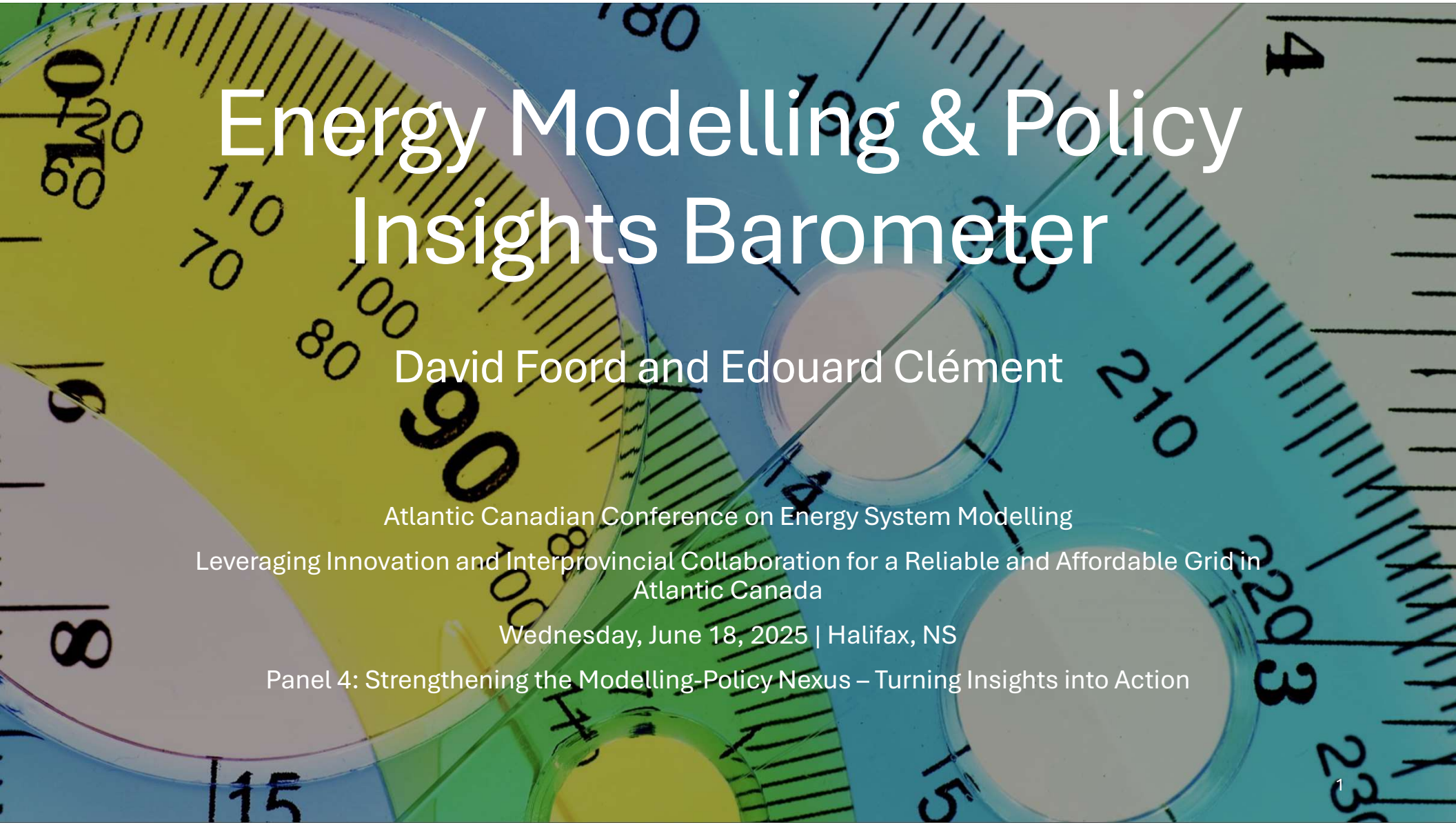


Energy Modelling & Policy Insights Barometer

David Foord and Edouard Clément

Atlantic Canadian Conference on Energy System Modelling

Leveraging Innovation and Interprovincial Collaboration for a Reliable and Affordable Grid in Atlantic Canada

Wednesday, June 18, 2025 | Halifax, NS

Panel 4: Strengthening the Modelling-Policy Nexus – Turning Insights into Action

Research Purposes and Methodology

Purposes

Understand the needs and expectations of policymakers, decision-makers and other stakeholders about energy modelling and data.

