

How to Harness People as an Intervention and Evaluate Such a Program

*Jake Fuller, EcoMetric Consulting, Denver, CO
Mersiha McClaren, DNV, Portland, OR*

ABSTRACT

It can be a challenge to leverage people and behavioral change to achieve deep and long-lasting energy savings. In Ontario, one such program is attempting to do just that. The Independent Electricity System Operator's (IESO) Energy Manager program subsidizes the salary of a trained full-time energy manager to work directly within participating organizations to find and achieve energy savings. The ultimate goal of the program is to change the culture within the participating organizations to value and achieve energy savings.

In 2020, IESO-funded energy managers achieved 23,970 MWh of reported electric energy savings by participating in three of the IESO's large commercial and industrial programs. They also achieved 6,469 MWh specifically from non-incented measures in 2020 from projects such as lighting scheduling, behavioral change, optimization projects, and equipment upgrades. Many energy managers also undertook projects that resulted in non-energy benefits, greenhouse gas reductions or water savings. If our team only relied on assessing the energy savings this program claimed, the team would have not been able to capture the broader impacts of this program.

Furthermore, interviews with participating organizations revealed that energy managers are seen as a valuable resource to focus on energy management and drive the implementation of energy efficient projects at their organizations. Energy managers reported changing the way their organizations operate by integrating energy efficiency into planning processes, developing corporate energy management and conservation plans, and improving energy data collection and analysis. These findings collectively demonstrate that incentivizing people rather than equipment can be a powerful intervention for industrial and commercial businesses.

Introduction

Over the past several years, the IESO has administered a unique program aimed at empowering a full-time energy manager to find energy savings, identify smart energy investments, secure financial incentives, and unleash competitive advantages in participating commercial and industrial organizations across Ontario. The Energy Manager program subsidizes the salary of the energy managers and supports them with training and technical support to change the culture within the participating organizations and create opportunities for energy savings through both incented upgrades and non-incented actions. The program requires minimum annual savings of 1,000 MWh, targeting larger facilities including industrial, commercial, and institutional buildings that can span multiple locations.

Our evaluation team has evaluated this program since 2015 when the program was delivered by Ontario's Local Distribution Companies (LDCs). In April 2019, the IESO began to centrally deliver all provincial energy efficiency programs in Ontario, including this program. The shift to central delivery by the IESO was directed by Ontario's Minister of Energy, Northern Development, and Mines, in an interest of cost effectiveness. The basic design and goals of the program remained the same during this transition. The program continued to focus on empowering trained energy managers to create persisting energy savings. However, there was one notable change to the program in the transition that shifted the incentive to a purely performance-based salary subsidy. In the previous LDC-delivered program, participants had a choice between a salary-based subsidy equal up to 80% of the energy manager's eligible costs and a

performance-based salary subsidy that required energy managers to achieve annual savings targets for incented and non-incented projects. The performance-based option allowed organizations to receive a salary reimbursement above \$40,000 if minimum performance goals were exceeded. In the centrally delivered program, which was subject to this evaluation, the flat salary-based subsidy option was eliminated, and all contracts were performance-based. There is limited flexibility if the performance targets are not achieved. If the energy manager does not reach their performance targets in the first year, the targets can be carried over into the second year of the contract. At the end of the second year, the performance targets must be met for organizations to continue being reimbursed by the program. Participants are eligible to receive up to five years of funding from the program if they continue to meet the contract requirements.

During the most recent evaluation of this program (i.e., assessment of program year 2020), our team worked with the IESO's evaluation and program teams to design a "holistic" evaluation of the IESO-funded energy managers' impacts on the organizations they served. Our team assessed gross savings verification of all non-incented projects submitted by energy managers and examined attribution associated with non-incented projects by surveying key decision makers of participating organizations. Incented savings generated by this program were assessed by others. Our team reviewed the IESO's spending on administering the program and energy managers' salaries to assess this program from the cost-effectiveness perspective, considering the program generates participation and savings for other IESO incentive programs. The team also conducted a process evaluation to understand more clearly the value of energy managers.

