

# Challenges for Québec's Smart Grid Development

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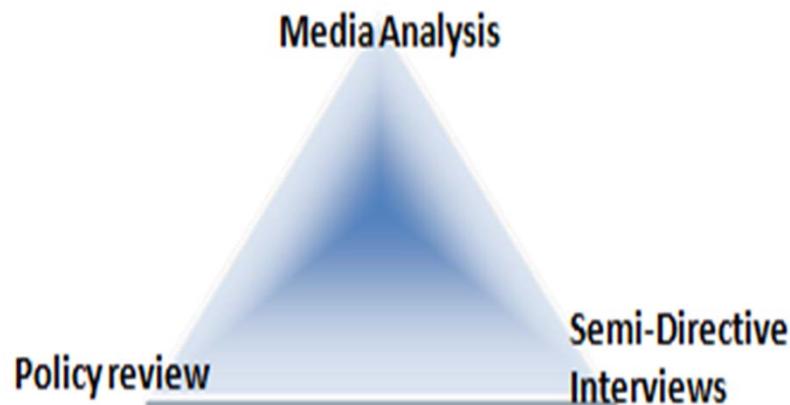
Presented in Wakefield, Québec. Second workshop of the SSHRC partnership: Unlocking the potential of Smart Grid: Partnership to explore the policy dimensions

The logo for Université du Québec à Montréal (UQÀM) features the letters 'UQÀM' in a bold, blue, sans-serif font. The 'À' is stylized with a circumflex accent. To the left of the text is a blue rectangular area with a diagonal hatching pattern.

