

What do we know about distribution-level flexibility?

enel x



We do distributed flexibility on a large scale

A world map with a dark blue background. Several regions are highlighted in a bright orange color, including North America (USA and Canada), parts of Europe (UK, France, Germany, Italy, Spain, and Ireland), Australia, and parts of South America (Brazil and Chile).

Currently offering over 8.5 GW of demand-side flexibility into markets

The vast majority of this flexibility is distribution-connected

Refrigeration in supermarkets



- Refrigerated warehouses and distribution centres have been participating for years.
- More than 3x as much flexibility is available from refrigeration in supermarkets.
- 30–80 kW of flexibility per site, so need **low-cost controls** and **sub-metering**.
- Enel X project starting soon to offer this into frequency response and wholesale markets, initially from hundreds of sites.

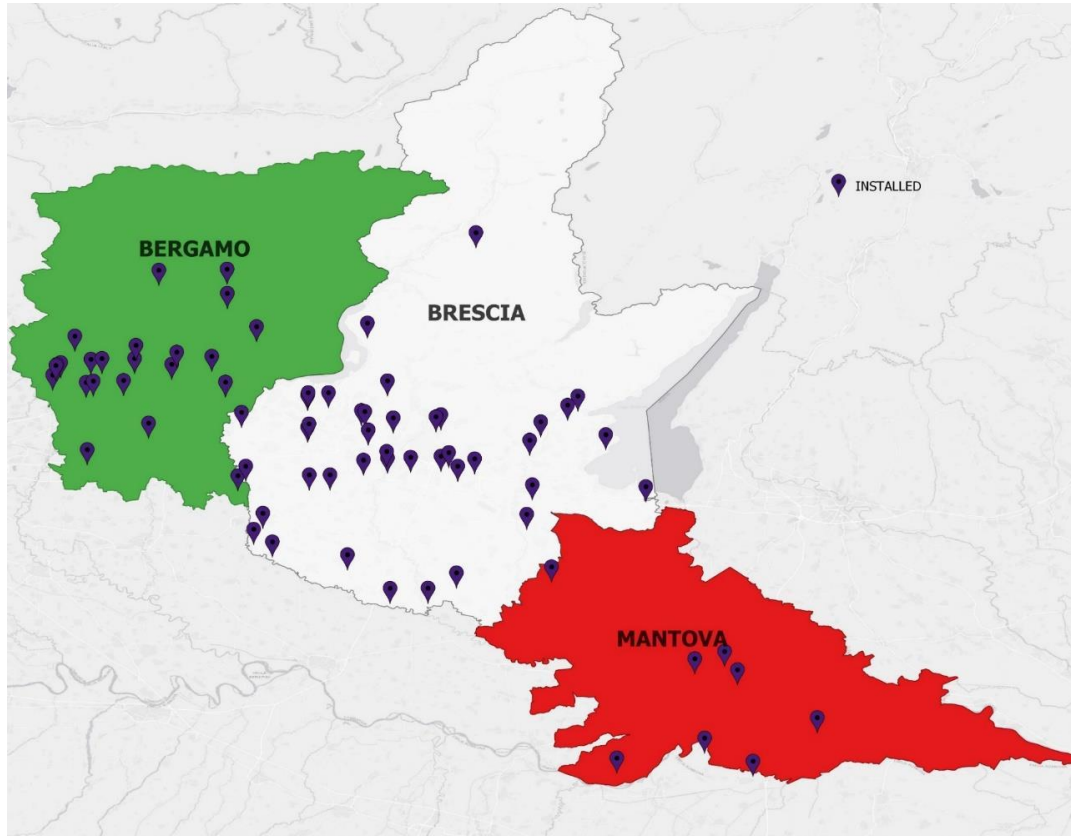
Gogoro battery swapping stations in Taiwan



- Over **2,000** battery swapping stations across Taiwan.
- 1.3 GWh of storage!
- Initially participating in frequency response market by modulating charging load.
- Bidirectionality will increase both capacity and availability.
- Real challenge with **scalability** of interactions with distribution system operator.