Shape future EMH initiatives, ensuring that energy modelling tools and insights are accessible, actionable, and aligned with stakeholder needs.

Methodology

Time	Task
Nov-Dec 2024	Developed statement of work (SOW) and draft survey questions.
Dec 2025	Received feedback from EMH Knowledge Mobilization Committee.
Jan-Feb 2025	Revised survey.
Mar 2025	Tested survey with 10 subjects.
April 2024	Finalized the survey and obtained UNB REB approval.
April-May 2025	Distributed survey and received responses.
June 2025	Analyzed and coded (grounded) the results.

Literature Review

Issues in Energy Modelling

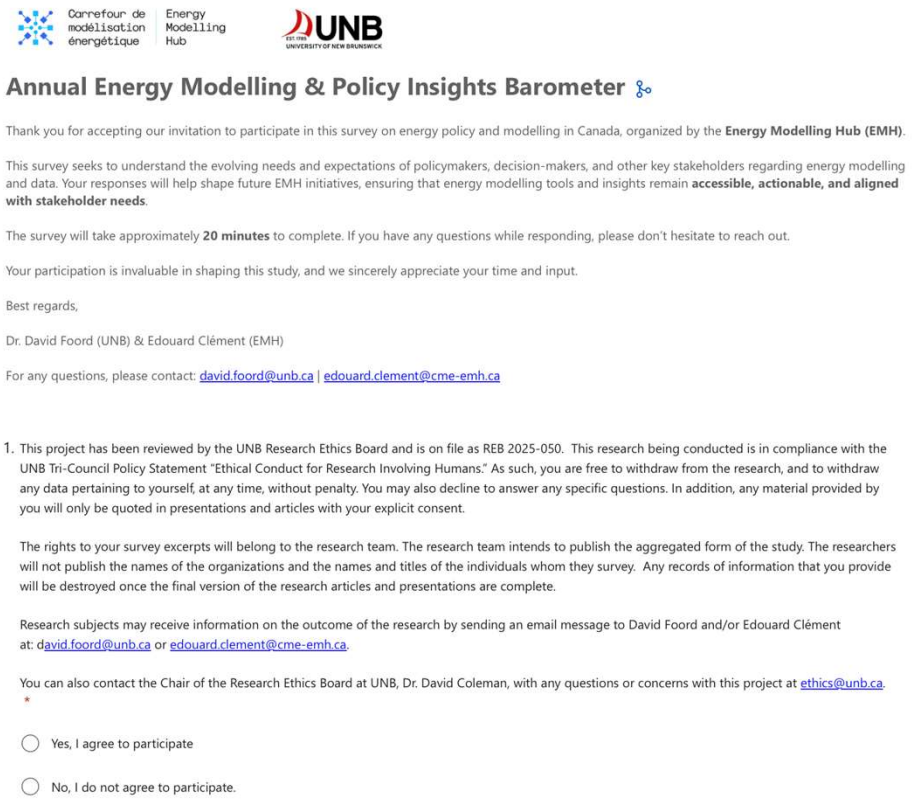
- Not transparent[2, 3, 4]
- Does not integrate human behaviour[1, 2, 3, 4, 6]
- Not relevant to policy problems at multiple scales[1, 2, 3]
- Does not address complexity of energy system[4, 6]
- Lack of model combinations [6]
- Limited involvement of stakeholders[2]

Previous Energy Modelling Surveys

- Survey of Canadian energy-economy model users and developers (n=14) on seventeen models[5]
- Survey of energy system modellers (n=61) on simulation and optimization models[6]

