Performance Monitoring for Energy Efficiency Programs: Defining the Canadian Experience

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ABSTRACT

This paper summarises the work undertaken to date, by the Office of Energy Efficiency (OEE) of Natural Resources Canada (NRCan), to develop stronger performance information by which to monitor program progress, and improve the linkages between objectives, program outputs and market outcomes for each initiative. The work described herein represents the first step by the OEE to establish a formal process by which to identify and collect performance information for all of the Efficiency and Alternative Energy (EAE) initiatives. The OEE has opted to use a performance indicators approach as a practical means of providing an "indication" that market outcomes are consistent with program objectives and targets.

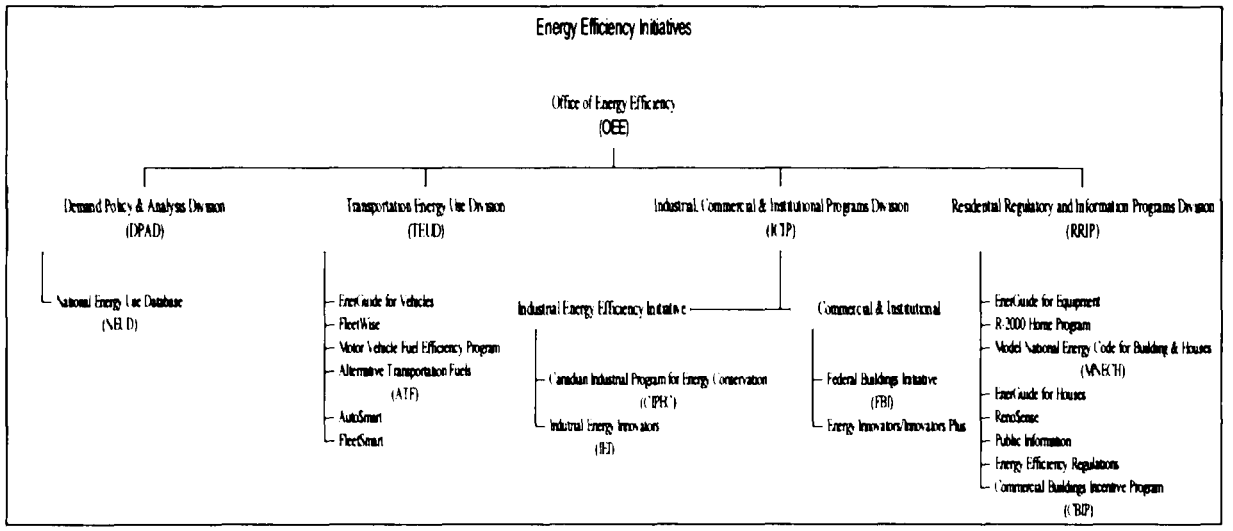
Introduction

In recent years, NRCan has increased its efforts to link changes in energy use to changes in greenhouse gas emissions through energy-use trend analysis and program performance monitoring. Initial efforts at developing performance information began with *Influencing Energy Use in Canada, (1997)* and continued with the OEE's *1998 Report to Parliament.* Performance monitoring in the field of energy efficiency however, is evolving (Violette 1996). To date, there exists no one model or process by which to develop performance objectives, indicators and targets, nor is there a prescribed method or protocol to guide the development of performance indicators. Nevertheless, in-depth performance information is crucial to effective program monitoring and successful program delivery.

The Office of Energy Efficiency (OEE) of Natural Resources Canada (NRCan) delivers a comprehensive set 19 Efficiency and Alternative Energy (EAE) Program initiatives, covering the four principle end-use sectors: Residential, Commercial, Industrial and Transportation. They are delivered through the different divisions that make up the OEE (see Figure 1) and they employ different policy instruments to meet their stated objectives, including:Leadership; Regulation; Information; Voluntary action; and Science and technology.

