

System analysis of the capacity of electricity mixes
to support the decarbonisation of the economy

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Energy systems are becoming increasingly complex in order to meet carbon emission minimisation and to pave the way for electrifying the economy. It is important to ensure consistency between the policy considerations surrounding these issues and the technical constraints.

Decarbonizing society requires a strong and rapid increase in electricity generation, in the range of a factor of 2. This additional low-carbon electricity will be dedicated to direct electrification of usages and the production of energy molecules such as hydrogen, methanol, synthetic fuels, etc.

A minimal and robust approach has been developed to design and assess scenarios by handling orders of magnitude in a rigorous way, including taking into account the natural constraints imposed on the power system (conservation of energy, satisfaction of demand at each moment, realistic intermittency of variable renewables...).

For illustration, this approach is used to evaluate the capacity of a nuclear plus renewable electric mix to support a massive production of energy molecules.