QUEST | Net-Zero Communities Accelerator Program

Energy Mapping and Action Planning Final Report

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Submitted to:

Municipal District of Pincher Creek | Town of Pincher Creek, Alberta

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LAND ACKNOWLEDGMENT

The **Pincher Creek** region acknowledges the traditional territories of the **Niitsitapi** (Blackfoot) and the people of the Treaty 7 region in Southern Alberta, which includes the **Siksika**, the **Piikani**, the **Kainai**, the **Tsuut'ina**, and the **Stoney Nakoda** First Nations, including **Chiniki**, **Bearspaw**, and **Wesley** First Nations. Southern Alberta is also home to the **Métis** Nation of Alberta Region 3.

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Municipal Climate Change Action Centre

The Municipal Climate Change Action Centre was founded in 2009 as a collaborative initiative of Alberta Municipalities, Rural Municipalities of Alberta and the Government of Alberta. The Municipal Climate Change Action Centre provides funding, technical assistance, and education to municipalities and community-related organizations, helping them lower energy costs, reduce greenhouse gas emissions, and improve climate resilience. Visit them at www.mccac.ca

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QUEST Canada is a registered Canadian charity that supports communities in Canada on their pathway to net zero. Since 2007, we've been facilitating connections, empowering community champions and advising decision-makers to implement energy use and emissions reduction solutions that best meet community needs and maximize local opportunities. We develop tools and resources, convene stakeholders and rights holders, and advise decision-makers — all with the goal of encouraging, assisting and enabling communities to contribute to Canada's net-zero goals. Visit them at www.questcanada.org

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TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

1.1 What is this Report About?

On September 25, 2024, the Town of Pincher Creek and the Municipal District of Pincher Creek No. 9 participated in an energy mapping and action planning workshop facilitated by the Municipal Climate Change Action Centre (MCCAC), as part of the Prairies Cohort of QUEST Canada's Net-Zero Communities Accelerator Program.

The workshop was attended by 9 participants representing diverse stakeholder groups, including municipal staff, consultants, and local organizations.

A presentation was made by the MCCAC identifying energy projects and climate action planning taken in the Pincher Creek Region to date, as well as planned and potential future projects.

Participants then participated in two sections of the workshop consisting of:

- **Energy Mapping**

  An interactive exercise engaging diverse local participants to identify strengths and opportunities for the various systems the Pincher Creek region has in place - energy efficiency, clean/renewable energy, transportation, infrastructure, land use, water, and waste using an interactive map of their community. Participants identified actions to achieve their vision of a Smart Energy Community.

- **Action Planning**

  The workshop provided an overview of the key considerations in developing a Community Energy Action Strategy, including actions which were identified based on QUEST's common local action strategies handout.

This report summarizes the results of the exercise, including diverse stakeholder perspectives on the opportunities for energy efficiency, waste energy integration, renewable energy, land use and transportation, and more, to reduce energy costs and greenhouse gas (GHG) emissions in the community.

1.2 Who Is it Intended For?

This report is intended to inform the municipal staff, councillors, stakeholders and the broader public about:

- Local strengths, achievements and impacts

- Opportunities to improve energy efficiency, integrate clean energy and improve transport as part of a Community Energy Action Strategy (CEAS)
- Potential opportunities for the region to pursue, continue, prioritize, and partner on

This report represents recommendations provided to Pincher Creek as key considerations in redeveloping a Community Energy Action Strategy. As a living document, the report content can be edited or changed as the community sees fit.

1.3 High Level Summary of Key Findings

Based on the results of the pre-survey and the workshop, the Pincher Creek region has the following strengths and opportunities to advance community energy and emissions reduction initiatives.

Table 1: Description of strengths, areas for improvement, and opportunities

Areas	Key Strengths	Key Areas for Improvement and Opportunities
Energy Efficiency	Residential Clean Energy Improvement Program (CEIP)	Opportunities for energy efficient or net zero development with the planned relocation of the Pincher Creek Emergency Services building Prioritizing upgrades to aging infrastructure Prioritizing residential upgrades in older neighbourhoods, especially homes that are currently reliant on diesel. Education for residents around residential energy efficiency can support this work
Waste and renewable heat	Waste to heat is being looked at (Biodigester) Waste to energy potential site has been selected and is under consideration	Potential corporate and commercial sites for generation waste heat and microheat opportunities
Renewable power	The Region is regarded as the wind energy capital of Canada, with a total of 9 wind energy projects currently producing 511 MW of energy	Distributed solar opportunities have been identified Maintaining current wind infrastructure and staying aware of new technologies

Land use	Established Land Use Plan provides direction Climate Risk Assessment & Adaptation Plan for the Pincher Creek Region is in place to support land use decisions that mitigate climate risks	Expand affordable and renter-friendly housing options Abandoned buildings and surrounding areas are an opportunity to upgrade, redevelop, and densify. Industrial brownfield sites (old wells, gravel pits) can also be repurposed Connect land use decisions with opportunities to expand tourism
Transportation	On demand, accessible, door-to-door transit (Pincher Creek Handi-Bus)	Transportation decisions can support inter-regional travel, and result in greater connectivity to commercial and tourism destinations, supporting the local economy Expanded bus and rail connections, including a bus to the Pincher Creek Airport
Energy networks	Captus Generation Natural Gas Power Plan (cogeneration facility with carbon capture hub)	Promotion of the Captus project and communicating the availability of waste heat can attract new business and investors to the region (i.e. greenhouses)
Other		Organics diversion Food waste capture Industrial carbon capture

Overall opportunities to consider across each of the five areas included:

- Engage with marketing and communications staff to conduct outreach and education in both residential and commercial contexts to promote existing projects, encourage program uptake, and enhance awareness of viable emissions reduction opportunities.
- Communicate climate action values to attract new businesses and support community economic development and tourism.

2.0 COMMUNITY PROFILE

The Town of Pincher Creek is located in southwest Alberta where the prairies meet the Canadian Rocky Mountains. Covering nearly 3500 km2 of land, the MD of Pincher Creek is a community that manages growth and supports western heritage while preserving the natural environment.

- Population: 3,875 (Town) and 3,348 (MD)
- Local job/local workforce:
    - Town: 53% employment rate with 57% participation rate
    - MD: 62% employment rate with 66% participation rate
- Major Employers in the area:
    - Alberta Health Services
    - Castle Mountain Resort
    - Fortis Alberta
    - Livingstone Range School Division
    - Municipal District of Pincher Creek
    - Pincher Creek Co-op
    - Pieridae Gas Plant
    - Town of Pincher Creek
    - TransAlta
    - Vestas Canadian Wind Technology
    - Walmart

In 2023, the Town of Pincher Creek's community emissions totaled 59,840 tCO2e while the MD's community emissions totaled 66,258 tCO2e. This does not include emissions from large industries. Additional details about the Pincher Creek region's emissions profile can be found in the GHG Inventory Report, created by the Community Energy Association through the Net-Zero Community Accelerator.

The Municipal District of Pincher Creek and Town of Pincher Creek have an Intermunicipal Development Plan, adopted by both municipalities in 2010 to deal with land use planning matters of mutual interest. The goals of this plan are:

- To facilitate orderly and efficient development in the designated Urban Fringe district while identifying each municipality's opportunities and concerns.
- To identify the land uses each municipality envisages for the IMDP plan boundary.
- When practical, to harmonize both municipalities' development and subdivision standards and requirements.
- To identify possible joint ventures, such as the provision of municipal services.
- To provide for a continuous and transparent planning process that facilitates ongoing consultation and cooperation among the two municipalities and affected ratepayers.
- To provide methods to implement and amend the various policies of the plan which are mutually agreed to by both municipalities.

The Town and MD's individual Municipal Development Plans also serves as a foundational document from which other actions and decisions are based, and establishes a vision for future growth and development in the region.

The Town and MD are also guided by strategic direction outlined in numerous existing plans, including and not limited to, the South Saskatchewan Regional Plan, Area Structure Plans, Downtown Pincher Creek Area Redevelopment Plan, Town of Pincher Creek Land Use Bylaw, Subdivision and Development Policies, and numerous Master Plans.

Specific to the Town, the Town of Pincher Creek Council's Strategic Priorities 2022-2026 outlines Council's strategic vision for the Town's future. Actions connected to Community Energy Planning include:

- Assisting residents in attaining a good quality of life by providing high quality parks, culture, services and opportunities that will result in significant improvement in the wellbeing of our residents, and ensuring that existing and future infrastructure is maintained and sustainable.
- Maintaining and improving the physical assets of the Town, including increased efficiency in asset management, planning and budgeting, with the desired outcome that all Town systems work well and have future capacity.

The Town of Pincher Creek Community Economic Development Strategy (2021-2026) also outlines pathways to achieve community goals that align with Community Energy Planning while also advancing community economic development, including downtown corridor revitalization, building up rather than out, addressing housing shortages, improving community assets, and increasing tourism products and services.

3.0 COMMUNITY ENERGY AND EMISSIONS MAP EXERCISE RESULTS

3.1 Map Exercise Results

Goal

This exercise was completed with a goal of providing participants with a hands-on energy mapping experience to enable them to share knowledge, discuss local opportunities and apply basic techniques for identifying opportunities in a spatial context, including planning local efficiency, clean energy, transportation, and land use actions.

The energy mapping exercise engaged multiple stakeholders, using a map to identify opportunities for their CEAS and initiatives. The exercise enabled participants to share these opportunities, and discuss various aspects and viewpoints.

The following results represent a snapshot of what was heard by staff and stakeholders who participated in the energy mapping workshop. These results may be considered and expanded upon at Pincher Creek's discretion, in the creation of their CEAS.

Summary of Energy Mapping Activity

1. Energy Efficiency

Using green stars and circles, the participants identified potential buildings and neighborhoods for energy efficiency improvements. **These are listed here:**

- Replace aging infrastructure and develop new buildings with energy efficiency top of mind:
    - MD Shop
    - Memorial Community Arena
    - Curling Club
    - Livingstone School (Lundbreck, AB)
- Key municipal buildings for energy efficiency audits and retrofits:
    - Pincher Creek Swimming Pool
    - Historic Lebel Mansion
    - Pincher Creek Community Hall
    - Memorial Community Arena
        - Specifically identified as a geothermal energy opportunity.
    - MD Shop
    - Town Shop
    - Water and Wastewater Facilities

- Key residential opportunities for energy efficiency audits and retrofits, including those which are currently on reliant on diesel:
    - Foothills mobile home park
    - Hamlet of Lundbreck
    - Castle Mountain Region
- Key commercial, industrial, and institutional opportunities for efficiency audits and retrofits:
    - Pincher Creek Health Centre
    - Businesses and industrial operations in Pincher Station
    - Ranchland Mall
    - Fox Theatre
    - Walmart & Boston Pizza
    - Pieridae Gas Plant
    - Captus Generation Natural Gas Power Plant
    - O'Sullivan's Concrete
    - St Michael's Catholic Church
    - Other industrial, commercial, and institutional sites.