[1] Fodstad, Marte, Pedro Crespo del Granado, Lars Hellemo, Brage Rugstad Knudsen, Paolo Pisciella, Antti Silvast, Chiara Bordin, Sarah Schmidt, and Julian Straus. "Next frontiers in energy system modelling: A review on challenges and the state of the art." *Renewable and Sustainable Energy Reviews*160 (2022): 112246.
[2] Hofbauer, Leonhard, Will McDowall, and Steve Pye. "Challenges and opportunities for energy system modelling to foster multi-level governance of energy transitions." Renewable and Sustainable Energy Reviews 161 (2022): 112330.
[3] McPherson, M., E. Rhodes, L. Stanislaw, R. Arjmand, M. Saffari, R. Xu, C. Hoicka, and M. Esfahlani. "Modeling the transition to a zero emission energy system: A cross-sectoral review of building, transportation, and electricity system models in Canada." *Energy Reports* 9 (2023): 4380-4400.
[4] Pfenninger, Stefan, Adam Hawkes, and James Keirstead. "Energy systems modeling for twenty-first century energy challenges." *Renewable and Sustainable Energy Reviews* 33 (2014): 74-86.
[5] Rhodes, Ekaterina, Kira Craig, Aaron Hoyle, and Madeleine McPherson. "How do energy-economy models compare? A survey of model developers and users in Canada." *Sustainability* 13, no. 11 (2021): 5789.
[6] Scheller, Fabian, Frauke Wiese, Jann Michael Weinand, Dominik Franjo Dominković, and Russell McKenna. "An expert survey to assess the current status and future challenges of energy system analysis." Smart Energy 4 (2021): 100057.

Respondents



Carrefour de modélisation énergétique | Energy Modelling Hub

UNB

Annual Energy Modelling & Policy Insights Barometer

Thank you for accepting our invitation to participate in this survey on energy policy and modelling in Canada, organized by the **Energy Modelling Hub (EMH)**.

This survey seeks to understand the evolving needs and expectations of policymakers, decision-makers, and other key stakeholders regarding energy modelling and data. Your responses will help shape future EMH initiatives, ensuring that energy modelling tools and insights remain **accessible, actionable, and aligned with stakeholder needs**.

The survey will take approximately **20 minutes** to complete. If you have any questions while responding, please don't hesitate to reach out.

Your participation is invaluable in shaping this study, and we sincerely appreciate your time and input.

Best regards,

Dr. David Foord (UNB) & Edouard Clément (EMH)

For any questions, please contact: david.foord@unb.ca | edouard.clement@cme-emh.ca

1. This project has been reviewed by the UNB Research Ethics Board and is on file as REB 2025-050. This research being conducted is in compliance with the UNB Tri-Council Policy Statement "Ethical Conduct for Research Involving Humans." As such, you are free to withdraw from the research, and to withdraw any data pertaining to yourself, at any time, without penalty. You may also decline to answer any specific questions. In addition, any material provided by you will only be quoted in presentations and articles with your explicit consent.

   The rights to your survey excerpts will belong to the research team. The research team intends to publish the aggregated form of the study. The researchers will not publish the names of the organizations and the names and titles of the individuals whom they survey. Any records of information that you provide will be destroyed once the final version of the research articles and presentations are complete.

   Research subjects may receive information on the outcome of the research by sending an email message to David Foord and/or Edouard Clément at: david.foord@unb.ca or edouard.clement@cme-emh.ca.

   You can also contact the Chair of the Research Ethics Board at UNB, Dr. David Coleman, with any questions or concerns with this project at ethics@unb.ca.
   *

   ◯ Yes, I agree to participate

   ◯ No, I do not agree to participate.

Affiliation	No.
Federal Government	17
Provincial/Territorial Governments	8
Private Sector	14
Academic Institution	12
Policy Research Organization or Think Tanks	10
Environmental or Advocacy Organizations	5
Other	11
Total	77

Model Users	No.
Independent model user	42
Model user with external consultants or partners	20
Does not use energy models	15
Total	77

Surveyed Priorities for Energy Policy and Decisions

- Decarbonization and emissions reduction
- Grid modernization & resilience
- Energy affordability & equity
- Indigenous participation and leadership in energy projects
- Renewable energy deployment
- Energy security and reliability
- Interprovincial transmission & infrastructure planning
- Investment and deployment of clean energy projects (e.g., wind, solar)
- Investment in and adoption of emerging end-use technologies
- Regulatory and policy support for clean electricity transition
- Trade policy impacts on energy systems and economic resilience
- Strengthening interprovincial and international energy trade flows
- Aligning industrial policy and innovation strategies with energy transition goals

