



Advancing Smart Energy Projects

A cursory scan of Finance and Business Models in Ontario

Clean Air Council Meeting | November 24th, 2017

QUEST  **CELEBRATING 10 YEARS** Quality Urban Energy Systems of Tomorrow

Presentation Outline

- About Smart Energy Communities and Smart Energy Projects
- Research Objectives
- What We Learned
- Opportunities for Future Research

What are Smart Energy Communities?

ENERGY EFFICIENCY

From building automation to street lights, Smart Energy Communities take advantage of the full potential of energy efficiency and capitalize on lower energy costs, cutting emissions, and improving operating performance.

HARNESSING LOCAL ENERGY

Smart Energy Communities harness local energy opportunities. These can be stock opportunities like solar, wind and geothermal, or they can be opportunities that are tailored to a community like water source cooling, sewage heat capture, biomass for heating, biogas for electricity, and transportation fuel.



SMART ENERGY COMMUNITIES CAN BE FACILITATED THROUGH THE IMPLEMENTATION OF A COMMUNITY ENERGY PLAN.

INTEGRATING CONVENTIONAL ENERGY NETWORKS

Electricity, natural gas, district energy, and transportation fuel networks in a community are better coordinated to match energy needs with the most efficient energy source. When conventional energy networks are integrated, it opens the door to innovations like alternative fuel vehicles, energy storage, waste heat capture, and combined heat and power.

LAND USE PLANNING

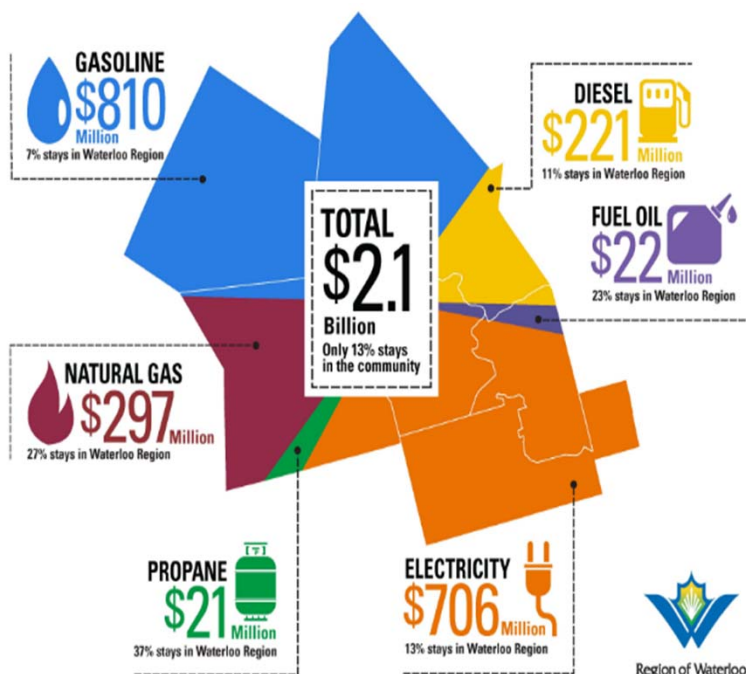
Smart Energy Communities integrate land use, recognizing that poor land use decisions can equal a whole lot of energy waste.

What are Smart Energy Projects

- > Any project that helps a community become a Smart Energy Community, such as:
 - Energy efficiency retrofits for existing buildings
 - New green building and community development
 - Local power and thermal production, transfer, and storage like CHP, district energy, geexchange, solar thermal, solar PV, and other storage technologies
 - Alternative fuel infrastructure



Community Energy Planning



Community Energy Planning

- A process whereby stakeholders come together to work towards becoming a Smart Energy Community
- It starts with a plan that sets local energy and GHG reduction targets plus a series of measures to achieve them
- It continues as an iterative process - with ongoing stakeholder collaboration to implement and evaluate measures

The Region of Waterloo's Approach: *Community Energy Investment Strategy (CEIS)*

- Outlines a process to prioritize energy investments and appropriate business models to support the development of local projects, meet the Region's targets, and keep more energy dollars local