Historically, the IESO only measured and evaluated the impacts from non-incented projects associated with this program, while the impacts of projects energy managers completed through other IESO programs were included in the evaluation and reporting of the programs that incentivized the projects. In order to show the true value of the energy managers across the IESO's portfolio, our evaluation included aggregated reporting of the savings energy managers achieved in IESO programs to inform IESO of the program's impact beyond non-incented savings. We also compared the type and size of projects energy managers had completed to the rest of the "general population" in those incentive programs.

On the process side, our evaluation team conducted in-depth interviews with energy managers and semi-structured interviews with the participating organizations that employ them. These interviews focused on gaining a deeper understanding of program satisfaction, use of IESO training and support services, measurement and verification (M&V) practices, and the impacts of a full-time energy manager on the participating organization.

The following sections describe the design and results of our team's holistic assessment of the IESO's Energy Manager Program.

Approach for Impact Evaluation and Attribution

The evaluation team's focus for the impact evaluation of the Energy Manager program was the non-incented projects completed by the energy managers. We used the energy manager as the sampling unit for the program gross and net impact evaluation resulting in a large evaluation sample of non-incented measures. For each sampled energy manager, we reviewed all completed non-incented measures with reported kWh savings.

Due to the transition of the program to the new centrally delivered model and COVID-19 impacts, the number of completed non-incented projects was lower than expected. Seventeen energy managers completed non-incented projects since the transition, totaling 193 individual measures. Our evaluation team included all non-incented measures of 15 energy managers because salary subsidies of these managers have been invoiced to the IESO. Completing the invoicing process for a project is a requirement for savings to be reported by the IESO.

We conducted a census of all non-incented measures for the Energy Manager program. Historically, we designed the evaluation as a 90/10 sample due to the high number of non-incented measures implemented in the program. However, due to the lower number of measures ready for evaluation in 2020, we conducted a census of all non-incented measures since the transition to central delivery in April 2019.

The evaluation team estimated gross impacts of the program by conducting detailed engineering analysis of each sampled measure. This analysis was supported by virtual inspections and measurement, documentation review, and interval billing analysis, when appropriate. The primary data source for engineering reviews was the program tracking data, calculation workbooks, and other supporting documentation submitted by the participating organization’s energy manager. The main impacts of concern for the IESO were kWh and summer peak demand savings.

We estimated net impacts of the program by conducting a free ridership analysis with the program’s participants. The basis of the free ridership analysis was direct query (interviews with past participants) about program influence and the theoretical counterfactual condition. This method is considered best practice for programs with large savings per project, unique applications, and low participant counts. Our evaluation team did not include spillover in the estimation of net impacts as prior NTG spillover assessments going back to 2013 did not identify any spillover attributable to the program. Incented projects that energy managers completed were reported under the program that provided the incentive and do not count as spillover for the Energy Manager program.

We also leveraged the IESO’s Conservation and Demand Management Cost-Effectiveness Tool to estimate measure-level costs and benefits, aggregated to program- and portfolio-level cost effectiveness. Our team estimated net greenhouse gas (GHG) impacts for each project by utilizing measure-level energy savings load shapes based on metered data and emissions factors provided by the IESO at the annual and hourly level.

As part of the holistic evaluation, we coordinated with the IESO to obtain the gross and net impact results from the other IESO programs that energy managers participated. Our team aggregated and compared these results to show the energy managers’ impacts and influence across the IESO’s programs.

Approach for Process Evaluation

In-depth interviews and mix-mode surveys informed the Energy Manager program process evaluation, as summarized in Table 1.

Table 1. Process evaluation data collection

Interview or Survey Group	Method	Population	Target Sample	Description of Contacts
Energy Managers	In-depth interview (IDI), over the phone	53*	15	IESO-funded energy managers under contract in the Interim Framework
Program Participant Survey (joint with NTG)	Mixed-mode survey (online and over the phone)	17**	Census	Participating organizations with completed projects that enroll in the Energy Manager program

* Fifty-three energy managers served the organizations that participated in the program at the time of the evaluation. Organizations predominantly hired one energy manager.

** The evaluation team selected only those organizations that completed projects under the new program rules set in April 2019. About 17 organizations completed projects that were ready for review under the new program rules at the time the team conducted these surveys (July-August 2020).