Workshop discussions including general action items, which are not site-specific. **These are listed here:**

- Focus on aging dated infrastructure. Consider what needs to be torn down and what can be upgraded.
- Look into older neighbourhoods for residential efficiency retrofits, and prioritize accordingly. Consider targeting older homes for the Clean Energy Improvement Program (CEIP).
- Educating residents on the benefits of energy efficiency and what upgrades may benefit their home.

2. Waste and Renewable Heat

Using red stickers and stars, the participants identified potential waste and renewable heat opportunities. **These are listed here:**

- Waste heat at the Memorial Community Arena with the Swimming Pool as the anchor
- Breweries (Wild Winds Brewer, Oldman River Brewing)
    - Microheat opportunities
- Landfill
    - Incentrator generates heat
    - Biodigester is being looked at but more information and an input source is needed
    - Education on new technologies would be of value
- Captus Generation
    - Burn waste and sequester carbon underground
- Pieridae Gas Plant
    - Waste heat
- Curling Club
    - Waste heat from Ice Plant

3. Renewable Power

Using green stickers and stars, the participants identified opportunities to integrate renewable power. **These are listed here:**

- Pool and Curling Club
  - Combined heat and power units
- Residential
  - Supporting rooftop solar with local battery / energy storage systems
- Commercial
  - Canadian Quarter Horse Association could develop onsite solar project
- Solar
  - Castle Mountain Resort (1)
  - Waterton Gas Plant / Park Front (2)
  - Main Street Pincher Creek (3)
  - Summerview / Oldman Dam / Castle View Campground (4)
  - Brownfield sites
- Wind
  - As older wind farms are being replaced, the region needs to stay aware of new provincial regulations and changes to wind energy technologies (turbines that produce significantly larger amounts of energy in comparison to older models).
    Focus on repowering existing projects.
    - High Priority: Kettles Hill and Castle Rock Ridge
    - Cowley Ridge

Workshop discussions also included general action items, which are not site-specific. **These are listed here:**

- A potential site has been selected for waste heat to power with carbon capture, but waste inputs would be needed from Calgary and Lethbridge as indicated above. Low priority at this time.
- Draw connections to wind and solar energy development recommendations within the MD's Municipal Development Plan.
- Maintain the necessary infrastructure and lobby provincial regulators to ensure that wind energy can remain a good revenue source for the MD.
- Look into hydrogen opportunities.
- Look into Small Modular Nuclear Reactor (SMR) feasibility.

4. Land Use

Using various colors of shading, participants identified zones for densification, mixed use, and restricted development. **These are listed here:**

- Green infrastructure
    - Stormwater retention in new development.
    - Community garden at Heritage Centre
- Abandoned buildings and surrounding areas are an opportunity to upgrade, redevelop, and densify
    - Sobey's building (old) in Downtown Pincher Creek
        - Connect to Rotary club study "Apple Tree" for a multi unit housing retrofit
    - Empty Lot Downtown (Site of a burned down restaurant)
    - Bargain Shop
    - Other sites
- Adding multiple housing options along mainstreet corridor
- Prioritizing affordable and renter friendly housing options.
- Commercial
    - Pincher Creek Station
    - Lundbreck Hamlet study (active project)
    - Look into expanded water and sewer infrastructure at the Pincher Creek Airport

Workshop discussions also included general action items, which are not site-specific. **These are listed here:**

- Connect actions to the Land Use Plan
- Connect land use actions to tourism opportunities
- Opportunities with Burmis Lundbreck Corridor Area Structure Plan and plans for residential development
    - The Burmis Lundbreck Corridor Area Structure Plan (ASP) defines a planning and development framework to guide future growth in the Plan Area by establishing a range of appropriate and compatible land uses, within a comprehensive development strategy.
    - The Burmis Lundbreck Corridor ASP considers existing land uses, surrounding developments, potential future land uses, public input, physical and environmental characteristics, infrastructure requirements, and growth trends.
    - The Burmis Lundbreck Corridor is an area experiencing country residential development pressures due to both its proximity to recreational areas (i.e. trout fishing in the Crowsnest River, skiing at Castle Mountain Resort) and the natural attributes offered in the area, and also because it is identified in the MDP as an area eligible for Group Country Residential development.

5. Transportation

Using yellow stickers, purple lines, and blue stars participants identified opportunities for transit amenities, EV charging, trail connectivity and inter-modal hubs. **These are listed here:**

- The Town can continue to support accessible door-to-door transportation through the Pincher Creek Handi-Bus.

- Increased transportation opportunities (bus & rail) to support tourism and interregional travel, including connectivity to and between Castle Mountain Resort, Waterton National Park, Pincher Creek Airport, Parks (Juan Teran Regional Park, Lions Ball Park) and Southern Alberta Ale Trail destinations.
- Increased connectivity to commercial destinations, i.e. Ranchland Mall and grocery stores
- Increased connectivity to other key destinations across the region:
    - Kootenai Brown Pioneer Village
    - Heritage Acres
    - Oldman Reservoir
    - Lundbreck Falls
    - Lost Things Distillery

6. Smart Energy Networks

Using a red marker and yellow stars, participants identified potential opportunities for district energy and district heat.

- Captus Generation Natural Gas Power Plant
    - Waste heat
    - Communicate that waste heat is available could be an economic development strategy to attract new business that may benefit (i.e. Greenhouses).

- Explore a district system that could connect the following sites
    - Water and wastewater sites
    - Swimming Pool
    - Memorial Community Arena
    - Crestview Lodge
    - Pincher Creek Airport

Workshop discussions also included general action items, which are not site-specific. **These are listed here:**

- Virtual power plant as a grid management solution. Virtual Power Plants use smart technology to optimize renewable energy and energy storage systems to provide power when most needed.

7. Other

Workshop discussions also included general action items, which are not site-specific. **These are listed here:**

- Organics diversion
- Regional food waste capture
- Industrial carbon capture

4.0 ACTION PLANNING ROUND-UP

4.1 Goal

To provide participants with an opportunity to discuss the most significant findings, and present their ideas for key areas for improvement, related needs, and potential actions.

4.2 Summary of Results

- **Energy Efficiency**: projects, policies, and other actions that aim to improve energy efficiency of residential and commercial buildings in the community, to reduce GHG emissions and lower energy costs and improve affordability.
    - ***High priority actions***
        - **Clean energy conversion (heating and cooling):**. Converting heating sources to more efficient methods such as natural gas, air sourced heat pumps), or geothermal will allow for a reduction in energy consumption and switch to more environmentally friendly means.
            - Improve awareness of all available programs and incentives and where to go to encourage clean energy conversion in the community through website resources and outreach.
            - As areas in the MD are off-grid (propane users) estimate the number of dwellings that could be converted, through a local survey, or based on data from energy providers, heating oil distributors and natural gas distributors if their data is available.
            - Obtain data annually from energy utility and incentive providers, about the number of incentives provided for clean energy conversions in order to measure GHG impact.
        - **Commercial energy efficiency:** Improving energy efficiency in the commercial sector can be accomplished using a combination of public education, incentives, policy and bylaws and partner initiatives. The community and partners could also develop a community retrofit project by combining energy efficiency initiatives.
            - Encourage energy performance ratings for all new commercial properties. Buildings larger than 5,000 square feet could be required to have sub-metering, and buildings larger than 10,000 square feet (e.g. commercial, multi-residential) could be required to do benchmarking and disclosure, based on utility data.
            - Obtain data annually from energy utility and incentive providers regarding the number of incentives provided for commercial efficiency

retrofits or new builds, in order to measure GHG impact. Establish working relationships with Fortis to provide high quality data for the MD as well as the Town.

- ***Medium priority actions***
  - **Commercial energy efficiency:**
    - Encourage energy efficiency with public education, including engaging businesses, such as a green shops program, and providing education on what grants are available. This work is already underway, but more focused staff time & capacity is needed.
    - Adopt building code bylaws, requiring minimum energy performance and efficiency standards or rating and labelling for different types of buildings (e.g. Energy Star, net-zero). This would collect information through the permitting process (e.g. energy or GHGs saved through high-efficiency or net-zero development). Follow provincial codes, but look into opportunities for building above code.
  - **Residential energy efficiency:** Improving energy efficiency in the residential sector can be accomplished using a combination of public education, incentives, policy and bylaws and partner initiatives such as installing low flow showerheads and weather stripping. The community and partners could also develop a community retrofit project by combining energy efficiency initiatives.
    - Encourage energy efficiency through a public education communications strategy. Provide broader education on the electricity grid and maintenance.
    - Encourage homeowners to apply for incentives from the utility, for energy audits and retrofit projects. This could include residential rebates, a total home energy savings program, net metering programs, federal government programs. Better mill rates could be offered for properties with higher energy performance.
- ***Low priority actions***
  - **Commercial energy *efficiency:***
    - Encourage businesses to apply for incentives from the utility for energy audits and retrofit projects. These could include a small business lighting program, commercial buildings retrofit program and net metering.
- ***No priority level indicated***
  - Continue to offer the residential Clean Energy Improvement Program, and enhance education and outreach to residents.
  - Consider opportunities to expand the Clean Energy Improvement Program to commercial and/or agricultural buildings.

- **Distributed Energy Resources**: Any distribution-connected resource that can potentially supply energy onto the grid. This includes resources such as residential solar panels, electric vehicles, home battery storage, distribution-connected generation, or distribution-connected energy storage of any type.

- **Wind energy**
  - Contact the utility before starting the process in order to ensure alignment with existing programs and technical requirements.
  - Conduct an energy technical mapping assessment and social acceptability analysis to help identify legally accessible land within the municipal boundary that has good wind regime, existing substation, appropriate setbacks, and social acceptance.
  - Determine potential GHG reductions and ROI based on size of the system, performance of the units, local wind regime, and infrastructure costs. Considerations for wildlife, ice, salt spray, and wind variability must also be taken into account.
- **Solar photovoltaic arrays and community solar farm:** Solar photovoltaic (PV) arrays provide an opportunity for municipalities to produce power for the grid, which would reduce greenhouse gas emissions and long-term costs.
  - Funding has been received to do a solar project. Outline potential risks, which could include the effect on the local environment with the removal of forests and farmlands to build a solar farm, effect on local the power grid with new inconsistent energy sources, effect on local water supplies as the solar panels degrade and leach poisonous chemicals into the soil, total solar potential, calculated through the number of sunlight hours per year, if and how the energy will be stored for later use, if the solar panels will be used for baseload or for peak demand, and cost and ROI of a system.
- **Solar PV (rooftop or ground mount):** Solar photovoltaic (PV) systems provide an opportunity for municipalities and citizens to produce power for use on site, which would reduce greenhouse gas emissions and long-term costs at the installed site.
  - Conduct a survey or study on what types of solar PV programs could work, what the potential uptake could be, and what real or perceived challenges might exist. Determine if the community or sister communities have their own professionals or students in this area that can come aboard to conduct these assessments.
  - Establish a Solar Ready Building Policy or Guideline for new buildings (i.e: requiring new buildings to be ready for net-metered small scale solar PV, and for solar thermal water heating).
  - Apply for federal and provincial incentive programs.
- **Micro-hydro:** Local features may present opportunities to generate electricity from hydro power. For example, there may be an existing dam, pipeline, a stream that could be damned, or gravity-fed outfalls that could be fitted with a turbine.
  - Identify locations that have the potential for micro hydro power generation.
- **Biomass**: actions could include converting heating systems to biomass pellet systems, CHP, or district heat.
  - Identify locations that have the potential for converting to biomass pellets and district heat, i.e. agricultural locations including the Cargill processing plant.
  - Conduct a study to determine feasibility for each system. Determine if the community or sister communities have their own professionals or students in

this area that can come aboard to conduct these assessments. This is of interest, although participants indicated that a private partner would be needed.
    - Connect with organizations working in the biomass space in Southwest Alberta
    - Implement a project (if community-owned facility).
  - **Waste to energy (e.g. landfills, organics, or wastewater)**
    - Conduct a study to determine the feasibility and implement a project to recover energy (electrical, thermal, or chemical) from inorganic waste, organic solid waste, and wastewater materials. This could be done through:
      - Gasification
      - Incineration
      - Depolymerization
      - Anaerobic digestion
      - Pyrolysis
      - Fermentation
  - **Renewable natural gas:** upgraded biogas, which is produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste, wastewater, and food waste.
    - Identify opportunities to produce and use renewable natural gas.
      - Connect the opportunity to the proposed Captus Generation natural gas-firing plant with incorporated carbon capture & sequestration and the Pieridae Waterton Gas Plant, which will include connecting other carbon emitting sources to the Captus hub, using the waste heat, and renewable natural gas.

