



Municipal Tools for Catalyzing Net-Zero Energy Development

Federation of Canadian Municipalities – Green Municipal Fund













What is "Sustainable"?

Meeting our needs today without compromising the ability of the 7th generation of our descendants to meet their own needs.

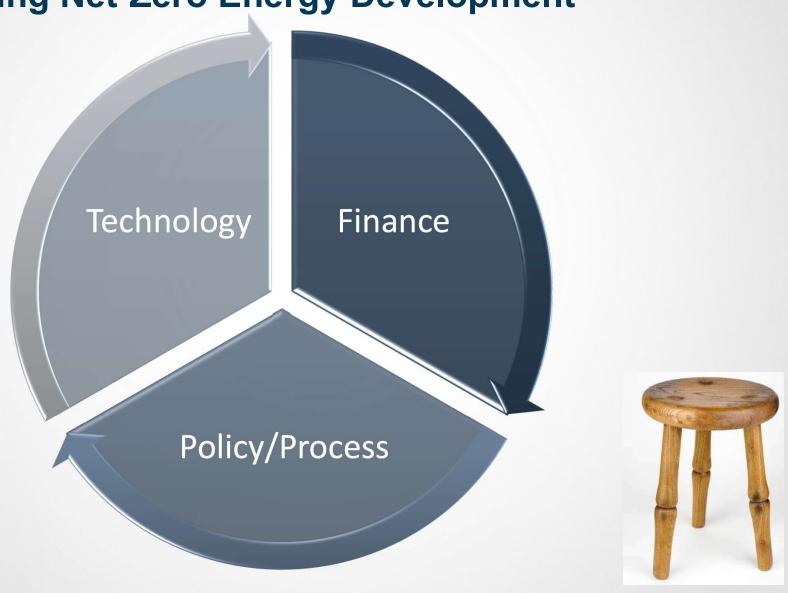
(c. Great Law of Iroquois Confederacy)

Net-Zero Energy Development

A building or project which produces all the energy it consumes on an annual basis, from on-site energy sources which are naturally renewable. The building / project may or may not be connected to a utility grid or energy storage system, but will have means to access and use its own energy over time – not necessarily exactly when it was generated.







- Conservation
 - Building Structure
 - Insulation
 - Air Barrier / Air Sealing
 - Windows
 - HVAC / Recovery
 - Lighting & Control
- Energy Storage
- Generation
- Performance Verification
- Vehicle Integration



Table 3-1: Sample Tech/Design Table

Technology / Design Type

Description: A concise explanation of what exactly this technology is and how it works.

Strengths: A brief exploration of where this technology or design approach is ideally intended to be used, and/or where it performs best.

Limitations: A summary of some of the limitations of this technology or design approach, or of where it should not be applied.

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Is the technology Established, and readily available in industry or Emerging?

Impact (* to * * * *):
a relative comparison of
the degree to which this
technology, properly
applied, will reduce the
impact or improve the
performance of the
building project. These
impacts should always be
verified by a local energy
modeller.

Cost (\$ to \$\$\$\$): a relative comparison of the cost of this design strategy against standard building code, on a (loose) lifecycle basis without incentives. \$ = low cost and/or high IRR, \$\$\$\$ = high cost / low IRR. These costs should always be verified by a local project team.

Scope: Building / Neighbourhood Development (ND) / City

Confidential S2e Technologies Inc.



(Sample technology)

Table 3-5: Batts - Cotton / Denim

Insulation Batts - Cotton / Denim

Description: Comes in batt form like fiberglass and stone wool but is made from recycled clothing or waste products that are cotton/denim based.

Strengths: Much like fibreglass or mineral wool in most practical respects. Typically has high recycled content and other environmental benefits (resistant to fungus, mold, and pests). Performs better than fibreglass at low temperatures and during high winds, and is exceptionally good at absorbing sound.

Limitations: Not widely available in Canada and can thus be expensive.