Priorities for Energy Policy and Decisions

No.	Priorities	All	Gov of Can	Prov & Terr Gov	Private Sector	Higher Ed	Think Tank	Env Org
1	Decarbonization and emissions reduction	4.49	4.25	4.50	4.71	4.25	4.78	5.00
2	Grid modernization & resilience	4.44	4.31	4.63	4.31	4.17	4.78	4.80
3	Energy affordability & equity	4.41	4.35	4.43	4.57	4.25	4.44	4.40
4	Energy security and reliability	4.38	4.06	4.43	4.54	4.55	4.00	4.40
5	Regulatory and policy support for clean electricity transition	4.31	4.31	4.50	4.00	4.36	4.13	4.80
6	Renewable energy deployment	4.29	4.29	4.50	4.50	4.00	4.22	4.40
7	Aligning industrial policy and innovation strategies with energy transition goals	4.13	3.69	4.25	4.27	4.36	4.00	4.60
8	Interprovincial transmission & infrastructure planning	4.13	4.25	4.25	4.00	4.00	4.33	3.80
9	Investment and deployment of clean energy projects (e.g., wind, solar)	4.12	4.08	3.88	4.15	4.00	4.67	4.00
10	Trade policy impacts on energy systems and economic resilience	3.98	4.08	3.86	3.91	4.27	3.63	4.00

Priorities that averaged “strongly important” (4.50-5.00) are circled in blue. All other priorities averaged “important” (3.50-4.49).

Priorities for Energy Policy and Decisions

No.	Priorities	All	Modellers	Collaborators	Non-Modellers
1	Decarbonization and emissions reduction	4.49	4.39	4.44	4.80
2	Grid modernization & resilience	4.44	4.25	4.61	4.73
3	Energy affordability & equity	4.41	4.52	4.12	4.40
4	Energy security and reliability	4.38	4.37	4.00	4.80
5	Regulatory and policy support for clean electricity transition	4.31	4.22	4.61	4.14
6	Renewable energy deployment	4.29	4.19	4.28	4.60
7	Aligning industrial policy and innovation strategies with energy transition goals	4.13	4.09	4.00	4.36
8	Interprovincial transmission & infrastructure planning	4.13	4.28	3.72	4.20
9	Investment and deployment of clean energy projects (e.g., wind, solar)	4.12	4.15	3.94	4.27
10	Investment in and adoption of emerging end-use technologies	3.92	3.85	4.06	3.93

Priorities that averaged “strongly important” (4.50-5.00) are circled in blue. All other priorities averaged “important” (3.50-4.49).

Roles for Energy Modelling in Realizing These Priorities

No.	Roles	All	Gov of Can	Prov & Terr Gov	Private Sector	Higher Ed	Think Tank	Env Org
1	Scenario forecasting	85%	85%	88%	75%	75%	100%	100%
2	Energy demand and consumption forecasting	76%	77%	88%	83%	75%	75%	60%
3	Cost-benefit analysis	71%	54%	63%	83%	75%	63%	80%
4	Decarbonization pathway analysis	70%	77%	63%	83%	67%	88%	80%
5	Market and policy impact assessment	68%	69%	75%	75%	58%	63%	60%
6	Investment and infrastructure planning	56%	38%	50%	67%	67%	63%	40%
7	Assessment of trade and tariff impacts on energy systems	52%	69%	38%	50%	50%	38%	40%
8	Analysis of interprovincial energy trade and market integration	48%	54%	50%	33%	58%	63%	40%
9	Interprovincial transmission and grid expansion	47%	62%	63%	33%	42%	63%	20%
10	Technology feasibility assessment	45%	38%	50%	33%	50%	38%	80%

