

Building Our Energy Future WR COMMUNITY ENERGY TERM 1 REPORT

ACKNOWLEDGEMENTS

The work of WR Community Energy is directed by an innovative Governance Committee which includes high-level representatives from the Region of Waterloo, its three urban municipalities, and five local gas and electric utilities. We would like to extend our sincere appreciation to everyone who has contributed time, energy, and expertise to the development of the Community Energy Investment Strategy, and WR Community Energy through its first term.



















Message from Chair

With the adoption of the Community Energy Investment Strategy and successful first term, WR Community Energy is proof that collaboration can enable change in our community. The best way to move towards a clean, equitable, and sustainable energy future is through meaningful partnerships. As a unique model in Canada, WR Community Energy demonstrates how cross-sectoral partners can collaborate to enable localized solutions and be conscientious of the interconnectedness of those decisions and actions. We know that collaborative work on community energy can unlock benefits that cannot be achieved in isolation. We look forward to the next term of WR Community Energy as we continue to build our energy future for our residents, businesses, and industries.

Jerry Van Ooteghem,

Chair Governance Committee, WR Community Energy

For this report, we use the term 'Waterloo Region' or 'region' to describe the geographic area which includes three cities and four townships, and 'Region of Waterloo' when referring specifically to the municipal upper-tier government.





INTRODUCTION

Energy is everywhere. It lights our homes and streets. It powers our workplaces and takes us where we want to go. It keeps us cool in the summer and warm in the winter. Energy fuels our local industries and technological innovation. It is the driving force behind our prosperity and health. As Waterloo Region shifts towards a clean, equitable, and sustainable community, we are presented with many opportunities to improve our relationship with energy. We need to use it more efficiently, generate more locally with clean technologies, and make sure this transition benefits everybody. Fortunately, we are well positioned to do this.

This Term 1 Report highlights the accomplishments of WR Community Energy and our partners from the first 3-year term (2019-2021) and outlines how we can show leadership to take advantage of our energy opportunities to the benefit of our local economy, quality of life, and environment.

Community Energy Investment Strategy

The purpose of the CEIS is to improve and sustain Waterloo Region's economic competitiveness and quality of life through the coordination of targeted energy investments.



Between 2014-2018 the <u>Community Energy Investment Strategy</u> (CEIS) was developed with the guidance and support of local cross-sectoral leaders representing the utilities and municipalities. Included in the strategy were a set of priorities which would initiate and direct the work of WR Community Energy's first term.

Term 1 Accomplishments

In 2019 WR Community Energy was launched to implement the CEIS. Our first mandate was to work on District Energy, Planning Processes, and Energy Literacy. Throughout the course of the first term, we initiated and supported projects, supplemented missing information, and began embedding future energy considerations into existing processes. This dedicated work and collaboration has produced 10 internal and external reports and projects. The major reports completed for external audiences include District Energy, Community Efficiency Financing, Ground Mount Solar PV, Wastewater Heat Recovery, Geothermal Potential, and Considerations for Community Energy Policy. The first term positioned WR Community Energy as a united front to lead the energy transition for Waterloo Region. The insights, projects, reports, and partnerships we developed have set a clear direction for the next term.