Emerging Impact: ★★★ Cost: \$\$ - \$\$\$ Building

(Summary table)

Table 3-2: Summary Overview of Design Strategies

Technology/Design Strategy			1 - 000000000		Context			
		Emerging	Impact (1 to 5)	Price (1 to 5)	Bldg	ND	City	
onservation			'					
Insulation		20		9			40	
Batts - Fibreglass / Fibre Wool	х		****	\$	x			
Batts - Stone Wool / Mineral Fibre	х	20	****	\$	х		2	
Batts - Cotton / Denim		х	****	\$\$-\$\$\$	x		8	
Blown Cellulose	x		****	\$	x			
Exterior Insulated Finishing System (EIFS)	х		****	\$\$\$\$	x			
Rigid Foam Board (FPS / XPS)	v		****	\$	v			

Financial Feasibility



Financial Strategies for Achieving Net-Zero Energy:

- Reduce expenses (i.e. eliminate redundancy)
- Offset expenses (i.e. incentives/grants or net-metering)
- Externalizing expenses (i.e. micro-utilities or 3rd party operator)
- Non-traditional methods of financing (i.e. energy service agrmt)



Courtesy: mfoa.on.ca

Policy/Program Feasibility

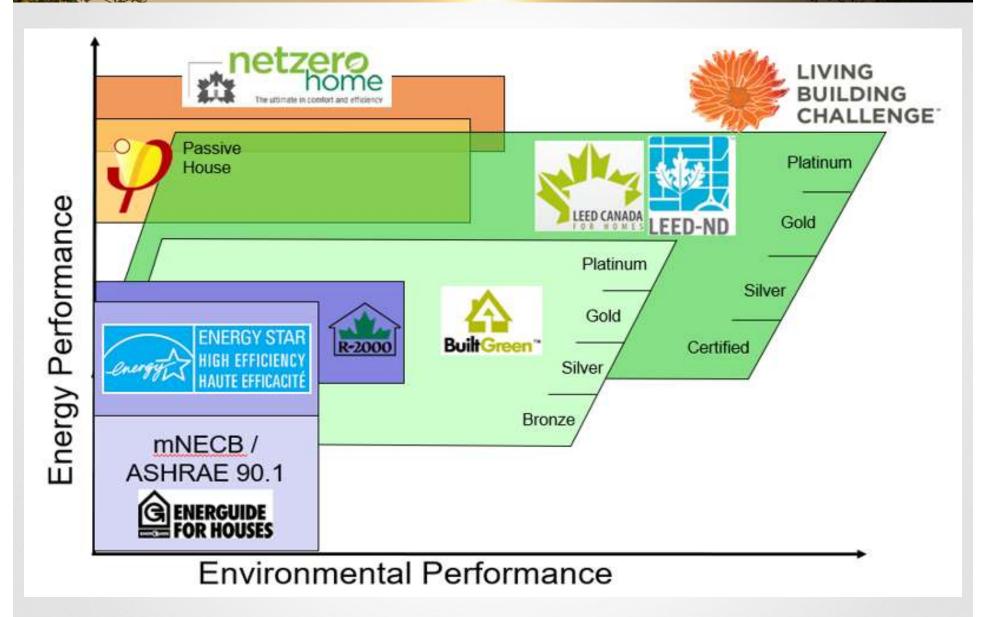
Policies and Programs that Support Net-Zero Energy:

- Solar enablement
- District energy
- Incentives:
 - Municipal Programs and Incentives (i.e. Tax-Increment Grant)
 - Provincial Programs and Incentives (i.e. SMART Green Program)
 - Utility Incentives (i.e IESO Save ON Energy)
 - Federal Programs, Incentives, Climate Initiatives (i.e. GIF)
 - Programs and Incentives outside of Canada
 - Industry Programs