Thirteen of the nineteen OEE initiatives are directed at influencing energy use in a specific end-use sector, while the remaining programs are more general in that they target more than one end-use sector. Together the EAE initiatives are designed to promote greater energy efficiency and the increased adoption of alternative energy in all end-use sectors, with the ultimate goal of reducing Canada's energy-related carbon dioxide (CO_2) emissions.

Figure 1: OEE Program Delivery Structure



Performance Monitoring and its Relevance to the OEE

In April 1997, the Office of the Auditor General of Canada released a report assessing the quality of the performance information provided for 16 of NRCan's energy efficiency initiatives, delivered under the Efficiency and Alternative Energy (EAE) Program. One of the objectives of the program audit was to determine if NRCan is measuring and reporting the performance of the energy efficiency initiatives;

The main conclusion in the Auditor General's report (April 1997) was that *"NRCan's current performance information, on both expectations and achievements, is not sufficient to determine the overall success of its energy efficiency initiatives."* In particular, the report noted that 1) objectives established for many of the initiatives *"do not provide a clear and concrete expectation of achievement;"* and 2) that *"for many of the initiatives, there is a lack of reported targets in terms of outcomes"* both of which are crucial for the OEE to assess its progress and report to Parliament.

A Performance Reporting System: Indicators Approach

Energy efficiency programs today are different from those of past years. They are less direct and therefore more difficult to evaluate using a conventional evaluation paradigm. The indirect nature of newer programs makes it more difficult to collect information on the actions being influenced and increases the quantity and type of information that must be collected. Also, program funding has decreased substantially compared to the 1980s, and as such there are fewer funds available for evaluation purposes. With fewer funds available and performance information more difficult to obtain, the OEE has opted to use the performance indicators approach.

Metrics are only helpful when an organisation has the capacity to develop and respond to them. The OEE considers the performance indicators' approach to be a more cost-effective means of developing good performance information. It is a practical means of providing an "indication" that

market outcomes are consistent with program objectives and targets. Indicators are in essence a yardstick by which to measure progress towards clearly stated goals and objectives. In addition, this approach provides a measurement system that supports and enhances continual performance improvement.

Performance Reporting Criteria

An effective measurement system must build upon consistent and well-understood definitions for the performance criteria. The OEE is basing its ongoing effort to develop stronger performance information on criteria published by the Office of the Auditor General of Canada. These criteria are summarised in Table 1 – they outline what the Office of the Auditor General considers to be essential for good performance reporting, and are what it uses to evaluate program progress when auditing Canadian government programs.

Table 1: Criteria for Good Performance Indicators

Attributes	*Explanation*
Meaningful	
Understandable	• clear (clearly and consistently defined) • context (explained) • concrete (measurable) • lack of ambiguity in direction
Relevant	• relates to objectives • attributable to activities • significant and useful to the users
Comparable	• allows comparison over time or with other organizations, activities or standards
Reliable	• accurately represents what is being measured (valid, free from bias) • data required can be replicated (verifiable) • data and analysis are free from error • not susceptible to manipulation • balances (complements) other measures
Practical	• financially feasible • feasible to get timely data

Source: Report of the Auditor General of Canada -- December 1997

Methodology: Improving Performance Information

Improving performance information is an ongoing process, and while considerable progress has been achieved since the release of the Auditor General's 1997 report, many of the issues raised are long-term. To this end, NRCan has committed itself to continually improving its program performance monitoring and information gathering. Using the criteria summarised in Table 1 above, OEE efforts now focus on six main activities:

- providing a clear and concise description of each program;
- clarifying and clearly stating the main objective of each program;

- identifying relevant program output activities, that contribute directly to the stated objective;
- establishing meaningful and measurable targets for each program, for both program outputs and market outcomes;
- developing clear and practical indicators for all identified targets; and
- identifying actual and potential attribution activities to monitor program outcomes (i.e. next steps).

The main responsibility for developing and collecting performance information rest with the Demand Policy and Analysis Division (DPAD) within the OEE, because it is DPAD who is responsible for preparing reporting documents that address overall energy efficiency and energy use in Canada, such as the Report to Parliament, The State of Energy Efficiency in Canada Report, and the Energy Efficiency Trends in Canada Report.

