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September 27, 2022

BY RESS

Nancy Marconi
Registrar
Ontario Energy Board
2300 Yonge Street, Suite 2700, P.O. Box 2319
Toronto, Ontario M4P 1E4

Dear Ms. Marconi:

Re: EB-2022-0157 – Enbridge Gas Inc. – Panhandle Regional Expansion Project

I am writing on behalf of Environmental Defence pursuant to *Procedural Order #1* to provide a description of the evidence that Environmental Defence proposes to submit in this proceeding and an estimate of the cost.

Nature of Proposed Evidence

Environmental Defence proposes to retain Dr. McDiarmid to review Enbridge's stage 2 analysis under EBO 134. Enbridge's analysis "considers the estimated energy cost savings that accrue directly to Enbridge Gas in-franchise customers as a result of using natural gas instead of another fuel to meet their energy requirements."[1] Dr. McDiarmid would review this analysis and conduct her own analysis of the net savings or net costs of customers using natural gas in comparison to alternatives. Dr. McDiarmid's evidence would focus on residential customers, who constitute over 60% of the purported stage 2 savings.[2]

Enbridge calculated the stage 2 cost savings on the implicit assumption that resistance electric heating is the alterative electric option.[3] However, customers are more likely to install high efficiency electric heat pumps, which can be almost 4 times as efficient as traditional resistance heating.[4] Accounting for this large difference in efficiency levels would have a major impact on the stage 2 analysis and result.

This evidence is important because Enbridge relies heavily on stage 2 of the EBO 134 test to justify this project. That is because stage 1 of the EBO 134 provides a negative net present value (-$95 million). In other words, the cost of this project will not be covered by incremental distribution revenues and will instead cost existing ratepayers approximately $95 million on a net present value basis. It will therefore be important to determine if the stage 2 analysis is accurate.

[1] Exhibit E, Tab 1, Schedule 1, p. 6.
[2] Exhibit I.ED.14 (Attachment 1).
[3] *Ibid*.
[4] EB-2021-0002, Exhibit L.ED.1, p. 6.

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This evidence is also important because Enbridge did not calculate the net costs to customers accounting for the different efficiency levels of gas furnaces versus cold climate heat pumps. Environmental Defence asked Enbridge to do so in an interrogatory and Enbridge declined to do so on the basis that their calculations do not include an "explicit variable" for efficiency.[5]

Time permitting, Dr. McDiarmid would also endeavour to provide high-level comments on electric ground source heat pumps as an alternative option for new construction greenhouses. This is relevant to the assertion by Enbridge that there are no viable alternatives to gas for greenhouses.[6]

Expertise and qualifications

Dr. McDiarmid is very well-placed to provide this evidence. Dr. McDiarmid provided evidence on Enbridge's proposed heat pump programming as part of the recent DSM proceeding (EB-2021-0002) and was accepted as an expert in that proceeding.[7] Dr. McDiarmid is a consultant based in the Kitchener area. She has researched the cost-effectiveness of heat pumps extensively and has prepared reports on this topic for the housing stock in the Waterloo area and for Ontario as a whole. She is currently involved in a number of ongoing research projects relating to heat pumps and has published on the subject in a peer-reviewed journal. Dr. McDiarmid has a PhD in biochemistry and a Master of Climate Change degree. Dr. McDiarmid will be able to leverage her past work on heat pump cost-effectiveness in Ontario to prepare evidence for this proceeding in an efficient and effective manner. Dr. McDiarmid's *curriculum vitae* is attached.

Time to prepare evidence

Dr. McDiarmid expects to be able to prepare evidence within three weeks of an order from the Board approving the proposed evidence. If more or less time were available, Dr. McDiarmid would endeavour to tailor the level of detail accordingly.

Budget

Dr. McDiarmid estimates a cost of between $7,000 and $14,000 to prepare her evidence and answer interrogatory responses. The cost of testifying at a technical conference and an oral hearing are difficult to predict, and it is not certain whether those steps will take place. If they did, they may add between 5 to 15% to the cost.

I estimate the incremental counsel costs required in relation to the preparation of Dr. McDiarmid's evidence will be between $2,000 and $4,000.

Yours truly,

Kent Elson

[5] Exhibit I.ED.15(b).
[6] Exhibit I.ED.1.
[7] EB-2021-0002, Exhibit L.ED.1.

