

Direct Testimony of George Foote (NSUARB-E-ENSC-R-12) ENSC DSM Plan 2013-2015

Before the
Nova Scotia Utility and Review Board
IN THE MATTER OF An Application to Approve
Efficiency Nova Scotia Corporation's Electricity
Demand Side Management (DSM) Plan
for 2013-2015

Direct Testimony of
George Foote

on behalf of the
Nova Scotia Consumer Advocate

May 22, 2012

1 **Q. Please state your name, professional affiliation, and address.**

2
3 A. My name is George Foote, I am a private consultant and sole practitioner advising
4 government, non-profit corporations, companies and others with a focus on matters concerning
5 energy and the environment. My address is 14 Cheltenham Court, Dartmouth, NS, B2Y 4V2.

6
7 **Q. On whose behalf are you testifying in this proceeding?**

8
9 A. My testimony is filed on behalf of the Nova Scotia Consumer Advocate.

10
11 **Q. Please provide a brief summary of your experience.**

12
13 A. I worked for 30 years with the Province of Nova Scotia, primarily in the areas of energy
14 efficiency, renewable energy and climate change. My last position with the province was as
15 Executive Director, Climate Change Directorate, Nova Scotia Environment, a position from
16 which I retired on April 30, 2010. As executive director, I was responsible for developing the
17 government's response to climate change. Under my direction, the Climate Change Directorate
18 developed the province's first Climate Change Action Plan and subsequently published
19 greenhouse gas regulations for Nova Scotia's electricity sector which are currently in force.

20
21 Prior to joining Nova Scotia Environment, I served as Director of Energy Markets and Climate
22 Change at the Nova Scotia Department of Energy where I was responsible for renewable and
23 alternative energy policy as well as electricity regulation.

24
25 I also have extensive experience with developing and delivering energy efficiency programs on
26 behalf of the Province of Nova Scotia. My professional qualifications are further summarized in
27 Exhibit A.

28
29 **Q. Have you testified before this Board?**

30
31 A. Yes, in 2011 on ENSC's 2012 DSM plan.

1 **Q. Have you testified before other utility regulatory Boards?**

2
3 A. Yes. I testified on behalf of the Nova Scotia Department of Energy at the joint National
4 Energy Board/Canada-Nova Scotia Offshore Petroleum Board hearing of an application by
5 EnCana for approval to develop the Deep Panuke Natural Gas Project offshore Nova Scotia.

6
7 **Q. What is the subject of your testimony?**

8
9 A. My testimony covers the following topics: (a) the proposed budget, energy savings
10 targets and programs for DSM for the years 2013 to 2015, (b) the move from a one year to three
11 approval process, c) level of effort with respect to low- income home programs, d) evaluation of
12 Enabling Strategies, e) level of free ridership and f) the administration of ENSC programs and its
13 budget presentation.

14
15 **Q. Have you reviewed the Company's evidence in this docket?**

16
17 A. Yes. I have read the evidence filed by the Corporation, including the proposed 2013-15
18 DSM plan, plan revisions, and attached reports. I have also reviewed information requests from
19 stakeholders and responses provided by ENSC.

20
21 **Q. Please summarize your conclusions and recommendations with regard to the**
22 **proposed budget, energy savings targets and programs for DSM for the years 2013-15.**

23
24 A. The revised budget presented by ENSC on April 18 for the three-year period 2013-2015
25 proposes an increase in investment with respect to past DSM activity in Nova Scotia.
26 ENSC has consistently raised the issue of industry capacity in its evidence and in its response to
27 Information Requests from a number of intervenors regarding the ability to effectively deploy
28 increased investment in DSM.

29
30 I am somewhat concerned that the level of investment proposed in the revised budget will
31 continue to prove challenging for ENSC to deploy in a cost-effective manner.

1 ENSC had the opportunity in the 2013-2015 to propose significantly higher levels of investment
2 and savings targets that would be more consistent with the IRP projections of spending in the
3 range of five per cent of utility revenues.

4
5 Indeed, ENSC was urged to so do at the hearing into the 2012 DSM plan by several witnesses
6 and at least one intervenor. That ENSC chose not to do so is significant.

7
8 IRP annual incremental program costs projections for 2013-2015 were in the range of \$74 to \$82
9 million per year with incremental annual energy savings of 276 GWh to 305 GWh per year.
10 ENSC estimated in response to Synapse IR-12 that it would need to spend about \$90 million
11 annually for the years 2013 to 2015 to achieve the savings targets for those years in the 2009
12 IRP. Clearly, the investment required to achieve a GWh of energy savings is higher than
13 anticipated by the IRP.