- **Land Use**
  - **Use brownfields:** Brownfields are former industrial sites where there is, or may be, contamination that could affect future use of the site. Due to our history of industrialization, they are numerous and varied in size, type of contamination, and location, and can range from former gas stations that may still have fuel tanks buried underground, to large industrial sites that have been abandoned.
    - Identify brownfield sites that could be used for renewable energy or green space (oil and gas sites, gravel, pits, gas station sites).
    - Complete the study of potential brownfield site for renewable energy installation or redevelopment to determining technical or financial feasibility, and begin to implement the recommended next steps (i.e. Summerview).
  - **Consult the community to update community plan or Land Use Plan:** Land use decisions have a long-term impact on greenhouse gas emissions and the wellbeing of a community. The location of roads, services, green spaces, utilities and how people move across the land can all be supported through land use planning. A community can reduce and avoid GHG emissions by consulting the community and updating the community plan or land use plan.
    - **High Priority:** In alignment with the Land Use Plan, develop an educational component to help the community understand why the community is moving in this direction for future development, and what benefits exist for people

considering purchasing a home, such as community wellbeing, energy affordability and GHG reduction. Consider additional educational & awareness campaigns for commercial developers.

- Consult the community on siting new mixed-use developments, identifying where to densify existing built environments, identifying where to improve active transportation networks, identifying where to generate clean energy, and introducing concepts such as net-zero ready buildings and require connecting to district energy where available. Capture this input in your community plan or land use plan.
- Encourage mixed use and transit-oriented developments with a diversity of building types, the community may:
    - *Encourage community members to think outside of the box and rethink what their community could and should look like.*
    - *Update the community plan or land use plan, with community input.*
    - *Identify areas for intensification. Encourage infill and densification and mixed-use development, with consideration to transit, housing, commerce, and boundaries for undeveloped areas to be protected if applicable.*
    - *Diversify land use mix in already built up, single use areas such as adding recreational areas, community facilities, housing and energy generation.*
    - *Reserve space for active transportation and prioritize access and circulation for pedestrians and cyclists.*
    - *Develop community improvement plans for brownfield or greyfield redevelopment, and infill.*
- Encourage local energy supply options, including:
    - *Encourage community members to think outside of the box and rethink what their community could and should look like*
    - *Update the community plan or land use plan, with community input, to include suitable locations for renewable energy development*
    - *Identify provisions (e.g. size, height, set-backs, other constraints) for wind, solar PV and district energy.*
    - *Include renewable energy as part of community improvement plans, including using brownfields.*
    - *Identify right-of-ways for district energy infrastructure.*
- Adopt policies that ensure building and energy developments preserve ecologically significant or sensitive areas, watersheds, and permafrost.
- Ensure community and council review and approval of key community and land use decisions.

- **<u>Transportation</u>**
    - **Active transport:** A community may encourage active transport and commute where transit exists. In addition to reducing GHGs, active transportation can help to reduce traffic congestion, reduce parking congestion, promote active living and contribute

positively to air quality and human health. Active transport networks also contribute to a more inclusive community and help bring cultures together.

- Continue to map the active transportation network and make it available and visible at high-traffic community centres and websites and groups.
- Access funding to provide infrastructure and encourage active transportation. This project can be done in 3 stages. First, the community would undertake a technical and financial study, followed by a pilot or demonstration phase, and finally, the implementation of a project.

- **Transportation demand management:** A comprehensive suite of transportation demand management actions could include supporting a diversity of active transportation options (to the degree that fits local context; cycling networks, bike share programs, pathways, and pedestrian-friendly sidewalks). This could also include supporting and providing public transit options with considerations for equitable access. For small or rural communities, options may include rideshare or carshare programs or buses. For mid-sized cities options also include city buses, rideshare or carshare, LRT systems and passenger rail stop. For large cities options include most or all of the above, including multiple stops for LRT systems, passenger rail, and rapid transit.
  - Continue to develop pedestrian-friendly sidewalks (expansion, streetscaping, shade tree planting). In particular, identify specific neighbourhoods where sidewalks need to be added.
  - Continue to develop bike parking facilities or bike racks
  - Bike lanes including painted bike lanes, cycle tracks with spatial or physical separation, “shared roadways” or sharrows and contraflow bike lanes
  - Multi-use trails
  - Starting ride sharing programs and expanding taxi service
    - Consider seasonal or event-based rideshare programs.
- **Fuel efficiency and electric vehicle replacements:** Fuel-efficient driving can save fuel costs , reduce greenhouse gas emissions, improve road safety and prevent wear on vehicles.
  - Increase the number of EV charging stations locally and pilot installation of residential EV chargers, such as part of residential home charger rental or incentive program.
  - Conduct a campaign to educate citizens which promotes the benefits of switching to fuel efficient vehicles such as energy cost savings and GHG reduction. Highlight the available rebates and programs, and address barriers such as range anxiety.

- **Smart Energy Networks**
  - **Micro-grid Solutions:** Micro-grids are part of the broader trend towards the decentralization of energy systems. They can operate independently from the traditional grid and are often powered by local, renewable energy sources. One of the primary motivations for deploying microgrids is to enhance the resilience of the electricity supply.

- **Energy Management:** Effective energy management strategies are crucial for the efficient operation of microgrids. This includes coordinating the complex interactions between different energy sources and loads. Smart energy networks require a systemic approach that integrates various energy resources, including renewables, to ensure efficient distribution and usage. Consider innovations in energy storage such as virtual power plants or virtual batteries. Virtual power plants use smart technology to optimize renewable energy and energy storage systems to provide power when most needed.
- **Technology Integration:** Microgrids often incorporate advanced technologies such as energy storage systems and power electronics converters to manage the flow of electricity and maintain stability. This action would require additional staffing capacity.
- **Regulatory Frameworks Developing:** Appropriate regulatory frameworks that support the implementation and operation of microgrids is essential. This includes policies for grid connectivity, tariffs, and incentives for renewable energy integration.
- **Economic Analysis:** Conducting thorough economic analysis to ensure the financial viability of microgrid projects, including cost-benefit analysis, financing models, and identifying potential revenue streams.
- **Community Engagement:** Engaging local communities in the planning and development process of microgrids ensures that the solutions meet the specific needs and priorities of the community.
- **Environmental Impact:** Assessing the environmental impact of microgrid projects to ensure they contribute to sustainability goals, such as reducing greenhouse gas emissions and promoting clean energy.

- <u>Water Conservation</u>
  - ***High priority actions:***
    - **Promote water conservation**
      - Implement measures to promote water conservation, such as a public awareness campaign, and conduct retrofit program to conserve water, such as targeting:
        - Toilet dams
        - Low-flow showerheads
        - Faucet aerators or washers
        - Rainwater collection
  - ***Additional actions for consideration:***
    - **Optimize water and wastewater systems**
      - Implement measures to optimize water and wastewater systems to reduce energy consumed in pumping and treatment of water. This includes evaluation of linear infrastructure to prevent and repair water leaks and improving efficiency of water and wastewater treatment equipment. Measures could include:

        - Leak detection and repair
        - Water meters and water-use monitoring
        - Pressure-reducing valves
        - Efficiency upgrades to wastewater treatment equipment
    - **Promote potable and non-potable water re-use**
        - Establish a program to promote potable or non-potable water re-use. This could include public awareness campaigns (especially during drought periods). This could also include incentivizing rain-barrels.
    - **Stormwater management**
        - Implement measures to reduce peak flow, such as stormwater retention ponds and tanks, greening roofs, bioswales and permeable pavement. Also consider and prepare for changing weather patterns related to climate change that may impact infrastructure. Measures could include:
            - Stormwater retention ponds and tanks
            - Bioswales
            - Rain gardens
            - Permeable pavement
            - Green roofs

- **Waste**
    - Recycling
        - Utilize the Eco-Centre to continue programs to collect and recycle residential materials such as glass, plastic, metals and electronic waste as a means to reduce the embedded energy in products that use recycled materials.
    - Waste Reduction
        - Establish waste management programs to reduce non recyclable, inorganic residential landfill waste as a means to reduce the total embedded energy in discarded products. This may include garbage bag tags, plastic bag bans and re-use programs like community swap days.
    - Waste Diversion
        - Implement or expand waste management programs to divert waste that results from industrial, commercial and institutional (ICI) sectors, as well as construction, renovation and demolition (CRD).
    - Organics Collection
        - Provide incentives for composters
        - Ensure diversion to municipal use (e.g. soil for flower beds)
        - Diversion to landfill for energy production
        - Regional system that captures food waste from restaurants by dehydrating.