	<u>Ground Mount Solar PV</u>	<u>Geothermal Potential</u>	<u>Wastewater Heat</u> <u>Recovery</u>	District Energy	<u>Community Efficiency</u> <u>Financing</u>	<u>Considerations for</u> <u>Community Energy</u> <u>Policy</u>
Summary	The AIRE (Accelerating Implementation of Renewable Energy) team explored and mapped renewable energy opportunities from solar, wind and biomass, in Waterloo Region.	A preliminary study by Beatty Geothermal Inc. explored geoexchange potential in Waterloo Region.	A preliminary investigation by KEB Engineering and Project Management of wastewater heat recovery opportunities based on data collected from Cambridge, Kitchener, and Waterloo.	A district energy prefeasibility study by FVB Energy for the area around King / Victoria in Kitchener.	A feasibility study was completed with Reep Green Solutions on financing deep energy residential retrofits in Waterloo Region.	A summary of key themes from three-years of community energy work and targeted interviews with industry leaders on integrating community energy considerations in municipal policies.
Audience	Developers & Municipal Staff	Developers & Municipal Staff	Developers & Municipal Staff	Municipal Leaders & Energy Developers	Municipal Leaders & Homeowners	Municipal Staff
CEIS Category	Energy Generation	Energy Generation	Energy Generation	Energy Efficiency & Energy Generation	Literacy & Energy Efficiency	Energy Efficiency & Energy Generation
Action/Next Step	Use decision framework to determine sites for potential solar energy development in Waterloo Region.	Explore geoexchange opportunities in Waterloo Region for appropriate development sites.	Explore wastewater heat recovery opportunities in Waterloo Region for appropriate development sites.	City of Kitchener to develop a business case for a district energy system.	Reep Green Solutions to complete a program design report.	Use findings to comment on the Regional Official Plan and area municipalities' Official Plans

UNDERSTANDING ENERGY

"Feeding our energy appetite is top of mind for many people these days"

David Suzuki

WR Community Energy **7**

Re-Evaluating Local Energy Spending

It is easy to take energy for granted. Afterall, it's largely invisible, available, safe, and affordable. To identify opportunities for change, it is important to know how much energy we use (by type) and where it is used (by sector) within our community. We know that in 2014, Waterloo Region spent \$2.1 billion on energy supply and only 13% of that spending stayed in our community. We also know that we imported 99.9% of that energy of which 45% was wasted contributing to various environmental consequences such as global warming and urban heat island effect.

Energy data makes the invisible visible. It shows the areas we need to target and gaps in our knowledge. In collaboration with our partners, WR Community Energy is committed to work to improve upon these statistics and will complete an update early in Term 2. By re-evaluating our local energy spending and sources we can work to change these numbers of our collective benefit. Our local leaders are well positioned to address these opportunities through leadership, policy, and education.



Conservation then Generation

Building a smart and sustainable energy future requires effort in both conservation and generation activities across the region. While both strategies are important, conservation (using less energy through increased efficiency) is widely recognized as the leading priority in community energy planning. There is significant work being done on energy conservation and energy waste both nationally and locally in Waterloo Region (ex: Sustainable Waterloo Region and Reep Green Solutions).

Our prioritization of conservation then generation is well aligned with other Canadian energy leaders including Natural Resources Canada's Energy Generation Council and Quest Canada's Technical Principles for the pathway to a Smart Energy Community. Recognizing this existing work, WR Community Energy has directed focus on generation opportunities and the abundance of local and renewable energy.

As we will discuss in the following section on Generation Opportunities, there are several ways to achieve this. There is no perfect solution. Each city, neighbourhood and building present unique opportunities to explore and incorporate local energy generation.



GENERATION OPPORTUNITIES

"Community Energy is the conscious effort to work together to integrate energy into our future."

Matthew Day, WR Community Energy

Photo Adam Clark

A Time for Transformation

In the spring of 2021, all eight municipalities in Waterloo Region endorsed TransformWR; our climate action strategy to transition to an equitable, prosperous, and low-carbon community. It identifies the need to transform the ways we power our buildings. WR Community Energy has contributed to this critical work through three reports focused on local energy sources:



Wastewater Heat Recovery



Geothermal



Ground Mount Solar PV

Wastewater Heat Recovery

Summary of Wastewater Heat Recovery in Waterloo Region by Klas Bockasten, KEB Engineering & Project Management Access the Report and Maps

Background

The Wastewater Heat Recovery (WWHR) Report includes a preliminary investigation of the trunk sewer heat recovery opportunities and is based on data collected from City of Cambridge, City of Kitchener, and City of Waterloo. If all heat was recovered in trunks with flows over 100 liters / second, the three cities could save 864,000m3 of Natural Gas a year or ~1,600 tonnes of greenhouse gases a year: roughly the same amount reduced by the City of Waterloo over the last 10 years.