14
15 ENSC's stated reason for not proposing higher levels of investment is that "continued growth in
16 cost effective energy savings is more dependent on building customer demand for energy
17 efficiency services and the capacity to deliver these services than on increasing budgets."
18 (Response to Synapse IR-12)

19
20 When questioned about the ability to cost-effectively deploy an amount equal to five per cent of
21 NSPI revenues, ENSC's response to Synapse IR-13 again refers to the need to further develop
22 energy efficiency service capacity before attempting to deploy funds over and above those
23 proposed.

24
25 One can conclude, therefore, that ENSC believes annual investment in DSM of \$46-\$50 million
26 for the years 2013-2015 and with slight increases for 2016 and 2017 represents an appropriate
27 and effective level of DSM investment in Nova Scotia and may indeed represent the limit of
28 what can cost-effectively be deployed at this time.

29
30 It should be noted that the 2011 DSM plan delivered 16.7 fewer GWh savings than planned but
31 at a cost of \$6.1 million less than proposed in the budget approved by the UARB. The proposed

1 budget of \$46.2 million in 2013 represents a more than \$10 million increased over unaudited
2 spending of \$35.8 million in 2011 and it comes with a reduction in annual energy and demand
3 savings over those reported for 2011. It is no surprise that savings are getting more difficult and
4 more expensive to achieve as the most cost-effective measures are adopted and new technology
5 once considered advanced becomes commonplace.

6
7 **Q. How should future DSM spending levels be established?**

8
9 A. It would appear ENSC is seeking guidance with respect to future levels of DSM
10 investment. In response to IR-9 from the Consumer Advocate, ENSC stated that "...an IRP
11 update completed by the end of 2013 would be beneficial in informing DSM planning for years
12 beyond 2015."

13
14 As part of its evidence, ENSC says on page 26 " This Plan proposes a multi-year model with the
15 appropriate levels of DSM savings and investment to achieve desired long-term sustainable
16 energy savings for Nova Scotia, to restrain the need for currently projected future supply, and
17 illustrates that revisions to DSM targets in the 2009 IRP Update are now warranted."

18
19 There have been a number of significant developments with respect to energy supply and
20 demand as well as environmental regulation affecting electricity since the most recent IRP
21 update in 2009.

22
23 More aggressive targets for renewable energy to 2020 have been announced by government, a
24 major restructuring of NSPI's largest customer, the pulp and paper mill at Port Hawkesbury is
25 nearing completion with significant implications for future load, and new federal regulations for
26 coal-fired electricity generation to 2030 have been proposed.

27
28 Equivalent provincial regulations for greenhouse gas emissions which now only cover the period
29 to 2020 are expected for the period 2021 to 2030.

1 NS Environment's current regulations for greenhouse gas emissions and air pollutants to 2020
2 were developed simultaneously as part of an integrated, multi-pollutant approach to air
3 emissions. It is conceivable, then, that new provincial environmental constraints to 2030 for
4 greenhouse gas emissions will also include a discussion of new limits for air pollutants to 2030 at
5 the same time.

6
7 As noted in response to Avon IR-34, ENSC states that "NSPI is responding to significant
8 changes in the business, including increased levels of renewable energy and more stringent
9 environmental requirements. This is reflected in recently announced plans for the seasonal
10 shutdown of two coal units at Lingan. Any plans to reduce capacity will require more detailed
11 study and analysis, taking into consideration such items as the operating flexibility of the fleet,
12 wind capacity contribution, and other operating constraints."

13
14 The major drivers of the IRP include current and future capacity requirements, energy prices,
15 energy demand, environmental regulation, and energy efficiency opportunities and costs.

16
17 Incremental net energy savings and incremental net energy demand savings have proven to be
18 more costly to achieve than projected in the 2007/2009 IRP as noted in tables provided by ENSC
19 in response to Consumer Advocate IR-30. Savings are almost 30 per cent more expensive to
20 achieve than forecast in the IRP and IRP Update.

21
22 The Total Resource Cost test forecast for the 2012 plan was 1.9 (**Figure 5.1 2012 DSM Plan**
23 **Savings and Investment**, Evidence of ENSC as DSM Administrator, Feb. 28, 2011. The
24 forecast TRC for 2013 has declined to 1.6 (**Figure 4.2 2013 DSM Plan Savings and**
25 **Investment**, Revised Appendix "A", pages 4-7).