Research Goals

1. Identify finance mechanisms and tools to support project investment
2. Match these tools to various types of projects and proponents using case studies
3. Explore how the Community Energy Planning Process can support and attract investment
4. *Refine the research question to support a deeper research effort*



Project and Proponent Types We Focused On

Proponent Type

Municipalities

Institutional Sector

- Universities
- Schools
- Hospitals

Not-for-profit organizations

- Not-for-profit co-ops
- Social Housing

Private Sector

- Small-Medium Enterprises (SMEs)
- Building Developers, Owners and Operators

Project Type

Building Energy Supply

- Renewable on-site electricity and heat
- CHP
- District Energy
- Energy Storage

Building Energy Efficiency

New Green Building Development

- Individual buildings
- New communities

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Building Energy Supply

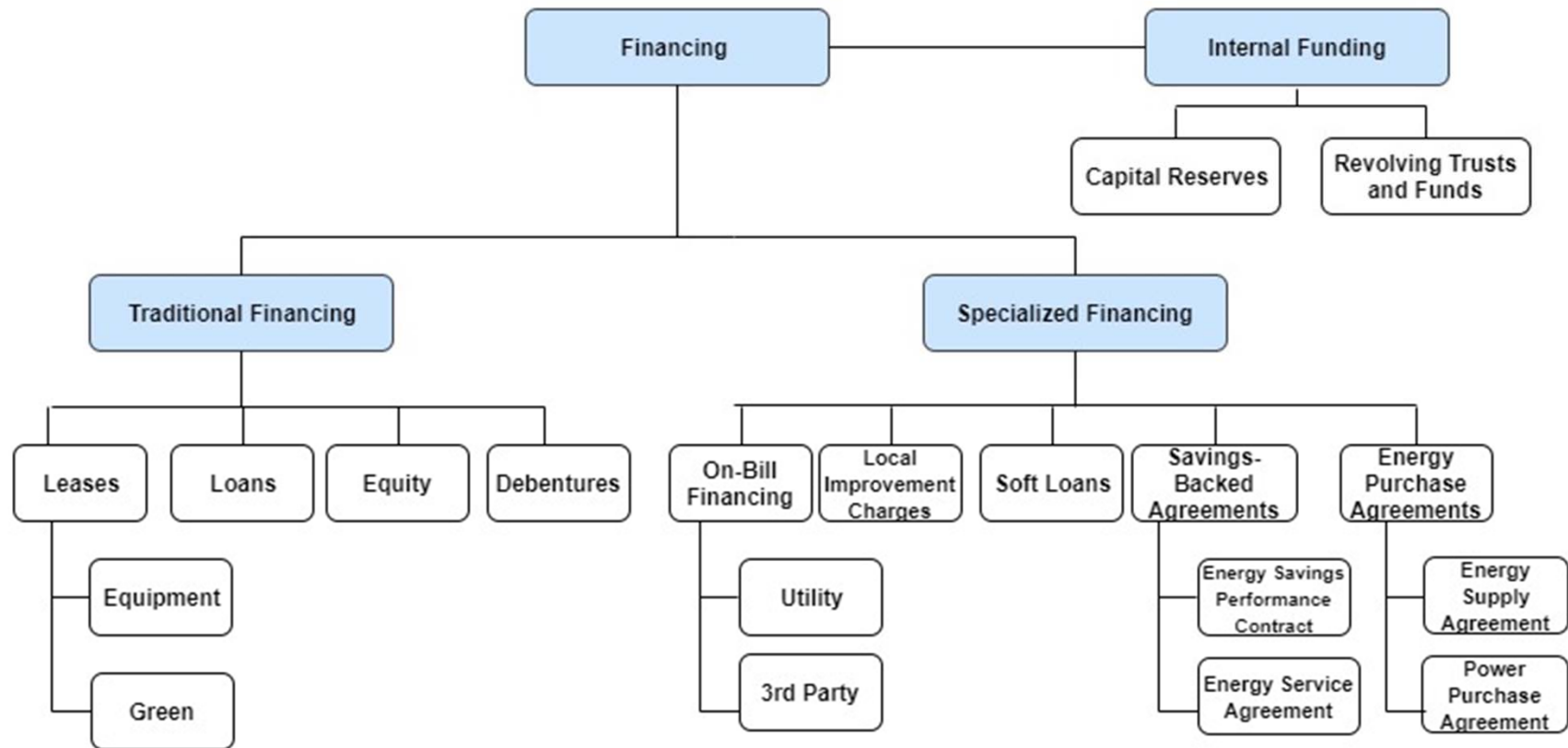
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- **CHP**
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Building Energy Efficiency