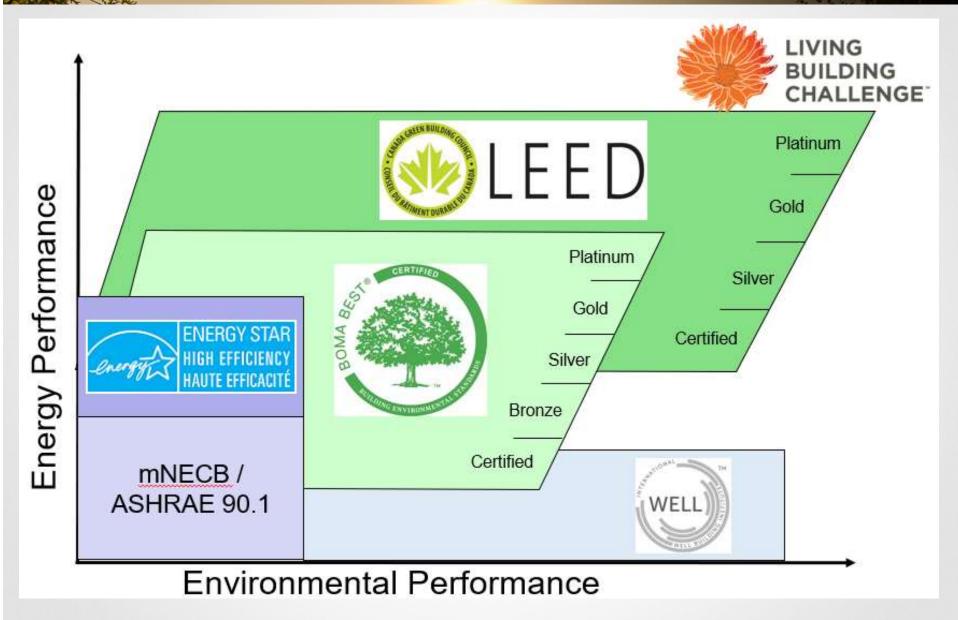
Green Housing Programs





Green Building Programs







Site One: West 5 (greenfield, mixed-use development)

Site Two:
McCormick Candy
Factory (urban,
mixed use
redevelopment)



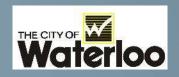
Site One: Block 4 (urban, mixed use redevelopment)

Site Two: Davis
Tannery (residential
[re]development)



Site One: Bramm Yards (urban, mixed use redevelopment)

Site Two: Greenfield Demonstration Site



Site One: Philip St (urban, commercial redevelopment)

Site Two: Frobisher Dr (industrial infill)

Lessons Learned

Case Studies - Kitchener



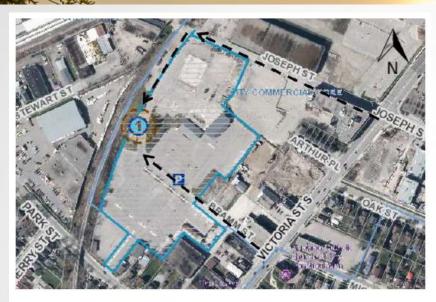


Figure 6-20: Aerial View of Bramm Yards within the Innovation District, Kitchener, ON





Figure 6-23: Conceptual Master Plan for a Greenfield Demonstration Site, Kitchener

Trends and Key Lessons Learned

- 1. Process is Secondary to Vision
- 2. Conflicting Policies
- 3. Death by a Thousand Meetings
- 4. Context, Context, Context
- 5. Experience is King
- 6. Institutional Inertia
- Incentives are Enablers, Not Less or More

(continued)...



Trends and Key Lessons Learned

- 8. Money Talks
- 9. Technology is Not the Issue
- 10. It's All About Design
- 11. Solar Access
- 12. District Energy
- 13. Optimizing the Underground
- 14. Permits and Approval



Benchmarking

Training

Continuous Learning

Consider Solar Right-to-Light District /
Distributed
Energy

Community Improvement Plan

Celebrate

Appendices and Sample Initiatives

- A. Incentives: Municipal, Provincial, Utility, Federal
- B. Solar Energy: Policies, program, by-law
- C. District Energy: Policies, easement, access agreement
- D. Community Improvement Plan and Programs



Kitchener Operations Facility – solar roof

Recommended Incentive Programs: Overview

- 1. Green Housing Incentive Program
- 2. Green Building Incentive Program
- 3. Property Tax Reduction Incentive Program
- 4. Advanced Queuing Incentive Program
- Property Assessed Payments for Energy Reductions (PAPER) Program
- 6. Development Charge Reduction Program
- 7. Building Permit Fee Reduction Program

