City of Fort St. John
COMMUNITY ENERGY & EMISSIONS PLAN

Prepared for
City of Fort St. John

Prepared by
The Sheltair Group (now Stantec)
Vancouver, BC

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Plan Summary

The City of Fort St. John has been working to address sustainability and climate change through a number of initiatives over the past several years. More recently, federal and provincial initiatives and legislation have been implemented to support local governments in taking action to advance energy efficiency, promote energy conservation and reduce greenhouse gas (GHG) emissions. This Community Energy and Emissions Plan (CEEP) builds on these initiatives and assists the City of Fort St. John in fulfilling its desire to ensure a sustainable future for the community, and its responsibility to respond to legislative requirements.

The CEEP answers the four key questions:

- Where are we now?
- Where are we going?
- Where do we want to go?
- How will we get there?

In 2007, Fort St John consumed over 3.3 million GJ of energy (191.5 GJ per capita) and contributed more than 201,000 tonnes of CO2e (11.6 tonnes per capita) to the atmosphere. Most of the community's energy use and emissions were from transportation (53%) with buildings contributing 33% and solid waste the other 14%. Community-wide emissions in Fort St. John are projected to increase to over 261,000 tonnes CO2e by the year 2030. Electricity use is projected to increase from 154 GWh per year in 2007 to 243 GWh per year in 2030 under a business-as-usual scenario.

A GHG emissions reduction target of 12% below 2007 by 2030 is proposed. This target represents a reduction of approximately 34% relative to the projected amount of emissions in 2030 if Fort St. John were to continue with business-as-usual. An electricity reduction target of 48% from the 2030 business-as-usual scenario (or 18% from the baseline year) is proposed. This would bring electricity consumption to 126 GWh by 2030.

A number of key goals and strategies are outlined that chart a course for moving towards this target.

- Land Use Goal: We will create vibrant, sustainable neighbourhoods through energy efficient planning, design and construction.

  Strategy 1: Increase density in designated areas

  Strategy 2: Increase diversity of housing options

- Transportation Goal: We will ensure alternative forms of transportation are a viable and attractive choice for residents

  Strategy 1: Change attitudes and behaviours towards the personal vehicle

  Strategy 2: Improve alternative transportation amenities

- Buildings Goal: We will improve the energy efficiency of buildings in Fort St. John

  Strategy 1: Increase energy efficiency standards for new construction

  Strategy 2: Retrofit existing buildings

  Strategy 3: Affect change in building occupant behaviors

- Solid Waste Goal: We will consider the life cycle impacts of our purchasing decisions and work towards becoming a waste free community.

  Strategy 1: Improve waste diversion opportunities

- Alternative Energy Goal: We will advance implementation of alternative technologies and truly position Fort St. John as "The Energetic City."

  Strategy 1: Encourage implementation of renewable energy

  Strategy 2: Develop district heating opportunities

A number of recommended actions are identified that relate to each of the strategies. These actions involve utilizing various types of change management tools, including Regulatory, Incentive / Financing, Awareness / Outreach, Process / Investigative. It is recommended that the City of Fort St John acts as the lead agency coordinating and monitoring the implementation of the CEEP.

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1. Introduction

1.1 What is a CEEP?

A Community Energy and Emissions Plan (CEEP) presents a strategy to assist our community in reducing energy consumption and greenhouse gas (GHG) emissions throughout Fort St. John. The CEEP answers the four key questions and provides the following information:

- *Where are we now?*
    - Information on the global, national, provincial and regional policy context of energy and GHG emissions
    - A profile of the physical and socio-economic features of Fort St. John
    - An inventory of current energy consumption and GHG emissions
- *Where are we going?*
    - A business as usual forecast of GHG emissions from the baseline year 2007 to 2030
- *Where do we want to go?*
    - A proposed GHG emissions reduction target to work towards
    - An overarching framework and key strategies, including the City's role and the community partners that will contribute to the strategy's success
- *How will we get there?*
    - A plan including several strategies and a collaborative approach to implementation
    - Specific actions and policy tools that will advance GHG emission reductions in each of the strategies.

1.2 How was the plan developed?

The City of Fort St. John has been working to address environmental sustainability and climate change through a number of initiatives over the past several years. These initiatives are inter-related, with goals to improve the liveability and long-term resiliency of Fort St. John, and involve similar stakeholders.

The process for developing the CEEP built on these existing and ongoing initiatives. The CEEP formally began in September 2009 and included a program to identify and engage targeted stakeholders across the community, and to reach out to residents more broadly in order to raise awareness around issues related to energy, climate change and sustainability. An outline of the engagement program is provided below.

Item	Description
Webpage	Information posted on the *"Be the Change"* section of City website and the Energeticcity.ca blog
Handout	A brochure provided to the public at various events to introduce the CEEP, present the community's energy and GHG emissions baseline, and outline next steps
Movie Nights	Movies at the Lido Theatre to raise awareness of issues around energy, climate change and sustainability, including "An Inconvenient Truth," "Flow," and "Radiant City."
Climate Cafés	Information and informal discussions at Whole Wheat and Honey and Cosmic Grounds. Residents were asked about: • The importance of taking action on climate change • Opportunities and challenges for Fort St. John with respect to reducing energy and GHG emissions • Actions they would be willing to pursue to reduce energy consumption
Local Promotions	Promotions on energy efficient products at Rona, Canadian Tire, Sears, The Brick, Wal-Mart, and Price Smart Foods
Radio Spot	A Moose FM interview to discuss the CEEP with the City Manager and Director of Planning and Engineering
City Council Workshop	A workshop with City Council to present the energy and GHG emissions baseline and discuss challenges and opportunities for the CEEP moving forward.

Item	Description
Task Force Workshops	Two half-day workshops with a targeted group of local stakeholders representing different sectors in the community. • The first workshop asked stakeholders to identify particular challenges and opportunities in the theme areas of the CEEP • The second workshop sought input on CEEP strategies and implementation.

The conversations that took place, and the input received through this engagement program informed the development of the CEEP. The plan was drafted in December 2009 and reviewed by City staff in January 2010. The Final CEEP was then launched at the *"Be the Change"* event at the North Peace Cultural Centre on March 11, 2010.

2. Context

2.1 Global Challenges and Impacts

An abundant supply of low cost energy has allowed industrialized countries like Canada to thrive from both an economic and social standpoint. Canadians enjoy an exceptionally high quality of life – among the highest in the world[1] – which is in part attributed to the material wealth generated as a result of a readily available supply of cheap energy. Many of the products we use on a daily basis such as plastics, paints, pharmaceuticals, fertilizers, and electronic components, are produced using oil and gas as a feedstock. As the abundance of conventional domestic resources decline and the costs of fossil fuel (e.g., oil, coal and natural gas) continue to increase; reducing our dependence on these energy sources will be a key strategy for ensuring long-term sustainability.

It addition to uncertainty around energy supply and pricing, we must face the reality that our use of energy is resulting in drastic increases in atmospheric concentrations of greenhouse gases (GHGs), which is the most significant contributor to global climate change. The Fourth Assessment Report (2007) of the Intergovernmental Panel on Climate Change (IPCC), states unequivocally that the consensus of scientific opinion is that:

- Global GHG emissions due to human activities increased 70% between 1970 and 2004;
- Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level;
- Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in human-caused GHG concentrations, and;

[1] The Economist Intelligence Unit's Quality of Life Index ranks Canada 14th out of 111 countries in nine different areas, including: health, family life, community life, material well being, political stability and security, climate and geography, job security, political freedom, and gender equality.
http://www.economist.com/media/pdf/QUALITY_OF_LIFE.pdf

- There is high agreement and much evidence that with current climate change mitigation policies and practices, global GHG emissions will continue to grow over the next few decades.[2]

To paraphrase, our impact on the climate system is real and individuals, businesses and institutions must go beyond what we are currently doing if we are to avoid the significant and potentially dangerous consequences of global climate change.

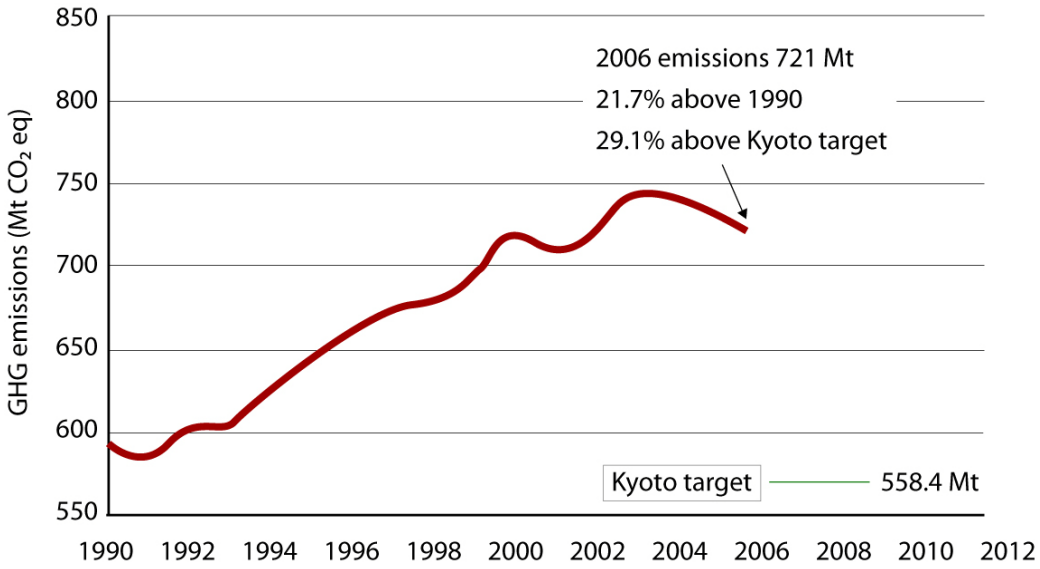


Figure 1: Canadian GHG Emission Trend[3]

2.2 Federal Legislation and Initiatives

In October 2006, Bill C-30 was originally tabled in the House of Commons as "Canada's Clean Air Act." This original version of the Bill was referred to the Legislative Committee before the second-reading stage, reflecting the fact that the bill had not been approved in substance by the House of Commons. It was then substantially amended by the Committee and reported to the House of Commons in March 2007. The amended Bill C-30 Canada's Clean Air and Climate Change Act, addresses air pollutants as well as greenhouse gases and enshrines the emissions reduction targets set out in the Kyoto Protocol, while introducing fixed

[2] IPCC 4th Assessment Report (2007). http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

[3] National Inventory Report: Greenhouse Gas Sources and Sinks in Canada, 1990-2006.

amounts of permissible GHG emissions for defined dates beyond 2012. Bill C-30 is an amendment to three separate federal Acts: the Canadian Environmental Protection Act, 1999; the Energy Efficiency Act, and; the Motor Vehicle Fuel Consumption Standards Act, the last of which is not currently in force.

The United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP 15) took place in December 2009 in Copenhagen, Denmark. At the conference, global leaders came together to determine whether—and how—the world will take action to avoid climate change over the next half century. The resulting Copenhagen Accord requires industrialized countries to set economy-wide GHG emissions reduction targets for 2020 (by January 31, 2010) and to allocate funds to assist developing countries in reducing emissions.[4] In the lead up to COP 15, the Canadian government announced its intention to reduce country-wide emissions by 20% below 2006 level by 2020; however, no plan has been released outlining how this target will be achieved.

2.3 Provincial Legislation and Initiatives

The Province has been moving forward with a series of ambitious measures to advance energy efficiency, promote conservation and reduce GHG emissions. These include:

- **GHG Emissions Reduction Target Act (Bill 44, 2007):** The Province of BC has set a province-wide GHG emissions reduction target of 33% below 2007 levels by 2020 and 80% below 2007 levels by 2050. The Act also sets requirements for Public Sector Organizations (PSOs) to be carbon neutral by 2010.[5] The BC Climate Action Plan outlines how the Province will get 73% of the way towards achieving these reduction targets.

- **Green Communities Act (Bill 27, 2008):** Bill 27 requires local governments include GHG emission targets, policies, and actions in their

[4] Copenhagen Accord (http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf)

[5] Although local governments are encouraged to support the provincial goals, Bill 44 does not apply to local governments.

OCP[6]. To achieve this objective, the legislation provides a range of potential new powers for local governments.[7]

- **BC Climate Action Charter:** A provincial initiative introduced in September 2007 to encourage local governments to significantly cut GHG emissions. Participating local governments have committed to becoming carbon neutral in their municipal operations by 2012.[8] Achieving carbon neutrality will require local governments to implement measures to reduce GHG emissions, and because it is currently not possible to operate without some emissions, local governments will need to purchase carbon offsets to net any remaining emissions to zero.

2.4 Energy & Emissions Initiatives in the Region

Stantec is working with the Peace River Regional District and four member municipalities to address energy use and GHG emissions in the Peace River region. The project includes the development of corporate energy and GHG emissions inventories and action plans for the Regional District, the Village of Pouce Coupe, and the Districts of Chetwynd, Tumbler Ridge and Taylor. Each of the five local governments will also be engaged in developing community Climate Action Plans. The integrated development of corporate and community actions for each local government reflects the unique circumstances faced by each local government, while aligning potential opportunities for cooperative action.

The City of Dawson Creek developed a Climate Action Plan in May 2008. The plan includes the following GHG reduction targets, which were incorporated into the City's Official Community Plan in November 2009[9].

- 14% below 2006 levels by 2012
- 33% below 2006 levels by 2020

[6] It is currently understood that these OCP requirements would have a transitional period and not be fully required until May of 2010. This implementation schedule cannot be defined with certainty until the Bill is enacted.

[7] Each of these possible powers still requires that the local government develop an enacting bylaw and to define the conditions and process for it to apply.

[8] The City of Fort St. John has signed the BC Climate Action Charter.

[9] The City of Dawson Creek is the first local government in BC to have incorporated GHG emissions reduction targets into its OCP, as required by legislation. The Local Government (GREEN COMMUNITIES) Statutes Amendment Act (Bill 27, 2008) requires that local governments set a GHG reduction target and incorporate it into the OCP by May 31, 2010.

- 85% below 2006 levels by 2050.

The District of Hudson's Hope is planning to develop a Community Energy Plan in 2010.

2.5 City of Fort St. John Initiatives

A number of related activities are underway that support efforts to reduce GHG emissions, which include:

- City of Fort St. John's Strategic Plan "Today and Tomorrow"
- Our Bright Future
- Be the change
- Corporate energy inventory and future plan
- Greenridge Heights (sustainable neighborhood development)
- Water Conservation and Low Flow Toilet rebate program
- Corporate Idle Reduction Initiative
- Green Building Policy

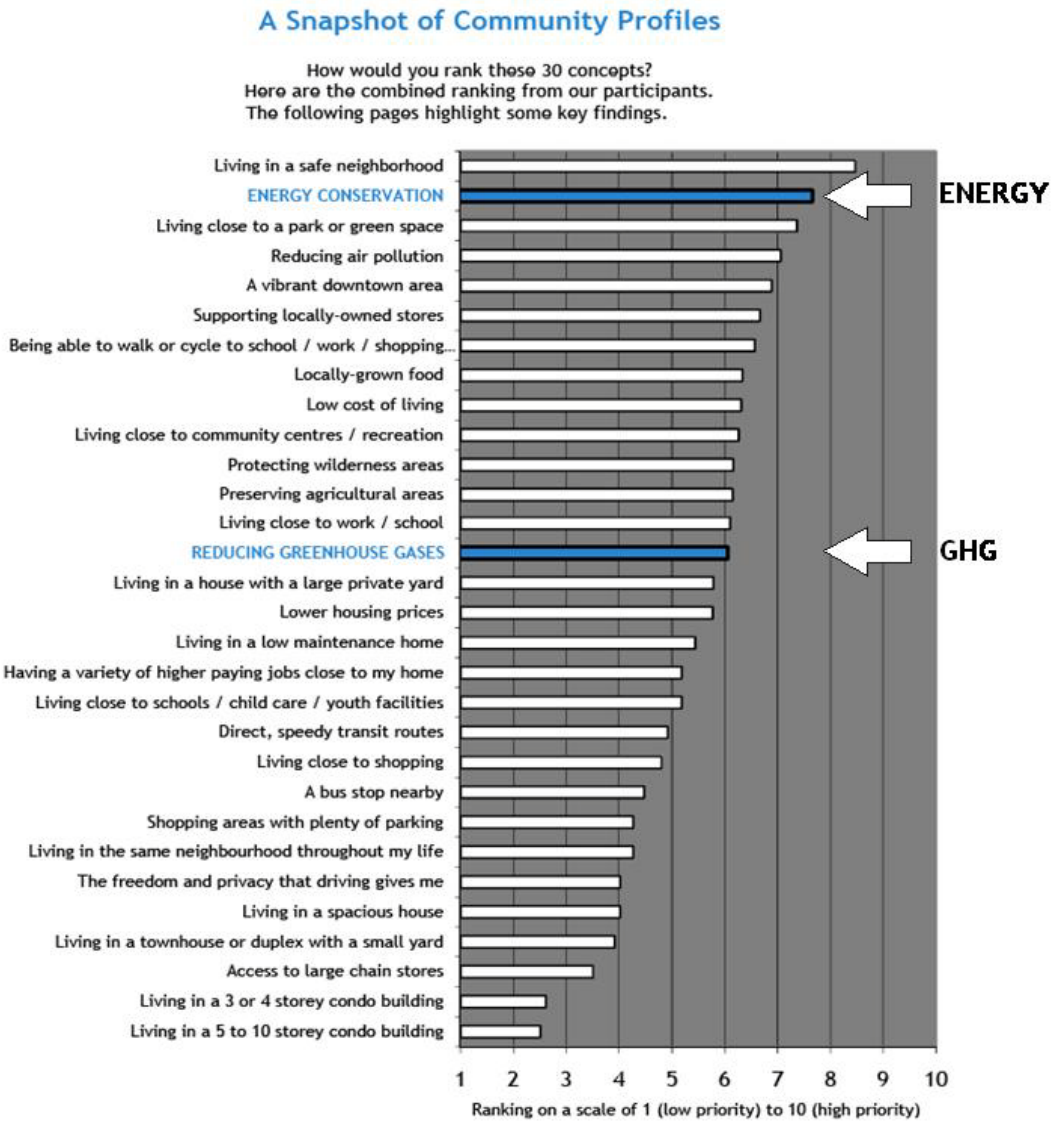
Our Bright Future

The City of Fort St. John underwent a community-based visioning process in 2007 – 2008 entitled *Our Bright Future*. The process was intended to assist in guiding growth in Fort St. John over the next 40 years.

During the visioning process, participants were asked to rate the housing choices, neighbourhood amenities, transportation options, environmental programs and land use priorities in order of importance. The visioning process enabled participants to see how making sustainable choices today can lead to a more livable community for future generations.

Green issues were consistently ranked high on the priority scale. Residents want to see a blend of environmental conservation programs, integrated land use, and transportation planning to address these priorities. Among the 30 issues residents were asked to rank, energy conservation was one of the highest ranked (2nd out of

30) and climate change was ranked as 14th out of 30. This gives the City a solid base of community support to draw upon, and this has contributed to the City's commitment to sustainability.



