

Audit Process in Ontario Provides a Different Perspective on Program Evaluation

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ABSTRACT

In Ontario, the evaluation of DSM programs is largely reported by the utilities themselves and reviewed by a collaborative committee of stakeholders representing consumer and public interests. Unique to the review process is an “audit” of the evaluation results by an independent outside party. One of the major challenges of the audit is how to define the function of the audit separately from the function of an evaluation. In the most recent audit of Enbridge Gas Distribution’s DSM programs the review committee wrestled with this issue and in doing so the role of the audit has been further refined. In this paper we describe how these issues were resolved and how the functions and role of the auditor were established. We explain the development of this project and how the audit transpired with Enbridge Gas Distribution. Among the major outcomes of the audit were that it developed set of guiding principles for this and future audits. These principles were agreed upon by the collaborative parties and serve as a model for successive audits. The project also developed a method of prioritizing the programs and measures that were the subject of the audit. The prioritization helped to focus the collaborative parties to the task at hand and helped to narrow discussions among the parties facilitating decision-making and more productive meetings. Finally, this paper will offer insight to the program evaluation activities in Ontario.

Introduction

Enbridge Gas Distribution (formerly Enbridge Consumers Gas) is a natural gas distribution utility serving 1.3 million customers in central and eastern Ontario with headquarters in Toronto, Ontario. Since 1995, Enbridge Gas Distribution has been mandated by the Ontario Energy Board (OEB) to design and deliver Demand-Side Management (DSM) programs to all of its customer markets. Since that time, Enbridge has been promoting natural gas savings through a program portfolio that covers its residential, commercial and industrial customers.

In December 1998, Enbridge reached agreement with DSM stakeholders on an incentive mechanism that will provide a financial reward to the Company for surpassing its DSM targets in any given year. This incentive mechanism, called the “Shared Savings Mechanism” or “SSM,” likewise has a financial penalty for if the Company under-performs relative to the DSM targets. The SSM rewards or penalizes the Company by an amount determined by 35% of the actual net benefits of its DSM programs over or under its pivot point. The pivot point is calculated as the net benefits of the Company’s forecasted amount of DSM savings, developed from a set of assumptions about participants, per unit energy savings, free ridership, etc. The net benefits are calculated using the “Total Resource Cost Test”, developed by California Energy Commission and the California Public Utilities Commission (California Energy Commission 1987)

One of the regulatory requirements stipulated by the OEB with the approval of the SSM was the need for an independent audit of Enbridge’s annual DSM Evaluation Report. This report is the Company’s documentation of program goals, actual results, evaluation research, and the resulting

calculation of the SSM amount. The evaluation report was further defined in a settlement proposal to contain:

- “a catalogue of DSM measures that lists the unit savings, incremental costs, measure life, description, and data source;
- a brief description of each program and the combination of measures or projects included in each program, together with the applicable assumptions concerning free riders, free drivers, program costs, participation, and the methodologies for combining measures and projects, and the resultant program screening inputs;
- A variance report that identifies the changes, if any, in the inputs and assumptions used for the purpose of calculating the forecast net benefits and the actual net benefits, together with the rationale for each such change;
- A summary of each program evaluation that was conducted during the fiscal year, together with a redacted version of the corresponding evaluation report that removes any commercially sensitive information or customer specific data;
- A discussion of the uncertainty levels in relation to the evaluation of individual programs; and
- Recommendations on future evaluation priorities.”

The ultimate goal of the independent audit is to make a determination of whether the Company’s claimed SSM amount as reported in the Evaluation Report is accurate and appropriate, and to give confidence to all stakeholders that the claim – as amended by the audit process if necessary - will be fair and justified. The first independent audit was conducted on the 1999 Evaluation Report. This effort concentrated on the accounting aspects of the audit and left the role and scope of the audit yet to be clearly defined. That experience suggested the need to ensure:

- That clearly defined audit principles guide the audit; and,
- the independence of the auditor.

Accordingly, to improve the audit process these two goals guided the audit of the 2000 Evaluation Report.

Audit Oversight

An Audit Subcommittee consisting of four stakeholders (one of whom is a Company representative) derived from a larger DSM Consultative Group selects and provides oversight to the independent auditor. The DSM Consultative Group is a multi-stakeholder body, which meets quarterly to discuss and review the Company’s DSM activities. In the audit of the 2000 Evaluation Report, the subcommittee consisted of members from the following organizations:

- Enbridge
- Green Energy Coalition
- Canadian Manufacturers & Exporters, and
- Energy Probe.

This committee provided the oversight that helped to define the role and scope of the audit and to further refine the audit process.