New Green Building Development

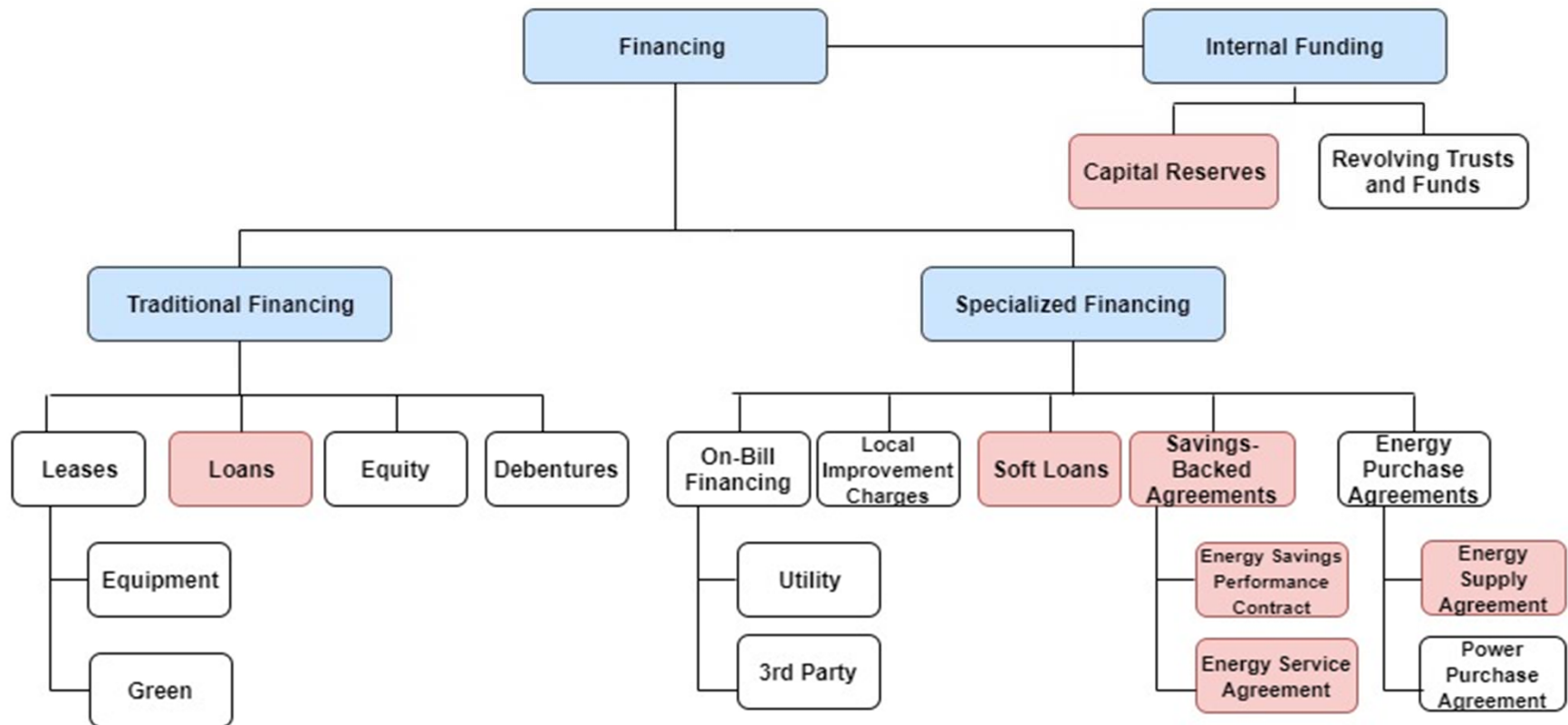
- **Individual buildings**
- New communities