Be the Change

As a commitment to building a more sustainable Fort St John, the City initiated the *Be the Change* initiative. This initiative offers an ongoing dialogue and holistic effort towards building a more sustainable Fort St John. *Be the Change* recognizes the interconnectedness of sustainability and livability and that *"livability tomorrow begins with today."* It aims to encourage every person in Fort St. John to be stewards of the necessary change towards a more

FORT ST JOHN
The Energetic City
"Livability tomorrow begins with today"
Be the Change

sustainable future. Energy and emissions is an integral part of this initiative and subsequently the City embarked on the Community Energy and Emissions Plan, while at the same time also undertaking a corporate emissions audit and exploring opportunities to reduce energy and emissions from City operations. The purpose of the Corporate Energy Plan is to establish emissions levels at a 2006 baseline in order to set reduction targets. The corporate energy plan will examine the emissions that the City of Fort St. John produces through the energy that municipal facilities use, the fuel that the corporate fleet uses, and the intake and output of municipal water and sewer systems.

Greenridge Heights

Greenridge Heights is a 53 ha greenfield property on the northeast edge of the City. In 2008 about 16 ha was given to the Northern Health Authority for the construction of a regional hospital. The remaining 37 ha of land is still owned by the City of Fort St John and has been the focus of an intensive, integrated and public design process. The City of Fort St John has elected to use this site as a pilot development and catalyst project. Unlike other similar subdivisions, this site will incorporate a greater density of housing units, a complex of civic facilities, including a school and cultural centre, and mixed-use commercial space and farm around an interconnected open space and trail network. It will also be a unique opportunity to pilot energy and emissions reduction strategies identified in the Community Energy and Emissions Plan.

3. Where are we now?

3.1 Community Profile

A profile of the community offers a deeper understanding of some of the challenges and opportunities in Fort St. John with respect to energy and climate change. Topics including geography, climate, population, dwellings, transportation, economy, and future growth were explored in the community profile, which is detailed in Appendix A.

Implications for Plan Development

The community profile highlights some unique implications (challenges and opportunities) for the development of the CEEP, including:

- The community is situated in an expanse of gently rolling plains, and supports geographically dispersed developments with low population densities. The wide open space may lead to perceptions that there is little reason to contain development to the municipal boundary. However, when housing, amenities, services and employment locations are dispersed, as they are in Fort St. John, there is a greater reliance on automobiles.

- Cold winters result in a higher number of heating degree days[10] in Fort St. John (approximately twice as many as in Vancouver). This results in increased energy demand to satisfy space heating needs in buildings. Further, cold weather results in increased vehicle idling (for real and perceived reasons), which impacts fuel consumption, air emissions, public health, and overall livability.

- An older building stock,[11] coupled with a colder climate, may result in inefficient use of energy for space heating. Energy retrofits and improvements to the existing building stock present an opportunity; however, there may be financial barriers for homeowners who cannot afford the upfront costs of building upgrades. Additionally, Fort St. John has a large percentage of rented dwellings (33%, which is slightly more than the provincial average). For property owners with rental units, the business case for investing in building

[10] A heating degree day is the number of days that the temperature is below 18oC, multiplied by the temperature below 18. For example 5 days at 12°C is 5*(18-12) = 30 degree days. The use of 18oC as the defining temperature for heating degree days is a common benchmark in heating and air conditioning analysis

[11] 75% of dwellings were built before 1980, and 30% were built before 1975. These older homes would have been built to less stringent energy requirements, may have deterioration of air sealing, and likely include older furnaces and water heating appliances.

upgrades may be lacking, as upfront investment costs are borne by the owner, while benefits (in terms of reduced energy costs) accrue to the renter.

- The vast majority of workplace commuting (78%) is done by single occupancy vehicle (SOV) in Fort St. John. That is, a sole driver using a car, truck or van to get to-and-from work. This mode of commuting results in increased fuel and energy consumption and GHG emissions.

- The presence of a large oil and gas industry in the region may result in perceptions of energy abundance and wealth, yet the majority of the energy produced and the wealth generated by this industry does not stay in Fort St. John.

The unique characteristics of Fort St. John also present some great opportunities for energy conservation and climate action moving forward, including:

- The availability of land means there is room for new development that can incorporate higher densities and district energy systems. This type of development will result in improved energy efficiency and benefit long-term sustainability (e.g., greater energy resiliency, improved housing options and affordability, etc).

- A greater number of hours of sunshine than most other regions in BC, means there are opportunities for solar energy, including passive design and solar hot water heating.

- A relatively high median household income ($79,428, compared to the provincial average of $62,346) may allow residents to make a greater investment in building upgrades, alternative energy technologies and low emission vehicles.

- A relatively young population, with a higher than average proportion of residents between the ages of 15 and 44 years, and fewer residents in the 45 and older age range. This youthful presence could present the City with some unique opportunities to promote active forms of transportation and to nurture entrepreneurship, encouraging businesses that offer energy efficient and sustainable goods and services.

- The majority of workplace commutes take place within the municipality[12] - that is, the majority of people are not commuting very far for work. Despite the fact that SOV commutes currently dominate, there are opportunities to increase the share of other transportation modes and reduce emissions associated with automobiles.

- The presence of industry in and around Fort St. John could help to support a transition to alternative energy (e.g., biomass from agriculture, wood waste, etc).

[12] 76% of the employed labour force commutes to a usual place of work (with a fixed address). Approximately 80% of these commutes take place within the municipality, while 20% of commuters travel outside the municipality for work. (Statistics Canada 2006 Census Community Profiles)

3.2 Current Baseline

An energy and GHG emissions inventory helps the community to understand how much energy it consumes and for what purposes, as well as how much it emits in terms of greenhouse gases and where those emissions come from. With the baseline inventory established, the community can forecast emissions into the future and use that information to set achievable targets and develop actions to reduce community-wide energy consumption and GHG emissions. 2007 figures for baseline energy consumption (in gigajoules) and GHG emissions (in tonnes of carbon dioxide equivalents) are shown below in Table 1 and presented by sector in Figure 2 on the following page.

- **Buildings:** This includes the energy to heat and cool residential, commercial and industrial buildings, as well as the activities that occur within these residences and facilities. This data is obtained from utility records and includes electricity and natural gas consumption. Other sources such as wood, fuel oil, or propane tank heat have not been quantified in the inventory.

- **Transportation:** Vehicular emissions estimates are based on a count of the vehicles registered in the region, an estimate of fuel consumption based on type of vehicle, and an estimate of the number of kilometres driven. This data is obtained through ICBC and Natural Resources Canada.

- **Solid Waste:** Waste does not directly consume energy but when deposited into landfills, it decomposes and releases methane gas which is a greenhouse gas. The inventory includes estimates of the annual mass (tonnes) of municipal solid waste disposed of at regional district landfills and attributed to Fort St. John, as well as Fort St. John's estimated share of (methane) emissions.

Table 1: Energy Consumption and GHG Emissions, 2007

Component	Electricity Consumption (kWh)	Energy (GJ)	GHG Emissions (tonnes of CO_2e)
Residential Buildings	69,417,261	932,231	36,428
Commercial Buildings	84,656,761	866,364	30,588
Industrial Buildings	12,694,586	45,701	279
Transportation	-	1,489,056	106,747
Solid Waste	-	–	27,413
Total	**166,768,609**	**3,333,352**	**201,455**
Total (per capita)	**9,583.3**	**191.5**	**11.6**

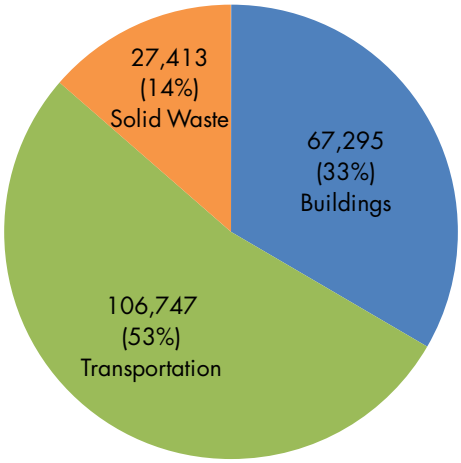


Figure 2: GHG Emissions by Sector[13], 2007

An exercise was conducted to test the validity of the CEEI figures for target-setting and GHG management planning within the City of Fort St. John. Residential sector GHG emissions from the CEEI were compared with estimates using Statistics Canada 2006 Census of Canada data and energy use intensities from BC Hydro 2007 Conservation Potential Review studies. The residential consumption values correlated with the estimates calculated and as such, it was concluded that the CEEI provides a sufficiently accurate baseline to support target-setting and GHG management planning in the City of Fort St. John. For more detail on the CEEI validation exercise, please see Appendix B.

To give context to Fort St. John's current energy state, it may be helpful to understand how it compares to communities in other jurisdictions. Benchmarking performance in GHG reductions may provide guidance to Fort St. John and inform the development of GHG reduction measures.

One approach to benchmarking involves making comparisons between communities of similar composition and nature. Characteristics such as population, density and climatic zone are key considerations when comparing community GHG emissions. For Fort St. John this approach to benchmarking might include other communities in the Peace River Regional District where density and climatic zone are directly comparable, or it might include communities of similar population size in British Columbia and across Canada. The latter is slightly more challenging due to a lack of readily available data on community GHG emissions outside of British Columbia.

[13] These figures are based on data provided through the Province of BC's Community Energy and Emissions Inventory (CEEI) initiative: http://www.env.gov.bc.ca/epd/climate/ceei/index.htm

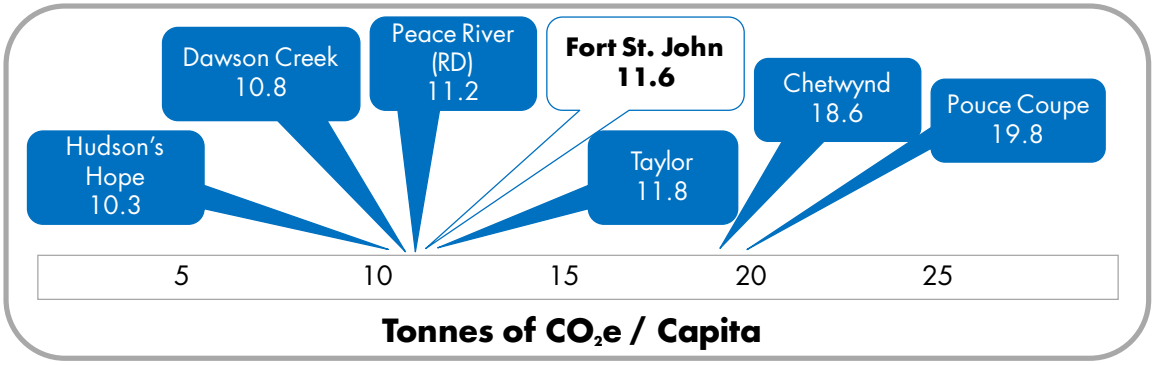


Figure 3: Benchmark communities in the Peace River Regional District

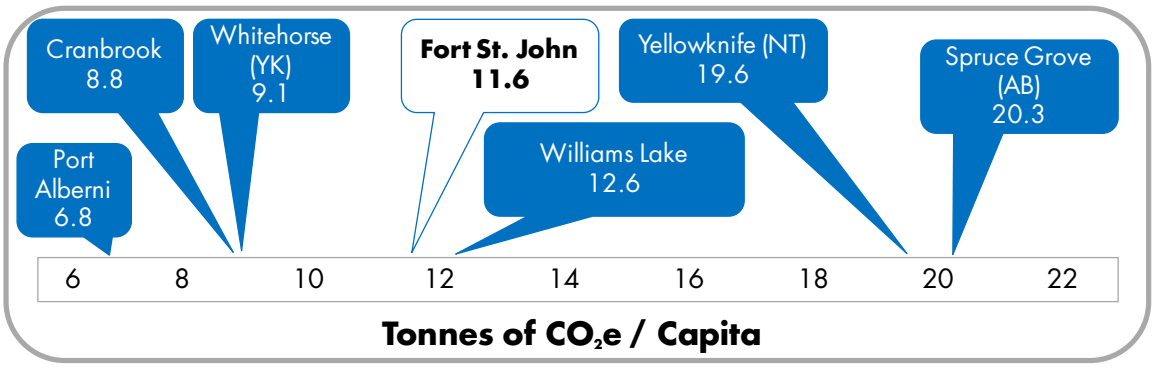


Figure 4: Benchmark communities in BC and Canada with populations between 10,000 – 49,000

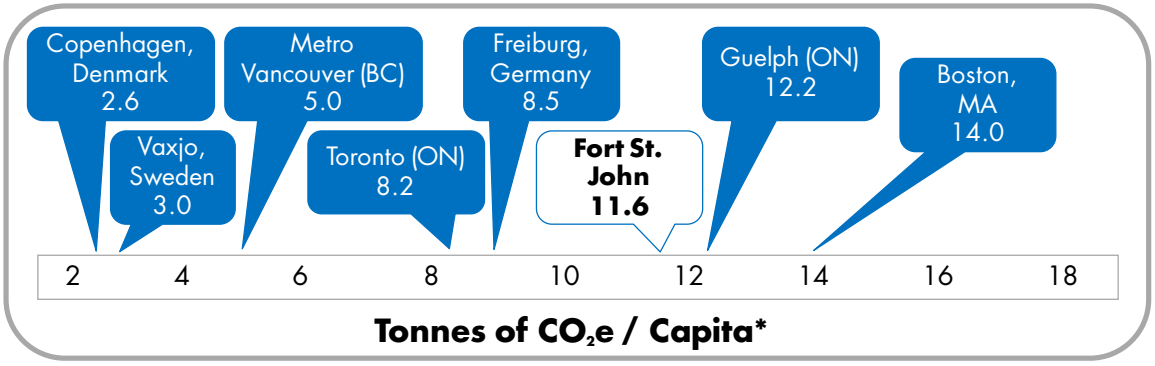


Figure 5: Benchmark communities from around the world[14]

[14] Community Energy Planning Best Practices, Prepared for BC Hydro by Garforth International llc (June 9, 2009)

4. Where are we going?

4.1 GHG Emissions Forecast

Community-wide emissions in Fort St. John are projected to increase to over 261,879 tonnes CO_2e by the year 2030. This forecast is based on population projections that use an annual growth rate of 2%, resulting in a population increase from 18,385 in 2007 to 28,991 in 2030[15]. This forecast assumes a business-as-usual approach; that is, no distinct intervention is taken by the City.

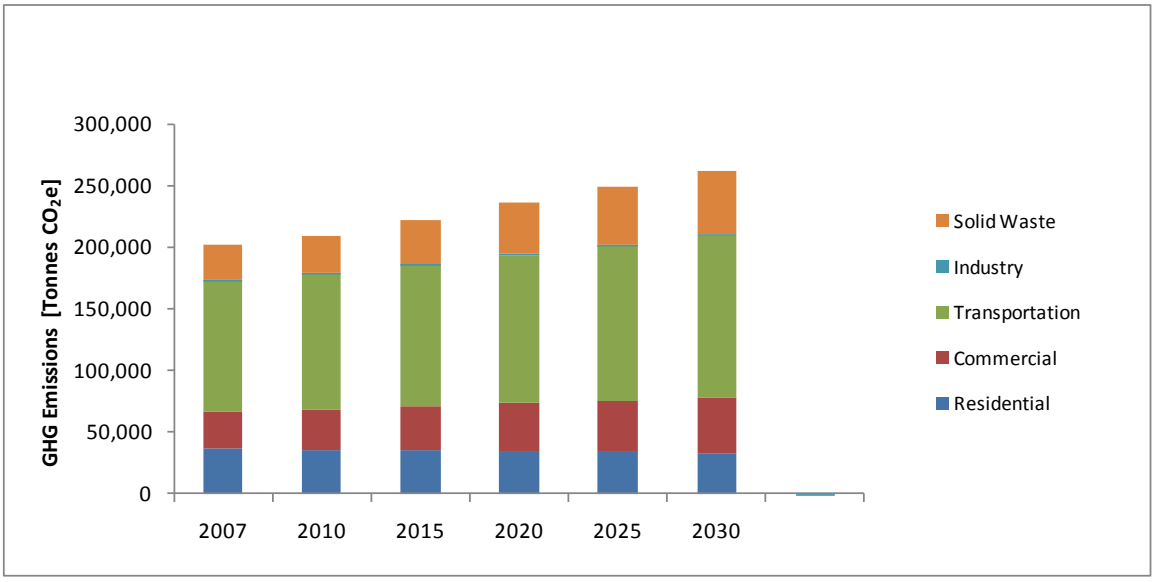


Figure 6: GHG emissions forecast (Tonnes CO_2e)

[15] The 2% growth rate used to project population for the emissions forecast is a more conservative figure than the growth rate used to calculate population projections in the City's OCP; this was deemed to be a more realistic growth rate by City staff.

4.2 Energy Forecast

Similarly, a business-as-usual forecast for energy was developed using the same population growth rate of 2%. Under this scenario, electricity is expected to increase from 154 GWh per year in 2007 to 243 GWh per year in 2030 (Figure 7).

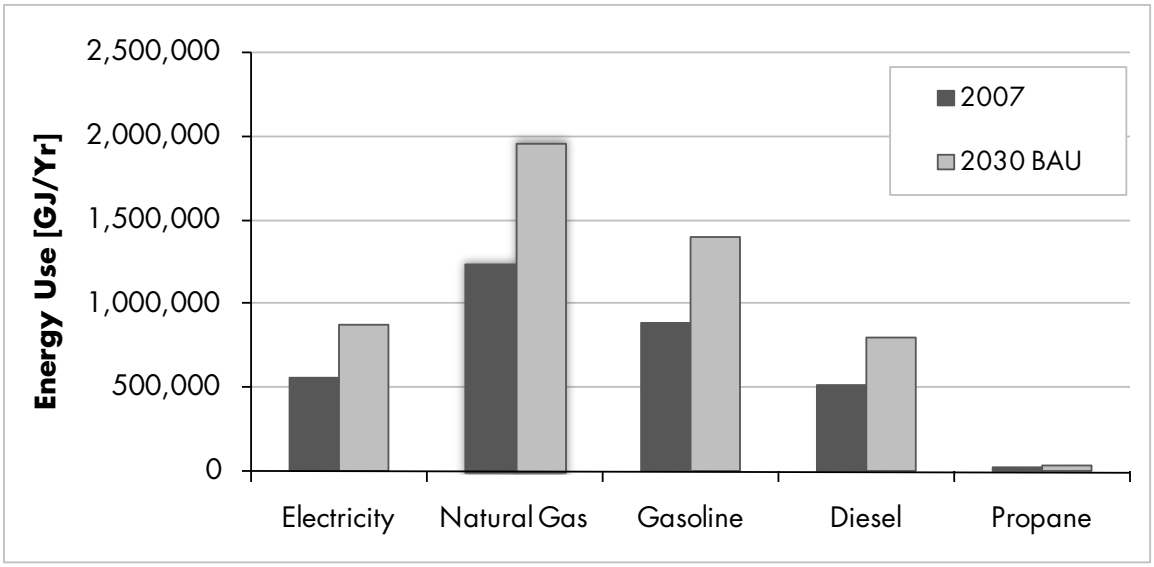


Figure 7: Energy Forecast (GJ/Year)

5. Where do we want to go?

5.1 A Framework for Reducing GHG Emissions

An adaptive management framework (outlined below) has been used to structure Sections 5 and 6 of the Plan. The framework ensures alignment between the various Plan elements and provides the City and community stakeholders with a common understanding of their approach to reducing energy and emissions.