In the following sections we describe the development of the audit process and how the audit transpired with Enbridge Consumers Gas. There is a discussion of the set of guiding principles developed for this and future audits. There is also discussion of the method to prioritizing the programs and measures that were the subject of the audit. The prioritization helped to focus the collaborative parties to the task at hand and helped to narrow discussions among the parties facilitating decision-making and more productive meetings. Finally, the discussion gives general insight on a method (i.e. the audit) in which an evaluation attempts to respond to numerous competing parties and interest groups.

Audit Principles

As mentioned above, one goal of the audit of the 2000 Evaluation Report is that it be guided by a clear set of audit principles. The purpose of the principles is to better define the audit and to guide the auditor in its scope and its priorities. In this way the expectations of the auditor are clear to the subcommittee from the outset of the audit. The role of the auditor stems from the financial audit function. As a result the emphasis in developing the audit principles was on the accuracy in accounting for program participation and savings.

The principles that guided this audit can be summarized as follows.

1. The audit resources should be directed primarily to those components that offer the greatest potential threats to the validity of the claimed savings. In general, these components are those that have large projected net benefit, combined with a large uncertainty in the inputs.
2. The audit process should review the entire chain that leads from initial program inputs through to the SSM calculation. This chain includes:
 - a. Specification of parameter values or assumptions for each standard measure.
 - b. Program participation tracking by program delivery agents.
 - c. Internal data flows from hard copy to databases to final SSM inputs spreadsheet.
 - d. Correct and consistent entry of SSM inputs to DS Strategist[®], the software tool used to calculate net benefits.
 - e. Calculation of the difference between net benefits from DS Strategist using projected budget inputs and those using post-program actual inputs.
3. All inputs that contribute to the SSM claim should be reviewed, subject to the prioritization defined by Principle #1. These inputs include:
 - Savings for an individual measure;
 - Engineering parameters that determine measure savings;
 - Measure life;
 - Numbers of measures installed;
 - Free ridership;
 - Third-party attribution effects—that is, program attribution based on Company influence on agents delivering DSM services other than Company’s implementation contractors;
 - Measure costs; and
 - Program costs.

4. The audit should:
 - a. Identify inconsistencies between approved assumptions and inputs used for Enbridge's SSM calculation.
 - b. Identify and resolve with Enbridge internal inconsistencies in the set of SSM inputs.
 - c. Identify and, where possible, correct inconsistencies between original program records and Company SSM calculation inputs.
 - d. Identify unreasonable and/or poorly supported assumptions and, to the extent practical, suggest and provide support for alternative assumptions.
 - e. As practical, where program design or delivery features appear to affect negatively the validity of key assumptions, point out design changes that might improve program performance.
 - f. As practical, suggest research, evaluation, and/or program tracking that may be conducted in the future to mitigate key uncertainties identified and not resolved by the audit.
5. The audit itself does not include re-calculation of the SSM claim. Enbridge re-calculated the claim after the Audit Subcommittee determines adjustments to be made based on the audit report.
6. The specific conditions under which budget and/or actual inputs would be changed based on new information from this audit or other sources will be determined by the Audit Subcommittee.

Evaluation experts will recognize that some or parts of these audit principles are elements routinely found in process and impact evaluations of DSM programs. However, none of these elements is intended to be comprehensive. Research, design, and delivery recommendations are provided to the extent that these issues emerge from the audit review. However, no attempt is made to provide a complete or prioritized research agenda or program review. Any issues arising in the course of the review will not result in definitive values to substitute for current assumptions, but will indicate if major problems appear to exist with those assumptions or the related program delivery. Substantive issues raised by the audit can be dealt with by the DSM Consultative through other avenues.

As indicated above, the primary goal of the audit is to give confidence to all stakeholders that Enbridge's SSM claim will be fair and justified. Based on the SSM definition, a revision to the budget or actual values for any of the following inputs can affect the net benefits and corresponding SSM claim:

- Savings for an individual measure
- Measure life
- Number of measures installed
- Free ridership
- Third-party program attribution
- Measure costs
- Program costs.

Accordingly, the audit is addressed to reviewing the accuracy of these inputs to the SSM calculation. For some of these inputs, as well as for certain components not reviewed, the approach of the audit requires some explanation. These inputs include:

- Spillover,
- Free drivership,
- Program costs,
- Free ridership, and
- Third-party program attribution.

Spillover and Free Drivership

Spillover and free drivership are two additional components that could be considered for the list of inputs to be reviewed in some contexts. These components were not reviewed in this audit for a combination of reasons. First, these components are not currently part of the SSM calculations, and were not identified by the Audit Subcommittee as high priority for audit review. Moreover, developing estimates of spillover or free driver effects would be beyond the scope of this audit effort.