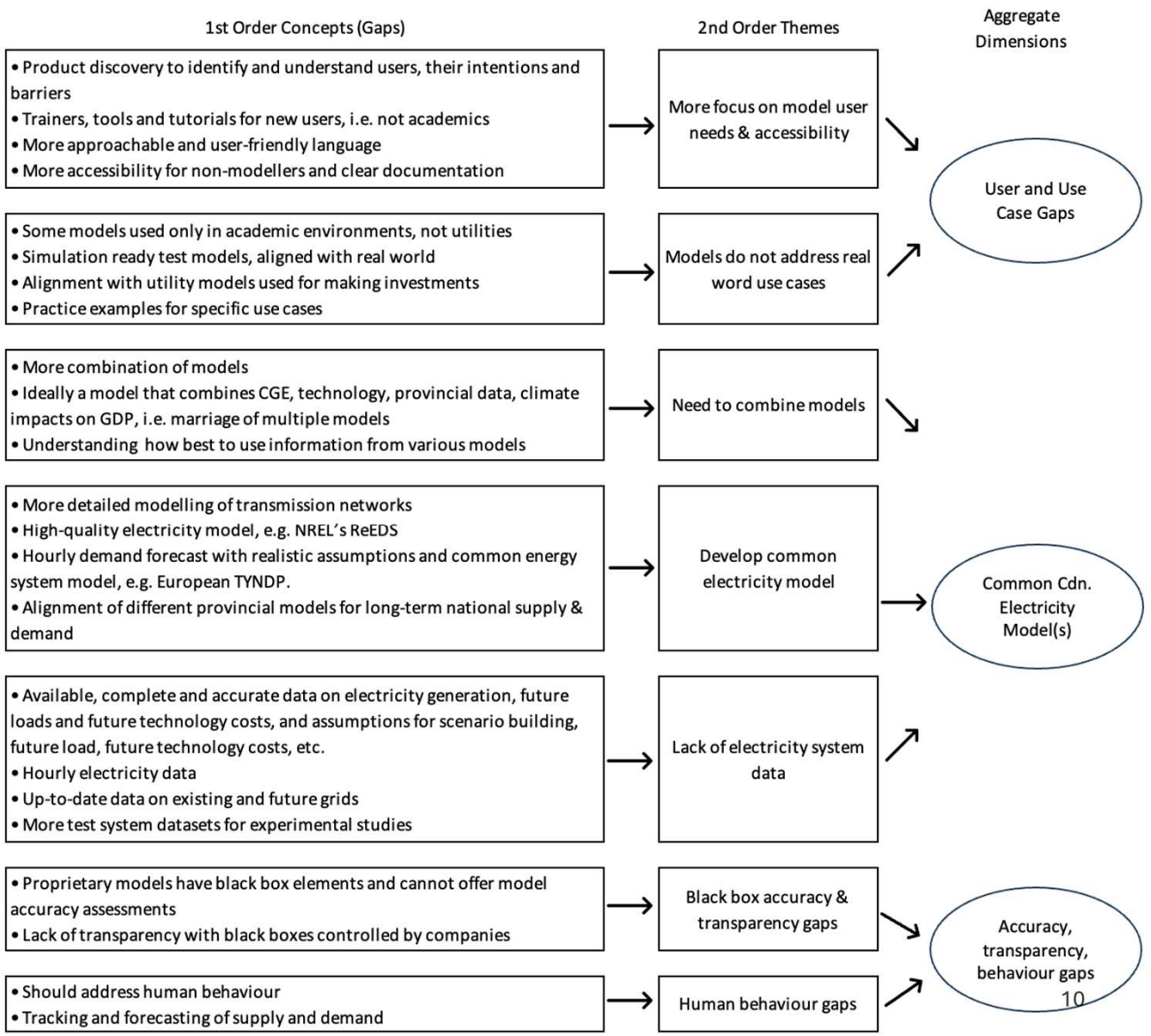
Roles that are at least 18 points higher or lower than the average for all respondents are shown in red circle.