Heather McDiarmid, MCC, PhD

heatheratp2@gmail.com

Experience

Independent Consultant, *McDiarmid Climate Consulting* *Dec 2017 to present*

- Clients have included the Environmental Defense, Ontario Clean Air Alliance, ClimateActionWR, Reep Green Solutions, GreenUP Peterborough, Waterloo Region Community Energy, Conestoga College.
- Prepared evidence for Ontario Energy Board hearings as an expert in residential heating options modelling.
- Developed curriculum materials for an internationally-recognized climate literacy certification program.
- Analyzed the financial and climate mitigation impacts of electrifying Ontario homes using heat pumps for space and water heating.
- Explored a housing archetype-based approach to decarbonizing residential homes in Waterloo Region.
- Conducted a residential retrofit financing program feasibility study to meet FCM requirements.
- Prepared a research-based study of the potential for active transportation hubs and programs to encourage transportation mode shifts in the tri-cities.
- Unearthed and detailed residential carbon mitigation programs and strategies from across North America to inform Toronto's climate action plan.
- Prepared a climate impact analysis and developed an evaluation framework for a non-profit.
- Performed primary and secondary market research on the feasibility of retrofit management.

Sustainability Living Lab Coordinator, *University of Waterloo* *Oct 2021 to July 2022*

- Facilitated opportunities for students to apply their skills and knowledge to campus sustainability challenges
- Documented campus work related to the UN Sustainable Development Goals
- Developed resources to support integration of sustainability content in courses and programs

Research Associate and Lecturer*, University of Waterloo* *Jun 2020 to present*

- Taught a blended (in person and online) graduate course in Climate Change Mitigation in Fall 2021.
- Worked with local non-profit organizations to provide experiential learning opportunities.
- Invited as a guest lecturer on Climate Change Communications and on Climate Change and Housing.
- Analyzed a database of over 44,000 home energy audit results to explore the emissions impacts of different retrofit and electrification approaches for the residential sector.
- Presented research findings at the International Green Energy Conference, Jul 15-18, 2021.

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Research Assistant and Writer, *University of Waterloo and David Miller* *Mar 2019 to Apr 2020*

- Investigated municipal programs from around the world that have been successful in cutting carbon emissions, highlighting the most relevant and universally applicable details for a book.
- Advised on structuring the book and collaborated in choosing programs to profile.
- Wrote early drafts of many chapters.
- David Miller, Director of International Diplomacy at C40 Cities, is the author of the book titled Solved: how the world's great cities are fixing the climate crisis.

Researcher, *Clean Air Partnership* *Apr to Aug 2019*

- Prepared a toolkit on municipal financing options for residential retrofit programs.
- Completed a 16-week research project in 10 weeks.
- Prepared and presented webinars to municipal representatives.

Academic Instructor, *Wilfrid Laurier University and University of Guelph* *2002 to 2011*

- Shared a passion for biochemistry with 6-200 students at the 2nd, 3rd and 4th year levels.
- Researched and developed new course content.
- Explored innovative ways of engaging students.

Education

- Master of Climate Change, University of Waterloo
- PhD in Biochemistry, University of Guelph

Leadership in Sustainability

- **Project Lead,** Homeowner's guide to heat pumps for WR *Jan to Jun 2021*
- **Committee Member and Co-Chair**, ClimateAction WR Residential Sector *Dec 2018 - present*
- **Committee Member**, UW CAP Climate and Energy Working Group *2019*

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Writing and Publications

- An analysis of the financial and climate benefits of electrifying Ontario's gas-heated homes by installing air-source heat pumps, prepared for Ontario Clean Air Alliance
- Accelerating the 1.5°C energy transition for Canadian residential buildings through selective direct electrification with heat pumps. Peer-reviewed article published in Canadian Geographer, July 4, 2022.
- Analysis of Enbridge Gas' proposed low carbon transition program for cost-effectiveness and climate alignment, prepared for Environmental Defense for use in OEB hearings
- An analysis of the potential for air source heat pumps to reduce energy costs and greenhouse gas pollution, prepared for Ontario Clean Air Alliance
- Deep energy efficiency retrofits vs direct electrification for urgent emissions reduction: a case study using 33,780 residential energy profiles in Waterloo, Canada. Presented to the 13th International Green Energy Conference Jul 2021.
- Active Transportation Hubs in Waterloo Region: a research pilot project prepared for ClimateActionWR
- Aerial thermal imaging and building energy efficiency updates in WR: a sustainable buildings pilot, prepared for ClimateActionWR
- Analysis of the Residential Electrification Potential for the Waterloo Region
- Residential heat pump water heaters as a climate action for the Waterloo Region
- Deep Energy Residential Retrofit: financing feasibility study for Waterloo Region, prepared for WR Community Energy
- Accelerating Home Energy Efficiency Retrofits through LIC Programs: a toolkit for municipalities , prepared for Clean Air Partnership
- Climate Change and the Tree Canopy of Waterloo Region
- Climate Change and Housing Affordability in Canada