5.0 SUMMARY OF RESULTS

5.1. Summary of Key Strengths and Policies/Programs in Place

Through this workshop, a number of local assets and strengths were identified. Here is a list of strengths:

- The residential Clean Energy Improvement Program (CEIP) is available for residential property owners in the MD or Town of Pincher Creek to finance up to 100% of energy efficiency and renewable energy projects, with a 2% fixed interest rate and a limited time $450 incentive.
- The Town and MD can leverage their existing working relationship and shared capacities to realize greater opportunities for the benefit of the region as a whole.
- Preliminary work and discussions to assess waste and renewable heat are underway in the region, including a landfill biodigester and a waste heat facility site.
- The proposed Captus Energy project will aim to generate reliable natural gas-fired electricity, while repurposing the depleted natural gas field right below for permanent geologic storage of the associated carbon emissions.
- The Town and MD of Pincher Creek can build on the momentum of existing plans and climate action already completed, while also considering opportunities to advance new actions. Existing plans, policies, and programs that provide a strong strategic foundation to support Community Energy Action Strategy include:
    - Town of Pincher Creek Council's Strategic Priorities (2022-2026)
    - Town of Pincher Creek Community Economic Development Strategy (2021-2026)
    - Climate Risk Assessment and Adaptation Plan (2023)
        - In June 2023, the Town and MD of Pincher Creek in collaboration with members of the Piikani Nation Lands Department completed a Climate Risk Assessment & Adaptation Plan for the Pincher Creek Region. The plan equips the Town and MD with foundational information on climate risks for the region, including an economic analysis of the impact of these climate risks. In the development of the CEAS, the Town and MD can find alignment with the 35 recommended adaptation actions, spanning the themes of Health & Wellbeing, Disaster Resilience, Infrastructure, Parks & Environment, and Economy. This project also produced a Homeowner Climate Risk Assessment to support residents to prepare for and build resilience to extreme weather events.
    - South Saskatchewan Regional Plan (2014-2024)
    - Town of Pincher Creek Municipal District of Pincher Creek No. 9 Intermunicipal Development Plan (2010)
    - Area Structure Plans, Downtown Pincher Creek Area Redevelopment Plan, Town of Pincher Creek Land Use Bylaw, Subdivision and Development Policies, and numerous Master Plans.
- The Pincher Creek Region is also widely regarded as the wind energy capital of Canada. A total of 9 wind energy projects, consisting of 255 turbines, are currently producing 511 MW of energy in

the Pincher Creek area (data provided by the municipality, via the Municipal District of Pincher Creek, Renewable Energy Conversion Study Progress Report, 2021):

- Cowley Ridge 2001 (20 MW)
- Castle River #1 2001 (39 MW)
- Castle Rock 2012 (77 MW)
- Castle Rock 2 2020 (29 MW)
- Riverview 2020 (105 MW)
- Oldman 2 2014 (46 MW)
- Kettles Hill 2006 (63 MW)
- Summerview 1 2004 (66 MW)
- Summerview 2 2010 (66 MW)

5.2. Opportunities Identified

Through this workshop, a number of opportunities were identified. Here is a list of opportunities, prioritized based on the action planning round. Priorities include:

5.2.1. Mapping Exercise

- Prioritize energy efficiency upgrades on aging municipal assets & infrastructure.
- New buildings, such as the planned relocation of the Pincher Creek Emergency Services Building, can be developed as energy efficiently as possible.
- Look into older neighbourhoods for residential efficiency retrofits, and prioritize accordingly. Consider targeting older homes for the Clean Energy Improvement Program (CEIP).
- Residential neighbourhoods that are currently reliant on diesel are prime opportunities for clean energy conversion and energy efficiency.
- Consider targeting industrial, commercial, or institutional sites for energy efficiency audits and retrofits, i.e. Pincher Station.
- Continue to explore waste & renewable heat opportunities, bringing in more information and expertise as needed.
- Continue to investigate sites for on-site or rooftop solar.
- Look into new regulation for wind farms and stay aware of changes to wind energy technologies. Maintain the necessary infrastructure to ensure that wind energy can remain a good revenue source for the MD.
- Stay aware of new & innovative technologies and look into their feasibility for the region (i.e. hydrogen, small nuclear reactors)
- Expanding housing availability, including affordable and renter-friendly options, and densification along the mainstreet corridor.
- Exploring new transportation options can increase connectivity between key commercial and tourist destinations, reduce emissions, and contribute to regional community economic development and tourism goals. Tourism destinations across the region are an opportunity to demonstrate leadership in transit connectivity and emissions reduction.

5.2.2. Action Strategies Round Up

- **Community retrofit project or community efficiency financing program**
    - **Medium priority:** Continue to offer the residential Clean Energy Improvement Program, and enhance education and outreach to residents. Consider opportunities to expand to commercial and/or agricultural buildings.
- **Clean energy conversion**
    - **High priority:** Improve awareness of all available programs and incentives and where to go to encourage clean energy conversion in the community through website resources and outreach.
    - **High priority:** As areas in the MD are off-grid (propane users)estimate the number of dwellings that could be converted, through a local survey, or based on data from energy providers, heating oil distributors and natural gas distributors if their data is available.
    - **High priority:** Obtain data annually from energy utility and incentive providers, about the number of incentives provided for clean energy conversions in order to measure GHG impact.
- **Commercial energy efficiency**
    - **High priority:** Encourage energy performance ratings for all new commercial properties. Buildings larger than 5,000 square feet could be required to have sub-metering, and buildings larger than 10,000 square feet (e.g. commercial, multi-residential) could be required to do benchmarking and disclosure, based on utility data.
    - **High priority:** Obtain data annually from energy utility and incentive providers regarding the number of incentives provided for commercial efficiency retrofits or new builds, in order to measure GHG impact. Establish working relationships with Fortis to provide high quality data for both the Town and MD.
    - **Medium priority:** Encourage energy efficiency with public education, including engaging businesses, such as a green shops program, and providing education on what grants are available. This work is already underway, but more focused staff time & capacity is needed.
    - **Medium priority:** Adopt building code bylaws, requiring minimum energy performance and efficiency standards or rating and labelling for different types of buildings (e.g. Energy Star, net-zero). This would collect information through the permitting process (e.g. energy or GHGs saved through high-efficiency or net-zero development). Follow provincial codes, but look into opportunities for building above code.
- **Residential energy efficiency**
    - **Medium priority:** Encourage energy efficiency through a public education communications strategy. Provide broader education on the electricity grid and maintenance.
    - **Medium priority:** Encourage homeowners to apply for incentives from the utility, for energy audits and retrofit projects. This could include residential rebates, a total home energy savings program, net metering programs, federal government programs. Better mill rates could be offered for properties with higher energy performance.

- **Solar photovoltaic arrays and community solar farm**
    - Funding has been received to do a solar project. If not already done so, create a study of one option or compare several options for solar PV and solar thermal in the community.
- **Biomass**
    - Identify locations that have the potential for converting to biomass pellets and district heat, i.e. agricultural locations including the Cargill processing plant.
    - Conduct a study to determine feasibility for each system. Determine if the community or sister communities have their own professionals or students in this area that can come aboard to conduct these assessments. This is of interest, although participants indicated that a private partner would be needed.
- **Renewable natural gas**
    - Identify opportunities to produce and use renewable natural gas. Connect the opportunity to the proposed Captus Generation natural gas-firing plant with incorporated carbon capture & sequestration and the Pieridae Waterton Gas Plant.
- **Land Use: Use brownfields**
    - Identify brownfield sites that could be used for renewable energy or green space (oil and gas sites, gravel, pits, gas station sites).
    - Complete the study of potential brownfield site for renewable energy installation or redevelopment to determining technical or financial feasibility, and begin to implement the recommended next steps (i.e. Summerview).
- **Land Use: Consult the community to update community plan or Land Use Plan**
    - **High priority:** In alignment with the Land Use Plan, develop an educational component to help the community understand why the community is moving in this direction for future development, and what benefits exist for people considering purchasing a home, such as community wellbeing, energy affordability and GHG reduction. Consider additional educational & awareness campaigns for commercial developers.
- **Active transportation & Transportation demand management**
    - Continue to map the active transportation network and make it available and visible at high-traffic community centres and websites and groups.
    - Consider:
        - Continuing to develop pedestrian-friendly sidewalks (expansion, streetscaping, shade tree planting). In particular, identify specific neighbourhoods where sidewalks need to be added.
        - Continuing to develop bike parking facilities or bike racks
        - Bike lanes, including painted bike lanes, cycle tracks with spatial or physical separation, “shared roadways” or sharrows and contraflow bike lanes
        - Multi-use trails
        - Ride sharing programs and Taxi service. Consider seasonal or event-based rideshare programs.
- **Water Conservation**
    - **High priority: Promote water conservation**

        - Implement measures to promote water conservation, such as a public awareness campaign, and conduct retrofit program to conserve water, such as targeting:
            - Toilet dams
            - Low-flow showerheads
            - Faucet aerators or washers
            - Rainwater collection
    - **Optimize water and wastewater systems**
        - Implement measures to optimize water and wastewater systems to reduce energy consumed in pumping and treatment of water. This includes evaluation of linear infrastructure to prevent and repair water leaks and improving efficiency of water and wastewater treatment equipment. Measures could include:
            - Leak detection and repair
            - Water meters and water-use monitoring
            - Pressure-reducing valves
            - Efficiency upgrades to wastewater treatment equipment
    - **Promote potable and non-potable water re-use**
        - Establish a program to promote potable or non-potable water re-use. This could include public awareness campaigns (especially during drought periods). This could also include incentivizing rain-barrels.
    - **Stormwater management**
        - Implement measures to reduce peak flow, such as stormwater retention ponds and tanks, greening roofs, bioswales and permeable pavement. Also consider and prepare for changing weather patterns related to climate change that may impact infrastructure. Measures could include:
            - Stormwater retention ponds and tanks
            - Bioswales
            - Rain gardens
            - Permeable pavement
            - Green roofs

- **<u>Waste</u>**
    - Recycling
        - Utilize the Eco-Centre to continue programs to collect and recycle residential materials such as glass, plastic, metals and electronic waste as a means to reduce the embedded energy in products that use recycled materials.
    - Waste Reduction
        - Establish waste management programs to reduce non recyclable, inorganic residential landfill waste as a means to reduce the total embedded energy in discarded products. This may include garbage bag tags, plastic bag bans and re-use programs like community swap days.
    - Waste Diversion

        - Implement or expand waste management programs to divert waste that results from industrial, commercial and institutional (ICI) sectors, as well as construction, renovation and demolition (CRD).
    - Organics collection
        - Provide incentives for composters
        - Ensure diversion to municipal use (e.g. soil for flower beds)
        - Diversion to landfill for energy production
        - Regional system that captures food waste from restaurants by dehydrating.

5.3 What We Heard

After the workshop, participants were asked what their most important take-away was. These takeaways are presented here, and provide further insight into Pincher Creek's greatest strengths, needs, opportunities, and what next steps are needed.

- The Town and MD can continue to balance capital-intensive projects with smaller-scale updates. Starting with simple actions has the potential to make a big impact, and can sustain momentum long-term (i.e. insulation, solar on buildings).
- Similarly, local actions for bottom up efficiency (microgrids and localizing) can be a key focus for the region, and when necessary, partners and other communities (i.e. Calgary and Edmonton) can support larger-scale projects when needed. Economic viability is a key deciding factor when deciding the future of projects.
- The process of energy conservation is a continuous one, which requires capacity and regular review and evolution. Create a committee to direct and continue momentum on energy work. This could include continuing to advance the work outlined in the 2021 Energy Team Charter.
- Budget can be a deciding factor and constrain upgrades to aging infrastructure, despite being planned for in strategic planning documents. Budgeting for these projects, engaging members of the public, and speaking to external investors will work hand in hand to support priority-setting and achieve implementation.
- New developments are an opportunity to build energy efficiently from the onset. The region may be interested in incentivizing construction that goes beyond building and energy code.
- Investing in active and public transportation, including more buses to get cars off the road to Waterton, can support the tourism sector, reduce emissions, and demonstrate leadership.
- Education and collaboration will be priorities going forward. Education to business owners can drive buy-in from the commercial sector, and opportunities arise when we get the right people in the room to collaborate. Prioritize strategies to get people to participate in engagement opportunities and share their perspectives on their vision for the region.
- Community-level plans and projects should involve more than just the municipal government. Local businesses, non-profit organizations, residents, and regional partners can all play crucial roles in the plan. These partners should be engaged early in the process to build buy-in.
- Locations in the region like the Airport and brownfield sites should be better utilized for sustainable development.

