

A Study on Nuclear Scenarios of Korea using GCAM

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Overview

Korean government declared the first National Energy Master Plan indicating that her objective to relieve dependency on imported fossil fuels through the promotion of nuclear power up to 41% of total power capacity. [1] This paper analyzes the effect of the promotion of nuclear power in Korea by 2095 compared with the scenario of maintaining nuclear power generation system in 2005 with the application of Global Change Assessment Model (GCAM).

Method

We construct three nuclear scenarios based on the reported nuclear power capacity and nuclear energy target in primary energy. The Scenarios are 2005 Scenario, BAU scenario and Government Target Scenario. The 2005 Scenario is a case of maintaining nuclear power generation system of 2005. This is used as a baseline of calibration in this analysis. The BAU scenario is a case of maintaining the nuclear power plants construction plan of the 6th Basic Plan which the nuclear power capacity would be 35,916MW by 2027. [2] And the Government Target Scenario is a case of attaining government's the primary energy target which would share 28% of total primary energy in 2030. The following table shows the remarks of each scenario.

Table 1 The Remarks of Each Scenario

Scenarios	Remarks
2005 Scenario	Utilizes the actual generation data (GCAM baseline calibration)
BAU Scenario	Utilizes The 6 th Basic Plan's nuclear power plant construction plan
Government Target Scenario	Utilizes National Basic Energy Plan's nuclear energy target in primary energy.

GCAM, a bottom-up type of an integrated assessment model developed by PNNL (Pacific Northwest National Laboratory) is implemented to analyze Korean nuclear energy scenarios. GCAM permits to analyze the fourteen regionally detailed energy systems with various energy supply technologies. [3], [4], [5]

The results show that primary energy mix, GHG emission, and others. Comparing the result of each scenario, and the impact analysis of nuclear energy promotion and policies related to GHG emissions in a national and global context.

Expected Results

Preliminary results of developed scenarios show the substitute effects among primary energies sources. Compared to 2005 scenario, nuclear energy share in primary energy has been increased in BAU Scenario and that contributes to mitigate the GHG. Comparison of other scenarios with the Government Target, it is found to construct more nuclear power plants to meet the government's nuclear energy target. To achieve this target, the capacity of nuclear power plants has to be doubled or, even tripled, keeping capacity factor of about 95%.

References

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