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Techno-economic analysis of renewable energy generation at the South Pole

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Renewable energy sources are widely recognized for their ability to provide affordable, reliable energy with reduced environmental impact. The South Pole is the site of the both current and future HEP experiments and presents singular conditions for a transition to renewables. South Pole power is currently supplied by diesel generators and the associated complex and costly transport of the required fuel. Transitioning to locally-available renewable energy sources presents an opportunity to reduce both negative economic and environmental impacts. We present here a techno-economic analysis for implementation of a hybrid renewable energy system at the South Pole. We explore a tailored model of resource availability and economics at this site for solar photovoltaics, wind turbine generators, lithium-ion energy storage, and long-duration energy storage in different combinations with and without existing diesel generation. We describe the results of this study as well as ongoing work to move towards a conceptual design of a hybrid renewable energy system.

Author: BENDER, Amy (Argonne National Laboratory)

Presenter: BENDER, Amy (Argonne National Laboratory)

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