Université du Québec  
à Montréal

# Smart Grid Development in Québec – A Case Study

## Plan of the presentation



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

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

# 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.

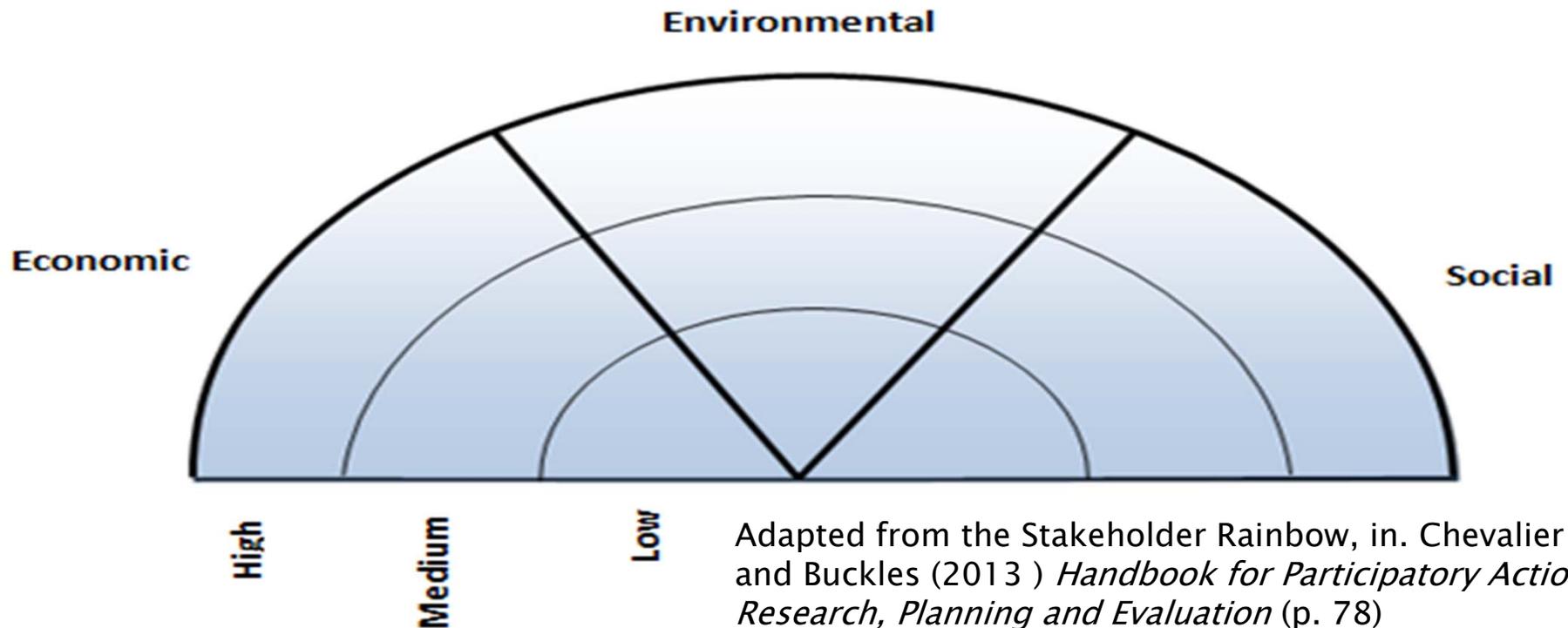
# Stakeholder interviews

- ▶ 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



Adapted from the Stakeholder Rainbow, in. Chevalier and Buckles (2013 ) *Handbook for Participatory Action Research, Planning and Evaluation* (p. 78)

# Utilities

Economic concerns as the main reason for smart grids development

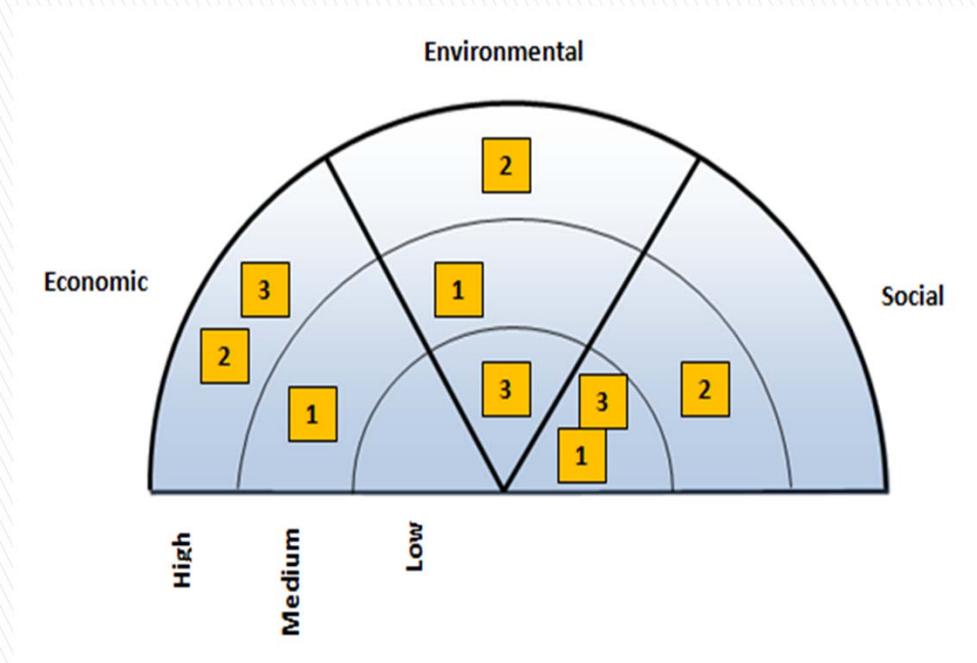
Consumption reduction to increase the exports

