

Need for new regulatory environment to enable investment in Microgrids

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Technical design options for protecting rural communities against extreme events (bushfires, flooding, etc.)

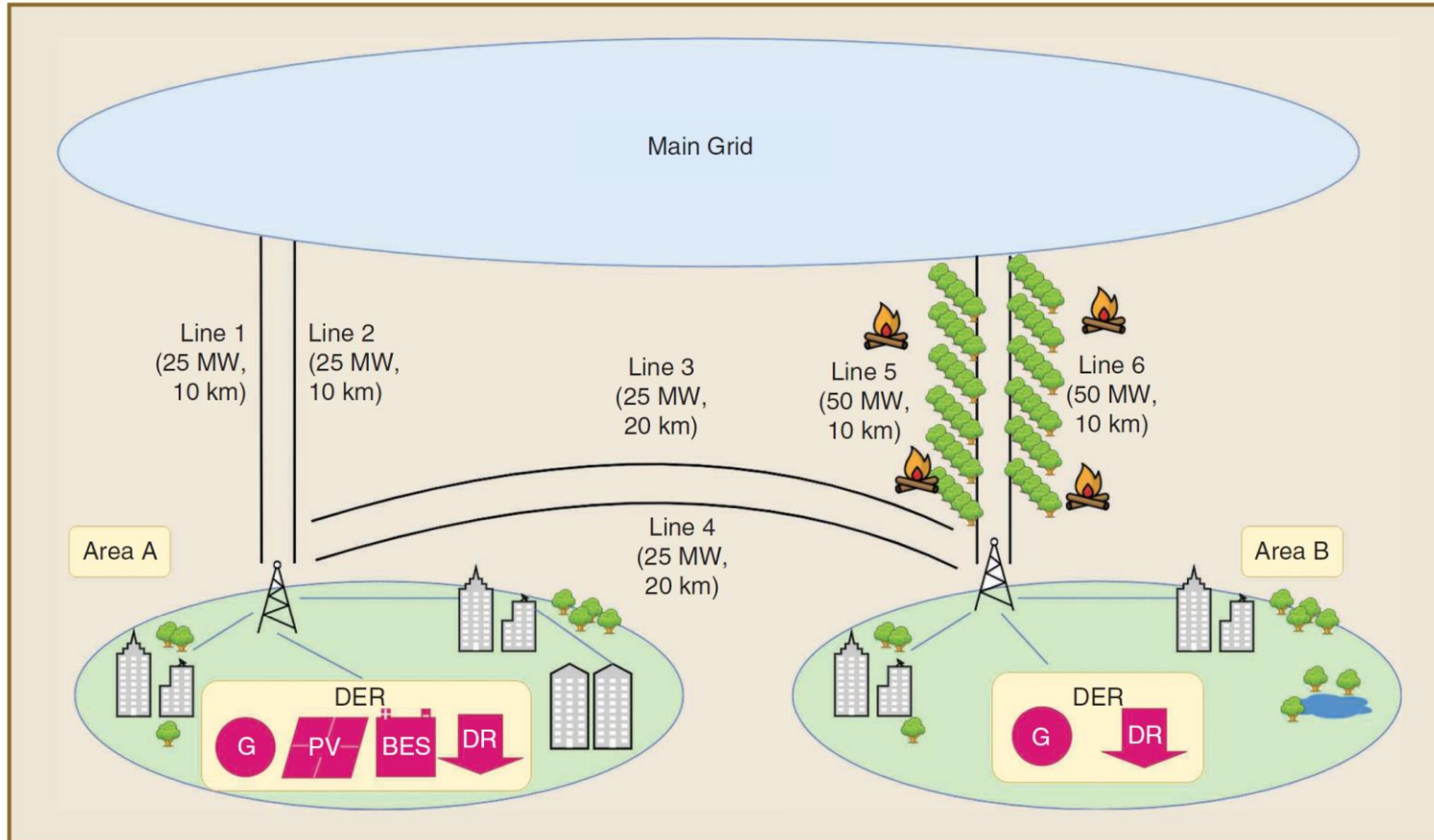


figure 8. The electricity network and DER candidates along with areas exposed to wildfires. BES: battery energy storage.

- ✓ *Preventive measures:* Investments in DER equipment such as storage plants, backup generation, and network investments. The model also finds the optimal volume of demand response contracted. These measures are made up front, precontingency, and thus are present in all scenarios.
- ✓ *Corrective measures:* These measures depend on the specific contingency and are scenario-dependent. We model two types of corrective measures, fast and slow:
 - *Fast:* Refers to the distribution system operation itself, including demand curtailments and a (smart) operation of system assets (topology control and dispatchable DER). These actions can occur right after a contingency occurs.
 - *Slow:* Installing and dispatching mobile DER. These actions feature a lag associated with the arrival of mobile equipment.

