

Estimation of Flexibility Resources for Power System Stabilization under a Long-term Low Carbon Scenario

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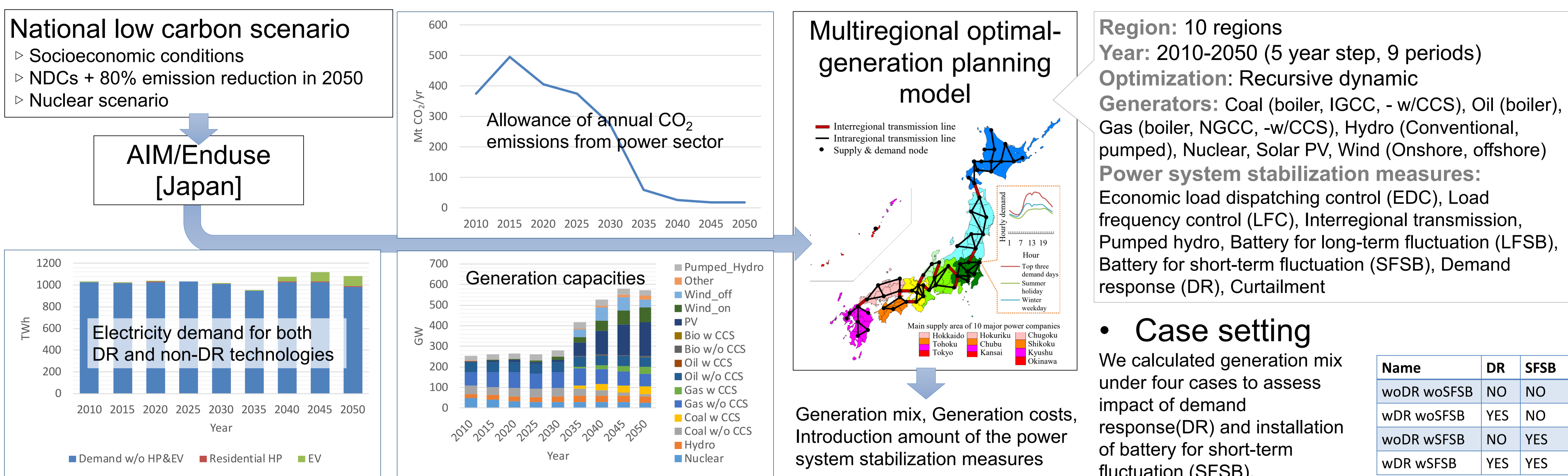
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Introduction

- Power system stabilization measures are indispensable under the large deployment of variable renewables.
- A power dispatch model, commonly used for power system analysis, is impossible to estimate the amount of future potential of demand response (DR) technologies and power demand under low-carbon target.
- In this research, **we estimated the introduction amount of the power system stabilization measures under the long-term low carbon scenario by combining the information of the technology selection model with the power dispatch model.**