6.0 CONCLUSION

This report highlights the consolidated results of the energy mapping exercise for the Town and MD of Pincher Creek, and identifies opportunities for their CEAS across the areas of energy efficiency, harnessing local energy opportunities, improving land use, transportation, and more.

The report is intended to be used to inform future planning decisions. The results can be used to inform the development of a CEAS, or specific projects and initiatives that the municipality or local stakeholders may wish to undertake. The report supports evidence-based decision making and ensures that the diverse perspectives presented here are considered when planning future initiatives.

Specific to the Pincher Creek region, the information and recommendations in this report can be used towards refreshing existing climate and energy plans. Overall, municipalities can support implementation of climate plans through continued leadership, governance, leveraged legislative tools, planning integration, and economic development.

As part of next steps in the Net Zero Community Accelerator Program, the Town and MD will complete a Community Energy Plan Implementation workshop. The workshop will focus on developing a governance structure, action plan, performance measurement process (i.e., KPIs and data management), and communication plan.

The Town and MD will also complete an Economic Impact Assessment, which provides an understanding of the economic development and job creation potential over the lifespan of the Community Energy Action Strategy.

QUEST Canada and the Municipal Climate Change Action Centre appreciate the opportunity to work with your municipality and local stakeholders to identify opportunities for integrated community-scale solutions to lower energy costs, reduce GHG emissions, and improve local resilience.