Target	A GHG emissions reduction **target** has been proposed. This is a community-wide target which will require efforts by the City, community partners and residents to reduce energy consumption and GHG emissions. In accordance with Bill 27 a numeric target must be set and incorporated, along with policies and actions, into the OCP.
Themes	Five **themes** (Land Use, Buildings, Transportation, Solid Waste, and Alternative Energy) that represent the key areas where energy is consumed and GHG emissions are generated within Fort St. John.
Goals	Each of the theme areas has a **goal** – a statement of what the community wants to achieve in that area.
Strategies	**Strategies** are proposed to assist in moving towards the goal. Most of these strategies relate to opportunities for "reducing energy demand", while others focus on the other "Rs" of the BC Hydro approach to sustainable community energy planning (see below). Within each strategy there is a description of the strategy, the City's role in implementation, and a preliminary list of partners that will need to be involved if the strategy is to be successful.
Implementation	Section 6 on **implementation** outlines the recommended policies and actions for advancing the strategies. These include a mix of outreach/education; incentives, pricing, and; regulation.

BC Hydro's 4Rs of Sustainable Community Energy Planning

The Plan is further guided by BC Hydro's 4Rs of Sustainable Community Energy Planning (Figure 7). This approach includes the following four steps:

1. Reduce energy demand
2. Reuse waste heat to heat buildings and hot water
3. Develop renewable heat sources to heat buildings and hot water
4. Develop renewable energy sources to supply electricity needs

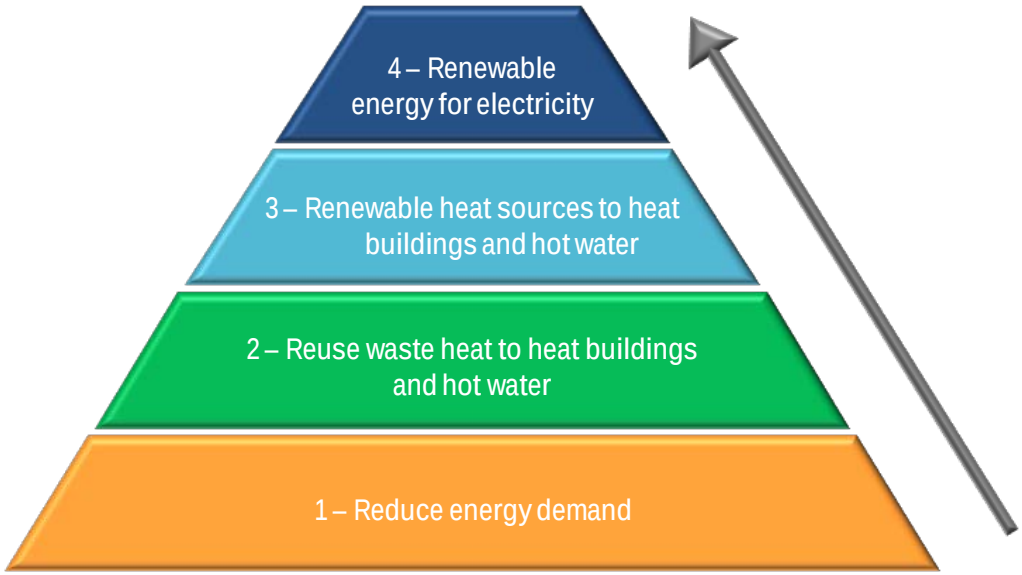


Figure 8: BC Hydro's 4Rs of Sustainable Community Energy Planning

5.2 A Strategic Path Forward

GHG Emissions Reduction Target

Staff and council were engaged in a target setting workshop to develop GHG emissions reduction targets. Target-setting is a challenging process that requires technical analysis, values tradeoffs and local knowledge. Based on this process, the following GHG emissions reduction targets are proposed:

- 3% above 2007 by 2015
- 1% below 2007 by 2020
- 6.5% below 2007 by 2025
- 12% below 2007 by 2030

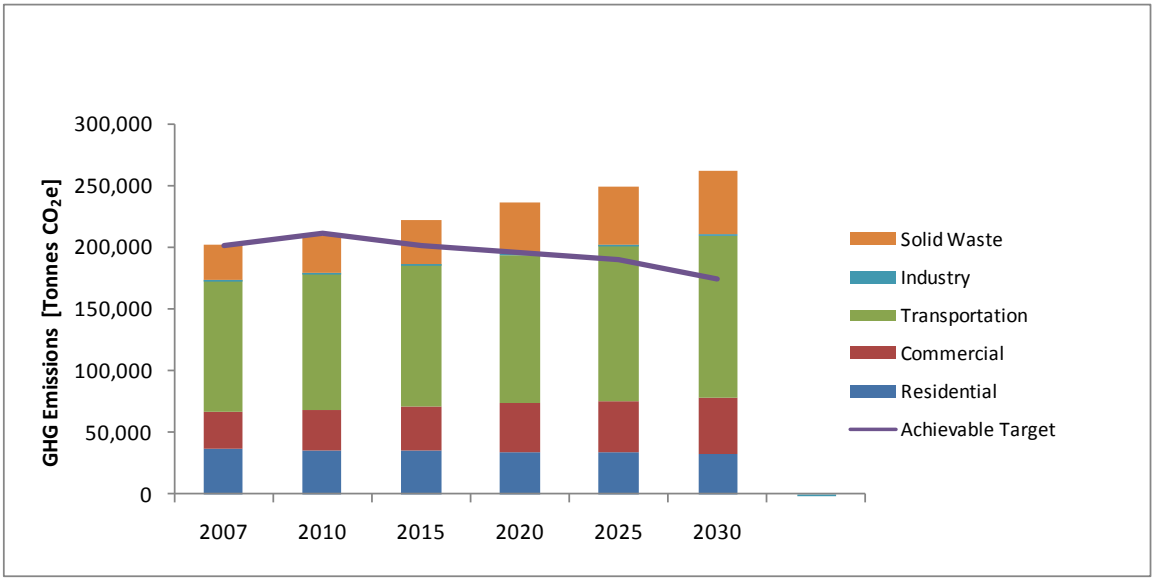


Figure 9: Proposed GHG emissions reduction target compared to projected emissions

These targets recognize the challenge of achieving reductions in the short term. Policies and actions to reduce emissions take time to establish and even longer to take effect. While 12% may seem like a modest reduction, it actually represents a reduction of 34% relative to the projected emissions in 2030 and based on the population projections for 2030, translates into per capita emissions of 6.1 tonnes CO_2e (compared to 2007 per capita emissions of 11.6). Based on an analysis of the reductions likely to result from

successful implementation of the strategies outlined in the Plan, this is thought to be an achievable target.

The City will meet the 2030 target through implementation of a range of strategies and policy tools in various sectors. Policy tools may include outreach, non-financial incentives, financial incentives, pricing or regulation. Depending on the policy tool selected, the cost of implementation and the potential for reducing emissions will be more or less. Generally speaking, both the cost of implementation and the potential for reducing emissions increase along the spectrum from outreach, to incentive, to regulation. There are of course many exceptions to this, depending on the specific context and implementation approach taken.

The GHG reduction potential for each of the sectors represented in the inventory has been estimated based on the strategies and actions outlined in this plan. The reductions achieved in each of these sectors will help the City to achieve its 2030 GHG emissions reduction target. Breaking it down this way helps to create an understanding of where opportunities for reduction exist and how hard the community will need to push in each of these sectors in order to achieve the 2030 target. Table 2 shows the reductions that are thought to be achievable for each of the sectors represented in the inventory.

Table 2: Current and Forecasted Emissions and Achievable Reductions

Sector	2007 Baseline Emissions (tonnes of CO_2e)	2030 Forecasted Emissions (tonnes of CO_2e)	2030 Achievable Emissions (tonnes of CO_2e)	Reduction from 2007 Baseline (%)
Residential Buildings	36,428	39,213	34,137	6%
Commercial Buildings	30,588	45,222	16,725	45%
Industrial Buildings	279	518	279	0%
Transportation	106,747	131,543	108,980	- 2%*
Solid Waste	27,413	51,748	17,130	38%
Total	**201,455**	**268,444**	**177,251**	**12%**

*Note: negative reduction implies that an increase over the baseline is expected

Energy Reduction Target

Figure 10 shows the achievable reductions in energy use from 2007 to 2030. Implementing the measures identified in the CEEP is expected to result in a 48% reduction from the BAU scenario, bringing electricity consumption to 126 GWh by 2030.

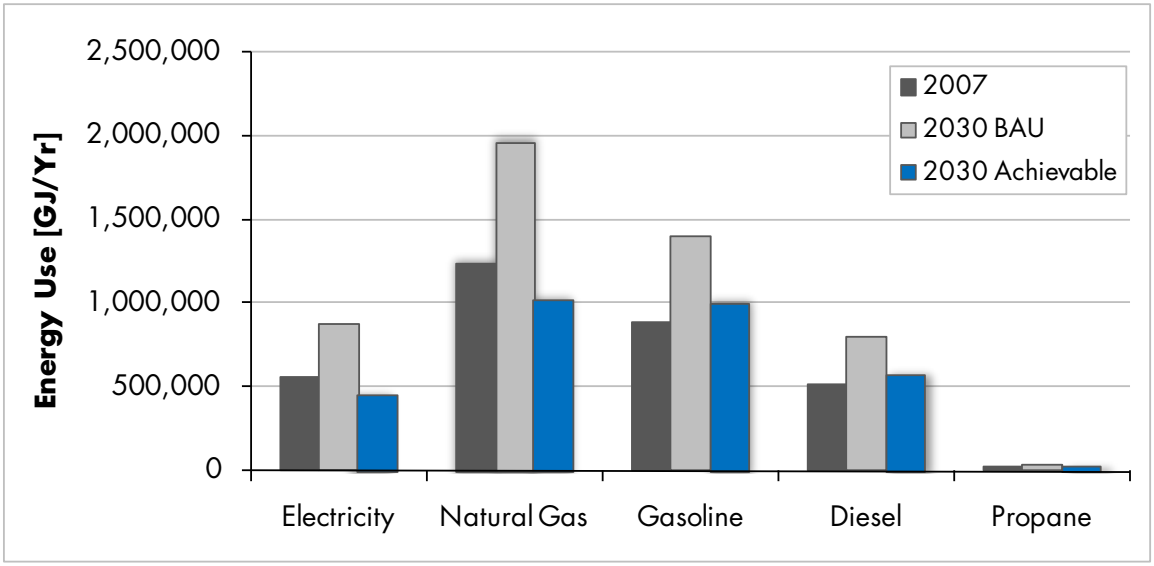


Figure 10: Achievable reductions in energy use compared to projected emissions

Goals and Strategies

The challenges, opportunities, goal, and strategies for each of the key theme areas are outlined below:

Theme: Land Use

Land use planning is one of the most powerful tools available to local governments to reduce energy and GHG emissions in the community. The preservation of natural areas and the development of vibrant, mixed use town centres are achieved through land use designations (e.g., zoning). Land use policies can influence the viability of local energy systems, impact the energy efficiency of the built environment (e.g., buildings and infrastructure), and affect the energy we use to get around our community (e.g., transportation).

City staff, Council members, and CEEP stakeholders identified a number of challenges and opportunities related to land use in Fort St. John, including:

Challenges:

- Lifestyle choices are a challenge to densification – households typically have a couple of vehicles, along with some recreational vehicles (e.g., boats, RVs, quads, etc) and require space to accommodate these
- Good examples of densification are lacking in rural and remote communities
- Lack of public awareness around how land use impacts energy consumption and climate change.
- Wide open space and available land leads to perception that there is no need to increase density
- Limited housing options and challenges around housing the transient worker population

Opportunities:

- Increase density in the City centre through infill development (e.g., ground floor commercial with second floor residential space) in an effort to create a more vibrant downtown.
- Work with developers and property owners to encourage higher density and to provide a diversity of housing options (e.g., through rezoning, density bonusing, etc)
- Build "best practice" examples into the plan and identify development projects that could be implemented in Fort St. John
- Rationalize the City boundary to stem sprawling development and encourage growth concentration nodes that are adjacent to public transit and services

Goal: *The City of Fort St. John will create vibrant, sustainable neighbourhoods through energy efficient planning, design and construction.*

Strategy L-1: Increase density in designated areas

Description: Low-density residential development, the predominant development type in Fort St. John, contributes to increased GHG emissions through its intensive use of energy compared to more compact forms of development. Whereas, medium-density development accommodates more housing units on less land; making public transit, district energy and infrastructure services more efficient and cost effective, increasing the viability of public transit, and contributing to greater housing choice, flexibility and affordability. This strategy defines growth areas and zoning where residential density can be increased. It involves efforts by the City to ensure that development is focused in specific areas, such as the Town Centre and Greenridge Heights.

City Role: This is a City-led strategy, which would require the City to define growth concentration areas through zoning bylaws and OCP amendments.

Partners: The success of the strategy requires the support of local developers and builders, property owners and managers, and Fort St. John residents. Community organizations, such as the Community Healthy Living Alliance and Northern Environmental Action Team (NEAT), can advance this strategy through outreach and promotion of the benefits of compact, complete communities.

Related Actions:

- # 2 Update OCP policies to meet sustainability objectives
- # 3 Establish growth concentration boundary in OCP
- # 5 Establish DCC Bylaw
- # 8 Establish CD zones, mixed-use zones and infill areas
- # 12 Allow Amenity Density Bonuses
- # 16 Develop a Sustainable Development Checklist
- # 17 Offer DCC & Permit rebates
- # 20 Developer / builder community workshops

Strategy L-2: Increase diversity of housing options

Description: Over half of dwellings in Fort St. John are single detached homes, while the next most prevalent dwelling type is low-rise apartment buildings, comprising 20% of the housing stock. The remaining dwellings are a mix of semi-detached homes, row houses, and mobile homes, though these dwelling types make up very small percentages of the total housing stock. Having a diversity of housing options available to residents can help to increase density and improve affordability. Further, housing options that meet different needs may afford residents the opportunity to remain in the community longer, or throughout their entire life. For example, seniors may be better able to maintain and afford smaller apartments, over single detached homes. This strategy seeks to provide a greater diversity of housing options to Fort St. John residents. It involves efforts by the City to encourage the development of units that appeal to residents throughout all stages of life and at various income levels. Additionally, it requires exploration of opportunities to provide reliable rental housing options for the transient worker population in Fort St. John.

City Role: This is a City-led strategy, which makes use of new powers available to local governments to define Development Permit Areas that specify preferred housing types by area. The strategy also requires the City to consider possible incentives to encourage more energy efficient housing options.

Partners: The success of the strategy requires the support of local developers and builders, and property owners and managers. Organizations that exist to support housing options (e.g., BC Housing, Abbeyfield Society, etc) may assist in advancing actions under this strategy.

Related Actions:

- # 2 Update OCP policies to meet sustainability objectives
- # 8 Establish CD zones, mixed-use zones and infill areas
- # 16 Develop a Sustainable Development Checklist
- # 17 Offer DCC & Permit rebates
- # 20 Developer / builder community workshops

Theme: Transportation

Transportation accounts for 53% of the GHG emissions in Fort St. John. Reducing emissions from transportation involves several factors. The City has a significant impact on transportation though its land use decisions (see Strategy L1 & L2) and, to a lesser extent, it's parking policies. Other aspects of transportation fall outside of the City's influence. For example, fuel prices, vehicle fuel efficiency standards, technology developments, and financial support for public transit, impact energy use and emissions from transportation. For this reason, strategies in this area focus on activities that the City can influence in partnership with organizations, businesses and individuals.

Several challenges and opportunities were identified for transportation in Fort St. John, including:

Challenges:

- Misconceptions around idling (i.e., people think it is necessary for diesel engines, in cold climates, etc)
- Lifestyle choices are a challenge to promoting alternative transportation (e.g., pride in vehicle ownership and "toys")
- Unique work situation of many residents necessitates driving (e.g., shift work, need to transport equipment to work, multiple businesses)
- Plenty of parking lots and free parking make it difficult to convince residents not to drive
- Low density development does not support transit
- Perceived lack of safety is a barrier to alternative modes of transportation (e.g., walking, cycling, etc)

Opportunities:

- Partner with large employers, business owners, schools, hospital, etc to build awareness
- Many employers are running out of parking space for their employees, which could provide an entry point for discussion around partnerships to provide alternatives to single occupancy vehicle (SOV) commuting, etc
- Opportunity to build on success of existing trail system and promote it as a way to get from point A to B.
- Young, active population that can use active modes of transportation
- Improve alternative transportation amenities and services (e.g., bus shelters, benches, lighting, bike lanes, etc)
- Predominance of single occupancy vehicle (SOV) commuters means there is a lot of room for improvement

Goal: *The City of Fort St. John will ensure alternative forms of transportation are a viable and attractive choice for residents*

Strategy T-1: Change attitudes and behaviours towards the personal vehicle

Description: Single occupancy vehicles account for 78% of commutes in Fort St. John. Driving a personal vehicle to work is often required due to the nature of the job (i.e. shift work or the need to transport equipment to-from work), or because alternative transportation options are not available or attractive. However, personal vehicles are also used when other options are available (e.g., carpool to work, or walking downtown to run errands). In these instances there are immediate opportunities to be more efficient in how we use our vehicles, and to reduce or eliminate the need to drive entirely. Actions such as idling reduction, alternative commuting, trip planning, and even purchasing more fuel efficient vehicles require individuals to rethink their attitudes toward the personal vehicle and to change their behaviours accordingly. This strategy involves a number of outreach and engagement activities to promote changes in personal vehicle use, including voluntary idling reduction initiatives, and partnerships with local businesses and organizations to encourage residents to drive less.

City Role: This is a City-led strategy, implemented in partnership with local organizations and businesses. The City's role would be to establish these partnerships and compile and provide educational information and materials to support outreach efforts.

Partners: Implementation of this strategy will require the participation of local organizations and businesses such as NEAT, School District 60 and local schools, Fort St. John Hospital and Health Centre, drive-through restaurants (e.g., Tim Hortons, McDonalds, A&W) and other large retailers (e.g., Home Hardware, Canadian Tire, Walmart, etc). Partnerships with Idle Free BC, Natural Resources Canada and diesel mechanics (local tradespersons and students in the automotive service technician program at Northern Lights College) could support the development of idling reduction outreach materials and help to dispel myths about diesel engine idling requirements. Partnerships with large employers (e.g., Canfor and Peace Valley OSB) could be established to pilot commute trip reduction programs.

Related Actions:

- # 7 Establish Idling Reduction Bylaw
- # 14 Preferential parking for low-emission / car co-op vehicles
- # 21 Establish a carpool / ride-share information portal
- # 23 Launch an idling reduction outreach program

- # 27 Explore an employer transit program

Strategy T-2: Improve alternative transportation amenities

Description: One way to encourage a reduction in personal vehicle use and associated emissions is to make alternative transportation options more attractive to residents. This strategy recognizes the opportunity for the City to support transit service through improved amenities and accessibility. It focuses on elements of transportation infrastructure and amenities that the City can control in an effort to improve the overall transportation experience in Fort St. John and encourage greater public transit ridership, more cycling, walking and so on. Activities in this strategy include improvements to amenities (e.g., bus shelters, benches, sidewalks, bike lanes, street lighting, end-of-trip facilities, etc) and outreach and incentives to encourage residents to take advantage of alternative options.

City Role: The City will need to ensure the necessary capital funds are secured to support new and improved infrastructure (e.g., bus shelters, benches, lighting, sidewalks, end-of-trip facilities, etc). Outreach will be required to communicate alternative options to residents, while opportunities to provide further incentives should be explored.

Partners: Partnerships with the Ministry of Transportation and BC Transit may help to further infrastructure and bus service improvements in Fort St. John. Institutions and other local organizations can assist with outreach to communicate the importance of alternative transportation options to residents (e.g., School Board and North Peace Secondary School Eco Club could do outreach to students and encourage programs such as the Walking School Bus).