- 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

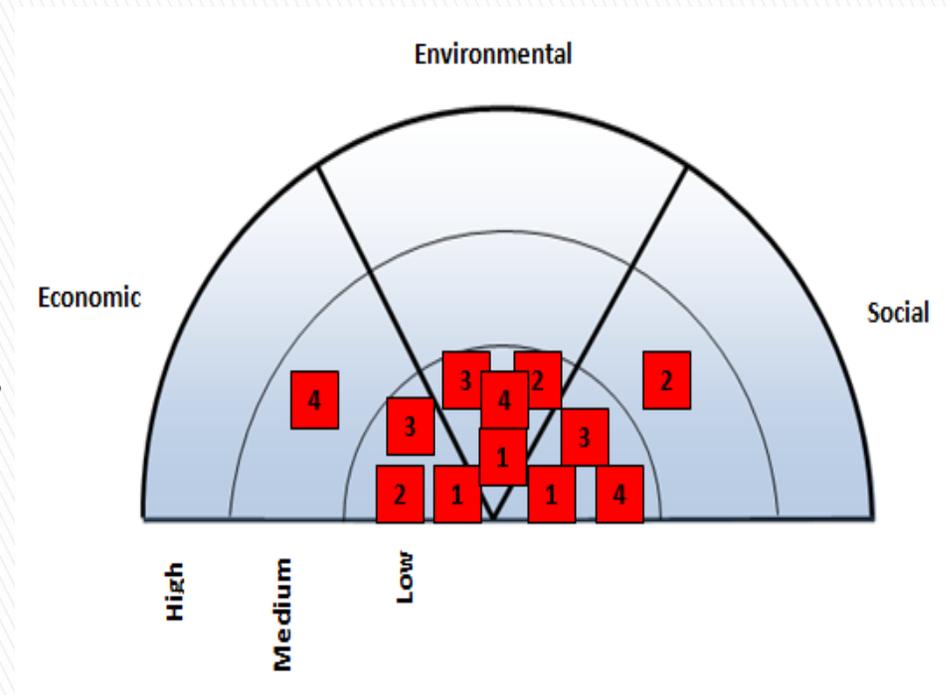
Opposition to the current approach/implementation of smart grids by Hydro-Québec and the government

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:

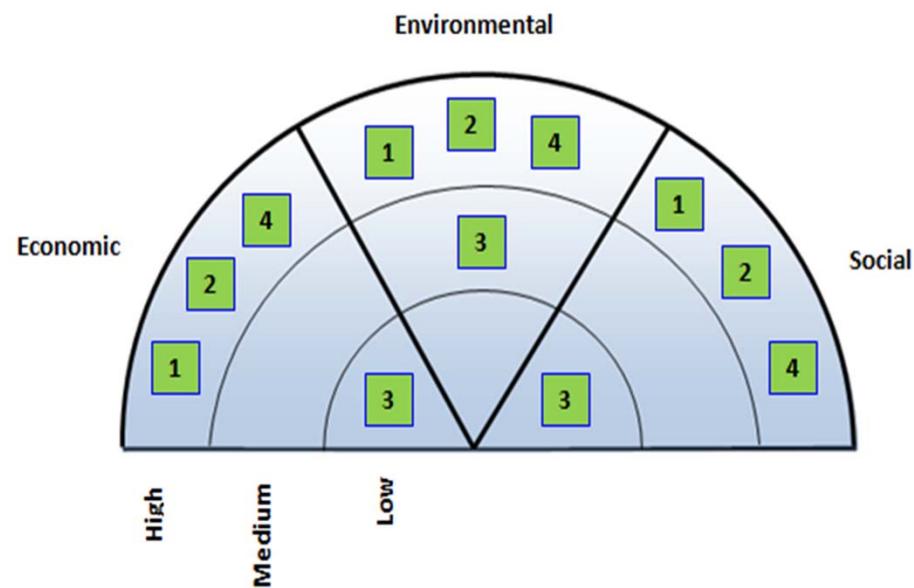
- Demand response / peak reduction
- Increase production and exports
- Reduce consumption/electricity bills