Resources & Mapping

The GIS thermal maps included in the WWHR report identify where trunk sewers can effectively be utilized to provide heating and cooling. New developments over 65,000 ft² near high-flow sewer systems should consider wastewater heat recovery systems.

Technology & System Overview

A WWHR system captures the thermal energy from wastewater and can be used as a source of heating or cooling. This type of heat recovery system can be captured at a building level or harvested from the city sewage system.



Wastewater Heat Recovery (WWHR) systems should be considered for developments over 65,000 ft²

Wastewater Heat Recovery Recommendations

This technology is well aligned with the growth trends of our community and opportunities emerge with density. From the map, you will see that economically viable areas generally match the ION routes. This is where we can expect much development to occur. To capitalize on this opportunity, we must:

- 1. Increase Awareness & Knowledge of the Technology
- 2. Develop a Municipal Database of Sewage Temperatures
- 3. Develop Effective System Regulations & Coordination
- 4. Consider Thermal Energy in Wastewater System Design.

As with other leading municipalities on this issue around North America, each municipality will play a critical role in managing the opportunities and technology associated with this valuable renewable energy.

You can access the full Wastewater Heat Recovery report and maps here.



Geothermal

Summary of Geothermal Energy Potential for the Waterloo Region report by Beatty Geothermal Inc. Access the Report and Maps

Background

This report is designed to start a conversation about the potential for open loop geoexchange systems in Waterloo Region. Geothermal opportunities exist across Canada. Waterloo Region, however, is unique in its capacity for a more energy efficient and ecologically preferable type of geoexchange system called, 'Open Loop Geoexchange'. Open Loop Geoexchange is not well understood by all relevant sectors of our community. The purpose of this report is to bring forward existing knowledge on the subject and put it in context with similar technologies and our broader community.

Resources & Mapping

What makes Waterloo Region unique in our ability to use this technology is the major bedrock aquifers are between 60 to 140 meters below surface and have an annual temperature of 10 degrees. In many parts of the community, the bedrock is typically limestone or dolostone, which are relatively easy to drill. We still have more to learn about the flow rates of these aquifers, but even a low-end flow rate of 10 L/s would heat and cool a good size building. At the time of writing (2021), many existing open-loop geo exchange systems in Waterloo Region have a surplus of energy available and are considering expanding. There are and there many more in various stages of development.

The opportunities for geoexchange have been mapped here for Waterloo Region.



Consider Geoexchange for buildings at least 5000 m2 and property size of 10,000 m2 and a minimum well capacity in the order of 10 L/s

Geothermal Recommendations

While there are many issues to iron out, this technology has the potential to be a game changer for most of our region. To do this we must:

- 1. Develop an enabling framework with streamlined processes that include system applications and inspections;
- 2. Educate energy developers, the building sector, and municipal planners on aquifer mapping, local groundwater uses, and existing regulations;
- 3. Track all types of geo-exchange systems in Waterloo Region; and,
- 4. Consider ways to reduce the risk to developers for open-loop systems.

This technology has the potential to decarbonize the heating load for much of Waterloo Region. While we have seen several successful examples of this technology so far, we have much more work to do to make it mainstream.

Full details are available in the <u>Geothermal Potential for Waterloo Region</u> report and maps.



Ground Mount Solar PV

Summary of Mapping Opportunities for Renewable Energy Development in Waterloo Region by the AIRE Team **Access the Report and Maps**

Background

In 2019, The Region of Waterloo and WR Community Energy partnered with the Accelerating. Implementation of Renewable Energy (AIRE) team to map renewable energy opportunities from solar, wind and biomass, in Waterloo Region. The resulting report and maps from this two-year project were designed to help municipalities reach GHG emission reduction targets by identifying opportunities for local renewable energy projects and infrastructure.