26
27 While the TRC is still acceptable, the declining trend provides further evidence of the challenges
28 ENSC faces in delivering cost-effective energy and demand savings in line with the IRP and IRP
29 update.

1 A new IRP completed prior to the end of 2013 would offer better guidance with respect to the
2 appropriate level of, and investment in, energy and demand savings for the years 2015 and
3 beyond.

4
5 A new IRP should be informed by additional clarity surrounding environment regulations for air
6 emissions to 2030, the immediate future of large industrial loads, particularly the Port
7 Hawkesbury mill, and the effect of renewable targets, including integration of intermittent
8 renewable energy on the grid, on the need for future capacity.

9
10 **Q. What is your view of the move to a three-year plan from a series of one year plans?**

11
12 A. Multi-year plans have the **potential** to increase program effectiveness and obtain greater
13 commitment from contractors, sponsors and clients. However, there is **no guarantee** that such
14 will be the case. Program design and delivery are still paramount in delivering real energy
15 savings and demand reductions at a reasonable cost.

16
17 The current regulatory framework that oversees ENSC includes a number of important strengths.
18 Furthermore, the UARB has recently adopted changes meant to provide more flexibility to
19 ENSC.

20
21 ENSC is proposing to offset the proposed longer time between plan approvals by a series of
22 mechanisms, including:

- 23
24 • quarterly meetings with both the UARB and stakeholders,
25 • annual progress reports,
26 • quarterly reports with preliminary net to gross values to be provided to UARB and
27 stakeholders in advance of quarterly meetings,
28 • ongoing tracking and a rolling schedule of full scale evaluations, and
29 • a protective trigger mechanism in case of significant performance setbacks.

1 This represents a reasonable effort to avoid any undue impact on the UARB's and stakeholders'
2 ability to conduct their important oversight roles. However, its effectiveness at replacing annual
3 stakeholder and board review as part of a regulatory process remains untested. It may be prudent
4 to make a more gradual transition to a three-year plan by moving first to a two-year DSM plan so
5 that the board and stakeholder may test drive the oversight mechanisms proposed as an
6 alternative to annual regulatory review. Approval of only the first two years of the 2013-2015
7 plan would address this issue.

8
9 **Q. Do you have any suggestions regarding the DSM Advisory Group?**

10
11 The quality and content of the annual report, the quarterly progress reports and the quarterly
12 meetings of the DSM Advisory Group will be the UARB's and stakeholders' window on the
13 success of the 2013-15 plan.

14
15 A formal Terms of Reference for the advisory group developed and approved by its members is
16 recommended. An independent chair of the Advisory Group elected by members may also
17 increase effectiveness of the group in its performance of its oversight role. An independent chair
18 could play a key role in establishing agendas for the quarterly meetings in co-operation with
19 ENSC, the board, and other stakeholders.

20
21 **Q. What are your views on the low income programs proposed by ENSC?**

22
23 A. Access to ENSC programs is important to ensure fairness to ratepayers who are paying
24 for the DSM initiative. It is recognized that some groups face higher barriers to participation
25 than others. These barriers can be of a financial or technical nature

26
27 ENSC's 2013-2015 DSM Plan includes an investment of \$13.3 million in Low Income DSM
28 programs over three years to achieve 19.0 GWh of incremental annual energy savings. The 2012
29 DSM Plan proposed spending on low-income households, including rental households, of \$4.3
30 million, little different on an annual basis than the 2013-15 plan.

1 I note that the Econoler evaluation indicated that the Low Income Program, including renters,
2 exceeded targets in 2011 by 3.3 GWh or more than 33 per cent with energy savings evaluated at
3 12.4 GWh or about two-thirds of savings expected during the three years of the plan now before
4 the Board.

5
6 One could conclude based on Low Income Program success in 2011 that the Program offered
7 sufficient incentive to overcome barriers faced by potential program participants, even though
8 eligible participants likely faced higher barriers to participation in DSM than higher income
9 electricity consumers.

10
11 Econoler's recommendations for the Low Income Renter Program included a recommendation
12 that ENSC monitor program barriers and participant concerns. In part, it said "To make sure to
13 go forward with the program and in the right direction, program barriers and
14 participant concerns will have to be watched closely."