Related Actions:

- # 6 Establish pedestrian- and biking-friendly standards
- # 9 Develop an alternative transportation network plan & map
- # 10 Establish an alternative transportation infrastructure reserve fund
- # 11 Improve pedestrian and transit amenities
- # 16 Develop a Sustainable Development Checklist
- # 21 Establish a carpool / ride-share information portal
- # 27 Explore an employer transit program

Theme: Buildings

Buildings account for approximately 33% of greenhouse gas emissions in Fort St. John. There are a number of policy tools available to the City to encourage and promote energy efficient buildings. Strategies in this area focus on providing information and incentives to encourage energy efficient new construction and retrofits to existing buildings. These efforts will be supported by provincial building codes that are evolving to reduce energy demand in buildings.[16]

Challenges:

- Public awareness and lifestyle choices (e.g., people like big homes with lots of space to accommodate "toys")
- Large transient worker population and absentee landowners create housing challenges (i.e., lack of long-term vested interest in property means residents won't necessarily see the benefits of energy improvements over time).
- Limited staff resources to administer and enforce building regulations / approvals.
- Lack of local knowledge and supply of home energy efficiency solutions and site-scale renewable technologies

Opportunities:

- Use City's water efficiency program as a model to improve energy efficiency in existing buildings.
- Rationalize or optimize building use or occupancy
- Look for ways to tie costs and savings from energy efficiency improvements to the house (e.g., through local improvement charges or revitalization tax exemptions)
- Public sector to develop examples of energy efficient buildings
- Invite suppliers to trade show focused on energy efficient buildings and site-scale renewable technologies

Goal: *The City of Fort St. John will improve the energy efficiency of buildings in Fort St. John*

[16] Prior to the recent building code updates (effective September 2008), a "built to code" detached dwelling home would have achieved an EnerGuide for Houses (EGH) rating of between 68 and 72. Under the new code, detached dwellings are targeted to achieve EGH 77. As articulated in the BC Energy Efficient Buildings Strategy, the Province aims to reduce energy demand by 9% per square metre by 2020 (commercial buildings) and by 20% by 2020 (residential buildings).

Strategy B-1: Increase energy efficiency standards for new construction

Description: Prior to recent building code updates (effective September 2008), a "built to code" detached dwelling home would have achieved an EnerGuide for Houses (EGH) rating of between 68 and 72. Under the new code, detached dwellings are targeted to achieve EGH 77. The province is looking to further increase requirements for new homes to EGH 80 by 2011. To complement these regulatory activities, the City may consider outreach and incentives are the principle focus of this strategy, which calls on the City to articulate desired energy efficiency and sustainability features of new construction (building on the Winter City Design Guidelines) and to communicate these to the development community. The strategy also includes consideration of possible incentives to further encourage energy efficient and sustainable development in Fort St. John.

City Role: The City's role in this strategy is to articulate the desired sustainable features for new construction in Fort St. John and to communicate this to local builders and developers. Engaging in these discussions will assist the City in understanding issues faced by the development community, which may allow for the development of locally-appropriate opportunities and incentives to encourage more energy efficient buildings. There is also an opportunity for the City to lead by example through the development of sustainable, energy efficient municipal buildings and facilities.

Partners: Local builders and developers, as well as students studying residential construction at Northern Lights College, are key partners in this strategy. Additionally, partners such as the Province of BC, BC Hydro, and Solar BC may provide information and incentives to advance energy efficiency in new buildings. Finally, building rating systems such as Leadership in Energy and Environmental Design (LEED) and EnerGuide could play a valuable role in increasing awareness of sustainable and energy efficient buildings though outreach to promote these rating systems would be required.

Related Actions:

- # 4 Include energy and water efficiency guidelines in DPAs
- # 5 Establish DCC Bylaw
- # 13 Establish a Revitalization Tax Exemption
- # 16 Develop a Sustainable Development Checklist
- # 17 Offer DCC & Permit rebates

- # 20 Developer / builder community workshops

Strategy B-2: Retrofit existing buildings

Description: There are 6,870 existing residential dwellings in Fort St. John, which account for approximately 18% of GHG emissions in the community. Over 75% of these dwellings were built prior to 1980 when energy requirements were less stringent. As a result, these older homes may have deterioration of air sealing, inefficient furnaces and water heating appliances, all of which contribute to increased energy consumption and GHG emissions. These dwellings represent a significant opportunity to improve energy efficiency and reduce emissions. This strategy looks at ways to encourage homeowners, landlords and property managers to improve the energy performance of residential buildings.

Similarly, the existing stock of commercial buildings accounts for 15% of GHG emissions in Fort St. John and presents opportunities for improvement. This strategy promotes existing programs and incentives to commercial building owners and managers in an effort to increase uptake of these programs and create a more energy efficient building stock.

City Role: The City's role in this strategy ranges from partnership-building and outreach, to the design and provision financial and non financial of incentives.

Partners: Information and incentives already exist to support the residential and commercial sectors in improving the energy performance of buildings. The Province of BC, the federal ecoENERGY program, and BC Hydro offer programs that will compliment the City's efforts to encourage retrofits.

Related Actions:

- # 17 Offer DCC & Permit rebates
- # 18 Promote the ecoENERGY for Homes Program
- # 20 Developer / builder community workshops

Strategy B-3: Affect change in building occupant behaviours

Description: Building retrofits and energy efficient new building construction represent only a portion of the opportunity to reduce energy and GHG emissions. The energy used within a building depends, to a large extent, on the behaviours of the people occupying the building. Research has demonstrated a 50% reduction in energy consumption, simply by changing the occupants. Therefore, this strategy focuses on outreach and education to increase public awareness of these issues and ultimately, change building occupant behaviours. There is significant opportunity for the City to demonstrate leadership in this area through the implementation of energy management programs in municipal facilities. These efforts could be visually displayed and communicated broadly to visitors to these facilities in an effort to raise awareness of energy conservation. To take these efforts a step further, the City may wish to develop partnerships to encourage other local businesses and organizations to follow suit (e.g., initiate a conservation challenge that would recognize organizations that implement energy management activities).

City Role: The City can contribute to this strategy through leading by example – implementing and broadcasting energy management activities in municipal facilities, reducing consumption, communicating the results at these facilities, encouraging other local organizations to follow suit, and recognizing these energy conservation efforts.

Partners: Partners in this strategy would be involved in outreach and promotion and might include BC Hydro (i.e. Team Power Smart[17]), the school district and local schools (educating youth and sending them home with information is an effective way of getting adults to take action), local media, real estate, and local businesses and organizations.

Related Actions:

- # 20 Developer / builder community workshops
- # 28 Appoint an energy manager / sustainability coordinator

[17] In an effort to make BC energy self-reliant by 2016, BC Hydro launched Team Power Smart which is a call to action for all British Columbians to join together and reduce their energy consumption. Individuals join online, pledging to reduce their electricity consumption by 10%. (http://www.bchydro.com/powersmart/)

Theme: Solid Waste

Solid waste accounts for approximately 14% of GHG emissions in Fort St. John. These emissions occur as a result of the decomposition of solid waste, which release greenhouse gases (primarily methane) into the atmosphere. Efforts to divert waste from the landfill will assist in reducing emissions from solid waste. Currently, curbside collection of recyclables is offered on a voluntary, user-pay basis. Otherwise, residents can choose to transport their recyclables to a depot. Organics collection is not currently offered, though some residents may choose to compost organics at home. Opportunities to divert solid waste should be pursued in partnership with the Regional District, and must include outreach and incentives to encourage residents to reduce, reuse and recycle.

Challenges:

- Lifestyle choices and consumption habits that increase waste in the community
- Limited size and space at current landfill, and difficulties involved in siting a new one (e.g., proximity to residential areas, truck traffic, noise and odour pollution, etc)
- Lack of subscription to current curb side recycling and organics collection programs

Opportunities:

- Outreach/education and incentives to encourage and simplify efforts to reduce, reuse, recycle, compost, etc
- Reusable bag campaign (to reduce or eliminate the use of plastic bags)
- Integrated resource recovery, waste-to-energy and biomass conversion opportunities
- Partnerships with Regional District to tackle solid waste issue

Goal: *Consider the life cycle impacts of our purchasing decisions and work towards becoming a waste free community.*

Strategy W-1: Improve waste diversion opportunities

Description: This strategy requires the City to work in partnership with the Regional District to improve opportunities for residents and businesses to divert waste from the landfill. Outreach and incentives will help to increase participation in recycling and composting programs. Additional partnerships with local businesses and retail outlets may assist in creating a culture around reducing, reusing and recycling. Several useful resources exist within the region to assist in these efforts, including the NEAT website,[18] Eco Depot website,[19] and the Peace Region Waste Reduction website.[20]

City Role: The City's role in this strategy is to get involved in outreach around waste reduction. Working in partnership with the Regional District and local retailers, the City can explore opportunities to provide incentives to residents to encourage waste reduction, recycling and composting. Examples include a user pay system for garbage collection (i.e. the more bags you put out at the curb, the more you pay), user pay systems for plastic bags at retail outlets, and reverse incentives (e.g., recycling at no cost, garbage collection at higher cost).

Partners: Key partners in this strategy are the Peace River Regional District (and member municipalities), NEAT, Eco Depot, local retailers, and the Chamber of Commerce, which could promote the development of waste management and recycling businesses in the region.

Related Actions:

- # 22 Promote product exchange / resale networks
- # 24 Undertake a recycling and composting awareness campaign
- # 26 Explore a community-wide recycling pick-up program

[18] http://neat.ca/

[19] http://www.ecodepotrecycling.com/index-1.html

[20] http://www.prrrdy.com/

Theme: Alternative Energy Supply

Alternative technologies exist for providing electricity, space and water heating requirements to buildings. Examples include: solar photovoltaic (PV) panels, ground source heat pumps, district energy systems, and Integrated Resource Recovery (an approach that seeks to capture energy from waste streams). Many of these technologies are not yet widely deployed (though many are fully commercialized). The major barrier is that there exists a real or perceived financial cost associated with incorporating these technologies which may not be recovered by the developer in the sale of the units. Opportunities to provide incentives that tie the cost of the alternative energy system to the home, can help to break down these barriers and encourage action. Preliminary research was conducted to provide the City with an overview of alternative energy technologies and to identify potential opportunities for further investigation. This research, presented in Appendix C, helped to inform the development of strategies in this theme area.

Challenges:

- Lack of local knowledge, expertise and suppliers to support transition to alternatives
- Public perception that payback periods are long (i.e., business case is lacking)
- Cheap price and perceived abundance of conventional energy sources

Opportunities:

- Promote existing programs and incentives that support transition to renewable
- City to show leadership with demonstration projects and exploration of district energy opportunities
- Encourage development of local expertise (i.e. economic development opportunity)
- Capitalize on funding opportunities to invest in developing renewable energy resources in the community.

Goal: *The City of Fort St. John will advance implementation of alternative technologies and truly position Fort St. John as "The Energetic City."*

Strategy E-1: Encourage implementation of renewable energy

Description: Based on the 2007 Community Energy and Emissions Inventory and on current energy prices, Fort St. John (residents, businesses, etc) spends over $90 million on conventional energy supply annually. Of this amount, approximately 98% leaves the community. Securing energy sources locally can help to maintain jobs and wealth in the community and as such, should be seen as a key opportunity for local economic development.

This strategy builds on the alternative energy resources research and proposes specific activities that the City can undertake with community partners to encourage the implementation of alternative energy technologies by residents, businesses and organizations.

A range of alternative and renewable opportunities exist in Fort St John. Key opportunities for Fort St. John (as identified in Appendix C) include:

- **Load reduction** – building retrofits, improved building energy standards and guidelines, and fuel choice;
- **District energy systems** – explore opportunities for district energy in the downtown and in new neighbourhood developments (e.g., Greenridge Heights). Renewable feedstock options might include wood waste (Canfor OSB plant), agricultural residues (biomass or waste-to-energy plant), and Integrated Resource Recovery (e.g., recovery heat from wastewater);
- **Solar thermal** - Passive solar is already reducing space heat in most homes by about 20%. Having one of the best solar regimes in the province, passive solar heating for homes and buildings is both technically feasible and financially viable. Existing homes can capitalize on solar gain through simple behavioural changes such as opening curtains to let sun in during the day. Optimizing the design of glazing, building overhangs and envelopes will allow retrofits and new buildings to maximize solar gain.

City Role: The City can encourage the development of renewable energy sources through outreach, incentives and policy development. Outreach could be done in partnership with local and provincial organizations using existing information (from BC Sustainable Energy Association (BCSEA), SolarBC, etc). Incentives for the City to consider include revitalization tax exemptions (amortization of implementation costs through property taxes) as well as partnerships with other levels of government and organizations such as BC Hydro offering rebate or incentive programs. Policies to articulate the desire to develop renewable alternatives might include design guidelines that state the importance of

building orientation to take advantage of solar potential, or a bylaw to define alternative energy systems and permit their use in all zones.

Partners: Key partners in this strategy include the BCSEA, SolarBC, NEAT, Peace Energy, the Province of BC, the federal government (Natural Resources Canada, Canada Mortgage and Housing Corporation), BC Hydro, the Chamber of Commerce and local developers and entrepreneurs. Additionally, the City may want to establish partnerships to demonstrate the use of alternative energy technologies through pilot projects.

Related Actions:

- # 5 Establish DCC Bylaw
- # 13 Establish a Revitalization Tax Exemption
- # 15 Rebates for solar hot water heaters
- # 16 Develop a Sustainable Development Checklist
- # 17 Offer DCC & Permit rebates
- # 19 Package, communicate information on solar solutions
- # 20 Developer / builder community workshops

Strategy E-2: Develop district heating opportunities

Description: District heating is a system for distributing heat generated in a centralized location for residential and commercial heating requirements such as space and water heating. This strategy includes actions to explore the potential for district heating, and to find funding sources and partners to support implementation.

City Role: Education/demonstration, finding funding partners and creating the built and regulatory environment to support it. The City can also be a partner in the energy utility created. Many district energy systems in Canada are developed with input of the community. Revelstoke, Vancouver, Whistler and Gibsons all have recently developed systems where the local government has played a role.

In addition to reducing emissions in the community, District energy systems contribute to local economic development, and downtown revitalisation. District energy systems are

increasingly viewed as a key GHG mitigation strategy and as such opportunities to obtain infrastructure and sustainable community grants are contingent on city involvement.

Partners: P3s, PRRD, Province, First Nations, Neighbouring communities, Industry (Canfor, Peace Valley OSB, Oil and Gas), Federation of Canadian Municipalities, Infrastructure Canada, Terasen Gas, BC Hydro

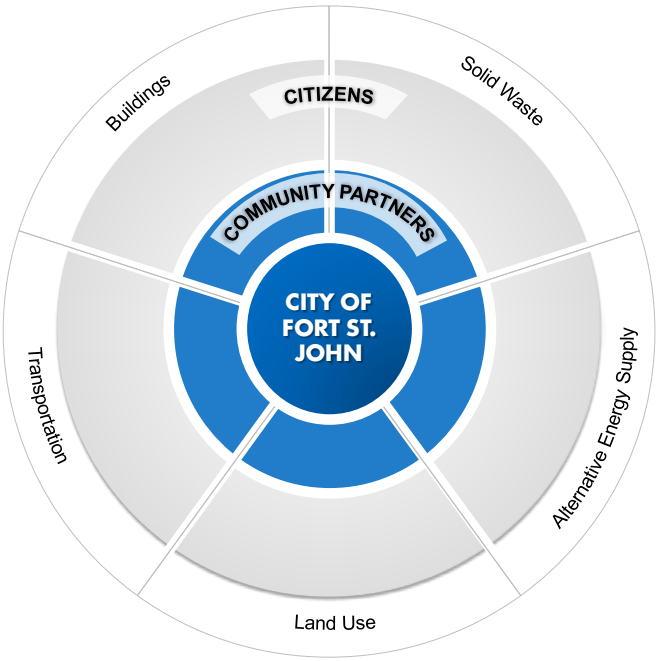
Related Actions:

- # 5 Establish DCC Bylaw
- # 6 Establish pedestrian- and biking-friendly standards
- # 16 Develop a Sustainable Development Checklist
- # 20 Developer / builder community workshops
- # 25 Explore a district energy system for Greenridge Heights the area around the Enerplex, and the Downtown

6. How will we get there?

6.1 A Three-part Partnership

As a local government, the City of Fort St John can use certain powers granted by legislation and within their mandate to help direct the future of the community. To mobilize action on Energy and Emissions, the City should work jointly with its partners and residents.



Through this CEEP process, residents indicated that the issue of energy and climate change was very important to the community. Residents also indicated that they are already taking action or are willing to do so in many areas (see survey results in Appendix D). This indicates that residents are willing to do their part with the necessary information and leadership to guide them.

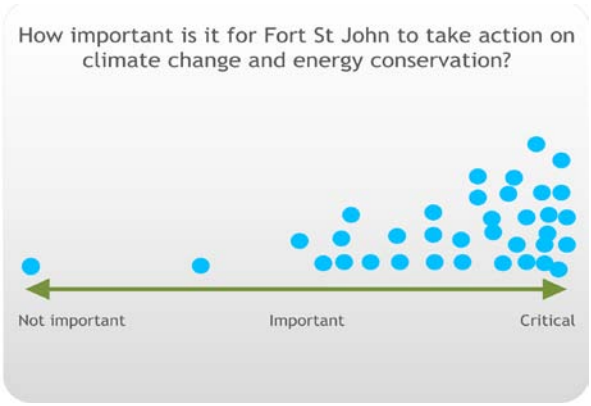


Figure 11: Results from the October Climate Café, indicating importance of energy and climate change to residents

The City of Fort St John acts as the lead agency coordinating and monitoring the implementation of the CEEP. While the CEEP identifies actions that fall within the City's mandate, it also identifies actions that rely on partners to succeed. The City's role is to help coordinate various efforts and partners in the community around the issues and specific actions that fall outside of its mandate. Through the CEEP process, a number of community partners already participated (see Appendix D) and during the final meeting, the majority of partners indicated their willingness to participate on an ongoing basis with the City to address the energy and climate change challenges.

6.2 Recommendations

The tools available to the City to generate change can typically be characterised as:

- **Regulatory** – such as OCPs, Zoning Bylaws, Idling Reduction Bylaw, etc., which establish policies and regulations that will shape the actions of others, by setting parameters which support community objectives.
- **Incentive / Financing** – encourage a desired activity by remuneration (financial) or by promising some other desired reward.
- **Awareness / Outreach** – education and awareness building in order to foster an environment where a behavior change is possible.
- **Process / Investigative** – ongoing process for supporting and maintaining the plan and its implementation, as well as exploratory actions that require more study and investigation

Each of the recommendations is briefly described below and a cross reference to the related strategy is provided in cryptic form. For a full list of Strategies and Recommendations, please refer to Appendix E.

Regulatory Tools

1 Adopt emissions target in OCP

Related Strategy: NA

To meet Bill 27 legislation, the emissions target proposed in the CEEP should be formally adopted in the Official Community Plan.

2 Update OCP policies to meet sustainability objectives

Related Strategy: L1, L2

The OCP needs to be aligned with the community feedback from the 'Our Bright Future' initiative and to reflect the community's commitment to sustainable land use patterns. Key objectives to consider in the policy update:

- Encourage neighbourhood 'nodes' (a more distributed network of smaller nodes to access amenities and basic needs)
- Encourage greater mix of housing types (alternatives to single family housing)
- Encourage infill and direct redevelopment to the downtown
- Encourage infill and densification of the community, particularly downtown
- Encourage alternative modes of transportation (transit, biking, walking)
- Revitalize the downtown

3 Establish growth concentration boundary in OCP

Related Strategy: L1

Review the City boundary and identify, in consultation with the Regional District, strategies and policies for directing growth to desired areas and to limit sprawl in surrounding agricultural areas. Policies to establish, implement, and review the growth concentration boundary should be set out in the Official Community Plan. This boundary can be determined through a range of factors such as infrastructure capacity.