Incentive Program Summary

							I	NCI	ENT	IVE	TO	PIC	S				
			Ι	and	Use	,			E	ner	gy			Wa	iter		
METHODS OF INCENTING Summarized from all ~40 municipalities studied in Table 4-1 above.		Brownfield	Mixed Use Development	Non-Brownfield	Greenfield	Green Roof	Urban Agriculture	Green Building Standards	Net Zero Building	Electric Vehicle	On-Site Renewables	Cool Roof	Indoor Conservation	Storm Water	Rainwater	Greywater	Totals:
Feasibility Study Grant	Α	5		1				1									5
Environmental Site Assessments	В	26		1													26
Tax Assistance Plan	С	19		8				1									26
Development Charge Rebate	D	13		6			1	2									22
Property Tax Exemption/ Rebate	Е	18	1	1				1									20
Building Permit Rebate	F	3	1	3													9
Remediation Loan	G	2		1				1			1						2
Density Bonus	Н			1			1	1									3
Cash Rebate	J	14	7	15		1	2	6			3	1	6	2	3	2	25
Totals Assessed:		100	9	37	0	1	4	13	0	0	4	1	6	2	3	2	182

Green Housing Incentive Program

	- 12					
		Yr.	3+ Incentive Lev	vels		
Performance Level		1st dwelling	2 nd dwelling	3 rd dwelling +		
Performance Level	Yr.					
	1st dwelling	3 rd dwelling +				
Net-Zero, EnerGuide 0 or less	\$7,500	\$6,000	\$5,000	\$4,000		
LEED Platinum, Passive House, EnerGuide 30 or less	\$6,000	\$4,500	\$3,000	\$2,500		
LEED Gold, Built Green Platinum, Net-Zero Ready, EnerGuide 50 or less	\$5,000	\$3,500	\$2,000	\$1,500		
LEED Silver, Built Green Gold, EnerGuide 65 or less	\$3,000	\$2,250	\$1,500	\$1,000*		
EnerGuide 80 or less, ENERGY STAR, LEED Certified, or Built Green Silver	Pre-required Pre-req					

^{*}The need for this incentive level should be re-evaluated based upon the success of the program as it progresses.

Green Building Incentive Program

Pe	erformance Level*	\$/m²
5	Living Building, EUI of 0 (zero) or less	15.00
4	LEED Platinum, BOMA Net Zero Challenge, EUI 50% <building code<="" th=""><th>12.50</th></building>	12.50
3	LEED Gold, BUILT GREEN Platinum, BOMA BESt Platinum, EUI 30% building code	10.00
2	LEED Silver, BUILT GREEN Gold, BOMA BESt Gold, EUI 20% <building code<="" th=""><th>7.50</th></building>	7.50
1	LEED Certified, BUILT GREEN Silver, BOMA BESt Silver, EUI 10% <building code<="" th=""><th>5.00</th></building>	5.00

^{*}Jurisdictions with Step Codes should also consider including higher steps / levels from those Codes in this table.

Property Tax Reduction Incentive Program

Tax Reduction	New Homes: Green Building Certification Levels	New Buildings: Green Building Certification Levels
20%	EnerGuide 80 or less, ENERGY STAR, LEED Certified, or Built Green Silver	LEED Certified, BUILT GREEN Silver, BOMA BESt Silver, EUI 10% <building code<="" th=""></building>
40%	LEED Silver, Built Green Gold, Energuide 65 or less	LEED Silver, BUILT GREEN Gold, BOMA BESt Gold, EUI 20% <building code<="" td=""></building>
60%	LEED Gold, Built Green Platinum, Net-Zero Ready, EnerGuide 50 or less	LEED Gold, BUILT GREEN Platinum, BOMA BESt Platinum, EUI 30% building code
70%	LEED Platinum, Passive House, EnerGuide 25 or less	LEED Platinum, BOMA Net Zero Challenge, EUI 50% building code
80%	Net-Zero, EnerGuide 0 or less	Living Building, EUI of 0 (zero) or less

Advanced Queuing Incentive Program

Prioritizes developments that will be Green Building Certified. All hard project costs are covered through related permit fees paid by applicants. Buildings will obtain higher performance, providing increased revenue on collected municipal

property taxes.



