Hydro-Québec's Perspective

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Hydro-Québec's Grid

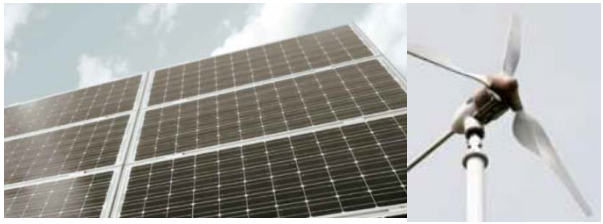
> 4 million of customers

≈ 115 000 km of distribution network (medium voltage)

≈ 3000 distribution active lines

Self-Generation and Net Metering

- Net Metering Option
  - For customers connected to the grid who want to operate power generation equipment of any sort (generator, wind turbine, etc.) to produce electricity for their own use from renewable sources.
  - The customer can optimize their energy use as part of a global vision of energy efficiency.
- Self-Generation Without Compensation Plan
  - For customers connected to the grid who want to operate power generation equipment, but can't comply with net metering option conditions.



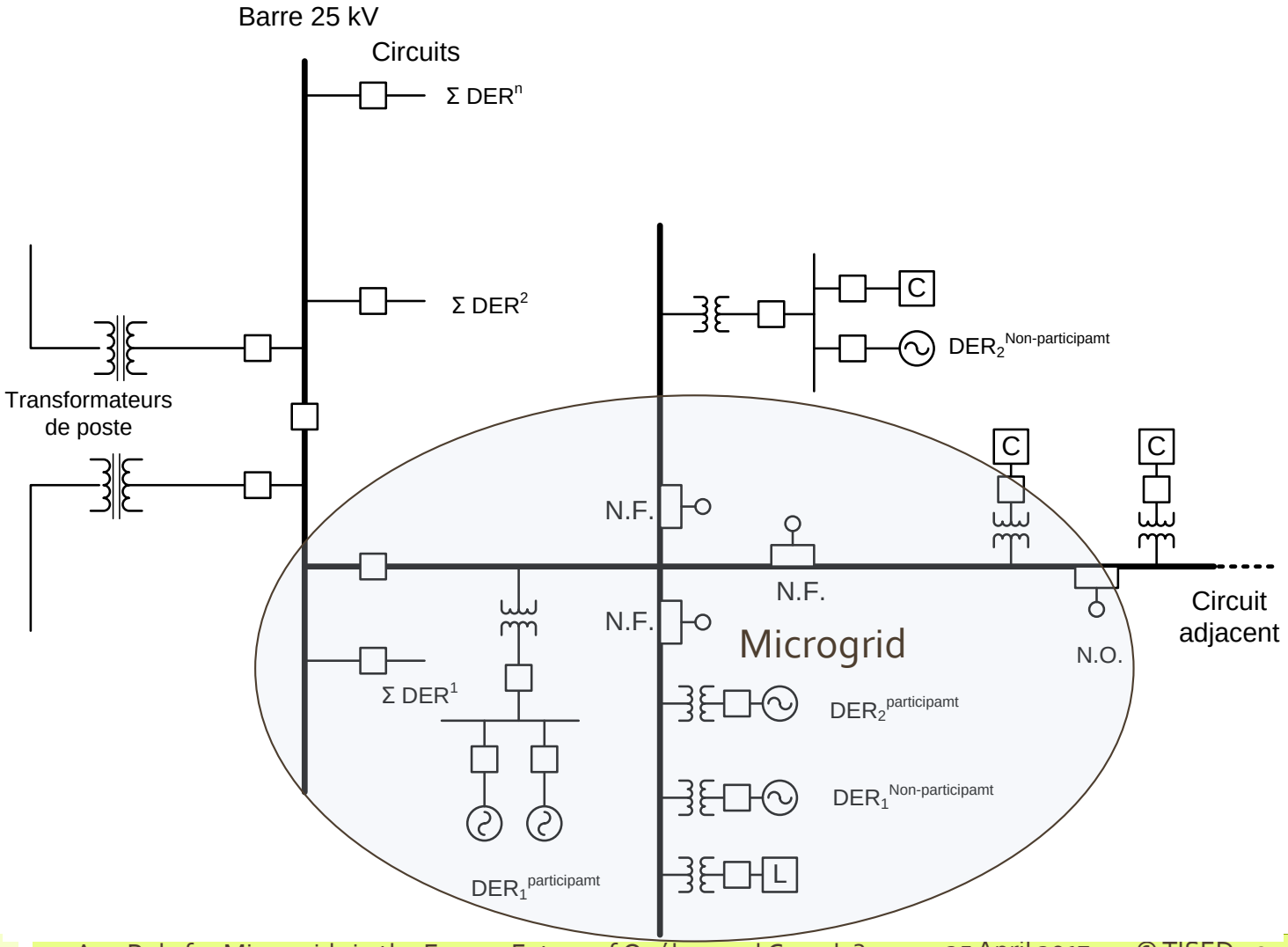
More details at http://www.hydroquebec.com/self-generation/

Hydro-Québec's Microgrid Perspective

- Today's Grid
  - The distribution grid is currently designed to limit outages and facilitate resiliency
  - Customers can build their own microgrid with net metering and self-generation options. However there are regulatory voids.

- The Grid of the Future
  - HQD is studying microgrid at:
    - Medium voltage (many customers and distributed energy resources)
    - Low voltage (one customer with distributed energy)
    - In order to improve:
      - Reliability and resiliency
      - Grid integration of distributed energy resources
      - Customer's participation ("*prosumers*")

Microgrid Example



Microgrid Concerns

- Technical:
  - IT infrastructure and cybersecurity
  - Operation with other Hydro-Québec systems
  - Planning and designing microgrids
  - Control DER, storage and load (participating or not)
- Legal and regulatory:
  - Regulations and requirements
  - Standardization
  - Power quality