Utility Program Costs

The audit did not review program costs. The audit subcommittee accepted Enbridge's reported program expenditures. For the 2000 program year, actual expenditures were 6.3% greater than the budget.

Free Ridership

Free ridership was identified as a key issue for review for several program components. In reviewing these free rider assumptions, the audit considered several aspects of the effect represented in net benefits calculations as "free ridership."

The simple definition of a free rider is a program participant who would have installed the measure in the absence of the program. However, some participants are *partial free riders*, who would have installed a portion of the project without the program. Others are *delayed free riders*, those who would have installed the measure but not as soon. In other cases, the participants would not have taken the action without the program, but the program itself is in part attributable to the efforts of another agency. In this audit, because the SSM claim is based on *lifetime* net benefits, the effective free rider rate is interpreted as the fraction of lifetime measure savings that would have occurred in the absence of the program. This fraction accounts for partial and delayed free ridership, as well as third-party program attribution. The fraction also discounts the value of later-year savings by the same discount rate as is used in the net benefit calculations.

Third-Party Program Attribution

Third-party program attribution is not a distinct input to the net benefit calculation in DS Strategist and the corresponding SSM calculation. These effects need to be captured in the calculations as part of the input free ridership. However, the audit identifies this attribution question as a separate

issue to distinguish it from free ridership that can be determined purely from participant decision-making.

For the residential programs, there were cases identified where services were jointly sponsored by Enbridge and another party, or where the measure is provided by a third party and Enbridge influenced the third party to provide that measure. In these cases, the fraction of credit due to Enbridge needs to be determined based on its contribution to the joint service or its relationship with the third party. This fraction is over and above any participant free ridership in terms of individual customers who would have undertaken the measure without the program.

All of the commercial and industrial programs were custom projects. For the custom projects, no cases of this type of third-party effect were identified in the audit. There were cases where a participant may have been influenced to implement a measure by another program in addition to the Enbridge program. These cases were treated as ordinary participant free ridership. That is, Enbridge was credited for the measure to the extent that the participant would not have implemented the measure without Enbridge's program. This credits Enbridge for actions taken over and above those resulting from any other existing programs.

Verification of Computation

Also critical to the validity of the SSM claim is the accuracy of the calculation process for a set of agreed inputs. The calculation is performed by Enbridge using the DS Strategist software. The auditor would normally include this calculation as part of its reported results. In this instance, the Audit Subcommittee had engaged another party separately to confirm that Enbridge's inputs to the DS Strategist calculation are consistent with the agreed values.

As part of this review of computational methods, the internal consistency of the inputs database was also assessed.

The Scope of The Enbridge Audit

The audit process was designed according to the principles outlined above. The specific steps in the process were:

- High-level review and classification of SSM inputs to identify key program components and issues for review.
- Review of Enbridge's DSM program documentation and tracking procedures, conducted via site visit and materials review.
- Review of key parameters and algorithms for the prescriptive or standard measures. This review applied to the residential programs, which consisted entirely of prescriptive measures.
- Review of a statistical sample of custom projects, including customer interviews. This review applied to the business markets programs, which consisted of custom projects.
- Assessment of Enbridge's method of determining incremental costs for custom projects.
- Reconstruction of the SSM calculation.

By analogy with an accounting audit, a strict interpretation of the "audit" function would be to determine if the elements of the SSM claim are supported by available documentation and consistent

with agreed computational procedures and parameter values. The audit would then identify and, if possible, correct discrepancies and also identify inputs that are unsupported.

The audit performed for Enbridge went beyond this accounting-style approach in the following ways:

- The review of inputs was done not just for consistency with prior assumptions, but also for reasonableness of those assumptions.
- Where the assumptions do not appear to be reasonable or well supported, a range of potentially more suitable values was suggested, to the extent practical.
- Where the review was unable to resolve uncertainties in particular inputs, there are suggestions for further research, or procedures to be employed in the future, to resolve some of these uncertainties.
- As part of the audit, a limited amount of direct evaluation work was conducted, including free rider assessment, in the review of custom projects.
- Where the review indicated that design or tracking features were likely to be reducing installation rates or net savings compared to the budget assumptions, we indicated potential program modifications that might mitigate these problems.

At the same time, this as well as any audit is limited by the time and budget allotted. Comprehensive review of potential problem areas is not possible. A leading principle of this audit process, therefore, was to focus attention on the inputs of greatest concern. Given the ultimate goal of producing a credible SSM claim, the components of greatest importance to the audit were those that had the greatest potential effect on the magnitude of that claim.