Property Assessed Payments for Energy Reductions (PAPER) Program (pg 1)

- Government establishes a revolving loan fund, set aside for the purpose of enabling green energy retrofit projects (conservation or PV)
- Define prequalification criteria that will help shortlist eligible homes (eq: homes built <1970)
- 3. Invite local public to apply
- Qualified applicants receive a complimentary home inspection and home energy audit
- PASS: home inspection identifies no major concerns, and home energy audit identifies retrofit opportunities
- Green loan is approved: \$30k is allocated to home owner, and \$30k lien is taken by the City on the property
- Home owner books appointment with an approved energy

Notes:

Municipalities have great credit and can get low interest rates (eg: via Infrastructure Ontario), thus enabling them to setup these revolving loan funds at low cost.

Partner with local utilities to identify areas in the city where infrastructure is strained, and focus on improving those areas first.

Home inspection to identify structural/mold or other reasons why the energy retrofit project should not proceed.

> FAIL: home inspection identifies mold, structural, or other major concerns: project stops, and inspection report is given to home owner for their action.

The \$30k is a loan, to be used to reduce energy bills, and is repayable through property tax (hence the reason the City takes a lien on the property). Unused portions of the loan will be credited back.

The "approved" consultant would be a Certified Energy Advisor and partner in the program, trained to know the retrofit ontions that have been pre-selected in this

(Cont...)

(Cont...)

Property Assessed Payments for Energy Reductions (PAPER) Program (cont.)

(Cont...)

\$30k lien is taken by the City on the property

loan will be credited back.

(Cont...)

- Home owner books appointment with an approved energy consultant, and selects a retrofit package from the list of predetermined options
- Home owner books 7 days away and prepares house (cleans, covers furniture, etc)
- City's pre-approved retrofit contractor inspects house 1 wk. prior to project to ensure homeowner will be ready.
- READY: contractor collects a house key and (while owners vacation) performs deep retrofits to save 50% of owner's energy bills, then performs follow-up energy audit to confirm success.

The "approved" consultant would be a Certified Energy Advisor and partner in the program, trained to know the retrofit options that have been pre-selected in this program and pre-designed to work for all the homes that have been pre-qualified in step 2 above.

\$2k of the \$30k loan is set aside to fund a vacation: the City can work with a travel agency to negotiate preferred group rates and secure nice family vacations for \$2k./4ppl.

- 12. NOT READY: home owner is charged a fee for contractors to remobilize, and project is rescheduled (go back to step 9) or cancelled at home owner's discretion.
- 13. Owners return from vacation to an improved house with cheaper utility bills, and the loan is repayed over time through an extra "GMM" line on their property tax bill.

Everybody wins! The City gets the loan repaid, the owner gets a better house, utilities save energy, the environment is happy, and the owners even get a vacation along the way!

Development Charge Rebate Incentive Program

DC Rebate	New Homes: Green Building Certification Levels	New Buildings: Green Building Certification Levels
10%	EnerGuide 80 or less, ENERGY STAR, LEED Certified, or Built Green Silver	LEED Certified, BUILT GREEN Silver, BOMA BESt Silver, EUI 10% <building code<="" th=""></building>
20%	LEED Silver, Built Green Gold, EnerGuide 65 or less	LEED Silver, BUILT GREEN Gold, BOMA BESt Gold, EUI 20% <building code<="" th=""></building>
30%	LEED Gold, Built Green Platinum, Net-Zero Ready, EnerGuide 50 or less	LEED Gold, BUILT GREEN Platinum, BOMA BESt Platinum, EUI 30% building code
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50%	Net-Zero, EnerGuide 0 or less	Living Building, EUI of 0 (zero) or less

Building Permit Fee Reduction Program

Permit Fee Rebate	New Homes: Green Building Certification Levels	New Buildings: Green Building Certification Levels
20%	EnerGuide 80 or less, ENERGY STAR, LEED Certified, or Built Green Silver	LEED Certified, BUILT GREEN Silver, BOMA BESt Silver, EUI 10% building code
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60%	Net-Zero, EnerGuide 0 or less	Living Building, EUI of 0 (zero) or less

Key Strengths of the Incentive Programs

- Education and Experience
- Social Benefits
- Environmental Benefits
- Direct Financial Returns



