Challenges for Québec’s Smart Grid Development

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May 8, 2014

Presented in Wakefield, Québec. Second workshop of the SSHRC partnership: Unlocking the potential of Smart Grid: Partnership to explore the policy dimensions
Smart Grid Development in Québec – A Case Study

Plan of the presentation

1. Reminder: Québec context & media analysis
2. Focus: Stakeholder interviews
   - perspective on sustainable development
   - centralisation vs. decentralisation
3. Conclusion and next steps

Adapted from the SPEED Framework (Stephens et al. 2008)
Energy context

- Hydro-Québec: the big player
  - the largest electricity generator in Canada with a capacity of 35,829 MW
  - domestic market: quasi-monopolistic structure of energy production, transmission and distribution
  - "heritage pool" (165 TWh at a set price of 2.79¢ per kWh): low and stable rate across the province
  - important dividends to its only shareholder, the Québec Government ($2 billion in 2011, $645 million in 2012)

- Renewable energy
  - 98% of the electricity production from hydropower in 2012
  - among the world’s leading producers of hydropower
Smart Grid Initiatives in Québec

Smart Grid Research Projects:
- Smart Energy Research Institute
- Equation: Mobilizing Project EcoloTic
- CanMet Energy research projects on grid modernization
- Hydro–Québec’s Laboratory in Energy Technologies (LTE)

Transport related Smart Grid Projects:
- Experimental project vehicle-to-grid (V2G) and vehicle-to-home (V2H)
- Development of charging stations for plug-in electric vehicles (250+)

Smart Grid Deployment Projects:
- Hydro–Sherbrooke – Dual energy project
- Hydro–Sherbrooke – Remote activation of generators for peak-shaving
- Hydro–Québec Voltage var reactive power management project (CATVAR)
- Hydro–Québec’s smart meters rollout (3.75 million smart meters by 2018)
### Media analysis

- Narrow focus on smart meters
- Opponents voice their concerns about smart meters
- Benefits of smart meters:
  - technological, environmental and economic
- Risks of smart meters:
  - health and safety (radiofrequencies)
  - cultural and economic (cost overruns)
- No debate on energy efficiency, climate change, decentralization, etc.

### Stakeholder analysis

- Wider focus on different smart grid technologies
- Stakeholders have a broader perception of smart grids in the context of sustainable development
- Benefits smart grids/smart meters:
  - technological, economic, environmental
- Risks smart grids/smart meters:
  - health
  - privacy concern / lack of public participation
- Debate on energy efficiency, climate change, decentralization, etc.
Stakeholder interviews

- N=16 (4 research & innovation; 5 industry; 4 civil society; 3 utilities; 0 government... )
- Selection of interviewees: positional and reputational approach
- Timeline: November 5, 2013 to February 14, 2014
- Semi-directive interviews: understanding, drivers of development, risks & benefits, key players, social acceptance, legislative framework, renewable energy & sustainable development
- Interview duration: 30 min to 2 hours
Can smart grids contribute to sustainability?

- Three analytical criteria:
  - economic, environmental; social
- Connection between smart grids and the three criteria of sustainable development: low, medium, high

Utilities

Economic concerns as the main reason for smart grids development

Consumption reduction to increase the exports
  • good for the economy
  • ...and the environment (exportation of green energy)

More balanced perspective regarding environment
  • importance of integrating intermittent renewables in the grid
  • but not a necessity

Social aspect of smart grids is irrelevant
Civil Society

Very low connection between smart grids and sustainable development

Opposition to the current approach/implementation of smart grids by Hydro-Québec and the government

Strong opposition to smart meters
  • Health concerns (radiations)
  • Actors involved in the media debate

Generating data + data centers could increase energy consumption (rather than the opposite)

Other ways to decrease GHG emissions
Research and Innovation

Strong connection between smart grids and the three aspects of sustainable development:

**Economic:**
- Demand response / peak reduction
- Increase production and exports
- Reduce consumption/electricity bills

**Environmental:**
- Electric vehicles
- Intermittent renewable energies
- Less infrastructures for energy
- Transition from a *grow and build* business model (Hydro–Québec) to an energy conservation model with *smart grids*

**Social:**
- Local economy / local solutions
- Connecting the grid to consumers
Industry

“Middle ground” perspective about the economic benefits of *smart grids*

On the one hand...
- smart grids reduce operation costs
- more energy efficiency for the utility
- peak shaving and demand response

On the other hand...
- problems related to the business model prioritized by Hydro–Québec and the ongoing *smart grids* projects
  - lack of local expertise
  - only a few *smart grids* related jobs created in Quebec

High interest in smart grids for environmental concerns

Lower interest in social aspects of smart grids
Centralization vs. Decentralization

Legend:
- Centralized
- Ambivalent perspective
- Decentralized
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<tr>
<th>Utilities</th>
<th>Research and Innovation</th>
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<tbody>
<tr>
<td>Continuity with the current business model</td>
<td>Interest in regional societies, closer to the consumers</td>
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<td>Centralization of the control centers for more economic efficiency</td>
<td>Strong interest in micro–grids’ development</td>
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<td>Marginal interest in micro–generation</td>
<td>Distributed generation</td>
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<td>No need to develop smart grids to integrate distributed generation (wind/solar)</td>
<td>Risks related to the centralized infrastructures</td>
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<th>Civil Society</th>
<th>Industry</th>
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<tr>
<td>Advocacy for an electricity revolution by two actors: decentralization and micro–grids</td>
<td>Smart grids can lead the path to decentralization and micro–grids... ...But not sure of Hydro–Québec’s willingness</td>
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<tr>
<td>Local electricity systems / Prosumers</td>
<td>Interest to change the business model</td>
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<td>Decentralization as a complement to the grid</td>
<td>Prosumers could integrate solar or wind energy to their home and sale their overflow of production</td>
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<td>Critics against the electricity system built by Hydro–Québec</td>
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Conclusion

- Emerging topic, fragmented perceptions, different visions
- Public opinion: narrow focus on smart meters
- Experts: broader focus and understanding
- Technology-driven agenda, but no policy agenda: incremental change
- Obstacles for paradigmatic change:
  - structure of Quebec’s electricity market (monopoly), path dependency
  - no incentives for energy efficiency
  - no need for green energy
Next steps and outputs

- Complete the stakeholder analysis (e.g. risks & benefits; perceptions on renewables and efficiency; pivotal role of Hydro-Québec, etc.)
- CPSA paper on the absence of a policy window for smart grids in Quebec (media & stakeholder analysis)
- Xavier’s Master Thesis on hard & soft path options for smart grids development in Quebec
- Comparison with other provinces?