7.0 ANNEXES

1. Maps

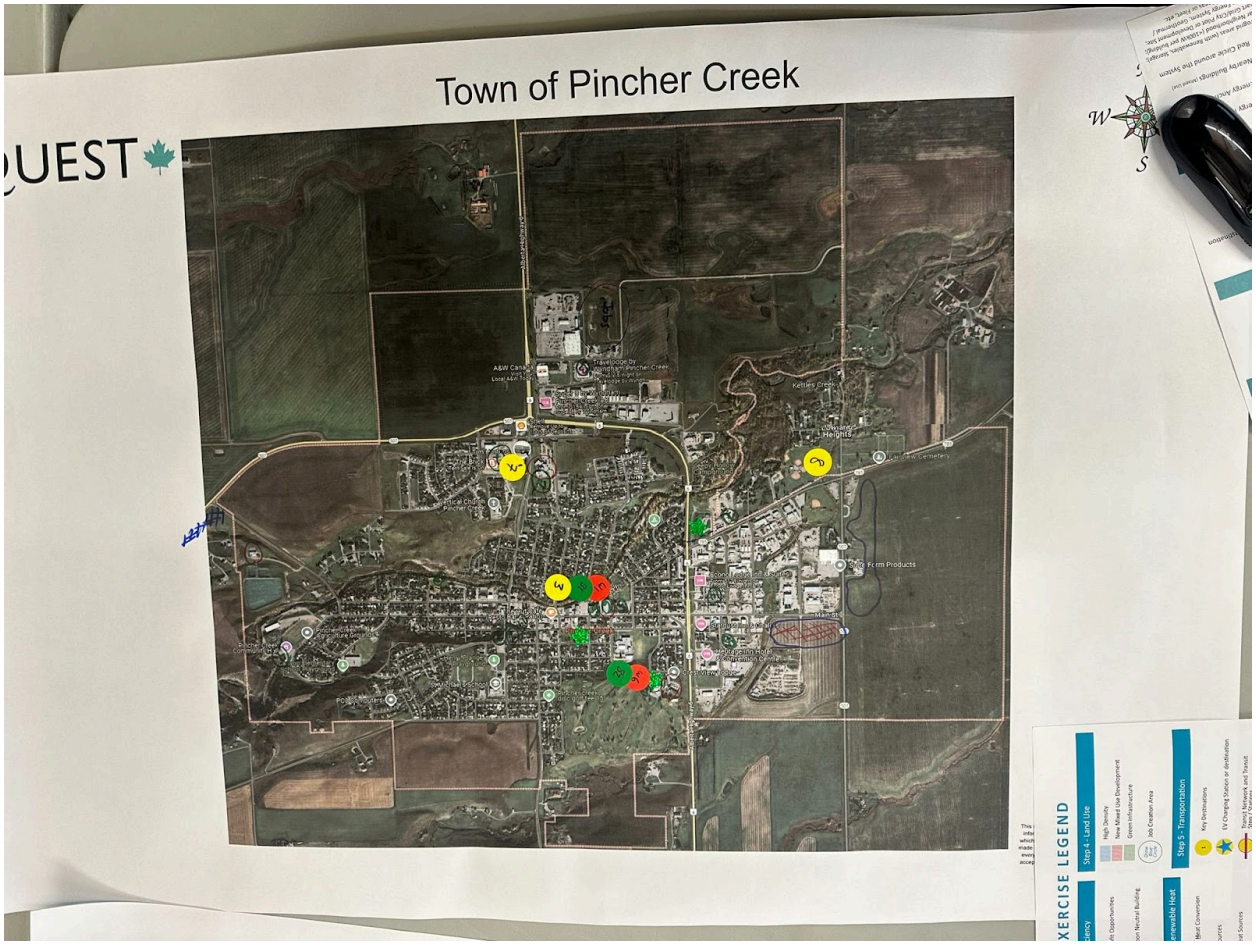

Figure 1: Town of Pincher Creek, Energy Mapping Results

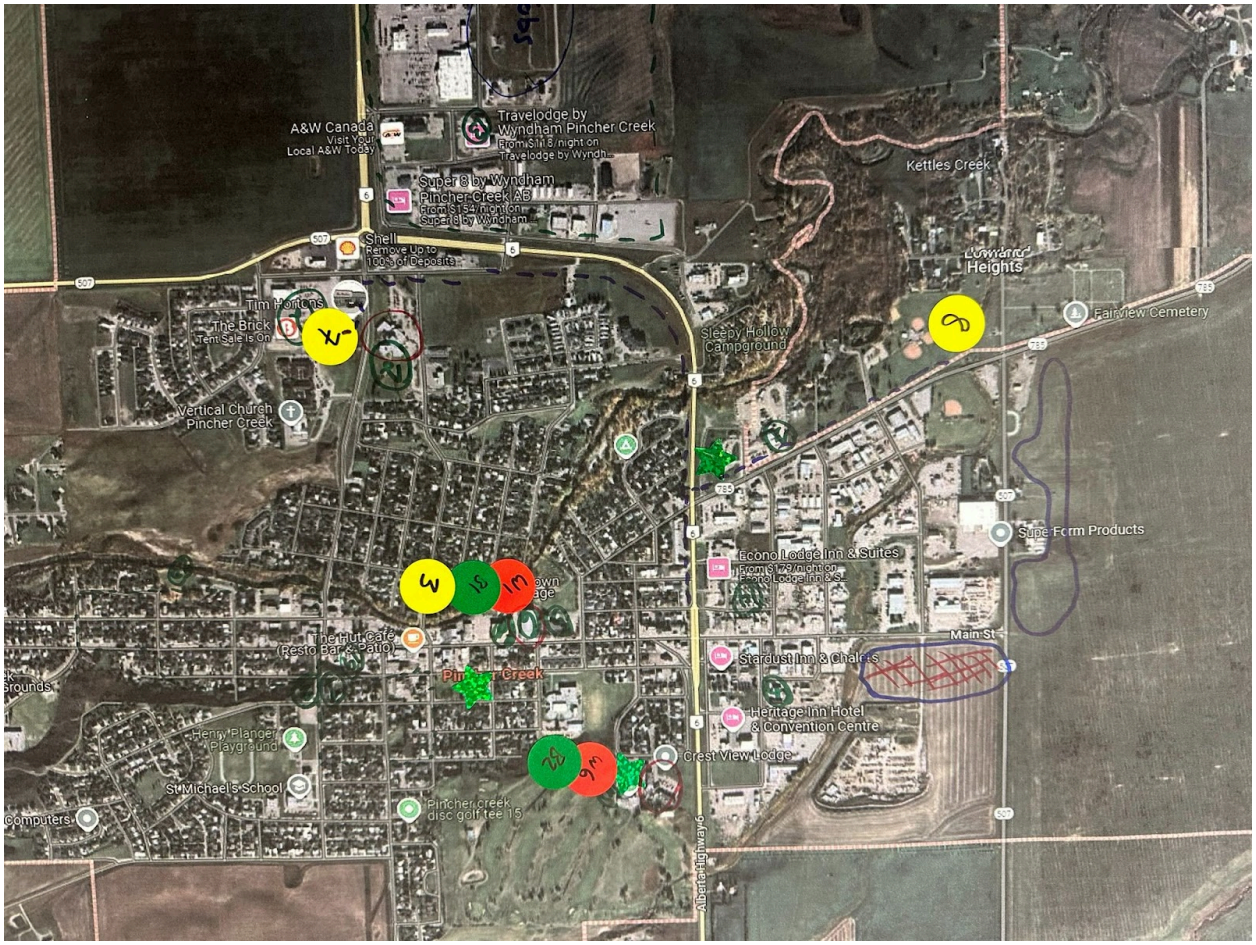

Figure 2: Downtown Insert, Town of Pincher Creek, Energy Mapping Results

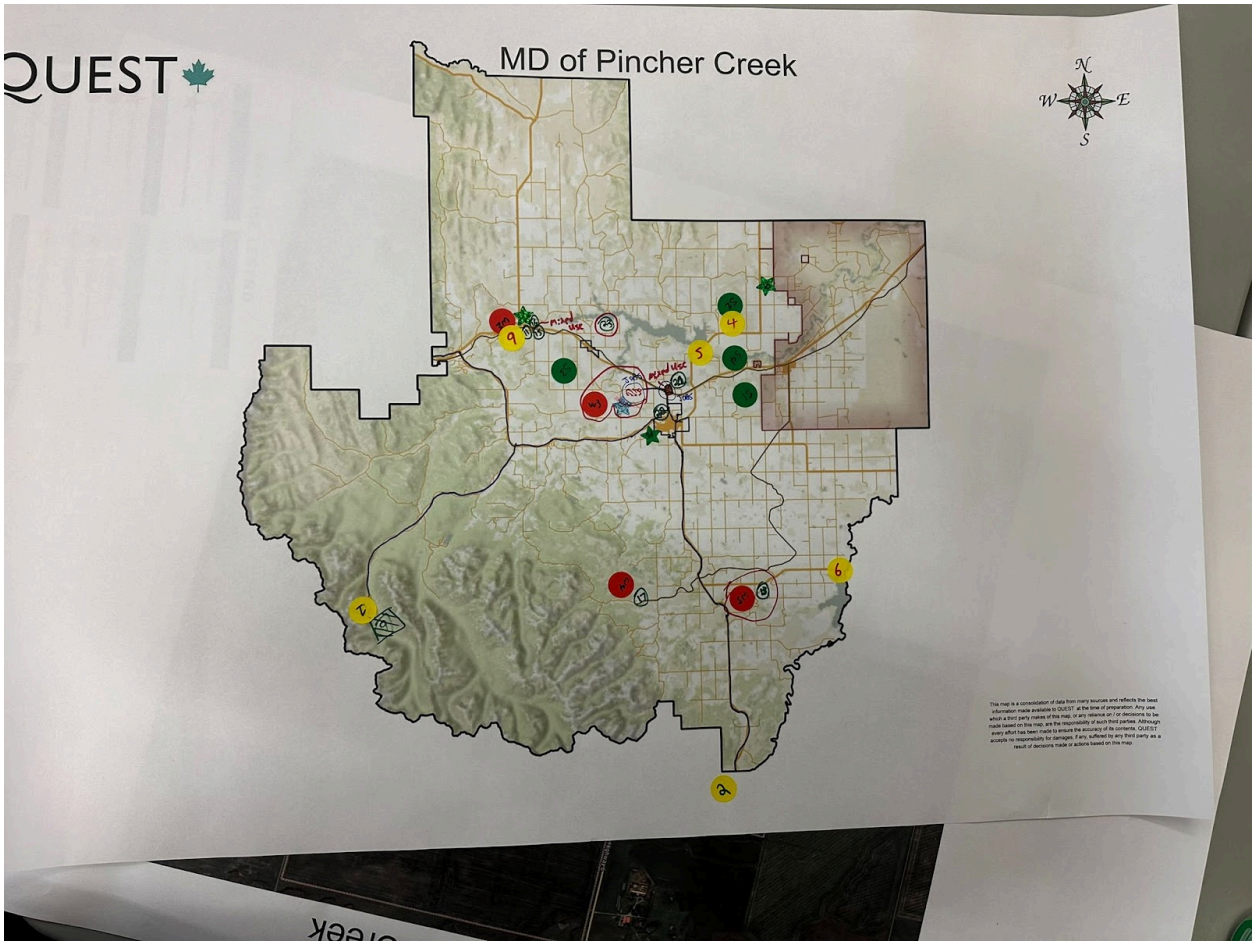

Figure 3: MD of Pincher Creek, Energy Mapping Results

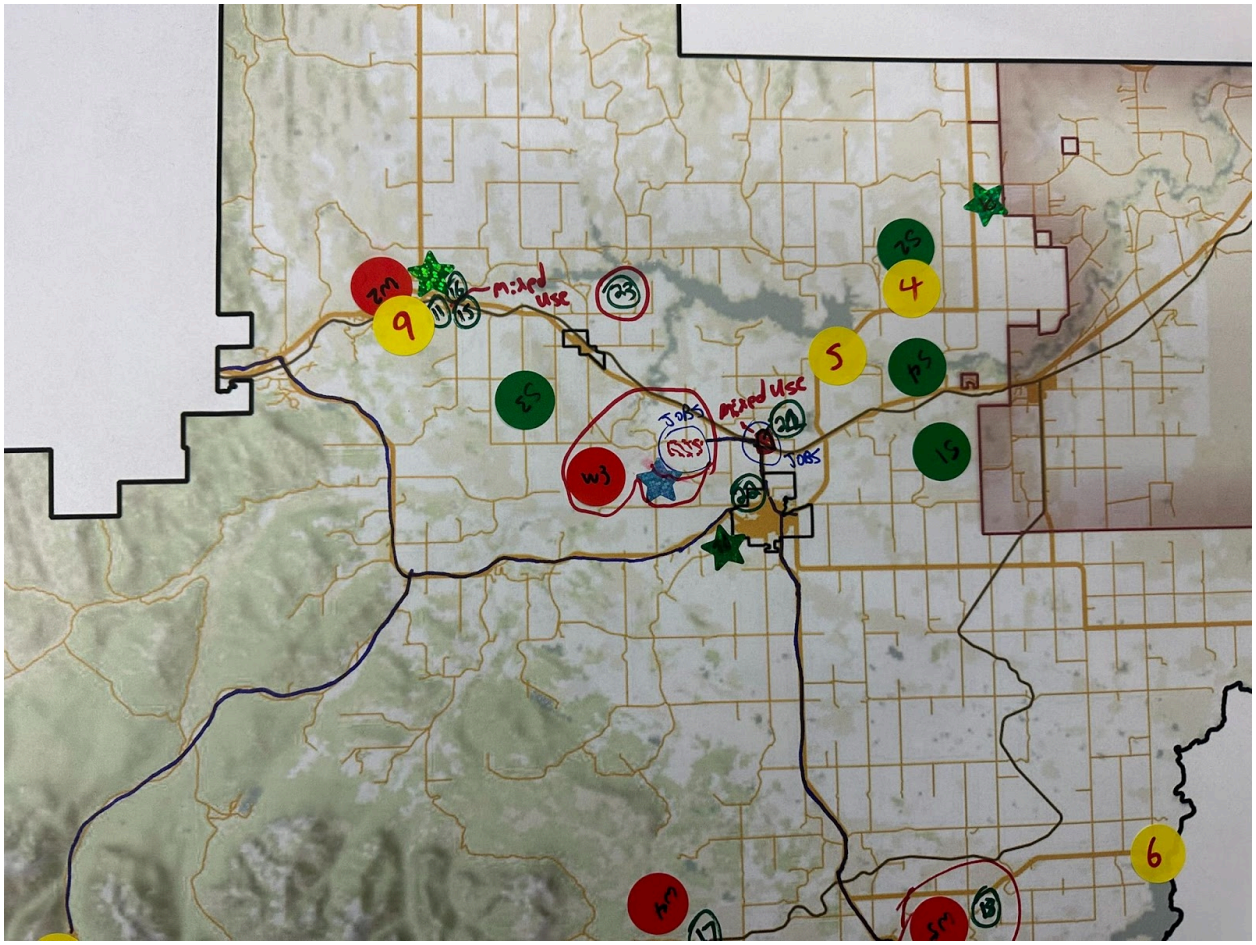

Figure 4: Insert, MD of Pincher Creek, Energy Mapping Results

2. Participant List

Name	Title	Organization
David Desabrais	Utilities and Infrastructure Manager	MD of Pincher Creek
Andrea Hlady	Director of Community Services	Town of Pincher Creek
Stacy Benson	Chamber Manager	Pincher Creek & District Chamber of Commerce
Tristan Walker	Executive (NCA Project Lead)	Massif Energy
Wayne Oliver	Councillor	Town of Pincher Creek
Jim Welsch	Councillor	MD of Pincher Creek
Tony Bruder	Councillor	MD of Pincher Creek
Dave Cox	Reeve	MD of Pincher Creek
John McGarva	Councillor	MD of Pincher Creek
Hammad Ahmed	Project Lead	Alberta Municipalities / MCCAC
Ronak Patel	Program Manager	Alberta Municipalities / MCCAC

Action Strategies Template		
Action strategy	**Item number**	**Strategy for implementation**
ENERGY EFFICIENCY		
Community retrofit project or community efficiency financing program or study. A community retrofit project aims to improve energy efficiency of residential and commercial buildings in the community, to reduce GHG emissions and lower energy costs and improve affordability. A Community Efficiency Financing Program can also be created to reduce barriers to energy efficiency retrofits in the community.	1	Develop a community retrofit project that would include energy efficiency, such as improving building envelope, and clean energy conversion measures. This can be done in partnership with a municipality who can access funding from the Federation of Canadian Municipalities, or by obtaining funding through other sources like the local utility.
	2	Work with neighbouring municipality to develop a community efficiency financing program that would support energy efficiency, such as improving building envelope, and clean energy conversion measures. This can be done in partnership with a municipality who can access funding from the Federation of Canadian Municipalities, or by obtaining funding through other sources like the local utility.
Clean energy conversion (heating and cooling). Fuel furnaces are less efficient than electric heaters, and other alternatives exist. Converting heating sources to more efficient methods such as natural gas, electric heaters, mini-splits, or forced heat will allow for a reduction in energy consumption and switch to more environmentally friendly means. This can help lower energy costs, maintenance costs, peak loads, and GHG emissions. This measure should be taken along with improving the envelope of buildings.	3	Consider further incentive programs by the utility and the municipality. Currently, homeowners and businesses may voluntarily convert heating systems, with support of incentives provided through provincial efficiency programs.
	4	Improve awareness of all available programs and incentives and where to go to encourage clean energy conversion in the community through website resources and outreach.
	5	Estimate the number of dwellings that could be converted, through a local survey, or based on data from energy providers, heating oil distributors and natural gas distributors if their data is available.
	6	Obtain data annually from energy utility and incentive providers, about the number of incentives provided for clean energy conversions in order to measure GHG impact.

Commercial energy efficiency Improving energy efficiency in the commercial sector can be accomplished using a combination of public education, incentives, policy and bylaws and partner initiatives. The community and partners could also develop a community retrofit project by combining energy efficiency initiatives.	7	Encourage energy efficiency with public education, including engaging businesses, such as a green shops program.
	8	Encourage businesses to apply for incentives from the utility for energy audits and retrofit projects. These could include a small business lighting program, commercial buildings retrofit program and net metering. Further incentive programs may be considered by the utility and municipality.
	9	Adopt building code bylaws, requiring minimum energy performance and efficiency standards or rating and labelling for different types of buildings (e.g. Energy Star, net-zero). This would collect information through the permitting process (e.g. energy or GHGs saved through high-efficiency or net-zero development).
	10	Mandate energy performance ratings for all new commercial properties. Buildings larger than 5,000 square feet could be required to have sub-metering, and buildings larger than 10,000 square feet (e.g. commercial, multi-residential) could be required to do benchmarking and disclosure, based on utility data.
	11	Obtain data annually from energy utility and incentive providers regarding the number of incentives provided for commercial efficiency retrofits or new builds, in order to measure GHG impact.
Residential energy efficiency Improving energy efficiency in the residential sector can be accomplished using a combination of public education, incentives, policy and bylaws and partner initiatives such as installing low flow showerheads and weather stripping. The community and partners could also develop a community retrofit project by combining energy efficiency initiatives.	12	Encourage energy efficiency through a public education communications strategy.
	13	Encourage homeowners to apply for incentives from the utility, for energy audits and retrofit projects. This could include residential rebates, a total home energy savings program, net metering programs, federal government programs. Further incentive programs may be considered by the utility and the municipality (e.g. discounts on EV charging units, permit fee adjustments, etc.)
	14	Adopt building code bylaws, requiring minimum energy performance and efficiency standards or rating and labelling for different types of buildings (e.g. Energy Star, net-zero). This would collect information through the permitting process (e.g. energy or GHGs saved through high-efficiency or net-zero development).
	15	Obtain data annually from energy utility and incentive providers regarding the number of incentives provided for commercial efficiency retrofits or new builds, in order to measure GHG impact.