Value of recognizing risk aversion in network planning against extreme events

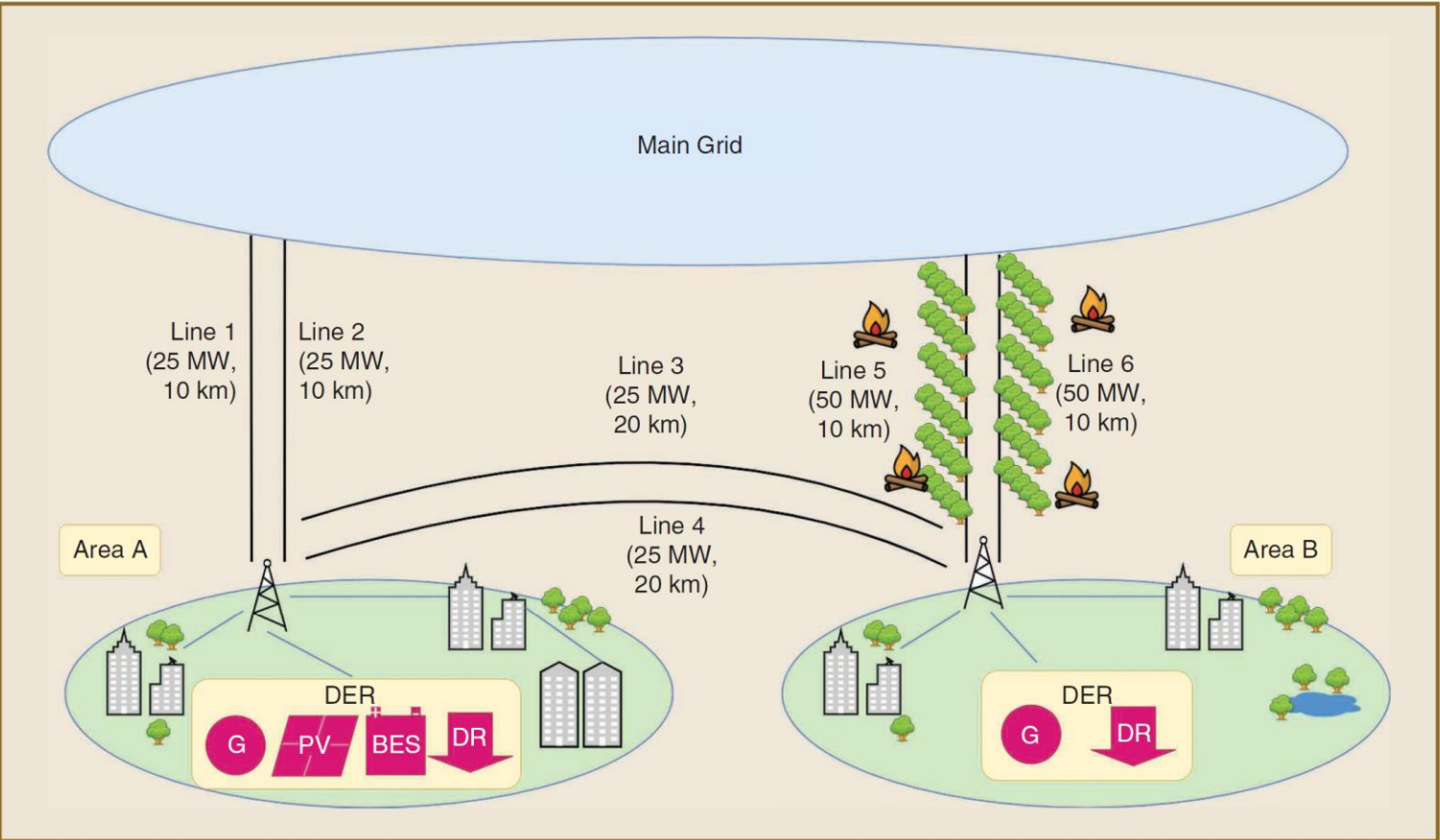


figure 8. The electricity network and DER candidates along with areas exposed to wildfires. BES: battery energy storage.

table 2. Results with costs in thousand U.S. dollars (kUS\$) per year.

	Case A	Case A (Reevaluated)	Case B
Assets and measures	L1, L2, L5, L6, MG, DR	L1, L2, L5, L6, MG, DR	L1, L2, L3, L4, L5, PV, BES, MG, DR
PV + BES investment cost	N-1	—	11,500
Line investment cost	113	113	150
Operational cost	32,850	33,115	21,901
Lost-load cost	27	19,665	6
Total cost	32,990	52,893	33,558

L: line; MG: mobile generator.

Key remarks

- Microgrids can provide insurance policy against extreme events!
 - Protecting the most vulnerable communities
 - Usually rural, difficult to reach
- Can also provide value from day-to-day market operation in mature competitive environments
- Change completely the network investment profile
 - Less redundancy, smarter grid!
- Need for change in regulation
 - Currently potentially against the interest of network operators
 - Issue of splitting regulated and unregulated roles and actors
 - **Traditional cost benefit analysis unsuitable to assess *option value* and resilience *benefits* that microgrids can bring**