Resources & Mapping

The approach used in AIRE is based on a standardized renewable energy resource assessment framework. Phase 1 focused on technical mapping and filtered out incompatible areas for various technical, economic, or legal reasons. Phase 2 focused on participatory mapping.

Technology & System Overview

The analysis in AIRE provides technical, political, and social support for renewable energy opportunities. The report provides a series of map outputs which show the review process used to evaluate wind, biomass, and solar energy potential. Since biomass and wind energy showed little promise, only the solar energy resources were taken to Phase 2.



Consider solar PV systems in areas identified in the AIRE maps.



Ground Mount Solar PV Recommendations

The key takeaway from this report is:

Large-scale ground-mount PV systems are the most likely near-term opportunity considered in this study. Due to regulatory changes in 2019, this is a relatively new space of responsibility for local municipalities and provides a wealth of opportunity for positive change moving forward.

You can access the full <u>AIRE report and maps</u> here.



COLLABORATION

"Access to energy is a vital component of keeping our society and economy moving every day."

Community Energy Investment Strategy, 2018

Photo Adam Clark

Collaboration with Community Partners

Since 2019, WR Community Energy has supported integrated discussion between industry, community, and policy leaders. These efforts will support Waterloo Region in achieving a smart energy future and sustained quality of life.

Collaboration and developing new relationships are vital to building a smart and sustainable energy future. As we continue to articulate the roles for our diverse stakeholders across Waterloo Region to ensure our energy transition, WR Community Energy is uniquely positioned support the initiation of complex projects until a natural owner is found. There are two key examples of this from our fist term where we able to leverage key relationships and marshal resources totalling over 200k in investments: Community Efficiency Financing and District Energy. In both cases, WR Community Energy took a leadership role in the pre-feasibility studies. We continue to support our community partners to take these results and move each project forward. Additionally, WR Community Energy was invited to provide comments to the Region of Waterloo's Regional Official Plan Review focused on the Policy Direction Paper on Climate Change document.



Community Energy Efficiency Financing



District Energy



Considerations for Community Energy Policy

Community Energy Efficiency Financing

Results will be available in early 2022

In 2020 WR Community Energy partnered with local environmental charity, Reep Green Solutions, to support a preliminary study on community efficiency financing. Changes to home heating and cooling, and water heating, have been identified in the adopted <u>TransformWR</u> report as a critical element to addressing GHG emissions in Waterloo Region. Recognizing that Reep Green Solutions was best positioned with staff and expertise to address homerelated projects, WR Community Energy marshalled the resources from other interested parties to take the project to the next level. The newly developed collaboration – now led by REEP – secured funding from the Federation of Canadian Municipalities to design the full program. The results of this work, anticipated in mid 2022, will provide a thorough understanding of the financing options and appropriateness for low-income homeowners in Waterloo Region.



District Energy

A district energy system moves heat and/or cool energy from a centralized source through a network of pipes to industrial, commercial, residential, or institutional buildings

WR Community Energy's first initiative was identifying potential of District Energy sites in Waterloo Region. We looked at 12 sites across the community that met 3 criteria: a) mixed use developments b) over 100,000m2 in heated space c) to be built within 10 years. With our long-list in hand, one site became most promising because of its density, demand on existing energy infrastructure, capacity for renewable energy, and developments controlled by the partners of WR Community Energy. The site was the innovation district in Kitchener.

A working group was established to oversee a pre-feasibility study for the site. The results of the study showed how a District Energy system could reduce GHG emissions by 5,000 tonnes a year with a financial payback of 6%. That would make it one of the largest GHG projects in the region. More research is required, however. The City of Kitchener (with Kitchener Utilities) is now on the case and exploring the project in more detail. More information about the project and the feasibility study can be found in Kitchener's Planning & Strategic Initiatives Committee meeting agenda from <u>September 28, 2020</u>.