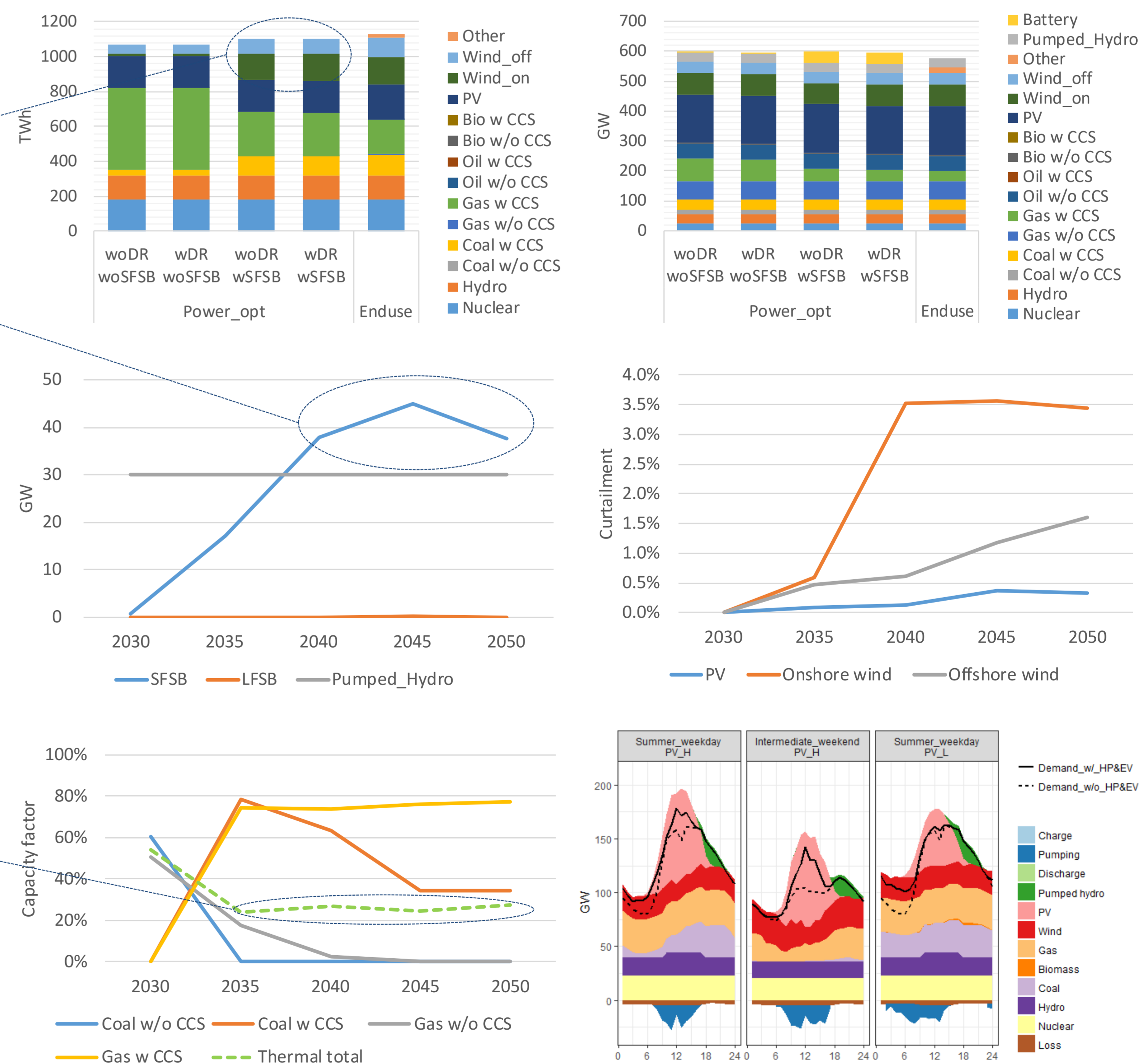
Methods

- Technology selection model (AIM/Enduse [Japan]) → estimates conditions under national low carbon scenario
- Power dispatch model (Multiregional optimal-generation planning model) → estimates the impact of power system stabilization measures



Results

- **Battery for short-term fluctuation is key to increase share of onshore/offshore wind.**
- It was necessary to introduce **battery for short-term fluctuation of the scale exceeding the current amount of pumped-storage** in 2040.
- Introduction of system stabilization measures such as **batteries and DR could increase the capacity factor of gas thermal power plants by 3.5 - 6.1%.**
- Despite the improvement of capacity factor of gas thermal power plants, the **capacity factor of thermal power plants would decrease to 25% after 2035** due to the high share of variable renewables.



Discussion

- Since stand alone technology selection model abstracts short-term fluctuation by variable renewables, combining the information of the technology selection model with the power dispatch model is necessary to present concrete future power system under long-term national low carbon scenario.