High Level Review

The high level review is the key first step in the process which involved sorting and ranking of each program by energy savings, net benefits and program costs to determine which programs contribute the most to the SSM claim. To prioritize the issues of interest within each market segment (residential, commercial, industrial, multifamily) the programs were ranked by volume savings and net benefits. Any changes in assumptions for the top ranked programs will have the largest impact on the overall performance of Enbridge’s programs. Therefore the programs with the greatest savings and net benefits in a sector are given the most consideration in this review. A summary of the ranking of the programs is shown in the table below.

Summary of Program Ranking

PROGRAM TOTALS	Percentage of Costs	Percentage of Savings	Percentage of Net Benefits
Residential	65.8%	46.3%	45.8%
Residential Multifamily	10.9%	11.8%	15.0%
Commercial	4.4%	13.5%	16.7%
Industrial	18.9%	28.4%	22.4%
OVERALL TOTAL	100.0%	100.0%	100.0%

Evident from these rankings is that the residential and multifamily programs together are responsible for over 60% of the net benefits. As a result the audit of the residential programs should be

given priority relative to the other market segments. The approach taken to audit these segments is described below.

Residential Programs

The residential programs are delivered through a number of channels, and the same measure can be delivered via several delivery mechanisms. The savings and net benefits from residential measures are calculated based on a unit savings, regardless of delivery mechanism. To determine which measures should get priority in the audit, the measures are ranked based on participation, savings and net benefits. These rankings are shown in the table below.

Ranking of Residential Measures

Measure	Percentage of Total Participants	Percentage of Savings	Percentage of Net Benefits
Water Heater Temperature Turndown	46.6%	47.7%	33.4%
Showerhead / Aerator	17.7%	26.7%	50.7%
Efficient Water Heaters	18.6%	11.4%	9.4%
Construction Heaters	0.4%	4.4%	0.5%
Furnace Filter Alarms	4.9%	3.4%	1.3%
7 Others*	11.7%	6.4%	4.7%

* These included pipe wrap, pool covers, thermostats, weatherization, window, and others.

As can be seen in the table, the majority of the claimed savings and net benefits in these programs are due to the temperature turndown and low-flow showerhead measures. The next largest measure in both projected savings and net benefits is efficient purchase. The remaining measures are relatively small in both respects. For each of these five measures, the audit reviewed the assumptions used in developing the savings claim and identified key questions regarding those assumptions. In consultation with the Audit Subcommittee, we targeted for a more detailed review the measures that ranked highest in contribution to projected net benefits. For each of these measures, we further targeted the issues identified by the Subcommittee as being of greatest concern at this time.

In some cases, an issue was identified as being a potentially large contributor to uncertainty or error in the SSM claim, but was not targeted for further attention by the audit. These were generally areas where further research was known to be needed, and this audit process was unlikely to resolve the outstanding questions.

An example of the key questions raised with respect to these factors for the top two residential measures are indicated in the table below.

Residential Measure Questions Targeted by the Audit

Measure	Number of Participants/ Installation Rate	Engineering Assumptions	Third-Party Attribution	Free Ridership	Measure Life
Temperature Turndown	What is the tank temperature before turndown? Does the participation rate reflect tanks already at 130 deg. F? How reliable is the documentation of units turned down?	Are there data to support the assumption that 35% will turn the temperature up again?	Not an Issue.	At issue as it relates to whether some customers may turn down to 130 as a safety measure or for other reasons.	Are there data to support using a 15-year life? What is the average life of a new water heater in Toronto? Should the measure life differ for existing vs. new heaters?
Showerheads	Does the participation rate reflect homes in which low-flow showerheads are already installed? Is appropriate correction made for units left at the home but not installed by the contractor?	Not an Issue.	What savings should Enbridge claim when showerheads are part of the water utility programs?	What is the basis for the free ridership assumptions?	What is the appropriate measure life?

Commercial and Industrial Programs

In contrast to the residential programs, the savings for each participant in the commercial and industrial programs is calculated individually. As a result, there were no standard assumptions or algorithms to review. Reviewing details of each custom project was beyond the scope of the audit. Instead, a two-part process was employed to review the inputs and assumptions for individual projects.

The first part, round 1, consisted of detailed review for a small number of individual projects. This round targeted a few large projects, and examined the full range of issues that could affect the SSM calculation for each. This spot check of some of the largest potential contributors to the SSM claim was intended only to provide rough indicators of whether the inputs for each project generally appeared to be appropriate, or whether there might be systematic problems that needed to be addressed.