DPAD developed a comprehensive table format to facilitate the collection and presentation of program monitoring information. Below is the Program Information Key that outlines the basic questions OEE program performance information seeks to answer. The questions were designed in keeping with the criteria outlined in Table 1, and serve to streamline and guide the process of collecting performance information from program managers.

DPAD adopted a consultative approach for developing and collecting performance information for each of the OEE programs. In order to alleviate duplication and what is often referred to as "survey fatigue," a table was filled in for each program, with existing performance information collected for other purposes (i.e. Report to Parliament). The partially completed tables were then distributed to program managers, along with the Program Information Key (Table 2) for guidance, for their review, comment and input.

Table 2: Program Information Key

Full Program Name?				
Objective: What is the program trying to achieve?				
	Program Output: Direct products and services that result from program activities, e.g. quotas, reports, policies, plans, etc.		**Market Outcome: Consequence** of the program	
Activity	**Indicator**	**Target**	**Indicator**	**Target**
What is the program doing to achieve the overall program objective? **What** is the purpose/objective of an activity? **Who** is the activity aimed at (target audience)?	**How** do we measure the success of an output in meeting its objective?	**What** do we want/expect to accomplish/achieve with a particular output? **When** do we hope to accomplish it by?	**How** do we know if a program is on track/measure success of a program?	**What** do we want/expect to accomplish/achieve overall with the program? **When** do we hope to accomplish it by?

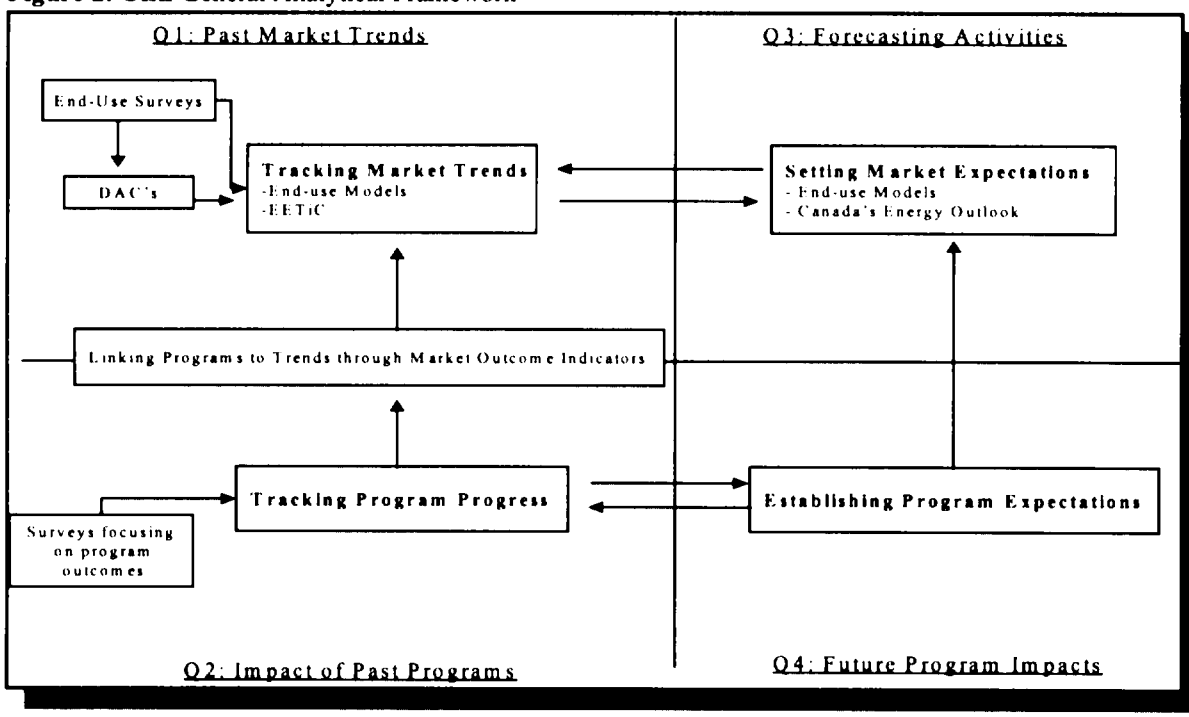
It quickly became apparent to everyone involved that this information gathering endeavour met not only the reporting needs of DPAD, but also the strategic planning needs of program managers. Each program table went through numerous iterations before the current version was obtained that met the needs of both program managers and DPAD.

