

MARCH 21, 2024

Using the Efficient Electrification Toolkit Resources

Presented by Adam Dixon





Agenda

1. Welcome and introduction
2. Review of the Efficient Electrification Toolkit
3. Interactive fact sheet
4. Lifecycle cost analysis tools
5. RETScreen tools and future training
6. Q&A

Workshop Objectives

1. Practice using the tools; live demonstration of available decision-making tools:
 - a. Fact sheets and guides
 - b. Calculators
 - c. RETScreen templates
2. Provide an update on next steps in the Efficient Electrification Toolkit series:
 - a. RETScreen mini-workshops
 - b. Technical helpdesk

Save on Energy Program Updates

- **Retrofit program** prescriptive incentives for most **non-lighting measures** increased as of October 30, 2023. Many **doubled**, including for air source heat pumps. Visit the [Retrofit program website](#) for the updated measures and incentives.
- The **Instant Discounts program** for lighting launched **December 18, 2023**. Program incentives are directly to distributors, enabling them to offer instant point-of-sale discounts on energy-efficiency lighting to customers.
- **Strategic Energy Management program** offers a two-year, cohort-based learning model to organizations with at least 3,000,000 kWh annual energy consumption.
- The **Existing Building Commissioning program** provides financial incentives for businesses to hire qualified commissioning providers, and to receive pay-for-performance incentives for savings achieved.

Save on Energy Training and Support

- **Save on Energy's Training and Support program** delivers webinars, coaching workshops and information resources to energy professionals across Ontario on a range of topics, including energy data, efficient electrification and heat pumps, all at no cost to participants.
- We also offer **incentives of up to 50% for 18 energy-efficiency training courses**, and of up to 75% to Enbridge customers for several courses.
- All our training and support resources, including webinar recordings, information sheets, guides and case studies, can be found on the **Training and Support page** of the Save on Energy website. For more information, contact us at trainingandsupport@ieso.ca



Review of the Efficient Electrification Toolkit

Five-step approach to efficient electrification

1

Establish goals and constraints

Understanding each building's constraints and establishing intelligent, realistic objectives are key to project success.

2

Reduce Heating Demand

Reduce the amount of energy needed to heat a building through envelope and mechanical upgrades to improve energy performance and reduce capital costs of new systems.

3

Optimize the HVAC system

Reduce energy waste in building mechanical systems through temperature controls, zoning and heat recovery.

4

Electrify Heating Systems

Use the life-cycle cost analysis section to compare the energy and emissions reductions and operating costs of electric heating systems over the lifecycle of systems under consideration.

5

Balance Heating and Cooling Sources

Explore the cost and GHG emissions implications of different fuels, including hybrid and all-electric HVAC systems.

What's in the toolkit?

The Efficient Electrification Toolkit is a resource for anyone considering, planning or designing building electrification projects in Ontario.

This toolkit can be used to support informed decision-making based on your organization's goals and constraints.

Using a five-step decision-making process, the toolkit helps building operators across Ontario address energy and/or GHG reduction objectives in an energy-efficient and cost-effective manner.



Technical planning tools

- Fuel-switching calculators
- Life cycle cost assessment tools
- RETScreen templates



Training opportunities

- Net-zero planning with RETScreen
- Financial analysis
- Electrifying HVAC with heat pumps



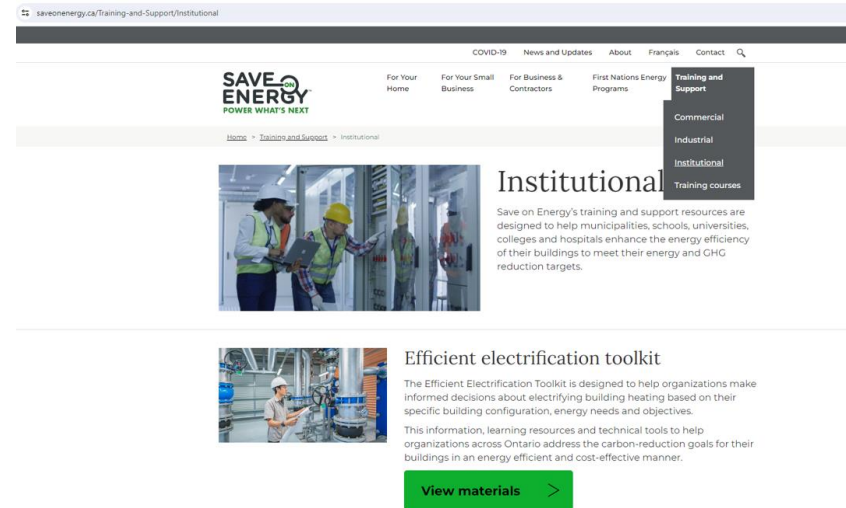
Hands-on support

- Technical support with the tools or post-training support
- Contact trainingandsupport@ieso.ca

Accessing the Resources

- Go to www.saveonenergy.ca/Training-and-Support
- The Efficient Electrification Toolkit is accessible to all building sectors listed:
 - Commercial
 - Industrial
 - Institutional
- Resources are laid out according to each step in the process.