4 Include energy and water efficiency guidelines in DPAs

Related Strategy: B1

Update existing DPAs guidelines to include energy and water conservation considerations for new development. This can include guidelines for landscaping, the siting of buildings (such as solar orientation) and exterior aspects of buildings, but not any guidelines contained within a building (such as low flow fixtures and efficient appliances).

5 Establish DCC Bylaw

Related Strategy: B1, E1, E2

Development Cost Charges are one time charges that local governments can levy development at the time of approval. DCCs shift financial responsibility for providing capital costs for off-site infrastructure from the general tax base to the developers of new growth requiring the infrastructure. DCCs enable local governments to encourage climate-friendly development though incentives (see section on incentives).

6 Establish pedestrian- and biking-friendly standards

Related Strategy: T2, E2

Establish pedestrian-friendly and biking-friendly standards in the Subdivision & Development Servicing Bylaw. The objective is to create environments that are less

focussed on cars, so road widths, sidewalks, street trees, etc. are important aspects of inviting alternative modes.

7 Establish Idling Reduction Bylaw

Related Strategy: T1

The bylaw can apply to certain zones where idling is common, such as schools, drive-throughs, downtown etc.

8 Establish CD zones, mixed-use zones and infill areas

Related Strategy: L1, L2

Zoning can play a key role in shaping land use patterns that directly impacts emission and energy use. Comprehensive development zones (CD zones) can be useful for larger development sites with a mix of proposed land uses. This zoning can provide opportunities for creative negotiation between the local government and developer to create a feasible development plan that meets local climate action objectives. Mixed use zones increase the opportunity to layer various uses vertically, thus increasing density and proximity of services to residents. The Zoning Bylaw should also indicate strategic areas where infill is encouraged though secondary suites and redevelopment.

9 Develop an alternative transportation network plan & map

Related Strategy: T2

The city has an extensive network of trails in the community. To encourage residents to use non-vehicular means of travel, a coordinated plan and map is needed to identify necessary routes and connectivity challenges. This could be done as a part of a Parks and Trails Master Plan for the community. The map can be a useful communication tool for people to know where they can find trails and connections to their destinations.

Incentive & Financing Tools

10 Establish an alternative transportation infrastructure reserve fund

Related Strategy: T2

Bill 27, 2008 provided local governments increased authority with respect to varying off-street parking requirements. Local governments may now exempt or reduce the amount of off-street parking required based on activities or circumstances related to the transportation needs associated with the land or building. For example, co-operative car share arrangements, buildings situated close to public transit, or the provision of additional bicycle parking are all alternative transportation features which could result in a reduced need for off-street parking. Local governments can now accept cash in-lieu of those

parking spaces and put it into an "alternative transportation infrastructure reserve fund". The reserve fund can be used to provide transportation infrastructure that supports walking, bicycling, public transit or other alternative forms of transportation.

11 Improve pedestrian and transit amenities

Related Strategy: T2

The City will work to improve opportunities for alternative (and active) forms of transportation and mobility. This could be accomplished through the following activities:

- Adding bike lanes to the road network or designating certain streets (not main streets) for bicycle traffic;
- Improving the existing trail network and creating linkages so residents can use it to get from A to B, rather than just for recreational purposes;
- Providing bicycle racks and end-of-trip facilities (e.g., lockers, showers, etc) at municipal facilities, and encouraging others to do the same via the Sustainable Development Checklist;
- Enhancing services that increase pedestrian mobility in the winter (e.g. snow removal from sidewalks);
- Communicating the lifestyle and financial benefits of public transit and active transportation, through promotion of programs such as the "Commuter Challenge" and "Bike to Work Week," and the "Walking School Bus."
- Improving bus shelters, lighting and seating around bus stops (to provide greater year-round comfort and accessibility to public transit users).

The City, in partnership with BC Transit, will explore opportunities to increase transit availability in Fort St. John, focusing on making improvements to existing transit services (rather than reallocating services) and adding services strategically as opportunities arise.

12 Allow Amenity Density Bonuses

Related Strategy: L1

During rezoning applications, Density Bonuses enable developments to surpass the allowable Floor Area Ratio (FAR) set within a particular zoning category in exchange for amenities (such as park space and heritage preservation), affordable housing, or for greener development and high performance "green" buildings. The impacts of increased density on services and the neighbourhood should be carefully considered. Density bonuses must be established in the Zoning Bylaw and set out the specific conditions needed in order to receive the increased FAR.

13 Establish a Revitalization Tax Exemption

Related Strategy: B1, E1

The Community Charter allows that a revitalization tax exemption may be offered for purposes of energy and water conservation. Municipalities must clearly define the

revitalization program in a bylaw. For example, a property tax exemption might be structured as X % for 5 years, for new homes that meet a standard of EnerGuide 80 (for detached dwellings) or LEED (rating to be defined) for commercial and multi-family buildings. The objective of this action is to create financial value for building "green" that stays with the property owner (as oppose to occupants / renters). This value can be used by builders as a marketing tool for the extra features of the energy efficient home and provides a clearly definable 'value' to offset any incremental cost to the homebuyer.

Resource: www.cserv.gov.bc.ca/LGD/gov_structure/library/community_charter_revital_tax_exemptions.pdf

14 Preferential parking for low-emission / car co-op vehicles

Related Strategy: T1

The City will investigate opportunities to provide preferential parking spaces to low emission vehicles (e.g., compact cars, hybrids, car co-op vehicles, car or van pools, etc) throughout the downtown area and work in partnership with large retailers and property owners to do the same in private parking lots (e.g., Totem Mall, Canadian Tire, etc). This action is intended to provide residents with a non-financial incentive to drive smaller, more fuel efficient vehicles.

In this way, residents that choose carbon-friendly modes of transportation are rewarded, as opposed to a more punitive approach such as increasing parking fees in the downtown area to discourage residents from driving downtown. It also recognizes that improvements to alternative transportation infrastructure take time and until these options become more viable and attractive to residents, there will continue to be a need to drive personal vehicles around town.

15 Rebates for solar hot water heaters

Related Strategy: E1

Residents expressed a willingness to invest in solar hot water systems given a certain degree of support from the City. This action – modelled on the City's successful water conservation program, which offers rebates to residents that install low flush toilets – requires the City to investigate the potential to offer a rebate to residents that install solar hot water systems. The City may wish to test such a program by allocating a small amount of funds in the first year (e.g., $10,000) and offering larger rebates to the first residents to install a solar hot water system (e.g., 10 or 20 rebates of $500 or $,1000). The cash rebate would be granted following an inspection of the newly installed system.

In addition, the City will communicate existing programs that provide incentives for solar hot water systems (see Action 20), which could greatly assist residents in covering the costs associated with purchase and installation.

16 Develop a Sustainable Development Checklist

Related Strategy: L1, L2, T2, B1, E1, E2

Local governments are encouraged to establish administrative policies that give consideration for development applications for projects that achieve lower emissions. To enable the City to better access and evaluate development applications against the city's sustainability objectives, it is recommended that a Sustainable Development Checklist be developed.

Example: *www.portcoquitlam.ca/__shared/assets/Sustainability_Checklist2040.pdf*

17 Offer DCC & Permit rebates

Related Strategy: L1, L2, B1, B2, E1

The City should offer Building and Development Permit rebates for development that meet a certain level of standard. This standard could be established though a Sustainable Development Checklist (see # 16) or be recognised green building standards, such as LEED. Various levels of rebates can be established based on various levels of performance. A good Development Cost Charge (DCC) Bylaw also provides financial incentives for development with lower infrastructure capital costs (such as higher density, infill or centrally located development). Bill 27 also enables local governments to waive or reduce DCCs for low environmental impact development patterns and small lot subdivisions meant to reduce GHG emissions.

18 Promote the ecoENERGY for Homes Program

Related Strategy:B2

The ecoENERGY Retrofit – Homes program is designed to help homeowners and owners of existing low-rise properties make smart energy retrofit decisions that will result in significant energy savings and a cleaner environment. The first step in participating in the ecoENERGY Retrofit – Homes program is to call for a professional energy assessment provided by an energy advisor certified by Natural Resources Canada (NRCan). The advisor will perform a pre-retrofit assessment of the home and provide home owners with a personalized action checklist of upgrades that will reduce energy consumption and give the owner access to rebates for the improvements made. Given the large percentage of low-rise, existing building stock in Fort St John, the incentives to encourage home owners to take action on retrofitting their homes will be crucial.

Outreach/ Awareness Tools

19 Package, communicate information on solar solutions

Related Strategy: E1

Fort St. John has an annual photovoltaic (PV) potential of 1100-1200 kWh/kW[21] (among the highest in BC) and gets approximately 2000 hours of sunshine annually[22]. This is more than enough to support solar energy systems, as the supply of solar energy comes from the light generated by the sun, rather than from direct sunlight. According to SolarBC, even cloudy days can provide enough energy for up to 60 percent of domestic hot water needs[23]. SolarBC provides information and incentives to support the installation of solar hot water systems in homes, communities, government buildings, First Nations communities, social housing, and schools. Additional resources include Northern Lights College, which is currently providing the two-day classroom theory to become a Canadian Solar Industries Association (CanSIA) certified installer. The City of Fort St. John will promote the installation of solar hot water systems to residents through the provision of pre-existing information from SolarBC and via the Sustainable Development Checklist (see Action # 16).

20 Developer / builder community workshops

Related Strategy: L1, L2, B1, B2, B3, E1, E2

The energy and emissions attributed to buildings and the enormous potential to reduce emissions from both the existing building stock and new development highlights a need to strengthen relationships with the local development community in order to maximize this opportunity. The City will look to partner with home building retailers and other organizations (e.g., Canadian Home Builders Association) to reach out to local builders and developers through workshops that discuss green building products and opportunities to retrofit and develop more sustainable and energy efficient buildings.

[21] This is an estimate of the electricity that can be generated (in kWh/kW) by grid-connected photovoltaic arrays without batteries. Natural Resources Canada, Photovoltaic Potential and Solar Resource Maps of Canada, 2009. https://glfc.cfsnet.nfis.org/mapserver/pv/index.php?lang=e

[22] Atlas of Canada Sunshine Maps, 2003. http://atlas.nrcan.gc.ca/site/english/maps/archives/3rdedition/environment/climate/020

[23] http://www.solarbc.ca/

21 Establish a carpool / ride-share information portal

Related Strategy: T1, T2

The City will explore opportunities to work with large employers both inside and outside the municipal boundary (e.g., Canfor, Peace Valley OSB, oil and gas companies, etc) to establish a carpool/ride share website. The site will assist residents in accessing and sharing information regarding car pooling options to minimize single occupancy vehicle commutes in Fort St. John. The site will need to be widely promoted by the City and employers.

Additional incentives for those choosing to carpool could also be investigated in partnership with large employers (e.g., preferential parking spaces for car or van pools (see Action 14), more flexible work hours to allow carpools extra time to get to-from work, etc).

22 Promote product exchange / resale networks

Related Strategy: W1

As a way to reduce consumption and divert waste from the landfill, the City will investigate the potential to promote or create product exchange and resale networks. This could be done online by creating a local version of websites like Craigslist or Kijiji to encourage Fort St. John residents to sell or give away items (e.g., furniture, electronics, etc). Alternatively (or in addition), an outlet that would allow residents to drop off quality used household goods would also encourage exchange or resale locally.

The Whistler Re-Use It Centre serves as an example. The sale of items from the Re-Use It Centre helps to provide food, emergency funding, and other social service programming in Whistler. In addition, it helps the community to address its sustainability goals (e.g., affordability and zero waste). Similar to Fort St. John, Whistler has a large transient worker population which, rather than buying new household items upon arrival in the community, benefits from having an outlet where they can purchase and return quality used items.

23 Launch an idling reduction outreach program

Related Strategy: T1

Vehicle idling not only increases GHG emissions, but also contributes fine particulate matter to the atmosphere. The latter affects ground level ozone (a contributor to smog), impacting local air quality and public health[24].

A recent study of Canadian driving habits and behaviours[25] identified a number of common misconceptions about idling, some of which include:

- Idling is good for your vehicle because it warms up the engine and keeps it warm;
- With the advanced emissions technology used in today's vehicles, carbon dioxide (CO_2) emissions from an idling vehicle are greatly reduced;
- Restarting my car many times, rather than letting it idle, is hard on the starter and other parts;
- I should turn my vehicle off when I'm caught in stop-and-go traffic or at a long stoplight.

As evidenced by these common misconceptions, a logical starting point to address the idling issue is to increase public awareness through education and outreach.

The City of Fort St. John will install idling reduction signage at all municipal facilities and properties. The City may also wish to consider partnerships to further promote idling reduction (e.g., voluntary idle free zones). The health authority and school district would be logical partners, as would local businesses, including drive through restaurants.

The federal government provides information resources to support communities in idling reduction initiatives, including articles, brochures, checklists and even a guide book to help communities create effective no-idling campaigns[26].

[24] According to the Asthma Society of Canada, approximately 3 million Canadians currently suffer from asthma and urbanization appears to be correlated with an increase in asthma cases over time (Asthma Facts and Statistics, April 2005).

[25] Natural Resources Canada: http://oee.nrcan.gc.ca/communities-government/transportation/municipal-communities/articles/idling-quiz.cfm?attr=28

[26] Anti-idling information resources at http://oee.nrcan.gc.ca/communities-government/transportation.cfm?attr=28

24 Undertake a recycling and composting awareness campaign

Related Strategy: W1

The City will partner with the Peace River Regional District, NEAT and the Eco Depot to deliver outreach and education on recycling and composting opportunities. The PRRD already has a well-developed website (www.pRRRdy.com) that could be promoted to residents to encourage waste diversion opportunities.

The City will also investigate opportunities to further encourage waste reduction. Building on its ongoing work with the Union of British Columbia Municipalities (UBCM) to lobby the provincial government to implement a fee for plastic shopping bags[27], the City should consider implementing a levy on single use plastic bags. While some municipalities have considered implementing a ban on single use plastic bags, most are now pursuing alternative approaches such as awareness campaigns to get retailers to phase out the use of plastic bags or to implement a charge or levy on their use. [28]

Other initiatives to encourage recycling and composting might include:

- Selling backyard composters and offering composting workshops (in partnership with a local garden centre or nursery);
- Promoting tours of the Eco Depot facility;
- Exploring financial incentives or disincentives for waste reduction. For example, charging households per bag of waste disposed, or charging more for waste pick-up and less for curbside recycling collection (note this would also require a partnership with the PRRD).

[27] The City of Fort St. John recommended that the UBCM lobby the Provincial Government to implement a fee for plastic shopping bags with revenue to be distributed to those local governments responsible for solid waste to be allocated towards a plastic bag recycling initiative, awareness program or other initiatives to encourage the use of reusable shopping bags.

[28] The authority of municipalities to enact measures connected with plastic bags originates with the constitutional authority of the provinces, as municipalities have no valid legislative power other than that delegated to them by the provinces. The basis for most plastic bag initiatives stems from municipalities' ability to regulate with respect to waste management, including waste disposal and recycling (http://www2.parl.gc.ca/Content/LOP/ResearchPublications/prb0827-e.htm#jurisdiction)

Process / Investigative Tools

25 Explore a district energy system for Greenridge Heights the area around the Enerplex, and the Downtown

Related Strategy: E2

District Energy is becoming more frequently integrated in new development, particularly in areas well situated to service multiple users. It has significant potential to save users money, conserve resources and reduce pollution. The City should conduct a feasibility study for a district system on the Greenridge Heights site, in conjunction with the hospital, and the area around the Enerplex. Future opportunities should also be explored in conjunction with redevelopment in the downtown area, as density increases. A range of innovative fuel source technologies may be feasible, including waste to energy, agricultural residue utilisation, biomass, and high rate aerobic digestion of sanitary effluent. Once the system is deemed feasible, the City should amend their bylaws to require areas within the specified zone to connect to the DE system.

26 Explore a community-wide recycling pick-up program

Related Strategy: W1

In partnership with the PRRD and Eco Depot, the City will explore the potential to roll out curbside recycling community-wide. The Eco Depot currently offers curbside pick-up of recyclables at the following costs:

- 3-months of service: $15 per month or $45 quarterly
- 6-months of service: $12 per month or $72 semi-annually
- 1-year of service: $12 per month or $144 annually

Residents that don't opt for curbside collection may take their recyclables to a local depot. Working with the PRRD and Eco Depot, the City should evaluate the success of drop off recycling (participation rates or waste diversion rates) and evaluate whether it is worthwhile to roll out curbside collection community-wide (e.g., would curbside collection result in increased waste diversion?).

27 Explore an employer transit program

Related Strategy: T1, T2

A large number of trips are generated to and from work. Trip reduction for these daily trips is a key focus. Explore an incentive program to encourage transit use, including subsidized transit passes for employees and students, shuttles to key work sites.

28 Appoint an energy manager / sustainability coordinator

Related Strategy: NA

An Energy Manager should be hired to champion the CEEP implementation. This person should be reporting to senior management at the City of Fort St John. This person will also promote existing programs to residents and make information available in the community. This person could have a broader scope, being a Sustainability Coordinator, but a key part of their job should be dedicated to the CEEP implementation. Furthermore, the Energy Manager should assist the City in reducing energy and emissions from municipal facilities, thereby addressing the City's commitment to the BC Climate Action Charter[29] and assisting the City in demonstrating leadership to the community.

29 Establish an CEEP implementation committee

Related Strategy: NA

The mandate for energy and emissions falls to numerous agencies in the communities. It requires a partnership effort to move implementation along in all areas effectively. To facilitate the ongoing collaboration required on the topic, an implementation committee should be established to collectively review progress, challenges and opportunities as they emerge. The Committee should be made up of a small group of representative individuals from across the community with the desire, enthusiasm and influence to champion local energy conservation and climate action. During the plan development process, several of the Task Force members expressed a desire to form such a group and identified additional stakeholders to be engaged moving forward. This committee should be initiated and overseen by the City of Fort St John.

30 Monitor progress annually

Related Strategy: NA

The City will use the inventory compiled by the Province (Community Energy and Emissions Inventory) to track energy and emissions moving forward. The CEEI provides a reliable way of monitoring community-wide GHG emissions that will be comparable to other BC municipalities.

Additional monitoring of CEEP actions will be required to ensure progress is made on plan implementation. As much as possible, annual reporting should be streamlined with existing City reporting in order to minimize burden on staff. This reporting could be coordinated by the Energy Manager (for example) and should be communicated to Council and the Implementation Committee on an annual basis. Wherever possible, the City should engage Implementation Committee members in monitoring and reporting on plan actions (for actions that require partnership or community involvement). This will ensure that Implementation Committee members remain engaged and active in the CEEP

[29] The BC Climate Action Charter is a provincial initiative introduced in September 2007 to encourage local governments to reduce energy and emissions from their operations. Participating local governments, including the City of Fort St. John, have voluntarily committed to achieving carbon neutrality in their operations by 2012.

31 Update CEEP in 3-5 years

Related Strategy: NA

As the actions in the CEEP will undoubtedly need to adapt to opportunities and priorities moving forward, the City should conduct a more comprehensive review of CEEP implementation every three to five years, changing and adding actions as necessary. In this way, the Plan becomes a living document that that is useful for ongoing energy and GHG management, as well as longer-term planning. In particular, it is useful to update this plan prior to, or in conjunction with, an Official Community Plan update, given that so many of the land use and transportation decisions in the OCP will have an impact on the CEEP.