The program participant surveys combined both the NTG and process topics in order to reduce the burden on participants. Surveys were mixed-mode, either occurring on the phone or online, depending on what worked best for each participating organization. We worked with the IESO and technical reviewers to ensure the participants being interviewed had a role in the decision-making process to join the program and implement the specific projects under review. Interviews focused on general program satisfaction and experience, program support and training services, the decision-making process to proceed with a project, and the value of the energy managers to the organization.

The evaluation team randomly selected fifteen active IESO-funded energy managers from the pool of 2020-21 energy managers. We completed in-depth phone interviews with active IESO-funded energy managers. These energy managers worked for a wide array of participating organizations including commercial real estate, institutional, manufacturing, mining, healthcare, university, food supply, and logistics and transportation. The in-depth interviews focused on program satisfaction and experience, program support and training services, M&V processes, impacts beyond kWh and kW savings, and the perceived value and impacts of their role as a full-time energy manager in the organizations they work with.

These data collection activities provided ample qualitative data and insights to be included in the evaluation to better understand the value of trained full-time energy manager operating within a participating organization.

Results – Energy Savings Achieved

IESO-funded energy managers generated notable savings for the IESO’s 2020 commercial and industrial portfolio. Savings achieved by energy managers were accounted for in multiple commercial and industrial programs. As shown in Table 2, projects implemented by IESO-funded energy managers achieved 23,970 MWh of reported annual energy savings in 2020 across three non-residential programs— Business Retrofit, Process and Systems Upgrades (PSUP), and Energy Manager (non-incented savings only). These reported savings accounted for 11% of total energy savings across the three programs. IESO-funded energy managers also achieved 6.61 MW of reported peak summer demand savings in 2020, representing 18% of peak demand savings achieved in the three programs.

Table 2. Energy manager gross reported electric savings

Program	Energy Manager Reported Energy Savings (MWh)	Percent of Total PY2020 Program Energy Savings	Energy Manager Reported Summer Peak Demand Savings (MW)	Percent of Total PY2020 Program Demand Savings
Business Retrofit	17,208	8%	5.64	16%
EM Non-Incented	6,469	100%	0.97	100%
PSUP	299	9%	0.00	NA

The Business Retrofit Program is IESO’s largest commercial program, providing incentives for prescriptive and custom projects including lighting retrofits, lighting controls, HVAC redesign, chiller retrofits, and variable-speed drive installations, among others. The program is designed for ease of participation with a streamlined application, approval, and M&V process for a wide variety of energy efficiency projects. IESO-funded energy managers achieved more savings for their organizations through this program than any other. IESO-funded energy managers achieved 17,208 MWh of annual reported energy savings in 2020—representing 8% of all energy savings achieved in the program that year. Energy managers also implemented larger projects through the program on average than the rest of the general population. Retrofit projects led by IESO-funded energy managers averaged 103,911 kWh of annual savings, compared to 60,609 kWh for the rest of the program.

A key stream of savings for IESO-funded energy managers are non-incented projects. In 2020, energy managers achieved 27% of their 2020 energy savings through non-incented projects totaling 6,469 MWh. As part of the Energy Manager program contract, IESO-funded energy managers must achieve at least 10% of their annual energy savings goal through non-incented measures. In 2020, energy managers were able to greatly exceed this goal. Non-incented projects tend to be low cost, high reward such as lighting scheduling projects, optimization, behavioral, and other operation and maintenance (O&M) actions. In 2020, O&M measures accounted for 38% of energy managers' non-incented energy savings, followed by equipment upgrades, optimization projects, and finally behavioral measures.

IESO-funded energy managers are also active in the IESO's PSUP, designed to incentivize larger, more complicated projects that require more stringent M&V. Due to the shift from LDC to IESO program delivery in April 2019, projects have been relatively slow to develop. In 2020, one energy manager led PSUP project was reported out of a total of three projects. The refrigeration optimization project achieved 299 MWh of annual reported energy savings, representing 9% of the total savings for the program in 2020. Our team expects that the energy manager impact on the program will increase in the next evaluation year as 34 out of roughly 75 PSUP projects are currently under contract for organizations with IESO-funded energy managers.

Historically, savings achieved by IESO-funded energy managers have been reported only for the program that incentivized them. In 2020, our team has recommended that the IESO and program evaluators develop reporting templates that aggregate savings achieved by IESO-funded energy managers across all of the IESO's programs similar to what is shown in Table 2. While the savings should only be counted towards goals once, it is important to quantify the energy and demand impacts of IESO-funded energy managers across all programs to fully understand their value to their participating organizations and conservation in Ontario as a whole.