## 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...

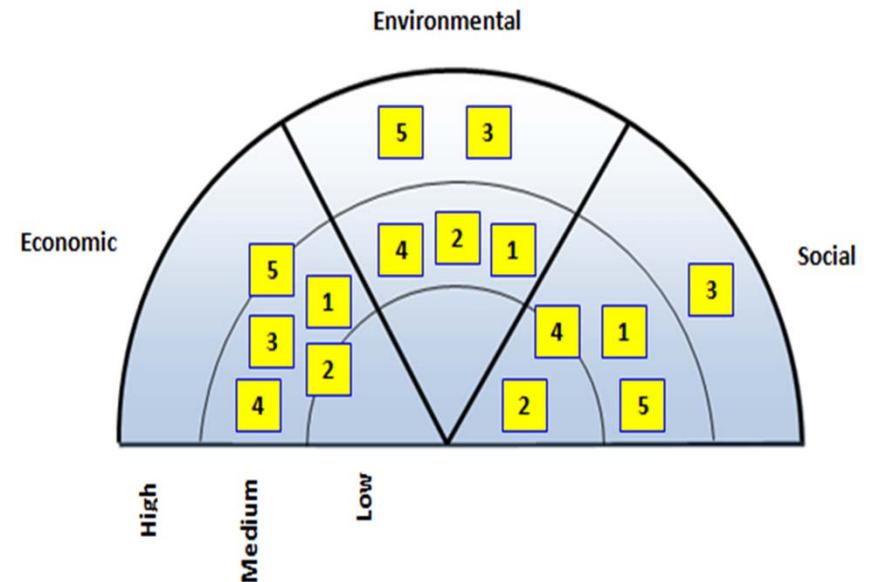
- smart grids reduce operation costs
- more energy efficiency for the utility
- peak shaving and demand response

On the other hand...

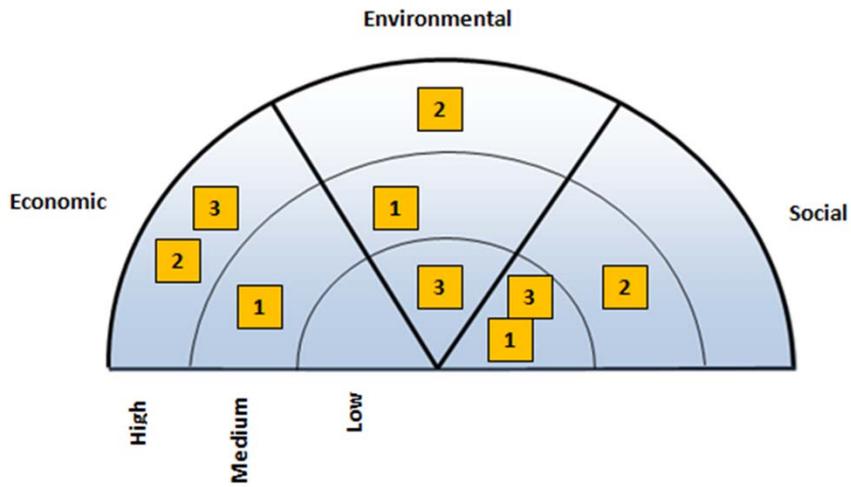
- problems related to the business model prioritized by Hydro-Québec and the ongoing *smart grids* projects
- lack of local expertise
- only a few *smart grids* related jobs created in Quebec

High interest in smart grids for environmental concerns

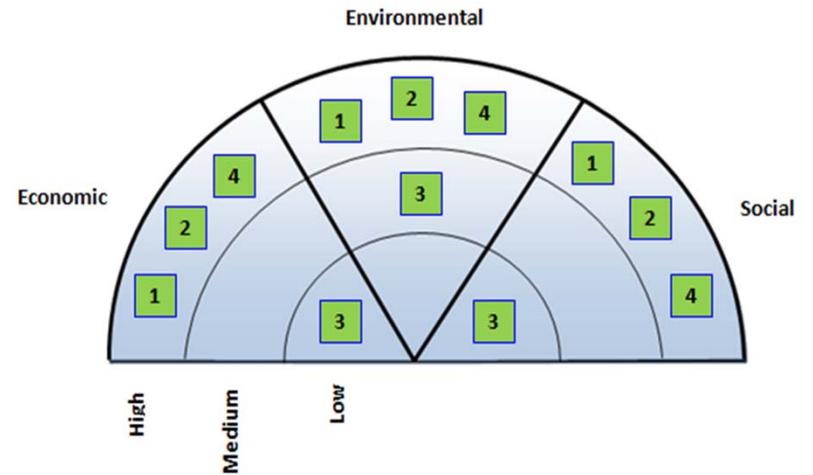
Lower interest in social aspects of smart grids