6.3 Catalysts for Implementation

Initiating implementation of this plan is very timely. Multiple opportunities are allowing the City and its partners to come together for action. Some catalyst opportunities include:

- Demographics – the young, educated demographic population of the community is driving a greater environmental awareness and expectations of environmental stewardship. The community demographics increase the chance of successful implementation of the CEEP.

- Affordability – as more and more individuals struggle to afford the large single-family homes, the opportunity for introducing alternative housing forms and smaller lots can become a big catalyst for the city in developing a more complete, compact community with a lower energy and emissions footprint.

- Site C – The BC Energy Plan called for BC Hydro and the provincial government to enter into initial discussions with First Nations, the Province of Alberta and communities to discuss Site C. Site C, a potential third dam and generating station on the Peace River, is one of several resource options being considered for meeting B.C.'s future energy needs. Regardless of the decision on whether to proceed with Site C or not, the community of Fort St John has the opportunity though this process to communicate its energy and emissions objectives and to forge stronger partnerships with BC Hydro and the Province around for key showcase projects in the community.

- Downtown redevelopment – there are currently a number of vacant lots in the downtown area, that can be effective catalysts for revitalizing the downtown area while also showcasing energy efficient development standards. The City owns the parking / Old Sew-it-Yourself site, as well as a lot across from the Northern Grand that can be co-developed with the adjacent two privately owned vacant sites. There are also a couple of old gas station sites that can be reclaimed. The Province provides

funding to identify contaminants on these brownfield sites to encourage communities to redevelop these vacant lots.

- Old hospital site – the old hospital site located in the downtown is in a key location for the success and revitalization of the downtown core. This site could act as a demonstration and showcase of greener development.

- Greenridge Heights & new hospital site – the City of Fort St John has embarked on the creation of a sustainable neighbourhood that pilots new strategies in the community. This site can act as a significant catalyst for alternative ways of development in the community, including demonstration of energy efficient construction. The site's location adjacent to the new hospital provides unique opportunities for energy efficiency. The new hospital will be certified as a Leadership in Energy and Environmental Design (LEED) Gold facility that takes energy and emissions into consideration. While construction of the new hospital facility is underway and changes to the facility is limited at this point, there might still be benefit for both the City and its Northern Health partner to pursue strategies for a district energy system to reduce emissions liabilities.

  Based on the high-level analysis, there appears to be a business case for the district energy system. To develop a DE system in conjunction with the hospital plant will require about $2 million in capital. The ROI is about 6% and the payback is about 20 years. Annual (gross) revenue will be about $350,000. The GHG impact on the community (school, community centre and residential units) is 1,080 tonnes per year of emissions reduction, relative to business as usual.

  Should the hospital join as a project partner in the utility, it can help reduce the hospital's carbon liability under Bill 44 regulation. The carbon liability cost for a facility of around 16,750sq meters is estimated at $22,000/year, which has a present value of $366,600.

- Other future development areas – a number of large scale areas that will be developed in the future offer opportunities for demonstration of energy efficient construction practices, opportunities for larger scale renewable systems and resource sharing. In addition to Greenridge Heights and the downtown, described earlier, these areas include the residential lands to the NW, light industrial lands to the SW, Mixed residential-commercial lands to the SE, and the BC Rail industrial lands to the SE. The downtown area and lands around the Enerplex are also offering opportunities for exploring demonstration of strategies though redevelopment / infill projects.

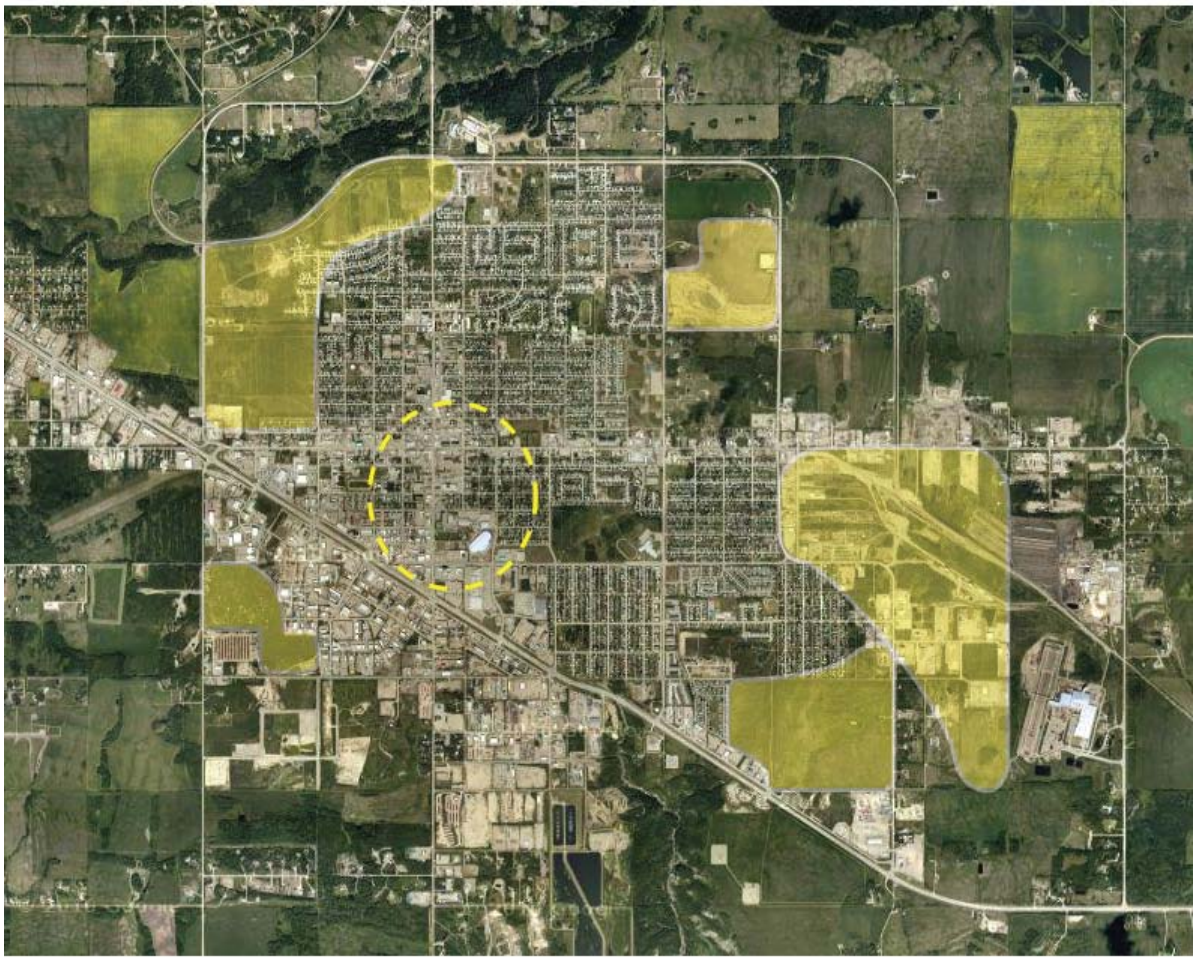


Figure 12: Large future development and downtown redevelopment areas for demonstrating strategies

6.4 Implementation Plan

Each of the 10 strategies was assessed against a number of criteria to evaluate the level of priority for action. It is recommended that all strategies be advanced, as they form a key part of the Energy and Emissions solution, but some priority is established in helping to define the level of effort required towards each strategy area.

	Proposed Strategies	Evaluation Criteria					Priority for action
		Capacity for collective improvement *	Size of market segment	City's ability to influence change	Cost of action	Cost per tonne GHG reduced	
LAND USE							
1	Increase density	Medium	High	High	Low	Low	High
2	Increase diversity of housing options	Medium	High	High	Medium	Low	High
TRANSPORTATION							
3	Change attitudes and behaviours toward the personal vehicle	Medium	High	Low	Low	Low	Medium
4	Improve alternative transportation amenities and services	Medium	High	Medium	Medium	Low	High
BUILDINGS							
5	Retrofit existing buildings	High	Med	Medium	High	Med	Medium to High
6	Increase energy efficiency standards for new construction	High	Low	Low	Low	Med	Low
7	Affect change in building occupant behaviour	High	High	Low	Low	Low	Medium
ALTERNATIVE ENERGY SUPPLY							
8	Encourage implementation of renewable energy	High	High	Low	Low	Med	High
9	Develop district heating opportunities	High	High	Medium	High	Med	Low to Medium
SOLID WASTE							
10	Improve waste diversion opportunities	High	Low	Medium	Medium	Med	High

* "Capacity for collective improvement' is based on feedback received at the stakeholder workshop

For each of the strategies, a number of recommended actions have been identified (see Appendix E). Each of these recommended actions are outlined below, indicating who would be responsible for leading implementation, the timeframe and rough budget estimates of internal costs (staff labour and direct expenses) and external costs (consulting fees). Internal labour cost is assumed at about $95,000 / annum, including salary, benefits and overhead. The timeframe indicates short-term (<3yr), medium term (3-5yr) and long-term (>5yr) priorities. The costs and responsibilities for these actions should be reviewed annually as part of the detailed budget planning process.

#	Action	Responsibility	Timeframe	Internal Costs	External Costs	Comment
1	Adopt emissions target in OCP	Planning	Short-term	$500		Minor edits to OCP to incorporate target. Cost for Public Hearing process not included. Recommend that action be undertaken at the same time as action #4.
2	Update OCP policies to meet sustainability objectives	Planning	Short-term	$15,000 and	$160,000	
3	Establish growth concentration boundary in OCP	Planning	Short-term	NA	NA	Included in action #2 for efficiency.
4	Include energy and water efficiency guidelines in DPAs	Planning	Short-term	$4,000 or	$8,000	Cost for Public Hearing process not included. Recommend that action be undertaken at the same time as action #1.
5	Establish Development Cost Charge (DCC) Bylaw	Planning	Short-term	$50,000		Undertake at same time as action #17 for efficiencies.
6	Establish pedestrian and biking friendly standards	Planning & Engineering	Medium-term	$20,000		
7	Establish idling reduction bylaw	Planning	Medium-term	$15,000		
8	Establish comprehensive development (CD) zones, mixed-use zones and infill areas	Planning	Medium-term	$7,500 and	$15,000	Cost for public engagement and Public Hearing process not included. Most cost effective during Zoning Bylaw update.
9	Develop an alternative transportation network plan and map	Planning	Medium-term	$15,000 and	$100,000	
10	Establish an alternative transportation infrastructure reserve fund	Finance	Short-term	$10,000		
11	Improve pedestrian and transit amenities	Planning & Engineering	Medium-term	$100,000		Cost varies on number of capital improvements made.

#	Action	Responsibility	Timeframe	Internal Costs	External Costs	Comment
12	Allow Amenity Density Bonuses	Planning	Short-term	$500		Some time for Council reports and research. No significant additional cost when included when updating the OCP and the Zoning Bylaws.
13	Establish a Revitalization Tax Exemption	Planning & Engineering	Medium-term	$20,000		Cost for public consultation not included.
14	Preferential parking for low-emissions / car co-op vehicles	Planning & Engineering	Medium-term	$7,500		Labour cost for identifying areas and signage.
15	Rebates for solar hot water heaters	Public Works	Short-term	$25,000		
16	Develop a Sustainable Development Checklist	Planning	Short-term		$7,500	Do in conjunction with OCP update (action #2) for efficiencies in cost.
17	Offer DCC and permit rebates	Planning & Engineering	Short-term	$4,000	and $5,000	Cost for research to benchmarking fees and suggested rebate levels. Do in conjunction with DCC Bylaw for efficiencies.
18	Promote the ecoENERGY for Homes Program	Energy Manager	Short-term	$7,500		Cost for awareness raising in partnership with NRCan. City can consider additional subsidies to cover cost of audits.
19	Package, communicate information on solar solutions	Energy Manager	Medium-term	$7,500		
20	Developer / builder community workshops	Planning & Engineering	Short-term	$15,000		
21	Establish a carpool / ride-share information portal	Energy Manager	Medium-term	$10,000	and $5,000	
22	Promote product exchange / resale networks	Energy Manager	Medium-term	$10,000		
23	Launch an idling reduction outreach program	Energy Manager	Medium-term	$10,000		
24	Undertake a recycling and composting awareness campaign	Energy Manager	Medium-term	$10,000		
25	Explore a district energy system for Greenridge Heights, the area around the Enerplex, and the Downtown	Engineering	Short-term (Greenridge Heights & Enerplex) Long-term (downtown)	$4,000	and $100,000	Cost sharing available though BC Hydro funding. Can be broken into 2 separate parts (a pre-feasibility and feasibility study).
26	Explore a community-wide recycling pick-up program	Planning & Engineering	Medium-term	$15,000		Labour costs for research and meetings.

#	Action	Responsibility	Timeframe	Internal Costs	External Costs	Comment
27	Explore an employer transit program	Energy Manager	Short-term	$15,000		Labour costs for research and meetings.
28	Appoint an energy manager / sustainability coordinator	Human Resources	Short-term	$95,000 / annum		Cost sharing available though BC Hydro. Cost includes benefits and overhead costs.
29	Establish an CEEP implementation committee	Energy Manager	Short-term	$4,000		Labour costs for meetings and Terms of Reference.
30	Monitor progress annually	Energy Manager	Ongoing	$4,000		Labour cost to monitor and report progress to Council annually.
31	Update CEEP in 3-5 years	Planning & Engineering	Medium-term	$4,000	and $60,000	

While the recommended actions might change from time to time as more information becomes available, the strategies provide a more constant direction of what the City is working towards. It is therefore recommended that the 10 strategies be used as the basis for reporting progress to Council and for identifying the action commitments from one year to the next. The appointed Energy manager will be the key person responsible for monitoring and reporting on the CEEP implementation progress. The annual reporting process is an opportunity to review progress on actions and to identify new action priorities for the upcoming year.

Appendix A: Community Profile

Community Profile

Geography

Fort St. John is located on the upland prairies north of the Peace River. Fort St. John is characterized by a wide expanse of flat, gently rolling plains, river-carved valleys covered in aspen, spruce and pine. Wildlife abounds, including elk, moose, deer and bears, which can be often viewed while driving along the Alaska Highway (97) or Highway 29 to Hudson's Hope.

Figure A-1: Map of Fort St. John (municipal boundary in red)

Climate

Fort St. John experiences a cool continental climate, including frigid winters and warm summers. A predominately south westerly wind blows through town, with wind speeds averaging around 13.7 km (8.5 mi).Due to its northerly latitude Fort St. John experiences short daylight hours in the winter and long daylight hours in the summer. The city experiences an average of approximately 76 hours of sunlight per month in winter.

Table A-1: Heating and Cooling Degree Days for Fort St. John and Other Jurisdictions

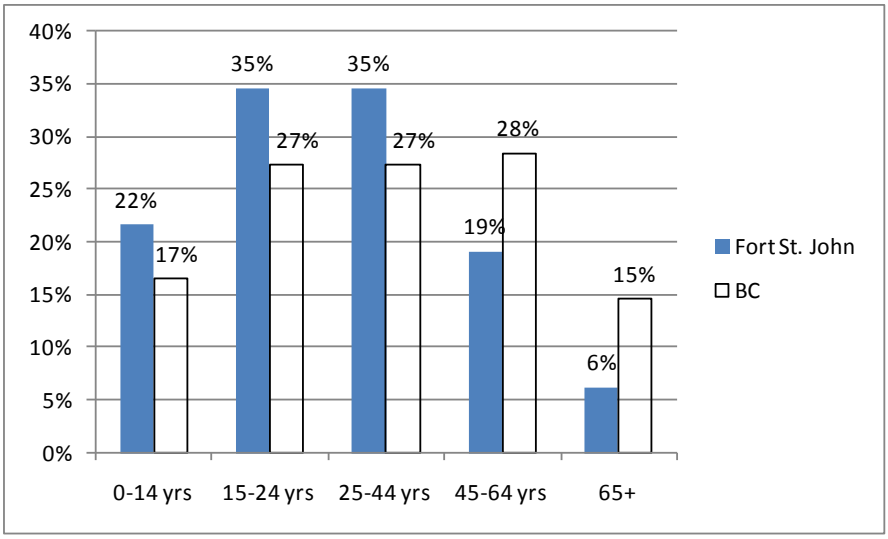
Location	Heating Degree Days (Annual)	Cooling Degree Days (Annual)
Fort St. John	**5847.2**	**27**
Vancouver	2,926	44
Prince George	4,728	40
Whitehorse, YK	6,811	8
Edmonton, AB	5,708	28
Toronto, ON	4,066	252

The severity of the winter results in increased energy use for space heat compared to the coastal climates of BC. The cold weather, particularly from December to March, also limits a range of alternative transportation options. The CEEP has been developed to work with the unique climate and location of Fort St. John.

Population and Dwellings

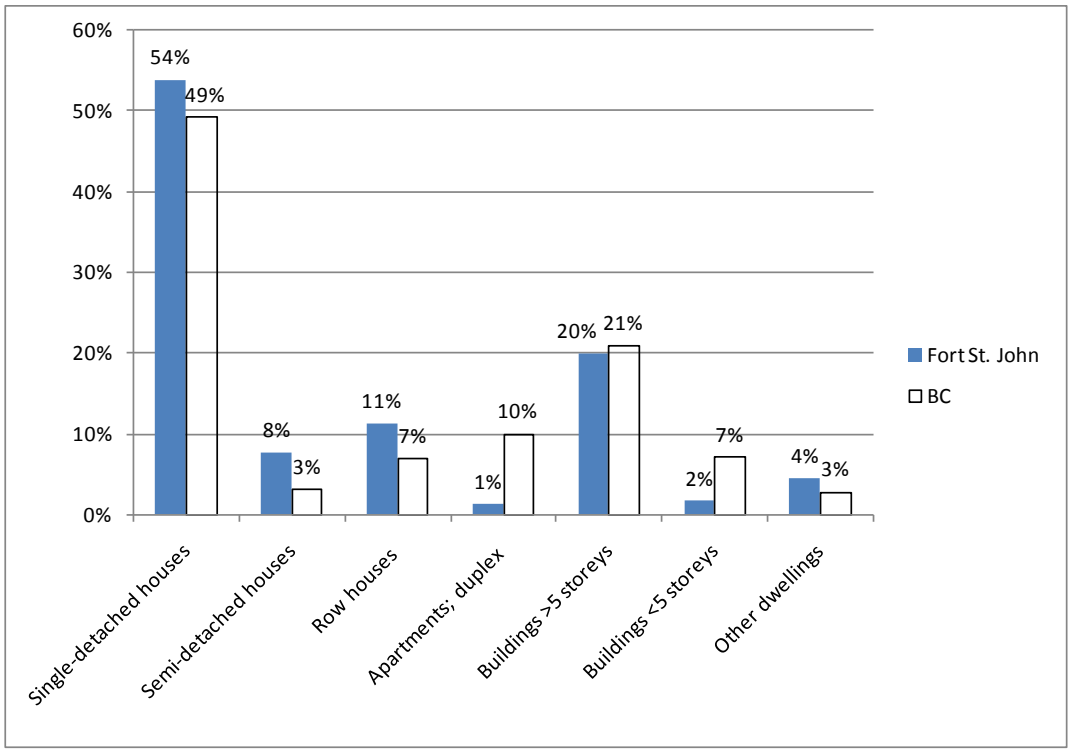
The City of Fort St. John's population in 2007 was 18, 760. Over the last two census enumerations, for 2001 to 2006, the City has experienced an 8.4 % growth rate. A population breakdown (see Figure A-2) indicates that Fort St. John's population contains a higher proportion of residents between the ages of 15 and 24 years, and between 25 and 44 years compared to the BC average, whereas there are fewer residents in the 45 and older age range.

