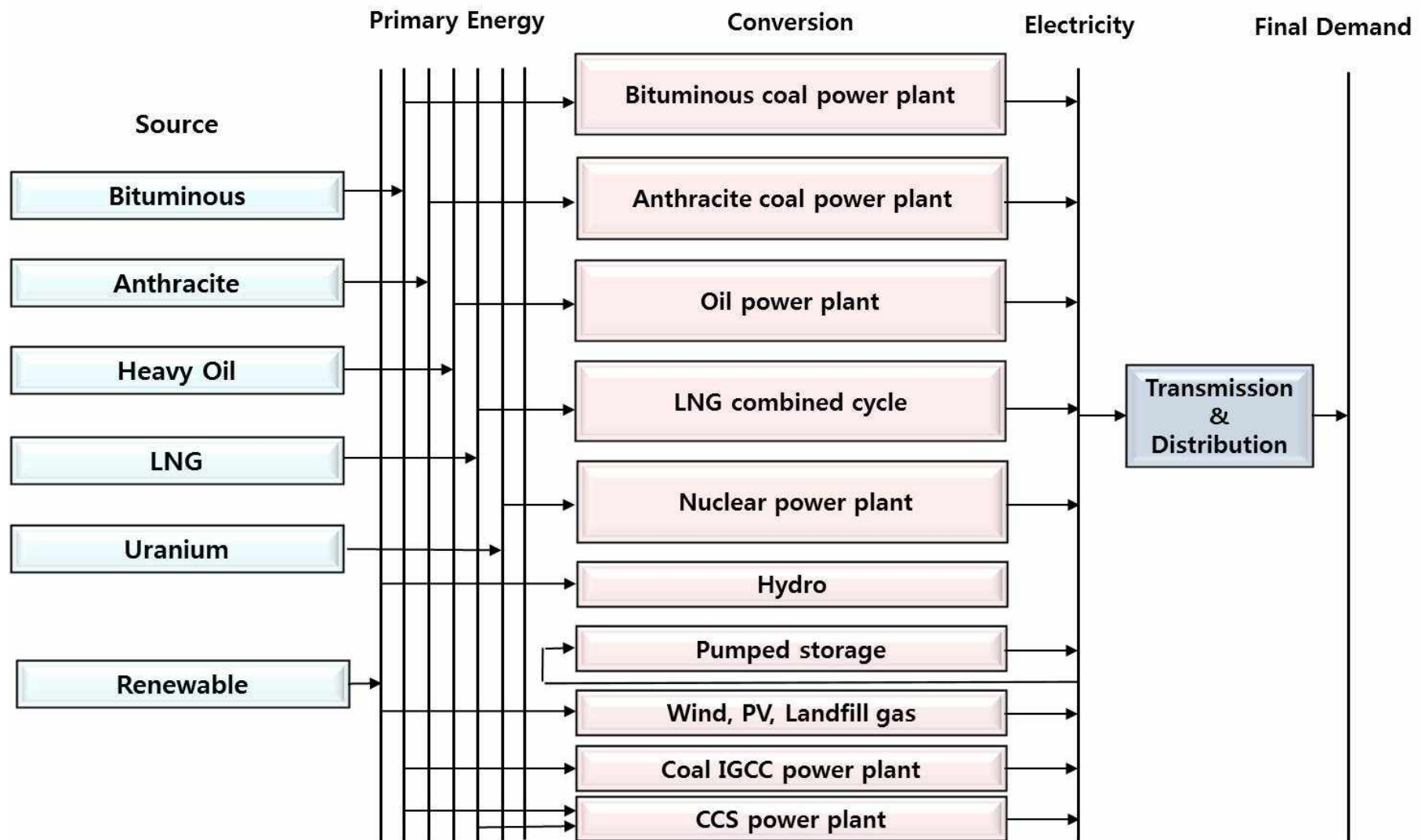


- ✓ Research questions
 - ❖ What will happen under some assumptions in Korea in the long-term?
 - fuel mix, capacity addition and other indicators
 - ❖ Can the fusion be a competitive option?