What We Learned – Tools and Mechanisms Identified



Inspired by Department of Energy <https://betterbuildingsolutioncenter.energy.gov/financing-navigator/allies>

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What We Learned – Matching Mechanism to Project and Proponent

- **The suitability of a particular financing model often depends on a combination of factors:**
 - *Building ownership, equipment ownership, financial partnership*
 - *Cash flow between finance provider, customer or end user, other project investor and*
 - *expected ROI and payback period*
- **An easier approach is to identify all of the different investment approaches or business models used to develop project in each customer market - **MUSH, residential, commercial, and industrial** - recognizing that there might not be a one size fits all solution!**

What We Learned – Case Study Successes

Municipal LED Retrofits using Capital Reserves

The city of Guelph and the Region of Waterloo borrowed from existing capital reserves to fund extensive LED streetlight retrofits at a lower borrowing cost than debentures: a viable financing option for municipalities that may be near or at their legislated maximum to borrow or have a lower credit rating



What We Learned – Case Study Successes

Multi Unit Residential Building using Energy Supply Agreement for CHP

Brookfield Condominium Services, property manager for a MURB in Toronto, entered into a 20-year Energy Supply Agreement with CHP developer Magnolia Generation to supply heat, power, and backup power. Magnolia owns and operates the system, and recoups the cost via the agreement - meaning zero upfront capital cost for the Condo Board



What We Learned – Case Study Successes

Hospital Deep Retrofit using an Energy Savings Performance Contract

Lakeridge Health recently undertook a \$17 million deep energy retrofit for 4 of its buildings. Energy savings and construction costs were guaranteed by the energy efficiency engineer and constructor - Ecosystem - through an Energy Savings Performance Contract. This enabled Lakeridge Health to receive a third party loan, paid back directly from the energy savings.



What We Learned - Challenges and Opportunities

Challenges

1. Perceived risks due to unfamiliarity with the finance mechanism, business model, or project performance
2. Competing investment priorities
3. Behavioral barriers due to unfamiliarity with project technology
4. Lack of supportive policies and/or community buy-in

Opportunities for the CEP Process

1. Provide Local Policy Clarity
2. Encourage Multi-Stakeholder Cooperation and Knowledge-Sharing Opportunities
3. Encourage Project Bundling
4. Promote Good Work

Opportunities for Additional Research

- Expanding the scope to include the single family residential sector and larger projects such as district energy and community solar
- Expanding the research of finance mechanisms and models for new green building and community development
- Modifying the commercial sector to differentiate between large industrial, small to medium enterprises, and multi-unit residential buildings
- Exploring additional case studies based on additional sectors listed above, and providing additional consideration for different project and property ownership structures as well as different business model approaches
- Exploring additional case studies of CEP policy and economic development strategies to attract investment



Alex Benzie
LEAD, ONTARIO SERVICES
on.caucus@questcanada.org

What We Learned - Case Study Successes

Municipal LED Retrofits using Capital Reserves

Municipality / size of LED retrofit	\$ Amount (Approx.)	Payback period and interest rate	Cost of borrowing savings compared to debentures at 3.5%	Source of Capital reserve
City of Guleph - replace 13,000 HPS luminaires	\$8 million	6 years, 1.5%	\$511,000 (\$881,848 - \$370,738)	Wastewater upgrades
Region of Waterloo - replace 8,000 HPS luminaires (Regional roads only)	\$3.3 million	8 years, 2%	\$214,530 (\$488,310 - \$273,780)	Roads rehabilitation