Training and Support



The screenshot shows the website's navigation menu with 'Training and Support' expanded to show 'Commercial', 'Industrial', 'Institutional', and 'Training courses'. The 'Institutional' section is highlighted, featuring a photo of two workers in safety gear reviewing a laptop. Below this is a section for the 'Efficient electrification toolkit' with a 'View materials' button.

saveonenergy.ca/Training-and-Support/Institutional

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Institutional

Save on Energy's training and support resources are designed to help municipalities, schools, universities, colleges and hospitals enhance the energy efficiency of their buildings to meet their energy and GHG reduction targets.

Efficient electrification toolkit

The Efficient Electrification Toolkit is designed to help organizations make informed decisions about electrifying building heating based on their specific building configuration, energy needs and objectives.

This information, learning resources and technical tools to help organizations across Ontario address the carbon-reduction goals for their buildings in an energy efficient and cost-effective manner.

[View materials](#)



Efficient Electrification Toolkit: Informational Resources

Informational Resources

An overview of the toolkit describes the five-step decision process.

Fact sheets to support establishing goals and identifying opportunities to reduce heating demand and optimize HVAC systems before electrifying:





- Fuels comparison
- Air source heat pumps
- Building envelope
- Heat recovery
- Right-sizing

ENERGY EMISSIONS AND COST COMPARISON FOR HVAC SYSTEMS

Canada's 2030 Emissions Reduction Plan outlines a path for the building sector to achieve a 40% reduction in greenhouse gas emissions (GHG) by 2030. This has spurred organizations across the country to set their own net-zero targets and develop plans to meet their reduction goals.


Ontario has a clean electricity system, so **electrifying HVAC systems** – which typically account for about 50% of building energy consumption – is an effective way to advance climate change goals. Heat pump technology is at the forefront of this shift, with the potential to improve operating efficiency by a factor of two or more compared to conventional heating systems. Their high efficiency enables heat pumps to be cost-competitive with more carbon-intensive natural gas systems in the long-term. Despite the numerous benefits associated with adopting heat pumps, it is important to note that we have identified certain barriers to their widespread adoption. The following outlines benefits of embracing this technology.


BENEFITS

-  Electrification of heating end uses will yield large emissions reductions
-  Technologies exist today to electrify most end uses:
 - Air-, ground- and water-source heat pumps
 - Solar-thermal boilers
-  Heat pumps are up to five times more efficient than conventional systems, and the technology continues to improve
-  Economics of heat pumps are improving rapidly

BARRIERS

- Initial cost of heat pumps is still a barrier in retrofit scenarios (but prices are coming down)
- The cost difference between heating with gas and electricity is still large. Gas prices remain low and GHG pricing policies may take until 2030 to reach operating cost parity with heat pumps in Ontario.
- Design and installation can be more complex than conventional systems

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Planning for Efficient Electrification: Calculators

Efficient electrification interactive fact sheet

The interactive fact sheet calculates outcomes and financial metrics for replacing a rooftop unit with an air source heat pump:

- Annual operating cost
- Carbon emissions impact
- Savings to investment ratio
- Internal rate of return
- Net present value
- Simple payback

Users input static (project specific) parameters and select from a series of adjustable parameters.

The screenshot shows the 'Efficient Electrification Interactive Fact Sheet' interface. It features the IESO and Save On Energy logos at the top. The main content is organized into several sections: a title bar, a descriptive paragraph, a 'DID YOU KNOW...?' section, a 'Adjust the parameters in bold below to quickly estimate the costs and benefits for your situation.' instruction, a 'Static Parameters' table, an 'Adjustable Parameters' table, a 'PROJECT OUTCOMES' table, and a 'FINANCIAL METRICS' table. A large orange arrow points from the adjustable parameters section to the project outcomes section.

EFFICIENT ELECTRIFICATION INTERACTIVE FACT SHEET

This Interactive Fact Sheet allows users to view the financial and carbon emissions impacts of electrifying building heating and cooling by replacing a rooftop unit (RTU) with an air-source heat pump (ASHP).