15
16 A detailed examination of barriers to participation by residential electricity users with a focus on
17 low income homeowners and renters might prove to be valuable aid to increasing the
18 effectiveness of program design and delivery. It would supplement efforts by ENSC to
19 implement recommendations made by its third-party evaluators to improve program
20 effectiveness and increase energy savings.

21
22 ENSC indicated in its response to Consumer Advocate IR-17 regarding additional investment in
23 low income programs that it "would adjust program targets to reflect experience gained in the
24 previous year."

25
26 In light of the relative success of the Low Income Program in 2011, it may be prudent to review
27 spending and targets for future low income programs with a view to increasing energy savings
28 targets and investment for low income electricity users while remaining within the overall annual
29 budgets proposed for the 2013-15 DSM plan.

1 **Q. Do you have any concerns regarding evaluation of ENSC programs?**

2
3 A. Yes, I am somewhat concerned about the evaluation of some elements of Enabling
4 Strategies.

5
6 The stated purpose of Enabling Strategies is to encourage the adoption of energy-efficient
7 behaviours and to increase participation in ENSC Residential and BNI programs. The proposed
8 annual budget for Enabling Strategies is \$4.9 million for 2013, rising to \$5.2 million by 2015.

9
10 In response to Consumer Advocate IR-19, ENSC indicated that it “plans to include third-party
11 evaluation of Enabling Strategies for which it claims savings, such as with Codes and Standards.
12 ENSC is not planning to include third-party evaluation of Enabling Strategies for which it is not
13 claiming savings.”

14
15 It is difficult to determine from ENSC’s response to IR-9 which program elements aside from
16 Codes and Standards will be subject to third party evaluation.

17
18 ENSC plans to make significant investment in encouraging a culture of conservation and greater
19 participation in energy efficiency through public education and outreach, green schools, and
20 other similar initiatives. The proposed annual budget for the Education and Outreach component
21 alone is \$2.7 million for 2013, rising to \$2.9 million in 2015.

22
23 These initiatives need to be independently evaluated for their success or failure at reaching target
24 audiences and their success or failure at motivating desired attitude or behaviour changes, rather
25 than simply their effect on claimed savings or increased participation rates in ENSC programs.

26 Given the magnitude of the proposed budget for Enabling Strategies for 2013 to 2015, a rigorous
27 evaluation of all significant program elements would appear to be appropriate.

1 **Q. Do you have any concerns about free ridership?**

2
3 A. Yes. There are a small number of programs that account for the majority of the increase
4 in investment between the initial filing on February 27 and the March 30 revision. As noted in
5 Multeese IR-14, the cost to achieve savings in Existing Residential, New Residential and BNI
6 Efficient Products increased by \$1.3 million, \$1.4 million and \$0.9 million respectively for 2013.

7
8 In response, ENSC, indicated that “..correcting the error found in the Energy Efficiency
9 Resource Assessment Model (RAM Tool), which resulted in an understatement of costs,
10 specifically, incentive costs for free riders.”

11
12 It would be useful to re-examine the design of these particular programs in some detail in order
13 to determine changes that could be made to reduce the level and cost of free ridership.

14
15 **Q. What is your view on the administration of ENSC programs and its budget**
16 **presentation?**

17
18 A. Annual budgets as presented **Figure 4.1 - 2013-2015 DSM Plan Savings and**
19 **Investment including Outlook to 2017** on Page 18 of its evidence will always be critical for
20 assessing DSM investment and energy savings targets.

21
22 It is also important that DSM spending be carried out in an efficient manner.

23
24 ENSC projects to spend about 10 per cent of its total budget on administration costs in future
25 years as noted in its response to Consumer Advocate IR-32.

26
27 In its response to Consumer Advocate IR-33, ENSC indicated the year 2013 may be an
28 appropriate time to undertake a management audit. The UARB may wish to consider making
29 such an audit mandatory for 2013.

1 The presentation of ENSC annual budgets to include expenditures by major category in a form
2 similar to that presented by ENSC in response to Consumer Advocate IR-32 might also be useful
3 stakeholders. Other categories to consider adding would be grants and assistance as well as
4 incentives. Categories of spending less than one per cent of overall budgets might be considered
5 less important.