WASTE & RENEWABLE HEAT & RENEWABLE POWER		
Education and engagement	1	"Educate residents and businesses on the potential and benefits of renewable energy, such as solar photovoltaic (Solar PV), wind power, micro-hydro and biomass. Apply for funding for an educational component or to help finance cost of pilot project. You may want to focus on specific types of renewable energy that are most well suited to your community, and showcase any community projects. Use your traditional means of communication, such as newsletters, social media, community hall gatherings and meetings.
Waste energy or district heat Each district heat system is unique, but all have common elements. These include using a renewable or waste heat source(s), piping the heat underground, converting homes and businesses to district heat, monitoring and managing load, and more. A technical study helps the community to understand all the components required and their cost.	2	Collaborate with community partners, such as businesses, to explore opportunities for integrating waste energy or expanding district heat.
	3	Ensure new or existing municipal facilities consider waste heat opportunities. Consider including with your building code.
	4	Conduct a technical and financial feasibility study.
	5	Create a pilot or demonstration upon completion of the technical and financial study. The municipality must fix their budget according to identified needs established during the study.
	6	Develop an implementation phase. District heat systems may require appropriate land-use provisions or right-of-way bylaws.
	7	Develop a guideline, policy, or bylaw to require connection to district heat (if available).
Wind energy Wind energy systems provide an opportunity to produce clean power, which would reduce greenhouse gas emissions and long-term costs. The reduction in GHG emissions depends on parameters such as the size of the system, performance of the units, and local wind regime.	8	Contact the utility before starting the process in order to ensure alignment with existing programs and technical requirements.
	9	Conduct an energy technical mapping assessment and social acceptability analysis to help identify legally accessible land within the municipal boundary that has good wind regime, existing substation, appropriate setbacks, and social acceptance. Reach out to QUEST Canada for advisory services related to renewable energy mapping assessments. Or, reach out to QUEST Canada for advisory services related to renewable energy mapping assessments.
	10	Determine potential GHG reductions and ROI based on size of the system, performance of the units, local wind regime, and infrastructure costs. Considerations for wildlife, ice, salt spray, and wind variability must also be taken into account.

Solar photovoltaic arrays and community solar farm Solar photovoltaic (PV) arrays provide an opportunity for municipalities to produce power for the grid, which would reduce greenhouse gas emissions and long-term costs. Municipalities can also enable citizens to 'lease' panels for a GHG or power credit). The reduction in GHG emissions depends on parameters such as the type and size of project, amount of kwH generated or offset, and the province's GHG coefficients for electricity, oil, gas and cost of the measure.	11	Does your community have its own land use bylaws and building codes? If so, make sure to consult these first. Also look up local or provincial regulations before starting this task. Contact the utility before starting the process, in order to ensure alignment with existing programs and technical requirements.
	12	Create a study of one option or compare several options for solar PV and solar thermal in the community (with FCM funding). Outline potential risks, which could include the effect on the local environment with the removal of forests and farmlands to build a solar farm, effect on local the power grid with new inconsistent energy sources, effect on local water supplies as the solar panels degrade and leach poisonous chemicals into the soil, total solar potential, calculated through the number of sunlight hours per year, if and how the energy will be stored for later use, if the solar panels will be used for baseload or for peak demand, and cost and ROI of a system. The community can then pilot a solar initiative. Determine if the community or sister communities have their own professionals or students in this area that can come aboard to conduct these assessments.
	13	Conduct a pilot, once EIAs are completed with regulatory approvals. Implement grid tying, such as ground mounted solar farm, which is a sizeable solar installation feeds into the grid. Community members could rent a solar panel or purchase power segments from the installation if virtual net metering is available.
	14	Build or expand a solar PV farm, once EIAs are completed with regulatory approvals. Once a community solar system is built, it would need to be marketed and would need to enroll customers.
	15	Establish a solar revolving fund to re-invest revenue into future projects.

Solar PV (rooftop or ground mount) Solar photovoltaic (PV) systems provide an opportunity for municipalities and citizens to produce power for use on site, such as net-metered, which would reduce greenhouse gas emissions and long-term costs. The reduction in GHG emissions depends on parameters such as the type and size of project, amount of kwH generated or offset, and the province's GHG coefficients for electricity, oil, gas and cost of the measure.	16	Conduct a survey or study on what types of solar PV programs could work, what the potential uptake could be, and what real or perceived challenges might exist. Determine if the community or sister communities have their own professionals or students in this area that can come aboard to conduct these assessments.
	17	"Establish a Solar Ready Building Policy or Guideline for new buildings (i.e: requiring new buildings to be ready for net-metered small scale solar PV, and for solar thermal water heating).
	18	Provide a rental, lease, or subsidy program for solar PV and thermal systems to assist homeowners in realizing the potential and cost savings related to a solar energy.
	19	Encourage solar PV Installations in residential and commercial buildings as a community retrofit project which could include financing solar PV and energy efficiency measures. Size the infrastructure for the facility use. Combine with storage if possible.
	20	Work with community partners to explore the installation of solar PV on buildings such as schools, community centers, shelters, fire stations, seniors homes, libraries, gas stations and grocery stores. Size the infrastructure for the facility use. Combine with storage if possible.
	21	If solar PV installation is on a community centre or shelter, combine with a diesel generator for backup power situations. If it's a solar thermal system, supplement with another heat source, which could include geothermal, biomass, district heat or conventional fuels such as natural gas.
	22	Apply for federal and provincial Incentive programs
Micro-hydro Local features may present opportunities to generate electricity from hydro power. For example, there may be an existing dam, pipeline, a stream that could be dammed, or gravity-fed outfalls that could be fitted with a turbine. A municipality that wishes to pursue micro-hydro must identify and assess the feasibility of potential in-stream, outfall, or dam installation and potential to tie in to the grid. A limiting factor of a micro hydro project could be location of the turbine in relation to the existing power grid. The costs of connecting to the grid must be factored in as part of the viability assessment.	23	Contact the utility before starting the process, in order to ensure alignment with existing programs and technical requirements.
	24	Identify locations that have the potential for micro hydro power generation.
	25	Study potential micro-hydro site for flow, distance to grid, and potential generating capacity to determine feasibility. Determine if the community or sister communities have their own professionals or students in this area that can come aboard to conduct these assessments.
	26	Implement a project to produce power to sell to the utility, or that powers a facility (net-metered). Some uitilies have restrictions on Micro-hydro systems larger than 100 kW. Recommended to contact the utility early in the planning stages

Biomass This action could include converting heating systems to biomass pellet systems, CHP, or district heat.	27	Identify locations that have the potential for converting to biomass pellets and district heat.
	28	Conduct a study to determine feasibility for each system. Determine if the community or sister communities have their own professionals or students in this area that can come aboard to conduct these assessments.
	29	Implement a project (if community-owned facility).
Waste to energy (e.g. landfills, organics, or wastewater) This action would include conducting a study, a pilot, and implementing a waste to energy project.	30	Conduct a study to determine the feasibility and implement a project to recover energy (electrical, thermal, or chemical) from inorganic waste, organic solid waste, and wastewater materials. This could be done through: - Gasification - Incineration - Depolymerization - Anaerobic digestion - Pyrolysis - Fermentation
Renewable natural gas	31	Identify opportunities to produce and use renewable natural gas.

LAND USE		
Use brownfields Brownfields are former industrial sites where there is, or may be, contamination that could affect future use of the site. Due to our history of industrialization, they are numerous and varied in size, type of contamination, and location, and can range from former gas stations that may still have fuel tanks buried underground, to large industrial sites that have been abandoned. Some brownfields can be used or renewable energy installations or community green space.	1	Identify brownfield sites that could be used for renewable energy or green space.
	2	Conduct a study of a potential brownfield site for renewable energy installation or redevelopment, determine technical or financial feasibility.
	3	Implement projects to repurpose a brownfield, produce clean energy and reduce GHG emissions.
	4	If done in partnership with a neighboring municipality, the municipality can apply for FCM funding if the site requires remediation or risk management or undertakes renewable energy production.
Consult the community to update community plan or land use plan. Land use decisions have a long-term impact on greenhouse gas emissions and the wellbeing of a community. The location of roads, services, green spaces, utilities and how people move across the land can all be supported through land use planning. A community can reduce and avoid GHG emissions by consulting the community and updating the community plan or land use plan. This could include designating areas for mixed-use development, generating clean energy, and more.	5	**Consult the community** on siting new mixed-use developments, identifying where to densify existing built environments, identifying where to improve active transportation networks, identifying where to generate clean energy, and introducing concepts such as net-zero ready buildings and require connecting to district energy where available. Capture this input in your community plan or land use plan.
	6	**Encourage mixed use and transit-oriented developments** with a diversity of building types, a community may: **(select measures to pursue)** **Encourage community members to think outside of the box and rethink what their community could and should look like.** **Update the community plan or land use plan, with community input.** **Identify areas for intensification.** Encourage infill and densification and mixed-use development, with consideration to transit, housing, commerce, and boundaries for undeveloped areas to be protected if applicable. **Diversify land use mix** in already built up, single use areas such as adding recreational areas, community facilities, housing and energy generation. **Reserve space for active transportation and** prioritize access and circulation for pedestrians and cyclists. **Develop community improvement plans** for brownfield or greyfield redevelopment, and infill.
	7	**Encourage local energy supply options** a community may: **(select measures to pursue):** **Encourage community members to think outside of the box and rethink what their community could and should look like** **Update the community plan or land use plan, with community input,** to include suitable locations for renewable

		energy development **Identify provisions** (e.g. size, height, set-backs, other constraints) for wind, solar PV and district energy. Include renewable energy as part of **community improvement plans, including using brownfields.** Identify **right-of-ways** for district energy infrastructure. **Create a common space or system where this info is accessible** to all admin departments, whether independently or working with first nation administration.
	8	Adopt policies that ensure building and energy developments **preserve ecologically significant or sensitive areas**, watersheds, and permafrost. Many indigenous young people are entering the policy-sphere. Your community could employ and or contract Indigenous youth studying or who have backgrounds in policy development.
	9	**Ensure community *and* council review and approval of key community and land use decisions.**
	10	**Develop an educational component** to help the community understand why the community is moving in this direction for future development, and what benefits exist for people considering purchasing a home, such as community wellbeing, energy affordability and GHG reduction.