Developing numeric GHG emissions reduction targets in accordance with Bill 27 is a challenge in rapidly growing communities.



FigureA-2: Population by Age Group[1]

The 2006 Census recorded 6,870 occupied dwellings in the community. The predominant housing type is single-detached dwellings (Figure A-3) comprising approximately 54% of existing buildings. The next most prevalent dwelling type is low-rise apartment buildings representing 20% of housing, respectively.



[1] BC Stats Community Profile 2007

Figure A-3: Housing Stock by Type[2]

Approximately 67% of dwellings in Fort St. John are occupant owned, and33% are rented. This is slightly lower than the provincial average of 70% of dwellings that are occupant owned. About 30% of the houses were built before 1970, and over 75% were built before the 1980s. These older homes would have been built to less stringent energy requirements, may have deterioration of air sealing, and likely include older furnaces and water heating appliances. Frequently there is an opportunity for improvements in energy efficiency in older buildings.

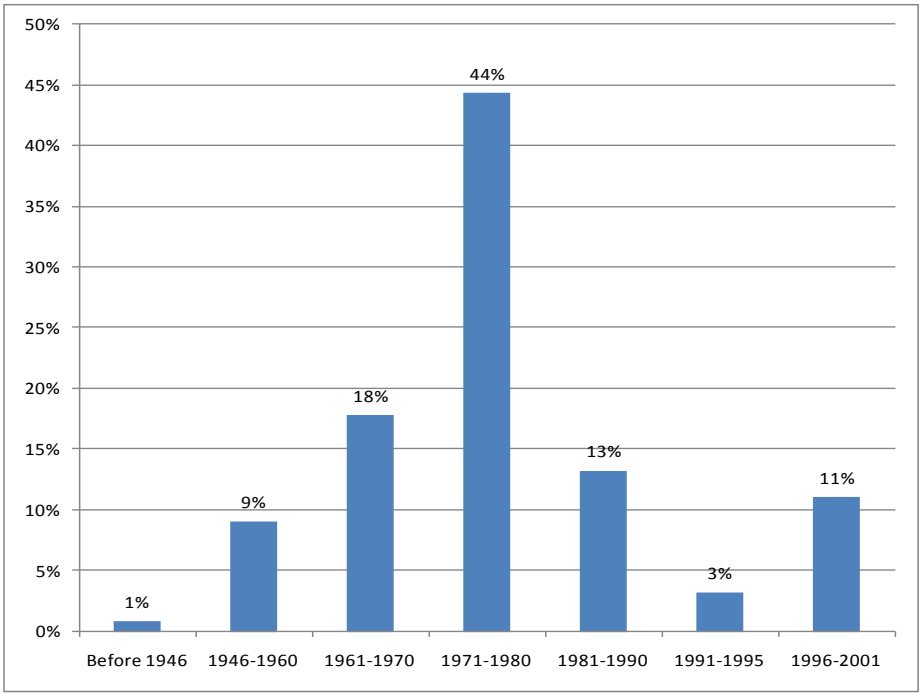


Figure A-4: Housing Stock by Age of Building[3]

New buildings constructed since 1990 represents about 14% of the total stock. Building permits issued since 2001 indicate that development of new single family homes has been fairly consistent over the last decade, and that there was a spike of multi-family housing development in 2007. Overall, there was very little housing development in 2008, which is likely associated with the poor economic climate that year.

[2] BC Stats Community Profile 2007

[3] *BC Stats Community Profile 2007*

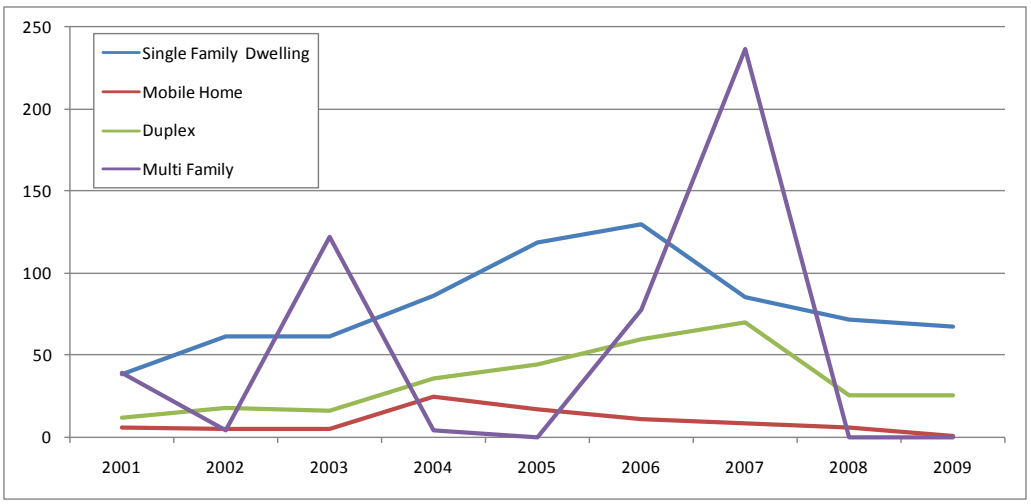


Figure A-5: Building Permits by Housing Type (2001-2009)[4]

Transportation

Transportation options in the City include automobiles, public transportation, cycling and walking. Public transportation is operated by BC Transit on a year-round basis, with three bus routes serving the City of Fort St. John. However, there are limited opportunities for walking and cycling in the winter season, due to snow and cold temperatures. As shown in Figure A-6, single occupancy vehicles account for the largest percentage of commutes (78%) in Fort St. John.

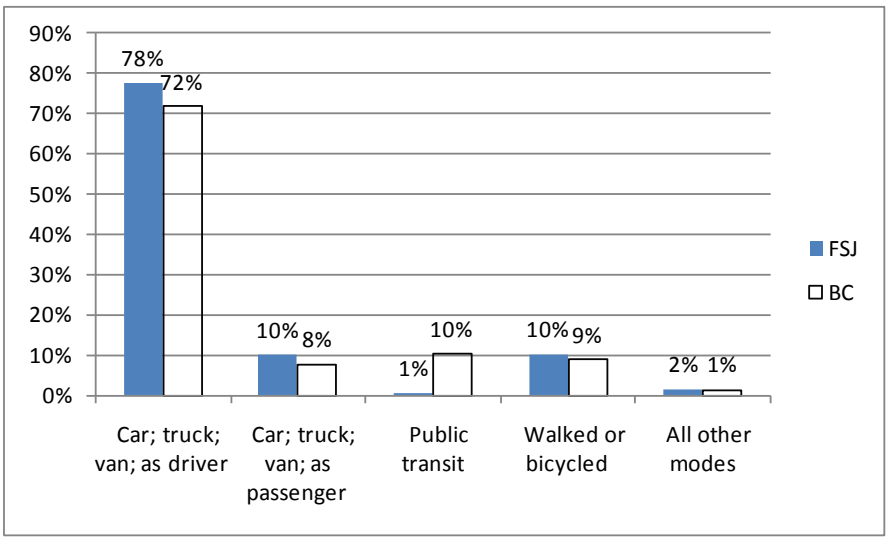


Figure A-6: Transportation Modal Split for Commuters[5]

[4] Information provided by City of Fort St. John, 2009

[5] Statistics Canada 2006 Census Community Profiles (note values may not sum precisely due to rounding)

Economy

Fort St. John is a retail, service and industrial center. The province's oil and gas industry, including the provincial Oil and Gas Commission is centered in the city. Forestry has become more important to the city since the opening of an oriented strand board (OSB) plant in 2005. Agriculture has been a long-term mainstay of the economy servicing and providing a market for the upland prairies. The Peace Region has close to 2.5 million acres in agricultural production making it the largest agricultural region in British Columbia. The region is home to some 1,800 farms, producing well over $100 million worth of product annually[6].

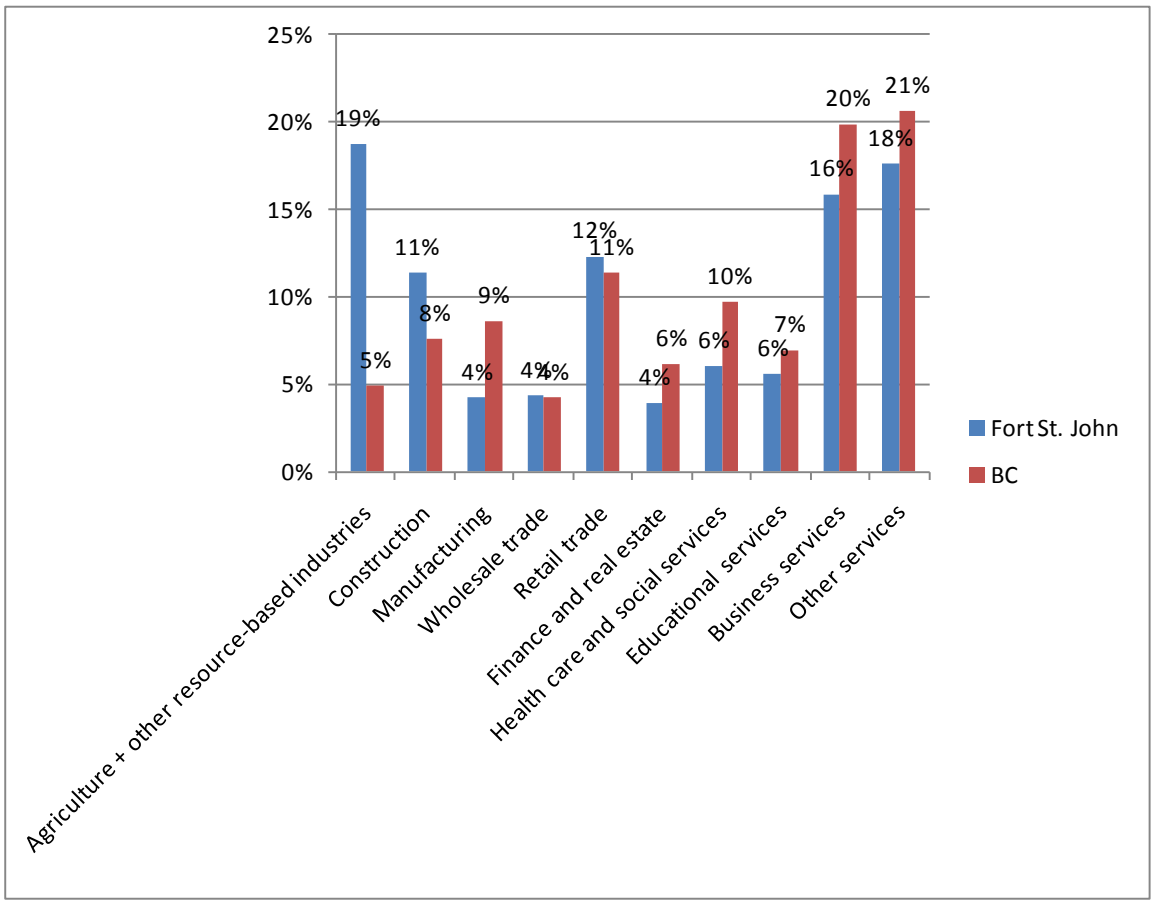


Figure A-7: Economic Diversity in Fort St. John[7]

[6] BC Peace River Grain Industry Development Council website: http://www.bcpeace.com/

[7] Statistics Canada 2009

Appendix B: CEEI Validation and Forecast Methodology

Inventory Validation and Forecast Methodology

Residential

Residential sector GHG emissions from the 2007 Community Energy and Emissions Inventory (CEEI), developed by the Province of BC, were compared with estimates using Statistics Canada 2006 Census of Canada data and energy use intensities from BC Hydro 2007 Conservation Potential Review (CPR) studies[1].

The total number of dwellings in the City of Fort St. John was obtained from the 2006 Census of Canada and compared to the number of utility connections in the CEEI report. The most direct correlation can be made between the Census dwelling counts and the number of electricity connections as most housing units are individually metered. The discrepancy where there are more electricity connections reported by the CEEI than the number of dwelling units may be attributed to instances where individual households have more than one electricity connection. The number of natural gas connections reported by the CEEI is lower than the Census dwelling counts, possibly reflecting the fact that Terasen classifies multi-unit housing as commercial connections and a limited amount of housing in the City of Fort St. John may be heated with alternative fuel sources such as electricity, heating oil, wood or propane.

Data Source	Number of Units
Statistics Canada 2006 Census Dwellings Counts	6,956
CEEI Electricity Connections	7,533
CEEI Natural Gas Connections	5,476

Residential energy consumption was estimated based on Census dwelling counts broken out by structural type and corresponding average energy use intensities for those structural types in the Northern Region from the BC Hydro CPR.

	# Units	Electricity (kWh)	Natural Gas (GJ)	GHG Emissions (tonnes CO_2e)
Total	6,956	61,296	520	28,653
Single-family/Duplex Dwelling, Pre 1976	1,873	11,373	100	9,834
Single-family/Duplex Dwelling, Post 1976	1,918	11,539	90	9,118
Row, Pre 1976	210	9,739	80	885
Row, Post 1976	565	8,635	70	2,085
Low-rise Apartment Units	1,985	5,307	50	5,194
High-rise Apartment Units	105	5,062	50	274
Mobile	300	9,641	80	1,264

[1] Marbek Resource Consultants Inc, Residential Sector Conservation Potential Review, BC Hydro, 2007

The average number of rooms in single family homes was obtained from Statistics Canada's 2006 Census, and the ratio between the City of Fort St. John's value (6.4) and that of the Peace River Regional District (6.7) was used to scale down the energy use intensities to reflect the lesser heating demands of smaller dwellings. The estimates of electricity consumption were within 11% of the CEEI values; 62,361,891 kWh/year as compared to 69,417,261 kWh/year. However, there is a greater discrepancy (25%) between estimated natural gas consumption and CEEI values.

	kWh/yr	GJ/yr	CO_2e/yr
CEEI Electricity Consumption	**69,417,261**	**682,329**	**36,428**
Total	**62,361,891**	**544,770**	**28,653**
Single-family/Duplex Dwelling, Pre 1976	20,342,505	187,300	9,834
Single-family/Duplex Dwelling, Post 1976	21,136,029	172,620	9,118
Row, Pre 1976	2,045,113	16,800	885
Row, Post 1976	4,879,029	39,550	2,085
Low-rise Apartment Units	10,535,233	99,250	5,194
High-rise Apartment Units	531,556	5,250	274
Mobile	2,892,426	24,000	1,264

Commercial

Commercial sector energy and emissions reported in the CEEI could not be verified as there was insufficient data with which to develop a methodology to estimate natural gas consumption in the commercial sector.

Industrial

The energy consumptions and GHG emissions reported by the CEEI could not be verified as there was insufficient data with which to develop a methodology to estimate natural gas consumption in the industrial sector.

Summary

The CEEI provides a reasonably accurate reporting of the community's energy use and emissions attributed to residential electricity consumption. However, given the poor agreement between the CEEI data and the residential natural gas estimate, additional analysis is warranted. Utility data and data from commercial and industrial activity represent potential data sources for further analysis.

Forecast

A business-as-usual (BAU) forecast was developed based on the CEEI inventory, using a population growth rate of 2%. The projected population based on this growth rate is shown below in Table B-1.

Table B-1: Population Forecasts Used as Input

Year	Population
2007	18,385
2015	21,541
2020	23,783
2025	26,258
2030	28,991

Table B-2 and in Figure B-1 show the BAU forecast of GHG emissions to 2030. With no distinct intervention by the City, emissions are expected to increase from 201,455 tonnes CO_2e in 2007 to 261,879 tonnes of CO2e in 2030.

Table B-2: GHG Emissions Forecasted to 2030 (tonnes CO_2e)

Year	2007	2010	2015	2020	2025	2030
Residential	36,428	35,961	35,183	34,405	33,627	32,848
Commercial	30,588	32,497	35,678	38,859	42,040	45,222
Transportation	106,747	109,981	115,372	120,762	126,153	131,543
Solid Waste	27,413	30,587	35,877	41,167	43,458	51,748
Industry	279	310	362	414	466	518

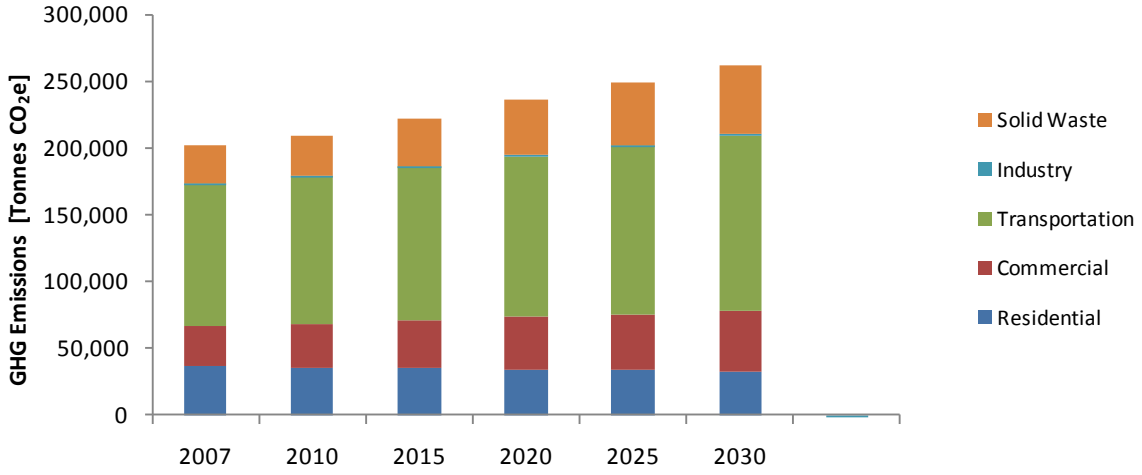


Figure B-1: Business-as-Usual Forecast of GHG Emissions

A BAU forecast for energy was developed using the same population growth rate of 2%. Electricity is expected to increase from 154 GWh per year in 2007 to 243 GWh per year in 2030. Implementing the measures identified in the CEEP is expected to result in a 48% reduction from the BAU scenario, bringing electricity consumption to 126 GWh in 2030 (Table 3).

Table 3: Electricity Forecast and Target

Electricity use, 2007	154 GWh
Electricity Forecast, BAU 2030	243 GWh
Electricity Target, 2030	126 GWh

Figure B-2 shows the business-as-usual forecast for energy to 2030.