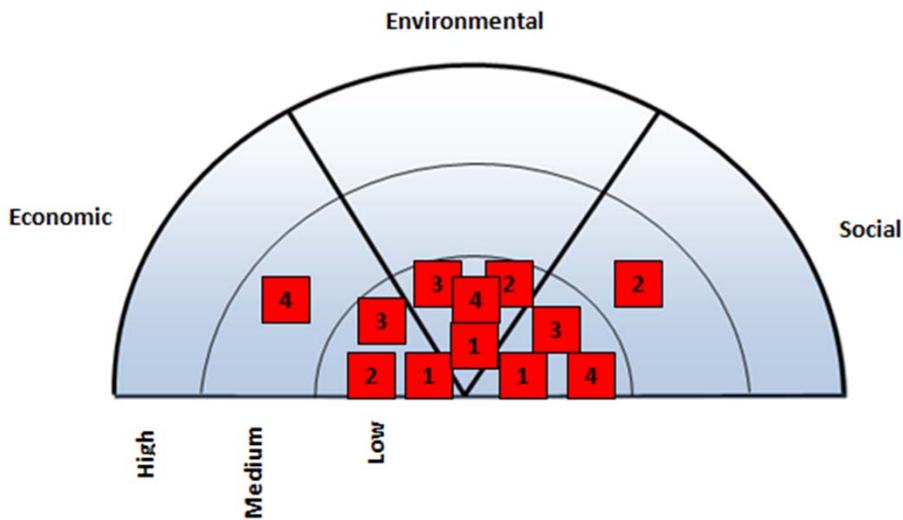
# Utilities



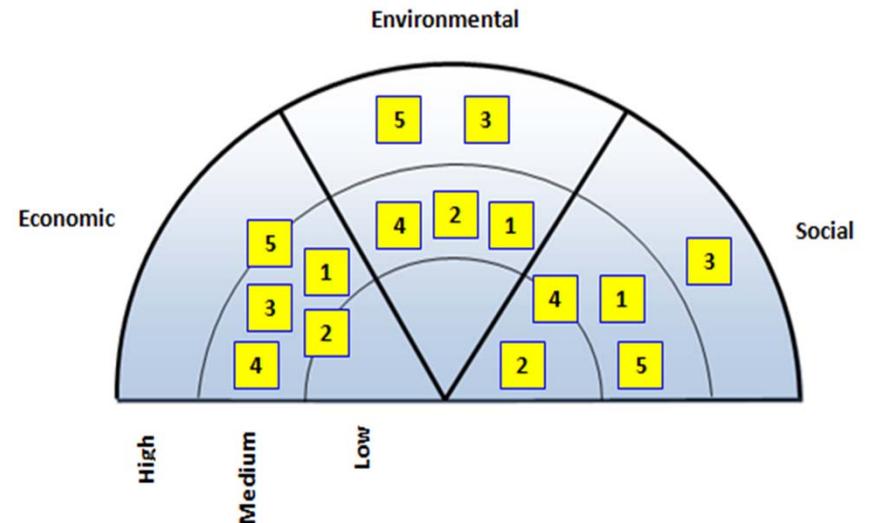
# Research and Innovation



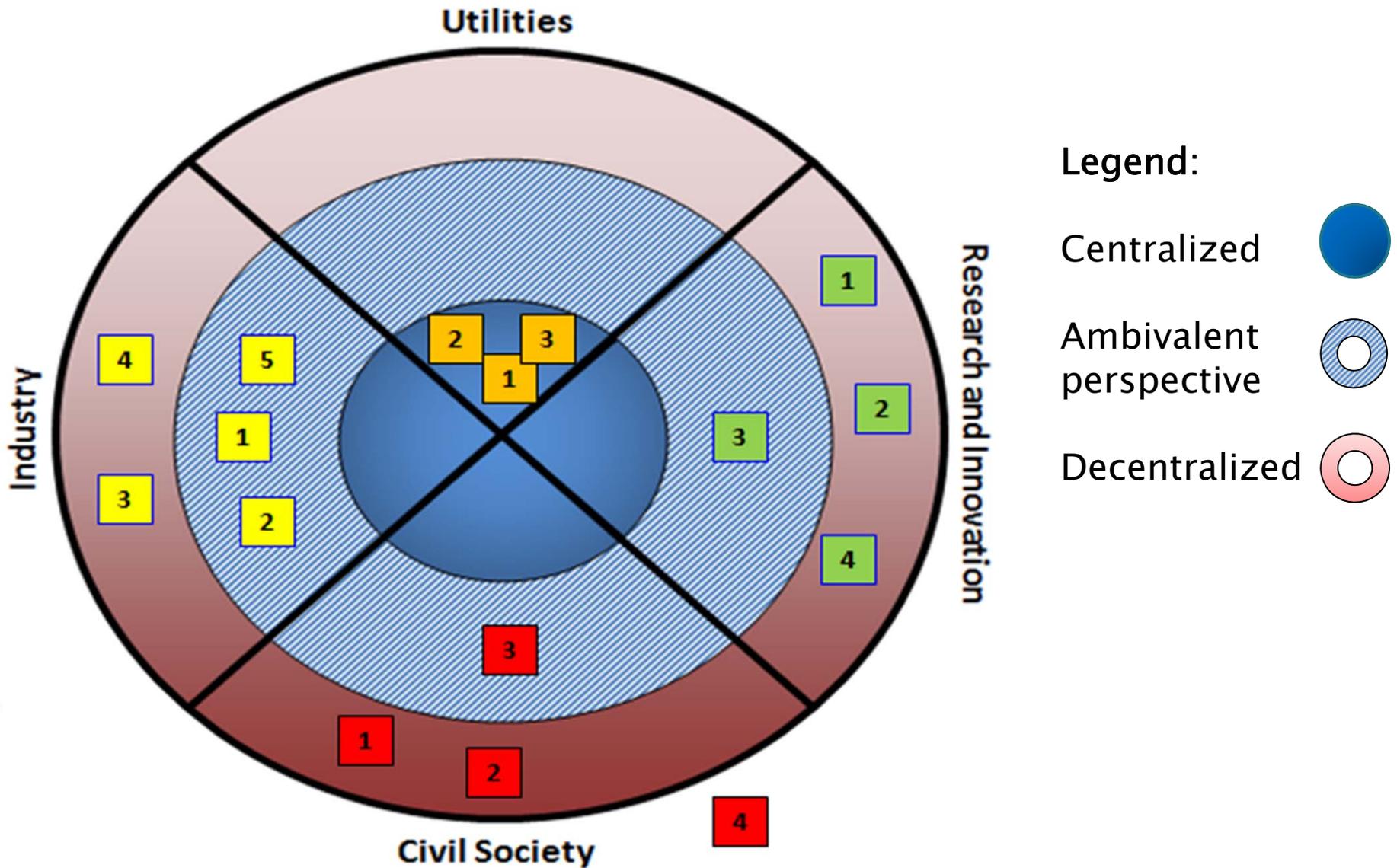
# Civil society



# Industry



# Centralization vs. Decentralization



## Utilities

Continuity with the current business model

Centralization of the control centers for more economic efficiency

Marginal interest in micro-generation

No need to develop smart grids to integrate distributed generation (wind/solar)

## Civil Society

Advocacy for an electricity revolution by two actors: decentralization and micro-grids

Local electricity systems / Prosumers

Decentralization as a complement to the grid

Critics against the electricity system built by Hydro-Québec

## Research and Innovation

Interest in regional societies, closer to the consumers

Strong interest in micro-grids' development

Distributed generation

Risks related to the centralized infrastructures

## Industry

Smart grids can lead the path to decentralization and micro-grids...  
...But not sure of Hydro-Québec's willingness

Interest to change the business model

Prosumers could integrate solar or wind energy to their home and sale their overflow of production

# 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?