NRCan's Evaluation Evolution

The framework illustrated in Figure 2 below presents the general analytic responsibilities of the OEE. In the 1980s analytical effort was aimed primarily at energy demand and supply forecasting (Quadrant 3), reflecting the concern about diminishing resource stocks and security of supply issues. Establishing program expectations (Quadrant 4) was done to a certain extent, but generally using aggregated macro models.

In the 1990s, NRCan expanded its analytical efforts to include energy-use trend analysis and program performance monitoring (Quadrant 1 and 2). Since the mid-1990s, the OEE has increasingly directed its efforts towards developing a consistent and comprehensive review of secondary energy-use trends for Canada, post-1990 (Quadrant 1). This information is published annually in the NRCan report *Energy Efficiency Trends in Canada*, which isolates the influence of key factors on energy demand since 1990, including changes in activity, structure (i.e. mix of activity), weather and energy intensity.

Figure 2: OEE General Analytical Framework



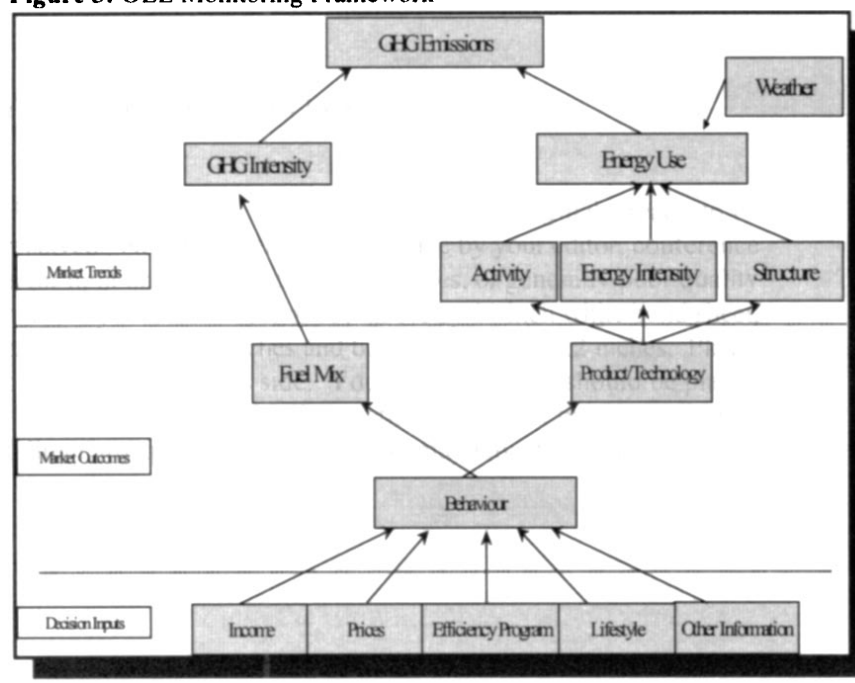
Increased analytical effort has also been aimed at linking Quadrants 1 and 2 and at further developing Quadrant 4 activities — establishing the impacts (outcomes) of current and proposed program activities. As for Quadrant 2, program specific evaluations have been completed for most

of the grant programs delivered by NRCan in the 1980s. These types of evaluations however have proven not only time consuming and costly, but arguably inconclusive. Efforts today are aimed at linking program activities to trends, through the use of market outcome indicators.