Roles for Energy Modelling in Realizing These Priorities

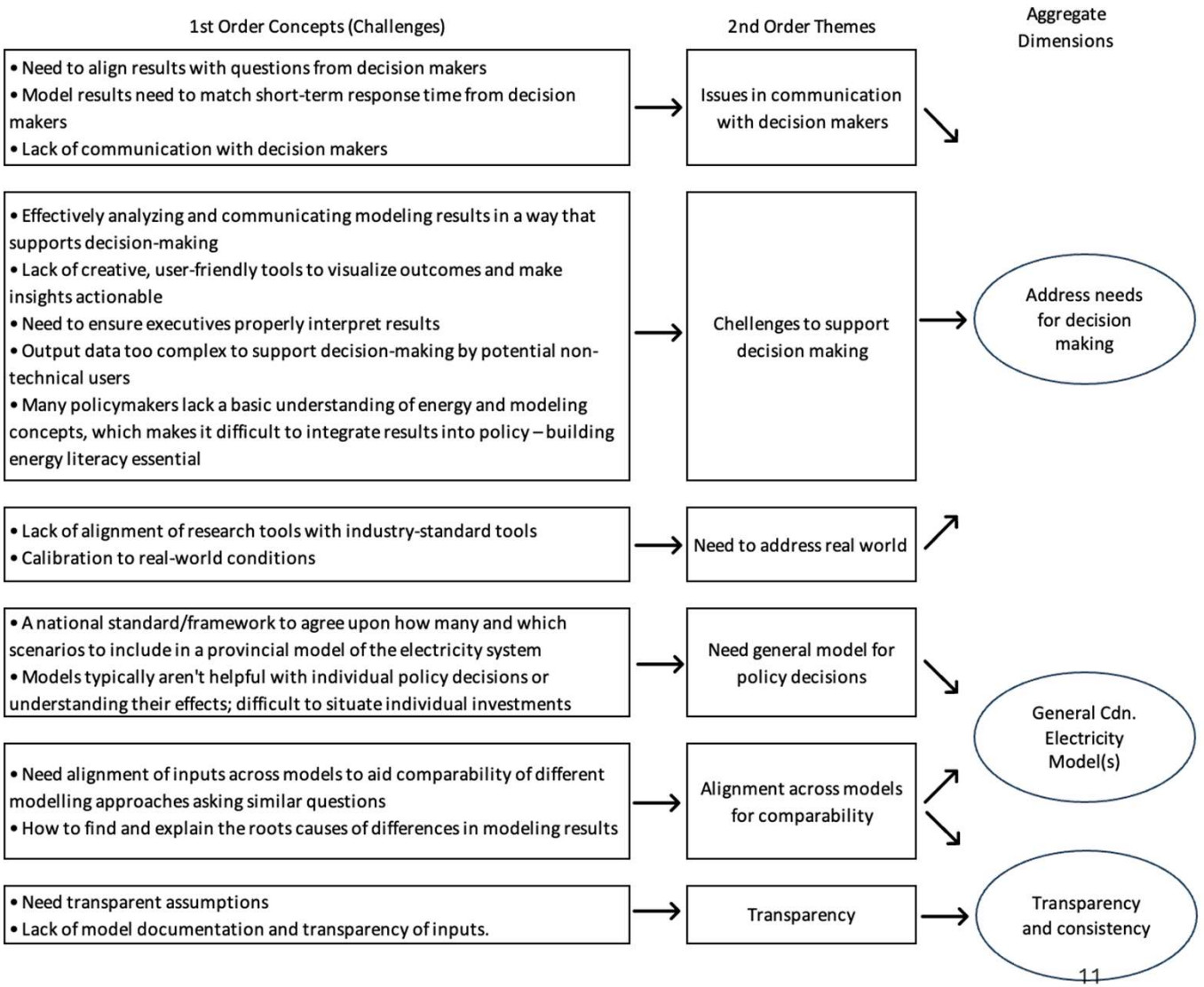
No.	Roles	All	Modellers	Model Collaborators	Non-Modellers
1	Scenario forecasting	85%	94%	89%	57%
2	Energy demand and consumption forecasting	76%	85%	61%	71%
3	Cost-benefit analysis	71%	74%	72%	64%
4	Decarbonization pathway analysis	70%	76%	72%	50%
5	Market and policy impact assessment	68%	74%	83%	36%
6	Investment and infrastructure planning	56%	56%	61%	50%
7	Assessment of trade and tariff impacts on energy systems	52%	65%	44%	29%
8	Analysis of interprovincial energy trade and market integration	48%	56%	50%	29%
9	Interprovincial transmission and grid expansion	47%	56%	44%	29%
10	Technology feasibility assessment	45%	38%	50%	57%

Roles that are at least 18 points higher or lower than the average for all respondents are shown in red circle.

What gaps or limitations exist with the energy modelling resources?



What challenges are faced in integrating energy modelling results into policy or decision-making?



What could be strengthened to enhance energy system modelling for Canada's energy transition?

