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Renewable Energy Communities with Peer-to-Peer Exchange: a chance-constraint approach

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This work presents a chance-constraint model for the management of Energy Communities, focusing on prosumers and peer-to-peer electricity exchanges.

The model aims to minimize the total operation costs of the community, while ensuring energy balance and satisfying technical constraints related to local production and the energy exchanges both inside the community and with the main grid.

Uncertainty in solar photovoltaic generation and electricity demand is addressed using individual and joint chance constraints that are modeled using normal distributions and approximated through piecewise-linear techniques when necessary.

The model is tested on a prototype example of community and is implemented in Python using Pyomo.

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