DID YOU KNOW...?

Replacing an aging rooftop unit (RTU) with an air-source heat pump reduces carbon emissions and may deliver a return on investment?

Adjust the parameters in bold below to quickly estimate the costs and benefits for your situation.

Static Parameters	
Floor area (m ²)	1000
Existing RTU efficiency:	70%
New equipment COP* (cooling):	6
New equipment seasonal efficiency (heating):	200%

Adjustable Parameters	
My RTU fuel is:	Natural Gas
New equipment type:	ASHP
I am located in:	Ottawa
My building insulation condition:	Medium
Energy efficiency measures:	Demand Control Ventilation and Heat Recovery

PROJECT OUTCOMES

Annual operating cost savings	\$9,732
Carbon emissions impact	-97%

FINANCIAL METRICS

Savings to investment ratio:	1.2
Internal rate of return:	8%
Net present value:	\$18,909
Simple payback (years):	10.3
\$/ton carbon avoided:	\$127

Efficient Electrification Toolkit: participant workbook

- Open the participant workbook that was emailed to you from trainingandsupport@ieso.ca.
- The workbook includes case study details that we will work through together in today's session, in both the interactive fact sheet and the LCCA tool.

PRACTICE: INTERACTIVE FACT SHEET

The Interactive Fact Sheet is a great tool to explore the impacts of energy efficiency measures and system electrification quickly and easily, to obtain rough estimates. Use the case study details and the Interactive Fact Sheet to complete the table below.

Metric	With no EE measures	With DCV only	With DCV and heat recovery	With DCV, heat recovery, and air sealing
Annual operating cost savings				
Carbon emissions impact				
Savings to investment ratio (SIR)				
Internal rate of return (IRR)				
Simple Payback (years)				
\$/ton of carbon avoided				

Life-cycle Cost Assessment (LCCA) Tools

Basic LCCA tool

With minimal user input, compare two or three retrofit project scenarios over a 30-year lifecycle.

Advanced LCCA tool

The advanced tool includes an introduction and written how-to guide. Users can input each variable considered in life-cycle cost analysis, providing greater accuracy.

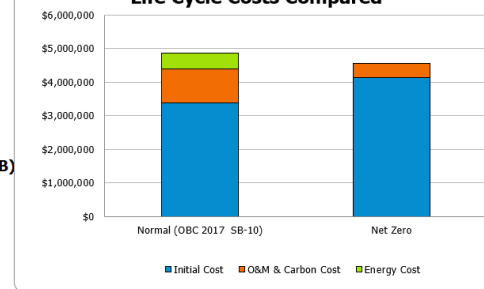
Life Cycle Costing Summary

	Option A	Option B
	Normal (OBC 2017 SB-10)	Net Zero
Initial Cost	\$3,395,500	\$4,142,088
O&M & Carbon Cost	\$96,469	\$420,460
Energy Cost	\$473,193	\$0
Total Cost	\$4,865,162	\$4,562,548

Financial Value Indicators (Option A vs B)

Net Investment	\$746,588
Net Present Value	\$302,613
Internal Rate of Return	5.4%
Savings to Investment Ratio	1.41
Time Horizon (1-30 years)	30 years

Life Cycle Costs Compared





Planning for Efficient Electrification: What's Next?

RETScreen Expert Archetype Models

Archetypes for common commercial and institutional building types have been created and model a transition from natural gas heating to air source heat pumps:

- Fire station
- Small office
- Laboratory
- Recreation centre

Additional building archetypes are available through RETScreen's virtual energy analyzer (VEA) and Net Zero Planner. Training and coaching on RETScreen will be provided throughout 2024.

Archetype

Fire station



Commercial/Institutional - Public order and safety

Efficient Electrification Toolkit and Helpdesk

The webinar recording and materials will be shared with you by email.

The tools can be accessed at SaveonEnergy.ca/Training-and-Support.

For questions and technical support regarding the Efficient Electrification Toolkit, contact trainingandsupport@ieso.ca.

Please use "EE toolkit helpdesk" as your email subject line. Requests will be triaged and addressed in the order they are received.

Efficient Electrification Webinar Series

Next events:

Feasibility Modelling with RETScreen – April 19

Using the Net Zero Planning Tool – May 16

Financial Analysis using RETScreen – June 14

View upcoming [events on our calendar](#).

[Sign up for our bulletin](#) to stay informed when registration opens.

Thank you!

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