Linking Program Activities to Trends in Energy Use and GHG Emissions

In recent years, the OEE has increased its efforts in linking program activity to changes in energy use, which ultimately influence the level of greenhouse gas emissions -- the largest component of which is energy-related carbon-dioxide (CO_2) emissions. Figure 3 depicts the OEE Monitoring Framework. This framework links program action to the ultimate objective, which is the change in energy-related GHG emissions. The bottom portion of Figure 3 depicts the complex nature of decision making, by listing some of the predominant decision inputs that influence consumer behaviour -- one of which is program activity and outputs. The middle portion of Figure 3 reflects how these inputs collectively influence behaviour, which is revealed in the form of observable market outcomes, in terms of the product/technology structure and fuel mix of the economy.

Figure 3: OEE Monitoring Framework



The top portion of Figure 3 shows that energy-related GHG emissions are the product of both aggregate energy use and the carbon dioxide intensity of the fuel mix. Changes in GHG intensity are a function of the fuel mix, while aggregate changes in energy use are influenced by many factors, including activity (e.g., increase in the number of refrigerators or cars), the composition or structure of this activity (e.g., big cars versus small cars), and energy intensity (e.g., energy use per unit of output). The weather effect (e.g., number of heating degree days) is also an influencing factor, with respect to energy use. The importance of each of these factors is explained in greater detail in NRCan's *Energy Efficiency Trends in Canada, 1990-1996.*

Energy efficiency programs typically operate at the producer and consumer levels, and are designed to influence behaviour (e.g., for manufacturers to make more energy efficient products and for consumers to buy and use them in a way which uses less energy). Programs seek to influence behaviour through a variety of means such as regularly produced program outputs including information brochures, regulations, and voluntary standards and agreements with industry.

A particular program's impact on GHG emissions is measured through a change in energy use

that results from a behavioural change at the end-use level. This includes the impact of the more efficient technology as well as behavioural response (the rebound) resulting from consumers now having equipment which costs less to operate. Through trend analysis, NRCan can develop relatively clear links between market outcomes (e.g. the purchase of a more efficient refrigerator) and market trends (the influence of energy intensity on changes in energy use).

Conclusion

This paper clearly emphasises the relevance of performance monitoring to the OEE and outlines the approach used by the OEE to develop stronger performance information by which to monitor program progress. This information is used for national reporting purposes, as well as to monitor what a program is achieving, in relation to its expectations, and using that information to design new programs, adjust existing programs and set future program expectations.

Developing a performance story also serves to improve our understanding of the linkages between energy efficiency programs and Canada's national climate change objectives. Initial efforts at developing performance information began with *Influencing Energy Use in Canada, (1997)* and continued with the OEE's *1998 Report to Parliament.* The work described herein however represents the first step by the OEE to establish a formal process for identifying and collecting performance information all of the EAE initiatives, on a regular basis.

Establishing a formal process to monitor and collect performance information on a regular basis proved invaluable. It engaged both program managers and divisional directors in the monitoring process, thereby encouraging them to address it in their planning activities. As well, it streamlined the information gathering process, thereby reducing the number of times such information is requested from program managers.

To date, the main achievements of the OEEs efforts to develop stronger performance information include:

- designing a conceptual framework for monitoring program performance;
- identifying market outcome indicators and targets for each program; and
- identifying the next steps for improving performance information in terms of attribution activities for each program.

Lessons Learned:

Many valuable lessons have been learned from our work to develop better performance information for the 19 OEE energy efficiency initiatives. Based on the criteria specified by the Office of the Auditor General, the OEE has isolated seven key steps that should be taken to improve performance information:

- clarify program objective(s) with reference to the broader mandate of the OEE;
- identify the target audience;
- identify and clearly define key program activities which support the stated objectives;
- establish clear, specific and measurable performance targets, for both the interim (relating directly to activities), and the long-term (relating to market outcomes);

- identify meaningful, reliable and practical indicators of success, in terms of outputs and outcomes (as defined by Auditor General -- see above);
- accountability – identify the divisional authority (and/or program manager) for delivering the program and developing the indicator(s); and
- identify attribution activities which seek to examine if and how program activities contribute to overall objectives.

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