**Project proposal**

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* 1. **objective/questions of your project;**
* Energy technologies have a tendency to become locked in. Mature technologies are favoured due to their accumulated experience and low costs, preventing the entry of new competitors into the market. Policies are important for creating diverity, discouraging lock-in and allowing new, superior technologies to grow. Small-scale and modular technologies are likely to be more responsive to these measures and prone to the rapid innovation needed to mitigate climate change(Trancik 2006).
* Under certain conditions, more granular technologies are empirically associated with faster diffusion, lower investment risk, faster learning, more opportunities to escape lock-in, more equitable access, more job creation, and higher social returns on innovation investment.(Wilson et al. 2020)
* a study that uses a dataset of cost overruns in 350 electricity generation projects found that investment risk tends to increase for larger hydro, nuclear, and thermal plants but to decrease for larger solar and wind plants.(Sovacool, Gilbert, and Nugent 2014)
  1. proposed scenarios;
* The proposed scenario targets only for electricity generation sector in South Korea.
* Coal power plants that are considered one of the main greenhouse gas emitters are replaced with granular technologies such as photovoltaic and wind.
* No modifications are needed for LNG. LNG power plants are expected to act as a buffer for fluctuating renewable sources.
* Given the government’s energy policy on nuclear power plant, we assume that SMR(small modular reactor) technologies are also introduced to achieve South korea’s net zero.
  1. methodology (assumptions, GCAM inputs to be used, edited);
  2. data required and sources of information;
* Not clear how the granularity of technology can be defined in GCAM.
* Can a technology diffusion speed be an input variable of GCAM?
* Can granular technogies compensate for expected stranded assets like coal power plants and other lumpy technologies?
  1. expected results and conclusions.
* Granular technologies can foster the decarbonization of south korea’s generation sector.

Sovacool, Benjamin K., Alex Gilbert, and Daniel Nugent. 2014. “An International Comparative Assessment of Construction Cost Overruns for Electricity Infrastructure.” *Energy Research & Social Science* 3:152–60. doi: 10.1016/j.erss.2014.07.016.

Trancik, J. E. 2006. “Scale and Innovation in the Energy Sector: A Focus on Photovoltaics and Nuclear Fission.” *Environmental Research Letters* 1(1):014009. doi: 10.1088/1748-9326/1/1/014009.

Wilson, C., A. Grubler, N. Bento, S. Healey, S. De Stercke, and C. Zimm. 2020. “Granular Technologies to Accelerate Decarbonization.” *Science* 368(6486):36–39. doi: 10.1126/science.aaz8060.

**Objective**: Understanding of the role and impact of granular technologies in achieving South Korea’s net-zero in 2050.

**Research question**: How can the implementation of granular technologies in energy sector contribute to achieving decarbonization, and what are the key challenges and opportunities associated with their adoption for effective decarbonization?