Considerations for Community Energy Policy

A summary of the Community Energy Considerations for Municipal Climate Change Policy Development on New Buildings by Alex Benzie and Matthew Day. <u>Access the Report Here</u>

To reach our community GHG target, the Region of Waterloo – as the upper tier of municipal government and one of the largest energy consumers in the community – is positioned lead by example and with policy. Regional Official Plans (ROPs) are the best way to lead by policy. It was the 2010's ROP which laid the groundwork for what became Waterloo Region's Ion light rail transit system. In a similar way, the upcoming ROP is addressing climate change.

In 2021, WR Community Energy was invited to provide input on the ROP's Policy Direction Paper on Climate Change. WR Community Energy is optimistic about what we read. There are many policy directions that could be significant to our community energy use and position Waterloo Region among the leaders in the province on the issue.

We provided comments based on three-years of webinars, seminars, courses, working groups, white papers, conversations, and targeted interviews with leading engineers, planners, developers, architects, and energy professionals from across Waterloo Region and the GTHA. We will use these insights and report to provide feedback to our local municipalities.



Community Energy Policy Recommendations

While we did not recommend specific policies, we shared findings on what we considered key themes including:

- Barriers to high performance new construction
- Importance of balancing collaboration, incentives, and regulation
- Importance of municipal staff resourcing, training, and internal processes
- Celebrating success and sharing learnings
- Importance of public interest and consumer demand
- Importance of political appetite and municipal leadership

Through our partners, WR Community Energy will be leading various working groups over the next three years to promote and action these lessons through various initiative, studies, and policies.

As Waterloo Region continues to grow, there is both a need and an opportunity to ensure that our community is built and designed with the energy transition in mind. The Region's Regional Official Plan will play a significant role in the success of the Community Energy Investment Strategy.

You can access the report here.



WHAT'S NEXT

"Land use planning is key to addressing climate change, and to achieving transformational change. Planning for long-term, sustainable growth and development is critical, since decisions about infrastructure and land uses can have implications for centuries to come."

Policy Direction Paper on Climate Change

The Path Forward

The first term of WR Community Energy demonstrated the viability and value of utility and municipal collaboration. With the resources developed along the way and presented in this report, Waterloo Region can continue to enable and implement significant energy projects, policies, and programs to support the energy transition.

As attention began to shift towards our second term, we organized a strategic session with senior and knowledgeable staff from our partners. This session enabled reflection on our key learnings and provided guidance on how to amplify impact. Two key takeaways emerged:

Focus efforts on 4 key priorities: Energy in Land-Use Planning and Developments, Priority Projects, Literacy & Communications, and Municipal/LDC Leadership.

2

Progress towards these priorities requires on-the-ground knowledge that the Governance Committee not ideally suited for. Priority-specific working groups will be established.



Energy in Land-

use Planning and

Developments



Priority Projects



Literacy and Communications



Municipal/LDC Leadership



A Strong Foundation

The strategic session and subsequent work by the staff and Governance Committee have provided a strong foundation to build our sustainable energy future. Looking ahead, WR Community Energy staff will focus on the following:

- Implementing the work plans developed with the working groups
- Completing and disseminating updated energy use data for Waterloo Region
- Continuing to support ongoing community projects including Community Efficiency Financing and District Energy
- Identifying partnership opportunities and knowledge gaps across the community
- Supporting energy literacy and collaboration across the community.

Since 2019, WR Community Energy has supported integrated discussion between industry, community, and policy leaders. These efforts will support Waterloo Region in building our clean, equitable, and sustainable energy future. We wish to extend our sincere appreciation to our Governance Committee, report authors, and many community collaborators.

If you are interested in learning more or discussing a project, energy potential in a development, or have any questions, please contact <u>WR Community Energy</u>.



Contact Us

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IN PARTNERSHIP WITH





Waterloo North Hydro