As it turned out, the first-round review raised two issues that the Audit Subcommittee decided needed further investigation. The first was that not all the projects reviewed had actually been completed during the program year. The second was that the free ridership for the reviewed projects was higher than the budget assumption.

Based on the results of this first-round review, the Audit Subcommittee expanded the scope of the audit to include a systematic review of a statistical sample of projects. The goal was to provide reliable estimates of project installation rates (i.e., what fraction of the claimed savings have actually been installed) and free ridership. This second-round individual project review was understood to be more of a primary evaluation function than an audit function.

The second-round of individual project review involved a less detailed review for a statistical sample representing the full population of all custom projects. The emphasis of this review was on free ridership, measure installation, and incremental measure costs. The incremental cost issue was identified in the high-level review and ranking and was incorporated as an extension of the second-round review. In conjunction with the project-level cost review conducted in the second-round of project reviews, the methodology Enbridge used to assign incremental costs was also assessed.

Thus, the review process for the business markets consisted of three primary components:

1. High-level review, including ranking of programs and projects within each sector to determine the emphasis of the audit.
2. First-round detailed review of selected custom projects.
3. Second-round basic review and interview for a statistical sample of custom projects.

The findings and recommendations from the review are then provided in a report to Enbridge and the Audit Subcommittee.

Results

The audit of Enbridge's Evaluation Report resulted in a series of recommendations for both the residential and the commercial and industrial programs. The recommendations fell into three categories as explained below.

Changes to Assumptions for SSM Calculation. These recommendations include changes to parameters and assumptions that will have a direct impact on the SSM calculation. The basis for these recommendations is fully supported by existing documentation or studies.

Assumptions requiring further study. These elements have been identified as being at issue, however there is no conclusive information on what the change to the assumption should be. For the purposes of calculating SSM the inputs remain unchanged.

Program Design and Operation Issues. During the course of the audit, program design and operational issues had become evident. While these are not the focus of the audit, they are not ignored either. These matters are recognized and mentioned in the audit report.

Only the first set of recommendations resulted in a change to the SSM calculation; if all were put in place it would result in a net decrease in the incentive by over 50% from the amount originally claimed. However the audit results are simply recommendations and the acceptance or rejection of them and the final impact on the SSM incentive still must be negotiated and decided by the Audit Subcommittee.

Conclusions

The review by collaborative parties of evaluation results that determine a utility's incentive can be a contentious and arduous process. The audit process, though not perfect, provides a means to prioritize and to organize the issues in a logical manner in an attempt to bring the parties to agreement. As long as the auditor remains impartial and is driven by the desire to provide reliable and defensible research solutions, (s)he can be trusted by all sides. Some of the benefits and drawbacks of the process are noted below.

Benefits

Keeps parties focused. By prioritizing the programs and measures within the programs, the audit is limited to concentrate on a manageable set of issues. This is a benefit for both the auditor and the members of the review committee who all are dealing with limited resources. This also helps to prevent the favorite issue of a particular participant dominate the discussion.

Brings to light previously unknown information and reports. The auditor has broad powers to interview company staff and obtain additional information during the course of his duties. In this way

the audit functions as a sort of “discovery” process. The auditor may reveal studies and surveys done by the utility that may bring new information to the calculations of savings. Often this information was either overlooked by the utility, resided within a different department, or the staff preparing the evaluation report was unaware of the information or its significance. Bringing this information to light during the audit process increases the comprehensiveness of the evaluation.

Keeps the process moving. The independent auditor has a limited budget and time frame and as such cannot be bogged down on a single issue. Despite disagreements, the auditor must investigate the issues and make recommendations.

Provides an impartial opinion. With the judicious selection of an experienced auditor all parties can be assured of sound impartial advice. This often facilitates otherwise divisive parties with competing agendas to come to agreement.

Provides feedback for succeeding years. The audit recommendations include items that require further study. If these recommendations are acted upon, the resulting information may remove an issue from the table, speed the process up in following years, and/or free up resources to take up other matters.

Drawbacks

Scope is limited. The audit scope is necessarily limited and the auditor can only focus on a limited number of items. This may be a problem if a particular sticking point is not addressed in the audit.

May permit some uncertain inputs. The prioritization of the programs and measures investigated means that some measures and/or inputs with little impact on the SSM may never be fully investigated. Unreliable parameters or assumptions may persist after the audit process.

Does not yet deal with costs. The audit process thus far has concentrated on the savings term of the net benefits equation and has not looked at utility costs. For this audit, the program costs were 6.3% more than budget while the energy savings were 48% greater. At some point the audit needs to give equal weight to program costs *and* energy savings.

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