Results – Cost Effectiveness

In terms of cost effectiveness, the Energy Manager program in 2020 was not cost effective from the Total Resource Cost (TRC) test perspective using a benefit/cost threshold of 1.0. However, the program was cost effective from the Program Administrator Cost (PAC) test perspective. Twenty seven of the 69 non-incented projects reviewed in 2020 had incremental costs of \$500 or less. Several large, non-incented capital upgrade projects implemented by energy managers in 2020 had high incremental measure costs, resulting in a decrease in the TRC ratio. Our team found that the cost effectiveness of the program in 2020 was negatively affected by the COVID-19 pandemic as fewer projects were implemented, and more administrative support and guidance for the participants under contract were required of the IESO.

Historic cost effectiveness tests of the program include the full cost of IESO-funded energy managers' salaries and administrative costs related to marketing and training of energy managers. This accounting fails to consider the value this program generates for other programs, as is shown above. Since energy managers generate projects for other IESO commercial and industrial programs, then their salaries and IESO administrative spending related to outreach and training of energy managers should be spread out amongst the cost effectiveness analyses of the programs they participate in. In 2020, 27% of the electric energy savings achieved by energy managers was through non-incented programs, while the majority was achieved through the Business Retrofit program. As such, our team recommended that only 27% of the energy managers' salaries and admin costs should be included in the cost effectiveness analysis of the Energy Manager program. The remainder of the costs should be included in the Business Retrofit and PSUP programs according to the amount of energy manager-led savings achieved in that year. As shown in Table 3, the resulting cost effectiveness ratios show marked improvement for the Energy Manager program and also provide a more equitable analysis of the cost effectiveness of this program.

Table 3. Energy Manager Program cost effectiveness

Program	TRC Costs	TRC Benefits	TRC Ratio	PAC Costs	PAC Benefits	PAC Ratio
Traditional CE	\$3,867,573	\$2,106,408	0.54	\$1,323,056	\$1,831,659	1.38
Alternative CE	\$2,901,589	\$2,106,408	0.73	\$357,071	\$1,831,659	5.13

In future evaluations of the program, we plan to consider the benefits derived from energy managers' projects across all programs to create a holistic cost effectiveness analysis of the energy managers as a resource themselves.

Results – Energy Managers' Value to Their Organizations

Most (14 of 15) interviewed energy managers reported they do believe they have changed how their organization operates. They explained:

- Energy efficiency is now part of the company's planning process
- Maintenance practices are now viewed from the energy efficiency perspective
- Greater commitment to reduce greenhouse gas emissions and energy costs
- Conducting more energy potential studies
- Improved energy data collection and analysis
- Installed more sub-metering to monitor energy use
- Developed corporate energy management and conservation plan
- Process-related and behavioral measures have been implemented to directly change how organization operates

Our team surveyed decision-makers of the participating organizations (i.e., supervisors of energy managers) to assess the greatest benefit of having a full-time energy manager within their organization. Participants indicated the greatest benefit is having a dedicated resource to focus on energy management and drive project implementation. Other benefits noted by respondents were energy and cost savings. Surveyed program participants also noted several other benefits to having a full-time energy manager beyond energy savings. These included greater employee engagement in energy and sustainability efforts as well as adding technical expertise to their organization.

Energy managers also reported that value and impact on their organization goes beyond the electric energy and demand savings reported to the IESO. Eighty percent (12 of 15) of the energy managers reported actively trying to identify water and fossil fuel savings (in addition to the efficiency savings) at the organizations they operate in. We asked the 12 energy managers who actively seek efficiency, GHG, and water savings how they prioritize these projects. Five of the 12 energy managers said they prioritize greenhouse gas (GHG) emissions reductions; four noted they use financial analysis to prioritize GHG, efficiency, or water projects; one said they prioritize water projects; and one prioritizes easy to implement projects. Collectively, these findings indicate that non-energy projects are also a priority, which highlights additional benefits this program generates which are not quantified by the program.