Reference Energy System



- ✓ RES of the TIMES(The Integrated MARKAL-EFOM System) model



Assumptions

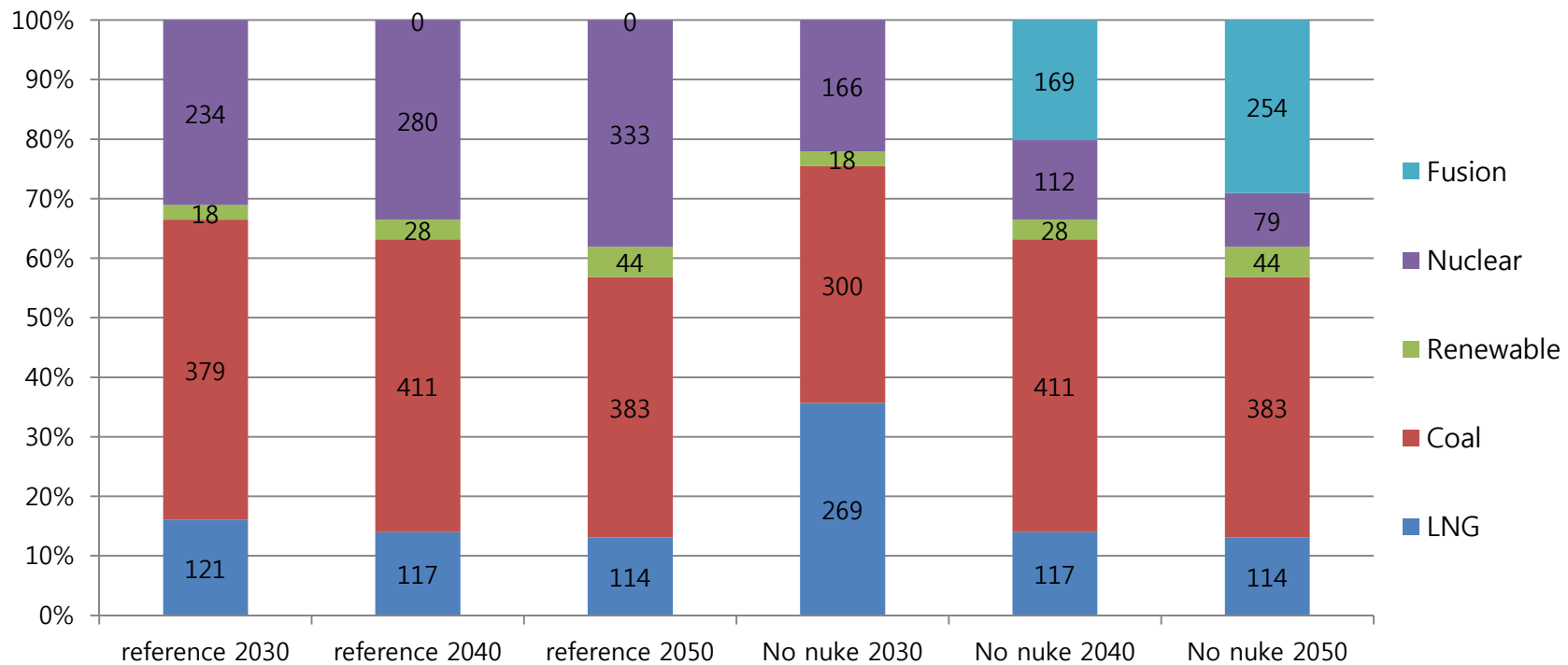


- ✓ Reference scenario
 - ❖ Carbon constraints are set to reduce emission by 3% in 2012, 13.4% in 2020, and 50% in 2050 compared to the emission level in 2000.
- ✓ No nuke scenario
 - ❖ No new reactors are built beyond those already under construction and government confirmed plants.
- ✓ Carbon constraints are assumed to mitigate from 50% to 20% or from 50% to 35%, by 2050, with two scenarios.
- ✓ Emerging power technologies, such as CCS, IGCC, and fusion, are competed with conventional technologies.
 - ❖ The installation capacity of CCS is limited to 10% of installed fossil power plants due to the availability of carbon storage.