No.	Area	All	Modellers	Collaborator	Non-Modellers
1	Increasing transparency in model structure, assumptions, and data.	4.38	4.48	4.61	3.87
2	Better coordination among government, private contractors, and academia	4.31	4.36	4.44	4.00
3	Strengthening the verification and validation processes for model outputs	4.18	4.23	4.39	3.80
4	Sustained funding for model maintenance, collaboration, and data	4.17	4.23	4.22	3.93
5	Improving public communications on modelling and energy transitions	4.08	4.15	3.78	4.27
6	Improving accessibility and clarity of model inputs and outputs	4.04	4.08	4.11	3.87
7	More research efforts to better integrate the social dimensions of transitions	4.03	4.00	3.94	4.20
8	Enhancing the integration of economic, industrial, and trade dynamics	4.03	4.06	4.11	3.86
9	Clearer policy direction and planning	4.00	3.98	3.89	4.20
10	Expanding training and support for senior managers and policy analysts	3.93	3.82	4.28	3.80
11	Increasing focus on equity considerations in energy modelling	3.71	3.70	3.72	3.73

Which energy system models have you used or are familiar with?

Model	Total
Energy System Optimization Models, e.g. TIMES/MARKAL (including NATEM)	23
CGE Models, e.g. gTECH	20
Power System Models, e.g. PyPSA	19
EMH-supported open-source models, e.g. SILVER, COPPER, EI2, CIMS, etc.	18
Energy System Optimization Models, e.g. TEMOA (used for ACES and CANOE)	11
Integrated Assessment Models, e.g. GCAM	10
Multi-sector capacity expansion models, e.g., OSeMOSYS	10
None	14
Other	31

How well do these energy system models support your decision-making needs?

Well

- Government of Canada
- Provincial and Territorial Governments
- Modelers
- Model collaborators

Neutral

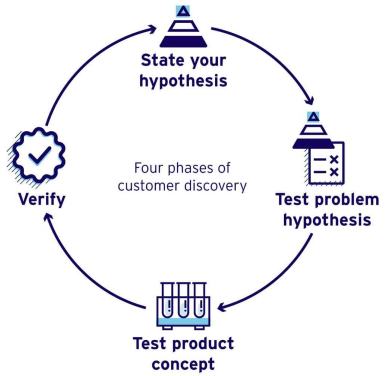
- Academia
- Think Tanks
- Environmental and Advocacy Organizations
- Non-Modelers

If you are not using energy modelling to support decision-making, what are the main reasons?

Reasons	No.
I don't have the expertise or capacity to use models	9
I rely on external consultants or partners for modelling insights	8
Lack of data or difficulty in accessing relevant inputs	8
Lack of transparency in modelling assumptions or outputs	8
I use other tools or methods for decision-making	7
I have not needed models until now	7
The models do not align with my specific needs	6
I do not need models for my work	5
Models are too complex or not user-friendly	4
I was not aware of available energy models	3

Conclusions

- **Priorities for energy policy and decisions**: decarbonization, modernization, affordability, equity, secure, reliable and resilient.
- **Roles for energy modelling in realizing these priorities**: big gaps exist among model users and non-users.
- **Gaps and challenges exist for energy modeling in Canada** in addressing decision maker needs, real word cases, accuracy, transparency, data and combination of models.
- **Solutions to gaps and challenges** include customer and product discovery, combination and integration of models, and development of common electricity models.



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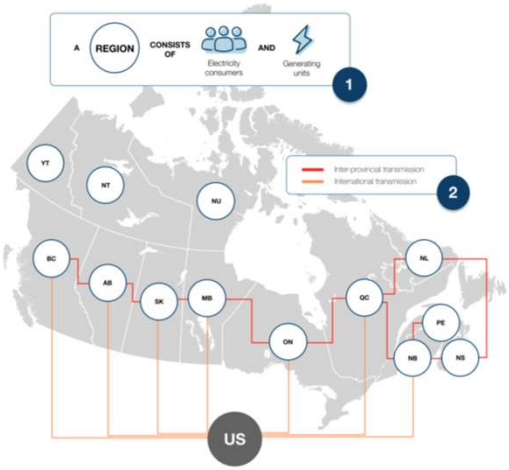

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