6

7 **Q. Does this conclude your testimony?**

8 A. Yes.

Exhibit A

George R. Foote

Bachelors of Arts (Political Science), University of Western Ontario, 1975

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WORK EXPERIENCE

February 2011 – Present

Private Consultant

Recent clients include Nova Scotia Consumer Advocate (advice on Efficiency Nova Scotia Corporation 2012 Demand Side Management Plan and related issues) and Nova Scotia Environment (advice on proposed federal greenhouse gas regulations affecting coal-fired electricity generation).

June 2010 – January 2011

Senior Advisor, Climate Change Directorate, Nova Scotia Environment, Halifax, NS

- Providing advice to Acting Executive Director on policy, regulatory, financial and administrative issues facing the Climate Change Directorate, including development of greenhouse management policy, climate change adaptation and implementation of Nova Scotia's Climate Change Action Plan.

April 2008 – May, 2010

Executive Director, Climate Change Directorate, Nova Scotia Environment, Halifax, NS

- Provides leadership for the implementation of Climate Change Action Plans for Nova Scotia, including oversight and direction of Directorate programs, activities, administration, financial, human resources, and budgetary matters to ensure clear prioritization and alignment with strategic goals and policy objectives.
- Leads the development and implementation of initiatives, strategies and approaches to ensure the Province has the capacity to reduce emissions by 10% below 1990 by 2020 and to enable the Directorate to consistently and effectively advise on future goals for greenhouse gas reductions in keeping with scientific and economic analysis.
- Works across government and with the MASH sector to integrate climate change risks into strategic thinking to ensure effective measures are being put in place to reduce GHG emissions and prepare the province for the effects of a changing climate are being implemented across provincial departments, municipalities, agencies, schools and hospitals.
- Provides expert advice to the Minister and to Government on Climate Change principles and practices, as well as legislative and regulatory trends in other jurisdictions, ensuring evidence-based information informs response to high level provincial issues, through the preparation of Memos to Cabinet, R&R's, briefing notes and personal presentations to Cabinet and Legislative Council.
- Directs the development and implementation of GHG regulatory frameworks including on-going processes and funding approaches and incentives to ensure

compliance (such as increasingly stringent absolute caps on GHG emissions) and to enable the shift to a low carbon economy. Policy development may span topics such as energy efficiency, renewable energy, fossil fuels, advanced clean coal, alternative fuels and vehicles, bio-resources, building codes, zoning, transportation planning, finance and infrastructure development; the work will encompass a wide range of policy, analytical and technical issues.

- Represents Nova Scotia's interests to maximize investment opportunities resulting from a low carbon economy and to ensure Nova Scotia's position is reflected in national and international planning and policy development on Climate Change. Through analysis and dialogue, articulates Nova Scotia's vision in working with governments and stakeholders to identify practical and effective options and opportunities, considering environmental, economic and political concerns that may impact Nova Scotia. Supports effective coordination of federal and provincial programs, participates in the development of multi-lateral strategies, negotiates inter-governmental, inter-agency and sectoral agreements, implements and/or enables partnering arrangements and collaborative frameworks that encourage corporate responsibility and that support absolute emission targets, policy-based commitments and sectoral agreements.

January 2007 - March 2008

Director, Energy Markets and Climate Change, Nova Scotia Department of Energy, Halifax, NS

- Leads the province's policy development and response to climate change. This issue has been steadily rising in importance and has become the leading environmental issue facing Nova Scotians, Canadians, and the globe.
- Ensures the timely and effective development of the province's renewable energy resources.
- Responsible for development of electricity policy, legislation and regulation.

- Responsible for development of natural gas distribution policy, legislation and regulation.
- Provincial representative on numerous federal/provincial/territorial committees, including those advising Canada on international climate change negotiations, management of emission reductions for large industry, and climate change impacts and adaptation.
- Responsible for developing and delivering projects and programs that compete for Department of Energy=s \$1.6 million annual budget for climate change and renewable energy.

June 2006 - December 2006

Acting Director, Intergovernmental Affairs and, Climate Change, Nova Scotia Department of Energy, Halifax, NS

- Ensures the department=s inter-governmental positions and negotiating strategies are consistent and effective in dealings with the federal governments and other jurisdictions by providing direct advice with respect to intra-departmental co-ordination on research, the department=s negotiating strategy, and development of policy options and the negotiation of agreements with other governments and the private sector.
- Lead responsibility for working with the federal government and other jurisdictions, industry and key stakeholders to develop an efficient and effective regulatory regime for the offshore and the province=s ocean energy resources.
- Works with other directors to develop an accurate assessment of the provincial impact of new energy initiatives put forward by the federal government, other jurisdictions and industry by conducting a high level assessment of their effect on Nova Scotia programs, policies and priorities.
- Leads the province=s policy development and response to climate change. This issue has been steadily rising in importance and has become the leading environmental issue facing Nova Scotians, Canadians, and the globe.
- Provincial representative on numerous federal/provincial/territorial committees, including those advising Canada on international climate change negotiations, management of emission reductions for large industry, and climate change impacts and adaptation.