Results – Generation of electricity



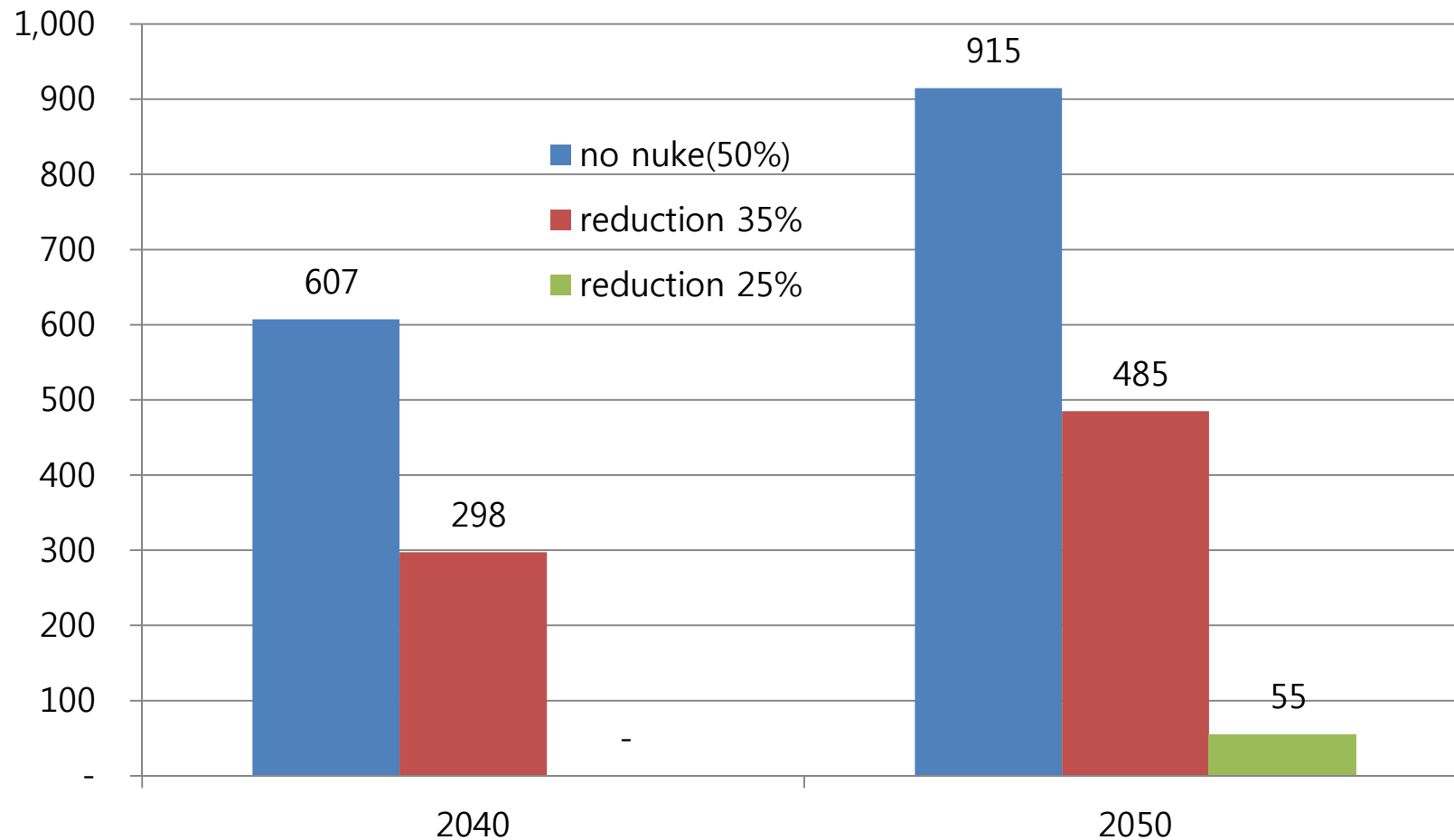
- ✓ In 'base' case;
 - ❖ Market penetration of fusion is not allowed.
- ✓ In 'no nuke' case;
 - ❖ Share of fusion is more than 20% in 2040.
 - ❖ Share of LNG is substantial in 2030.



Results – Generation under CO₂ constraints



- ✓ Sensitivity analysis of CO₂ constraints
 - ❖ Carbon constraints is critical factor to ensure fusion penetration.



Concluding Remarks



- ✓ The MARKAL-TIMES model results show that a significant share of fusion power will penetrate into the electricity energy systems.
 - ❖ No more nuke scenario + Higher CO₂ mitigation scenario
- ✓ In no more nuke scenario;
 - ❖ Share of gas power can be substantial without alternative baseload like fusion.
 - ❖ And if cheap gas (such as shale gas) enter into the Korean market, share of gas power will dramatically rise.



**Thank you
for your attention!!**

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