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Title: Distribution network energy storage business model

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Why is distributed energy storage important?

This can lead to significant line over-voltage and power flow reversal issues when numerous distributed energy resources (DERs) are connected to the distribution network . Incorporation of distributed energy storage can mitigate the instability and economic uncertainty caused by DERs in the distribution network.

How does a distribution network use energy storage devices?

Case4: The distribution network invests in the energy storage device, which is configured in the DER node to assist in improving the level of renewable energy consumption. The energy storage device can only obtain power from the DER and supply power to the distribution network but cannot purchase power from it.

How to constrain the capacity power of distributed shared energy storage?

To constrain the capacity power of the distributed shared energy storage, the big-M method is employed by multiplying $U_{e s, i p o s}(t)$ by a sufficiently large integer M .
$$(5) P_{e s s m i n} U_{e s, i p o s} \leq P_{e s, i m a x} \leq M U_{e s, i p o s}$$
$$E_{e s s m i n} U_{e s, i p o s} \leq E_{e s, i m a x} \leq M U_{e s, i p o s}$$

How can shared energy storage services be optimized?

A multi-agent model for distributed shared energy storage services is proposed. A tri-level model is designed for optimizing shared energy storage allocation. A hybrid solution combining analytical and heuristic methods is developed. A comparative analysis reveals shared energy storage's features and advantages.

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