Our team also surveyed decision-makers of the participating organizations about their reasons for creating an energy manager position. Two top motivations for instituting the energy manager position were: the potential of energy savings (11 of 17 responses) and development of centralized oversight of various energy management efforts (7 of 17 responses). These results provided qualitative evidence of program's job impacts.

The net savings analysis of the program resulted in a net to gross ratio of 91%, reflecting low levels of free ridership. Energy managers were perceived by participants as key players in project identification, analysis, and documentation. While in a few cases, the participants indicated they would likely have pursued the projects in question regardless of whether they had an energy manager. In most cases, the participants felt that energy managers were instrumental in identifying feasible projects, speeding up

project implementation, and ensuring that all required documentation and savings estimates were accounted for.

A more thorough input-output analysis of job impacts leveraging program savings, reinvestment rates, and program spending revealed that 68 jobs were created by this program. About 37 were direct jobs (energy managers, administrative jobs, contractors hired to complete projects); 10 were indirect jobs (i.e., additional jobs created from economic activity related to program participation, such as jobs at equipment supply distribution centers or in manufacturing); and 21 were induced jobs (i.e., jobs supported by the spending of income and benefits resulting from energy manager program activity).

The IESO also supports its program participants and energy managers with training, support services, and technical assistance provided by a third-party vendor. The program also offers access to an Energy Manager Hub online where energy managers can find on demand training, resources, chatline, and industry news. Interviews with participants confirmed that IESO-funded certification courses such as Building Operator Certification (BOC) and Certified Energy Manager (CEM) were seen as a valuable workforce development resource. Energy managers expressed high satisfaction with frequent webinars offered by the program that focused on subjects like calculating baselines and M&V. These findings highlight non-energy benefits in employment and workforce development created by the program that should be considered in understanding the impacts of the program.

Discussion

Traditional evaluations of energy efficiency programs, which typically focus on energy savings metrics, could not fully capture the value of IESO-funded energy managers. Energy managers not only generated savings for the Energy Manager program, but they also generated savings across multiple other IESO commercial and industrial programs. Many energy managers also undertook projects that generated non-energy savings (GHG and water savings) and have reported changing the culture of their organization to value efficiency. If our team only relied on assessing the energy savings this program claimed, the team would have not been able to capture the broader impacts of this program.

By investigating the impacts of energy managers across all programs and within the organizations they operate, our evaluation found that the Energy Manager program was able to achieve electricity and demand savings within and outside of the program, as well as job impacts. Qualitatively, the evaluation also uncovered evidence of non-energy benefits. The program leveraged talented energy managers to enable their organizations to complete impactful energy efficiency and other projects and these managers were also critical in changing their organizations' operations to focus on energy, water, and fuel efficiency as a resource. This program successfully demonstrated that incentivizing people rather than equipment can be a powerful intervention for our industry.

These conclusions led us to provide several recommendations to the IESO that focus on supporting, capturing, and reporting the holistic impacts of energy managers that were being missed through traditional energy efficiency evaluation. These recommendations include:

- In the cost effectiveness analysis of the IESO's portfolio, salaries paid to energy managers and the administrative spending related to the outreach and training of energy managers should be distributed amongst the programs the energy managers used to achieve the savings.
- Develop reporting systems to track verified savings achieved from projects implemented by IESO-funded energy managers across all IESO programs.
- Develop resources such as case studies, training sessions, and calculators to support energy managers in achieving and reporting all savings in their organizations beyond just electricity. These can include water, fossil fuels, and emissions reductions.
- Consider updating the Excel-based document energy managers use to report savings achieved to include water, fossil fuel, and emissions reductions.

Our evaluation, which we consider more holistic than a traditional energy efficiency program evaluation, can still be improved. The participating organizations in our study have been investing in energy managers over several years making an evaluation of long-term program impacts fertile ground for additional study.

Acknowledgements

We would like to thank Nik Schruder, Jessei Kanagarajan, Alice Herrera, and Jimmy Lu from the IESO for their assistance in coordinating this evaluation effort. With their support and guidance, the evaluation team was able to complete their activities as efficiently and successfully as possible.

We would also like to thank all the program participants and energy managers that the evaluation team interviewed. Their insights have been invaluable to the evaluation team's efforts to improve the Conservation Programs and have produced high quality data that will serve Ontario conservation efforts for years to come.