Residential batteries in Lombardy

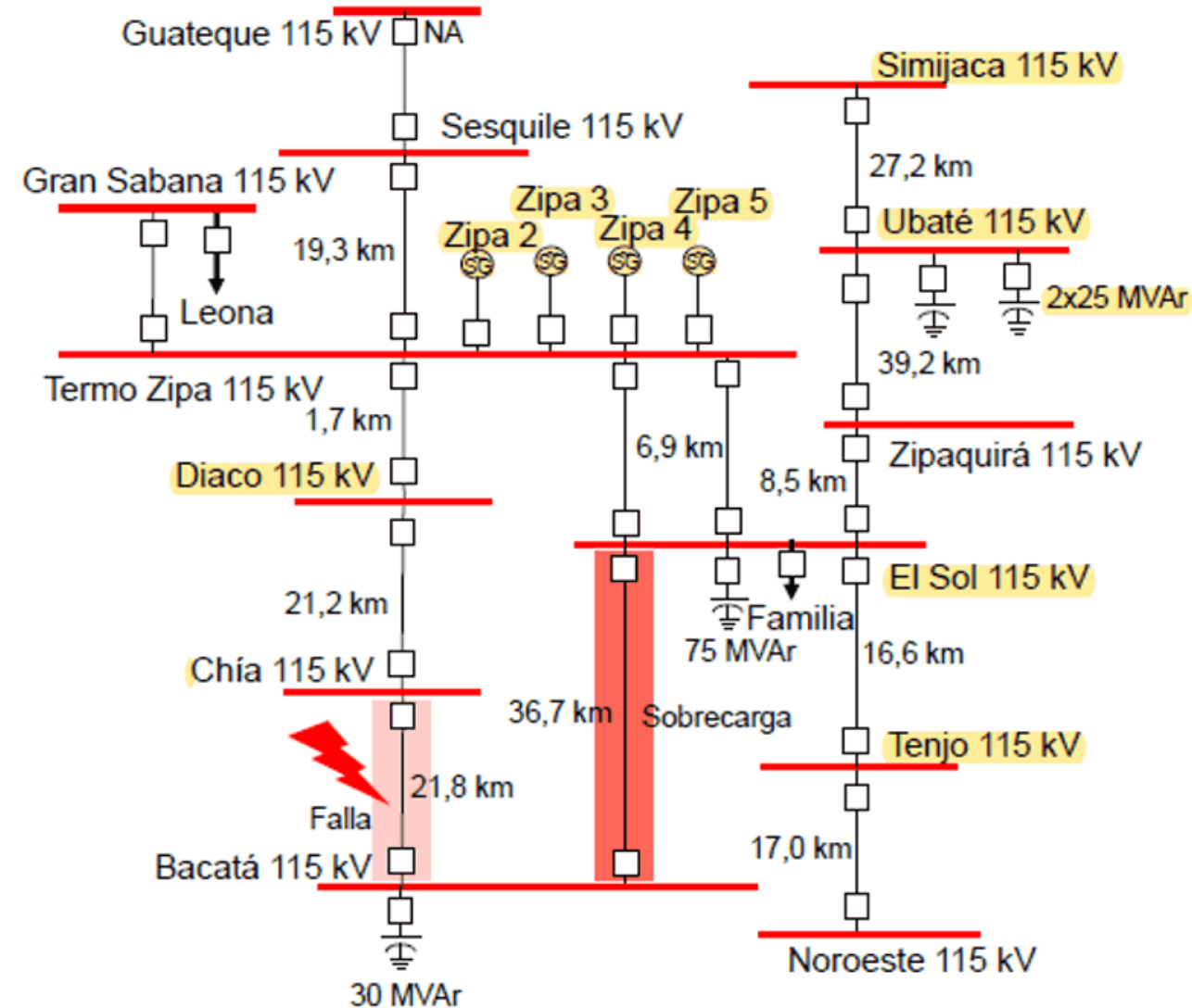


- Many residential solar + storage installations, with storage just used to maximise self-consumption.
- Project to aggregate flexibility from existing installations for market purposes.
- Focused on UVAM, because it was the only open market.
- Successfully worked with a wide variety of batteries and inverters, but **standardised APIs** would help.
- The requirement to “follow baselines” for UVAM is nonsensical and extremely wasteful.
- Needs a sane approach to **baseline methodologies** and/or to allow use of **sub-meters**.

ENELFLEX project in Bogotá



- Part of the distribution network is loaded beyond N-1 capacity.
- Contracting 35 MVA of firm capacity from distributed flexibility allows 299 MVA of customer load to remain online during a fault.
- Limitations to **value stacking**: participating customers lose value in other markets.
- Situation arose because of rapid load growth: cannot build new capacity fast enough.
- It would be a bigger ask for a European system operator to do this deliberately.



Brooklyn/Queens Demand Management programme



- Proposed as a 3-year project to defer a \$1.2b substation upgrade.
- Procured flexibility from a mix of demand response and battery storage.
- Winners required to provide certain services, but had option for **stacked participation**.
- Programme cost less than expected, and has been extended indefinitely.
- Success has led to further Non-Wires Alternatives programmes, with **10-year duration**.



1. Although residential loads will be significant, it's important to be **technology-inclusive**.
2. **Product design really matters**: if you get it wrong, you will limit participation and prevent value stacking, driving up costs.
3. Small sources of flexibility often need **sub-metering**.
4. To be happy not building capacity, distribution system operators need:
 - for the use of flexibility to be **more profitable** than the easy option of capex.
 - **long-term certainty** about the availability of flexibility.

Thank you!

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