TRANSPORTATION		
Active transport A comprehensive suite of transportation demand management actions could be undertaken in the community. This could include supporting a diversity of active transportation options (to the degree that fits local context; which could include cycling networks, bike share programs, pathways, and pedestrian-friendly sidewalks). This could also include supporting and providing public transit options with considerations for equitable access. For small or rural communities, options may include rideshare or carshare programs or buses. For mid-sized cities options also include city buses, rideshare or carshare, LRT systems and passenger rail stop. For large cities options include most or all of the above, including multiple stops for LRT systems, passenger rail, and rapid transit.	1	Partner with community organizations to launch new projects encouraging active transportation systems such as eBike sharing system, bicycle parking, resting and cooling stations, showers, lockers, signage to encourage active transportation, as well as incentives for bike purchases and exchange. Community organizations may take steps of their own like encouraging employees and installing bike parking.
	2	Create a map of the active transportation network and make it available and visible at high-traffic community centres and websites and groups.
	3	Access funding to provide infrastructure and encourage active transportation. This project can be done in 3 stages. First, the community would undertake a technical and financial study, followed by a pilot or demonstration phase, and finally, the implementation of a project.
	4	Pedestrian-friendly sidewalks (expansion, streetscaping, shade tree planting)
	5	Bike parking facilities or bike racks
	6	Bike lanes including painted bike lanes, cycle tracks with spatial or physical separation, “shared roadways” or sharrows and contraflow bike lanes
	7	Bike share programs
	8	Public bike tire pumps
	9	Multi-use trails
	10	Carsharing programs
	11	Ride Sharing programs
Fuel efficient driving Fuel-efficient driving can save you hundreds of dollars in fuel each year, improve road safety and prevent wear on your vehicle. If all drivers in Canada practiced fuel-efficient driving, we would collectively prevent six megatonnes of carbon dioxide from entering the atmosphere each year. The combination of enhanced fuel efficiency, improved road safety and reduced GHG emissions make fuel-efficient driving a winning strategy for Canadian drivers.	12	Conduct a study to gather information on what barriers or perceived barriers there are to fuel-efficient driving, which audience you should target, what messages resonate well with that audience, how/where prompts should be used etc. Focus groups and observational studies are effective methods.
	13	Develop a pilot to test the effectiveness of social marketing techniques, to gather feedback from the community, and to make program changes.
	14	Implement a behaviour-change project involving a combination of social marketing techniques, based on the results of your pilot stage (include community-based social marketing techniques such as use of community leaders, prompts, commitments, and challenges).
	15	Develop public awareness tools including printed materials, forums, webinars, free presentations, social media campaigns, media and editorials.
	16	"Compliment activities with: (select which measures to pursue) - Access to eco-driving courses - Electric vehicle charging infrastructure - Incentives, rebates and mandates to switch personal and commercial vehicles to electric, hybrid, or low-carbon vehicles

		- Switching community fleet of vehicles to electric, hybrid, or low-carbon
Fuel efficient and electric vehicle replacements EV systems use electrical energy to power an electric motor, which ultimately reduces the need for gasoline and the dependence on damaging fossil fuels in a large part of the transportation sector. This transition will not only be more cost-effective for buyers in the long-term as EVs are cost-effective and deliver great performance, and it will also contribute to addressing the community's overall GHG emissions and air pollution levels. Aside from hybrid vehicles, the two most common types of EV options include fully electric vehicles and plug-in hybrid vehicles.	17	Increase the number of EV charging stations locally and pilot installation of residential EV chargers, such as part of residential home charger rental or incentive program.
	18	Create incentives that will reward individuals who choose to purchase EV or second-hand replacements, or demonstrably more fuel efficient compact vehicles. This could include rebates for home charger units, toward fuel efficient vehicle replacements, toward other consumer products (such as LEDs), or could be in the form of discounts for use of recreational facilities or local restaurants.
	19	Conduct a campaign to educate citizens which promotes the benefits of switching to fuel efficient vehicles such as energy cost savings and GHG reduction. Highlight the available rebates and programs, and address barriers such as range anxiety.
	20	These activities can be further complemented by: (select which measures to pursue): - Switching community-owned vehicles to electric, hybrid, or low-carbon - Enabling use of community-owned electric vehicles by community organizations when not in use - Creating an EV car share program
Idle-free policy The term "idling" refers to running a vehicle's engine when the vehicle is not in motion. This can occur while a car is being heated, cooled, stopped at a red light, or waiting while stationary with the engine running. The consequences of engine idling include wasting fuel and money, and causes excessive engine wear and is a main contributor to air pollution and the release of GHG emissions. For the average vehicle with a 3-litre engine, every ten minutes of idling costs over 1 cup of wasted fuel-and one half of a litre if your vehicle has a 5-litre engine. It is important to keep in mind that every litre of gasoline you use produces 2.4 kilograms of CO2.	21	Conduct a study first, to gather information on: where idling occurs, what barriers or perceived barriers there are for not idling, which audience you should target, what messages resonate well with that audience and how/ where prompts should be used.
	22	Develop a pilot to test effectiveness, gather feedback from the community, and make program changes.
	23	Implement a project involving a combination of social marketing techniques, based on the results of your pilot stage (include community-based social marketing techniques such as use of community leaders, prompts, commitments, and challenges).
	24	Develop public awareness tools including printed materials, forums, webinars, free presentations, social media campaigns, media and editorials.
	25	Provide alternatives for municipal staff, such as idle reduction technologies like block heaters, cab heaters, auxiliary power units, green energy and hybrid vehicles.
	26	Promote alternative shelter listing local restaurants and businesses that participate by promoting anti-idling.
	27	Provide alternative shelter such as parking shelter, bus shelter and rest areas.
	28	Consider a policy that states unnecessary idling is unacceptable in the community.
	29	Monitor effectiveness through digital surveys, observation studies and school or student projects.

SMART ENERGY NETWORKS		
Micro Grid Solution An action strategy for microgrid solutions typically involves several key steps to ensure the successful planning, design, and implementation of a microgrid system. Microgrids are part of the broader trend towards the decentralization of energy systems. They can operate independently from the traditional grid and are often powered by local, renewable energy sources. One of the primary motivations for deploying microgrids is to enhance the resilience of the electricity supply. Microgrids can maintain power during outages caused by extreme weather or other disruptions	1	Energy Management Effective energy management strategies are crucial for the efficient operation of microgrids. This includes coordinating the complex interactions between different energy sources and loads. Smart energy networks require a systemic approach that integrates various energy resources, including renewables, to ensure efficient distribution and usage.
	2	Technology Integration Microgrids often incorporate advanced technologies such as energy storage systems and power electronics converters to manage the flow of electricity and maintain stability
	3	Regulatory Frameworks Developing appropriate regulatory frameworks that support the implementation and operation of microgrids is essential. This includes policies for grid connectivity, tariffs, and incentives for renewable energy integration
	4	Economic Analysis Conducting thorough economic analysis to ensure the financial viability of microgrid projects, including cost-benefit analysis, financing models, and identifying potential revenue streams
	5	Community Engagement Engaging local communities in the planning and development process of microgrids ensures that the solutions meet the specific needs and priorities of the community
	6	Environmental Impact Assessing the environmental impact of microgrid projects to ensure they contribute to sustainability goals, such as reducing greenhouse gas emissions and promoting clean energy

WATER CONSERVATION		
Optimize water and wastewater systems	1	Implement measures to optimize water and wastewater systems to reduce energy consumed in pumping and treatment of water. This includes evaluation of linear infrastructure to prevent and repair water leaks and improving efficiency of water and wastewater treatment equipment. Measures could include: (select measures to pursue) - Leak detection and repair - Water meters and water-use monitoring - Pressure-reducing valves - Efficiency upgrades to wastewater treatment equipment
Promote water conservation	2	Implement measures to promote water conservation, such as a public awareness campaign, and conduct retrofit program to conserve water, such as targeting: - Toilet dams - Low-flow showerheads - Faucet aerators or washers - Rainwater collection
Promote potable and non-potable water re-use	3	"Establish a program to promote potable or non-potable water reuse. This could include public awareness campaigns (especially during drought periods). This could also include incentivizing rain-barrels.
Stormwater Management	4	Implement measures to reduce peak flow, such as stormwater retention ponds and tanks, greening roofs, bioswales and permeable pavement. Also consider and prepare for changing weather patterns related to climate change that may impact infrastructure. Measures could include (select measures to pursue): - Stormwater retention ponds and tanks - Bioswales - Rain gardens - Permeable pavement - Green roofs

WASTE		
Recycling	1	Ensure and create programs to collect and recycle residential materials such as glass, plastic, metals and electronic waste as a means to reduce the embedded energy in products that use recycled materials.
Waste reduction	2	Establish waste management programs to reduce non recyclable, inorganic residential landfill waste as a means to reduce the total embedded energy in discarded products. This may include garbage bag tags, plastic bag bans and re-use programs like community swap days.
Waste diversion	3	Implement or expand waste management programs to divert waste that results from industrial, commercial and institutional (ICI) sectors, as well as construction, renovation and demolition (CRD).
Organic collection	4	Select measures to pursue: - Provide incentives for composters - Ensure diversion to municipal use (e.g. soil for flower beds) - Diversion to landfill for energy production

OTHER		
Clothesline program Using clotheslines in replacement of drying machines has multiple advantages, such as low installation and repair costs, zero GHG emissions and saved money that would have been spent on the energy for the dryer. On average, households can save up to $15 to $20 per month. Additional benefits of using a clothesline for drying clothes is that the sun acts as a natural deodorizer, antibacterial and bleach for clothing and sheets. Drying clothes outdoors is also much more gentle, which will result in a longer lifespan for the clothing and reduce the need and cost for replacement.	1	Distribute free outdoor and indoor retractable clotheslines to eligible residents to help decrease energy consumption from the use of dryers throughout the year. First, review existing bylaws to determine where it is allowable, followed by a survey to determine who uses clothesline, and perceived barriers. Upon completion, launch pilot project, conduct follow-up survey, and develop a communications strategy.
Business energy challenge In order to encourage energy efficiency and clean energy conversion in the commercial sector, invite businesses to take part in a community energy challenge. The challenge could center on achieving energy efficiency and GHG reductions over a one month or twelve month period, and results could be submitted digitally. The energy and GHG reductions could be quantified through various data, for example, the of businesses, types of measures, energy bills and usage and a comparison of the average energy consumption per square foot.	2	Organize a business energy challenge once a year which could take form in a community feat or celebration to to look at the collective impact. Ideally around fall or winter. It can be based on measuring energy efficiency efforts over one month or over a full year.
	3	Invite community-owned businesses to take part in the energy challenge.
	4	Work with community partners to establish an effective communications and outreach plan, along with supplier channels and discounts.
	5	Organize a communications launch and award ceremony for recipients. This could be held at a pre-existing community event or festival.
	6	Invite nominees and submissions for the annual recognition of energy champions in commercial category. Energy champions will have achieved reduction in GHGs through energy efficiency, clean energy conversion (heating), renewable energy production and transportation.
	7	Engage a committee to review nominations and submissions. Selected submissions could be presented awards on an annual basis, communicated to the public, engaged when possible, and GHG reductions recorded as part of measuring community impact.
Community energy challenge In order to encourage energy efficiency and clean energy conversion in the residential sector, invite households to take part in a community energy	8	Organize a community energy challenge once a year, ideally around fall or winter. It can be based on measuring energy efficiency efforts over one month or over a full year.
	9	Invite households to take part in a Community Energy Challenge. Encourage participation and education through in-home visits

challenge. The challenge could center on achieving energy efficiency and GHG reductions over a one-month or twelve-month period, and results can be submitted via webpage. The energy and GHG reductions could be quantified through various data, including number of households, types of measures, energy bills and usage and comparing average energy consumption per square foot.	10	Work with community partners to establish effective communications, outreach, supplier channels and discounts.
	11	Organize a communications launch and recognition and award ceremony for recipients. This could be held at a pre-existing community event or festival.
	12	Invite nominees and submissions for annual recognition of energy champions in residential category. Energy champions will have achieved reduction in GHGs through energy efficiency, clean energy conversion (heating), renewable energy production.
	13	Engage a committee to review nominations and submissions. Selected submissions could be presented awards (annually), communicated to the public, engaged when possible, and GHG reductions recorded as part of measuring community impact.
	14	Prepare award selection, presentation, and communication.