- Responsible for developing and delivering projects and programs that compete for Department of Energy=s \$2.3 million annual budget for climate change, energy efficiency and renewable energy.

December 2004 – June 2006

*Acting Manger, Climate Change, Nova Scotia Department of the Energy, Halifax, NS -
Energy Management, Markets and Climate Change Division*

- Leads the province=s policy development and response to climate change. This issue has been steadily rising in importance and has become the leading environmental issue facing Nova Scotians, Canadians, and the globe.
- Lead author of Nova Scotia Climate Change Plan, including presentation of plan to Executive Council and to federal officials. Part of negotiating team.
- Provincial representative on numerous federal/provincial/territorial committees, including those advising Canada on international climate change negotiations, management of emission reductions for large industry, and climate change impacts and adaptation.
- Responsible for developing and delivering projects and programs that compete for Department of Energy=s \$2.3 million annual budget for climate change, energy efficiency and renewable energy.
- Requires considerable independent thought to develop policy in national and global context and position Nova Scotia to take advantage of opportunities and challenges.
- Extensive experience and knowledge of national and international policy and program issues as well as a working understanding of energy supply and demand

options, including an appreciation of technical and cost issues associated with various technologies and mitigation strategies.

March 1995 - December 2004

Policy Advisor, Nova Scotia Department of Energy and Department of Natural Resources, Halifax, NS

- Provided policy analysis and recommendations to senior management on issues relating to climate change, renewable energy, and energy efficiency in Nova Scotia, with a focus on environmental implications for energy supply, demand and pricing.
- Prepared briefing material for ministerial use and develops recommendations on alternatives and options in areas of energy strategy, policies, and planning. The individual develops and advises on strategies, policies, and programs directed at the efficient and environmentally responsible use of energy by all economic sectors.
- Member of number of federal/provincial/territorial working groups on climate change as part of national Climate Change Process (1998-2002), including Analysis and Modelling Group, Emissions Trading Working Group, Public Education and Outreach (provincial co-chair), and Electricity Working Group.
- Conducted strategic analyses and provides advice on the implications for provincial climate change policy in response to federal, provincial, and territorial proposals as well as those from industry and non-governmental organizations.
- Provided policy advice on the economic impacts of climate change policy options, especially proposals for constraints on emissions of large industrial emitters, including Nova Scotia Power Inc. and the major pulp and paper companies.

- Developed and maintained a strong network of contacts with key analysts, advisers and decision makers in the area of climate change within governments at all levels and with and the private sector.
- Represented the province on F/P/T and P/T policy and advisory committees.

November 1984 - March 1995

Supervisor, Residential Energy Programs, Energy Management Division, Department of Natural Resources, Halifax, NS,

- Managed staff of four engaged in delivery of residential energy programs.
- Developed residential energy program partnerships with private and public sector partners, including R-2000 Home Program, ENERhouse Housing and Energy Conference.
- Responsible for public education and outreach on residential energy efficiency and conservation as well as renewable energy, including concepts and content of printed and audio-visual material and media campaigns.
- Developed and delivered projects under the Canada-Nova Scotia Memorandum of Understanding on Energy Conservation, a multi-year, multi-million dollar agreement.

OTHER RELATED EXPERIENCE

December 1998 to 2000

Canada Mortgage and Housing Corporation, Ottawa, ON

◁Judge of CMHC's External Research Grant program with special responsibility for energy and environmental project proposals. Judges meet for three days each year to rank project proposals received by CMHC under its External Research Program.

June 1995 to May 1996

Sustainable Housing and Education Consultants, Wolfville, NS

◁Developed project concepts, prepared written proposals, and completed final reports for research on energy and environmental issues related to housing

◁Performed contract work for Natural Resources Canada., including computer-based analysis of energy performance of housing stock in New Brunswick., Nova Scotia, and Newfoundland.. Analysis included indoor air quality testing of air infiltration, ventilation rates, formaldehyde, radon, and volatile organic compounds.

REFERENCES Professional References and Character References available upon request