

Energy storage solutions to decarbonize electricity through enhanced capacity expansion modelling

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Abstract-

To meet ambitious global decarbonization goals, electricity system planning and operations will change fundamentally. With increasing reliance on variable renewable energy resources, energy storage is likely to play a critical accompanying role to help balance generation and consumption patterns. As grid planners, non-profit organizations, non-governmental organizations, policy makers, regulators and other key stakeholders commonly use capacity expansion modelling to inform energy policy and investment decisions, it is crucial that these processes capture the value of energy storage in energy-system decarbonization. Here we conduct an extensive review of literature on the representation of energy storage in capacity expansion modelling. We identify challenges related to enhancing modelling capabilities to inform decarbonization policies and electricity system investments, and to improve societal outcomes throughout the clean energy transition. We further identify corresponding research activities that can help overcome these challenges and conclude by highlighting tangible real-world outcomes that will result from pursuing these research activities.

Index Terms-

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