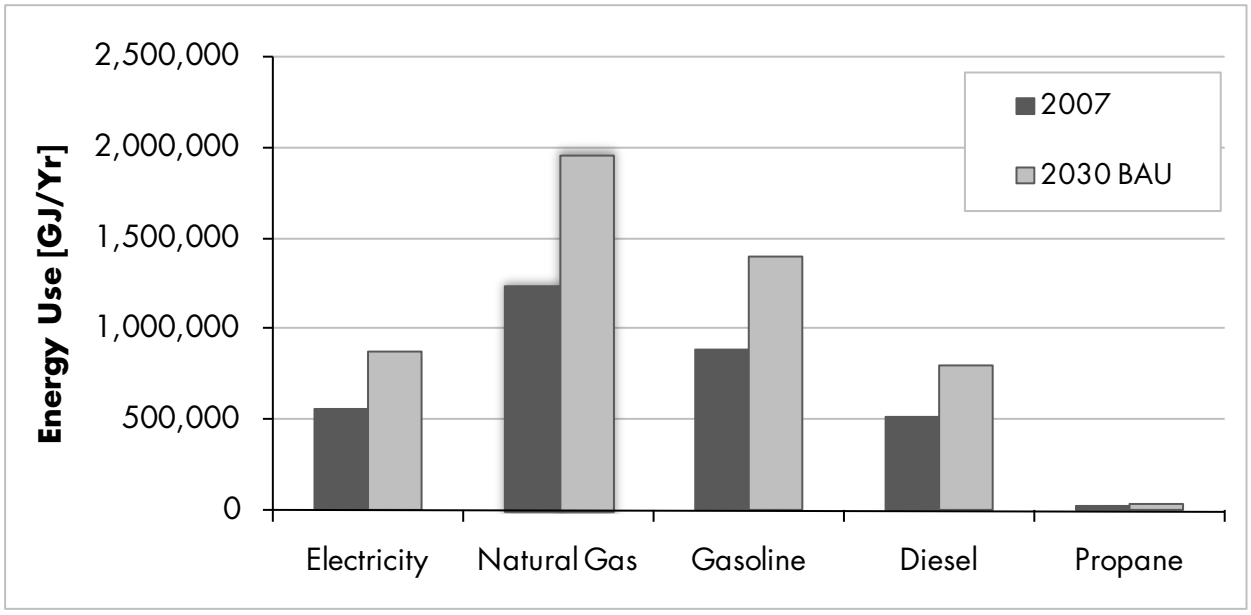


Figure B-2: Business-as-Usual Forecast for Energy

Appendix C: Alternative Energy Resources Research

City of Fort St. John
Community Energy and Emissions Plan

Alternative Energy Resources Research

Table of Contents

Overview

The City of Fort St. John is developing a Community Energy and Emissions Plan (CEEP) to reduce energy consumption and greenhouse gas (GHG) emissions in the community, charting their path towards a sustainable energy future. As part of this initiative, the City wants to better understand the alternative energy resources and approaches available to them, and potentially viable for implementation. This research gives an overview of several alternative energy resources providing a brief description of each one and highlighting potential local opportunities for Fort St. John. The research has been structured using BC Hydro's 4Rs framework for Sustainable Community Energy Planning (Figure C-1 and Table C-1). The 4Rs framework provides a structured approach to energy planning, which assists in ensuring effective use of investment dollars in the community.

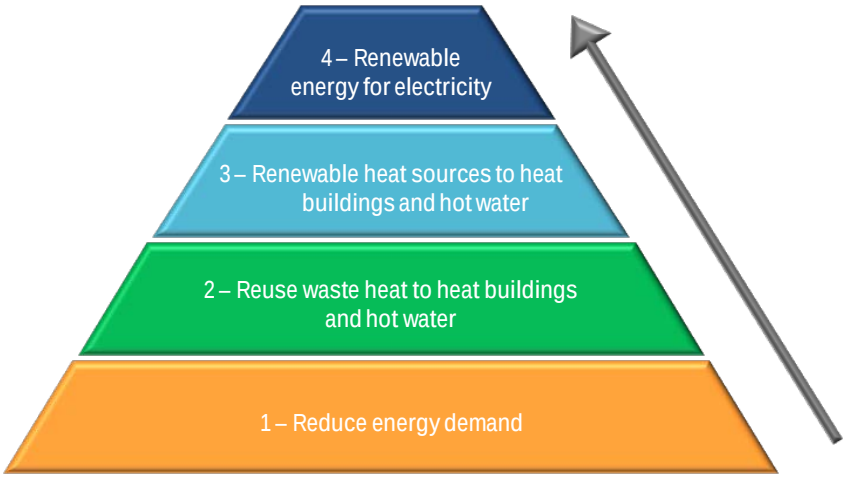


Figure C-1: BC Hydro's 4Rs for Sustainable Community Energy Planning

Table C-1: Alternative Energy Resources Categorized using the 4Rs Framework

1	Reduce Energy Demand	• Load reduction (community and building design)
2	Reuse waste heat to heat buildings and hot water	• District energy • Landfill gas recovery
3	Renewable heat sources to heat buildings and hot water	• Solar thermal • Geoexchange
4	Renewable energy for electricity	• Biogas systems (Combined Heat and Power) • Biomass (Combined Heat and Power) • Geothermal • Solar • Wind

1. Reduce Energy Demand

The energy saved by reducing demand represents the greatest source of "new" energy in a community. As such, implementing activities in this area should be the first step and a high priority within any community energy plan.

LOAD REDUCTION

Description

The way we design and build our communities impacts our demand for and consumption of energy. Community energy planning is a commonly used approach for exploring opportunities for load reduction in the community, including:

- Energy efficient land use – compact, mixed-use development with infrastructure that encourages alternative transportations;
- Green buildings – building energy standards for new construction (e.g., EnerGuide, Energy Star, LEED, etc) and retrofits to improve the energy efficiency of existing buildings;
- Demand-side management – energy management activities (e.g., monitoring and benchmarking performance, recommissioning, etc), and changing behaviours (e.g., through education and awareness programs, incentives, etc).

Local Opportunities

The City of Fort St. John is exploring opportunities for load reduction in the development of their Community Energy and Emissions Plan. Some of the key strategies identified that will contribute to load reduction, include:

- Increase density in designated areas
- Increase energy efficiency standards for new construction
- Retrofit existing buildings
- Affect change in building occupant behaviours

2. Reuse Waste Heat

DISTRICT ENERGY SYSTEMS

Description

Southeast False Creek Neighbourhood Energy Utility, Vancouver
Source: Natural Resources Canada

Distributed energy systems provide energy throughout a district through a network of pipes carrying steam or hot water, often from central heat generation plant. Users access that energy by connecting heat exchangers or heat pumps to the distribution system, reducing the amount of heat generation capacity needed on site in individual buildings. High temperature systems distribute energy in the form of steam, while moderate temperature systems distribute hot water. Generating heat at a central plant offers the benefits of production at scale, allowing for greater efficiencies and flexibilities in fuel sources. Facilities with significant on-site heat generation, such as industrial plants, large recreational facilities, or institutional buildings like hospitals, may also contribute their excess energy to the system.

Buildings serviced by district energy systems may have lower capital costs associated with heating equipment, but the installation of the central heating plant and the network of piping can be expensive depending on the type of fuel source and size of the system. Developing a small stand-alone energy utility servicing a smaller district may limit the efficiencies and options available for fuel sources, while the installation of the insulated piping network needed to distribute the energy can cost up to $1 million per kilometre. A balance between the scale of the generation plant and the size of the distribution network must be considered for the development of a viable system.

Local Opportunities

Canfor is building a $13.5 million energy facility at the Fort St John sawmill. The proximity to the municipality and especially to the proposed site (4 km) offers potential opportunities for heat and power integration with the local infrastructure. In these locations, a district heating loop may reduce energy consumption for space heat and domestic hot water in buildings. A heating utility specifically servicing the new hospital and surrounding community may also be an option given that the hospital would already be developing a significant amount of heat generation capacity to service its own needs. A separate utility with increased capacity may benefit from operating as a larger scale system while servicing the needs of the neighboring community as well.

LANDFILL GAS RECOVERY

Description

Methane gas in a landfill is created by the decomposition of organic materials (e.g. food). Landfill gas (LFG) is roughly 50 percent carbon dioxide (CO_2)and 50 percent methane gas (CH_4), a greenhouse gas (GHG) that has 21 times the Global Warming Potential (GWP) of CO_2. At present, only CH_4 is considered to be a GHG. The CO_2 component of LFG is considered to be part of the natural carbon cycle. LFG recovery can be accomplished by capturing LFG and flaring it (open flame burning), or using it in an engine to produce electricity and heat, or in a boiler to produce hot water (the latter two options are known as waste-to-energy).

The Ministry of Environment developed the Landfill Gas Management Regulation under *the Greenhouse Gas Reduction (Emissions Standards) Statutes Amendment Act, Bill 31 – 2008*. The regulation establishes province-wide criteria for landfill gas capture from municipal solid waste (MSW) landfills. The regulation focuses on GHG emission reductions from landfills with the objective of maximizing landfill gas emissions reductions and identifying opportunities to increase landfill gas recovery. Effective January 1, 2009, municipal solid waste landfills with 100,000 tonnes or more of waste in place or with an annual waste acceptance rate exceeding 10,000 tonnes are required to undertake an assessment of landfill gas generation and to submit the results to the Ministry by January 1, 2011.

Local Opportunities

The Fort St. John Landfill, operated by the Peace River Regional District (PRRD), is one of 35 landfills in the province having a disposal rate greater than 10,000 tonnes per year or more in 2006. Table C-2 shows the estimated methane emissions to be attributed to the landfill in the future.

Table C-2: Predicted Methane Generation from the Fort St. John Landfill[1]

	2008	2012	2016	2020
CH_4 (tonnes/year)	1.305	1,311	1,110	940
CO_2e (tonnes/year)	27,413	27,528	23,310	19,738

The Fort St. John Landfill does not currently have an active LFG management system, though legislation will soon change this. A LFG management system for the landfill is estimated to cost between $10 and $15 per tonne of CO_2e reduced and result in reductions of 1,272,000 tonnes of CO_2e, over a ten year period[2].

[1] *Inventory of Greenhouse Gas Generation from Landfills in British Columbia*. 2008. Ministry of Environment (conducted by Golder Associates Ltd.)
[2] *Cost Estimation Model for Implementing GHG Emission Reduction Projects at Landfills in British Columbia*. 2008. Ministry of Environment (conducted by Golder Associates Ltd.)

3. Renewable Heat Sources

SOLAR THERMAL

Description

Solar hot water systems generate heat from sunlight through solar collectors, most commonly mounted on the roof. The two types of solar collectors most suitable for solar water heating systems in BC are glazed flat plate and evacuated tube collectors as they are best suited for cold weather and possible snow. A fluid carries heat from the collectors and pumps it through a heat exchanger to a tank for storage and subsequent use.

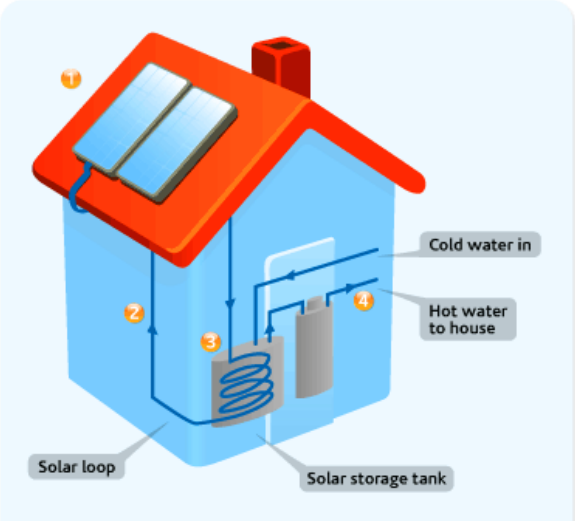


Figure C-2: A typical solar hot water system for a residential home[3]

Local Opportunities

The potential for solar hot water systems is dependent on the energy found in the in the seasonal solar radiation reaching Fort St John. This is at a maximum in the summer, suggesting potential applications for heating swimming pools and other seasonally intensive facilities.

A solar hot water system was modeled in RETScreen based on an installation that may be typically expected on a single family house with four full-time residents. Table C-3 provides a summary of this exercise.

[3] Source: SolarBC (www.solarbc.ca)

Table C-3: RETScreen summary of solar hot water system

Total area (m2)	4
Number of panels	2
Cost ($)	5,500
Total production (GJ)	9
Natural gas displaced (GJ)	12
% typical household consumption	10

GEOEXCHANGE

Description

The earth's temperature tends to maintain at relatively constant levels, and ground source heat pumps operate by transferring heat to and from the ground as needed. Ground source heat pump systems can be installed in a number of configurations depending on the site conditions, such as the orientation of the loops in the ground, the fluid used to transfer heat and the material of the piping installed underground. The mechanical components required for a typical single family residential installation are often no larger than a small refrigerator.

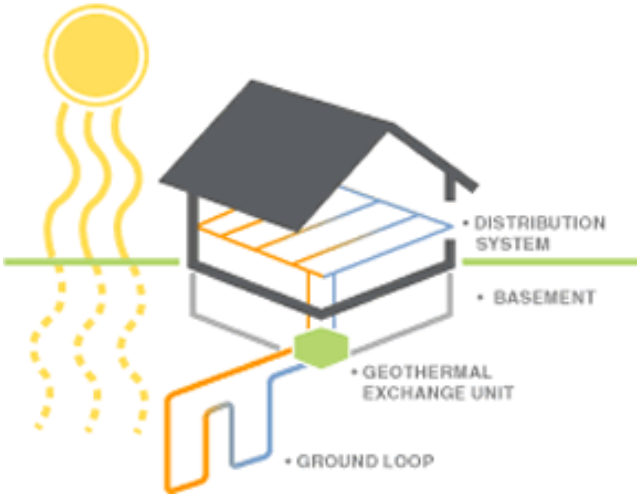


Figure C-3: A typical ground source heat pump system[4]

[4] Source: Peace Energy Cooperative (www.peaceenergy.ca)

A significant cost associated with ground source heat pumps is related to the installation of the loops in the ground. Relatively shallow horizontal loops are relatively easy and inexpensive to install, but are only applicable with sufficient land area. Vertical loops are bored up to 450 feet into the ground and can be installed when space is limited. Installation is more expensive due to the increased complexity of drilling deep into the ground, but often requires less piping than horizontal loops as the ground temperature is more constant at greater depths. Water submerged loops are often easiest to install when a large enough body of water is available.

A representative ground source heat pump system for a twenty unit townhouse development was modeled in RETScreen and resulted in a payback period of approximately 30 years (see Table C-4).

Table C-4: RETScreen summary of ground source heat pump system

Capacity (kW)	75
Cost ($)	250,000
Total production (MWh)	325
% natural gas displaced	90

Local Opportunities

There are local opportunities for geo-exchange systems in Fort St. John (see Figure C-4). These systems tend to be better suited to multi-family residential dwellings where there are more people to bear the cost of installation. However, while these systems typically have a higher initial cost than conventional systems, the true cost (referred to as life-cycle cost) of geothermal systems is typically less. So, in essence, properly installed geothermal systems cost less than conventional systems, when you factor in the cost of operation, maintenance and replacement over time.

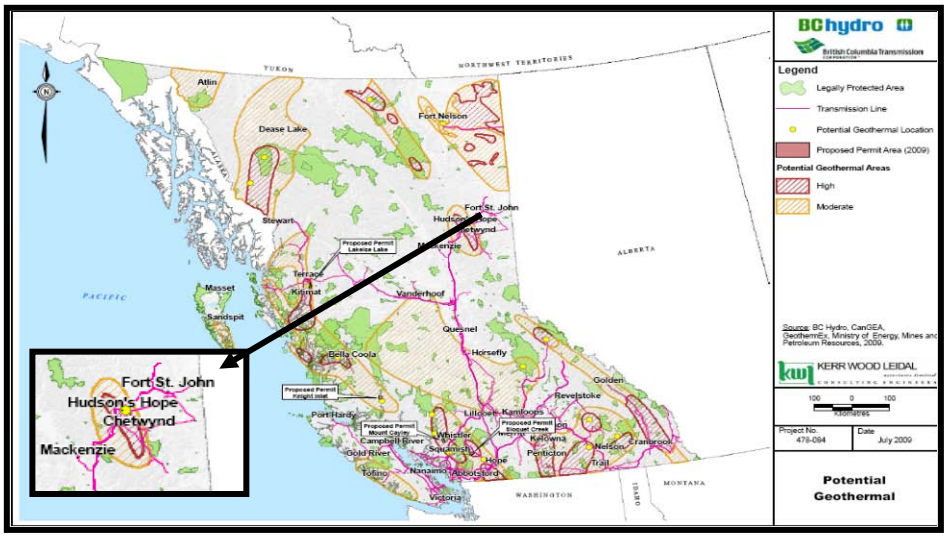


Figure C-4: Geothermal Resource Potential in BC (Fort St. John inset)

4. Renewable Energy for Electricity

BIOGAS SYSTEMS

Description

Biogas systems use anaerobic digestion to produce methane. Methane can be used in a boiler to produce heat or in an engine connected to a generator to produce electricity. These systems are fuelled by renewable materials like organics and biosolids (e.g., manure, crops and crop residues, and food processing by-products). Figure C-5 shows a typical biogas system.

Biogas systems are often used in agricultural areas as they offer co-benefits to the agricultural industry, such as reduced pathogens and odours as a result of the treatment of manure and other organics through anaerobic digestion.

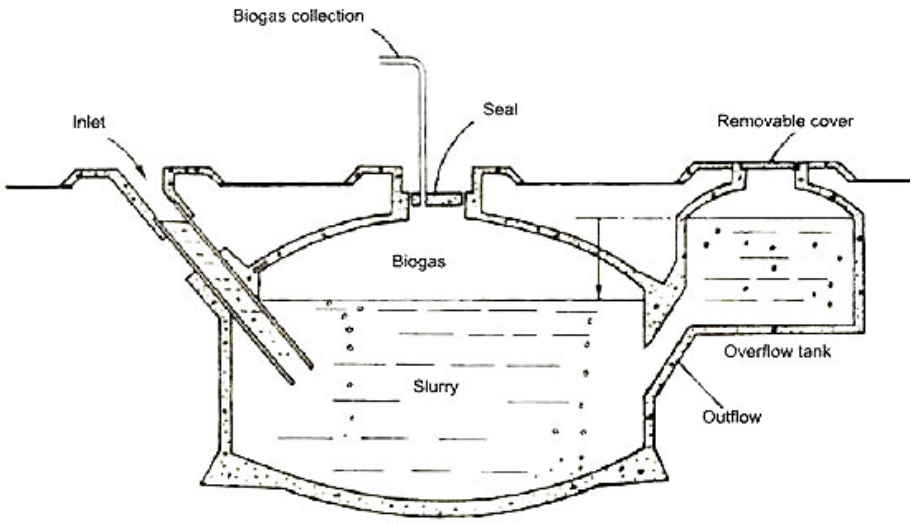


Figure C-5: A typical biogas system

Local Opportunities

Currently, there is no primary treatment of sewage in Fort St. John – sewage is dealt with using lagoons. The South Lagoon has complete aeration and handles 70% of total sewage. The North Lagoon, which operates seasonally and handles 30% of total sewage, uses anaerobic digestion. The lagoons have a total sewage discharge of 15,000 m^3 at peak. Opportunities to use biogas in conjunction with sewage treatment are limited in Fort St. John, as the City has sewage lagoons instead of a treatment plant. There may be opportunities to promote site-scale biogas systems to agricultural producers in the surrounding region.

BIOMASS (Combined Heat and Power, CHP)

Description

Biomass energy is energy that is stored in non-fossil organic materials. Potential sources of biomass include sawmills and other industrial wood wastes, municipal solid waste (MSW) and agricultural waste. Energy is typically obtained from biomass through combustion or other technologies that are selectively developed for different fuel sources. Traditional technologies include fuel-fired steam boilers or steam turbines, although emerging technologies using pyrolysis and gasification are being explored. The use of a sustainable biomass resource as fuel can be considered to have no net release of CO_2 as an equivalent amount was sequestered during the lifetime of the plant, but the use of other waste materials may result in net emissions for other greenhouse gases.

The economics of biomass power generation are highly variable depending on a number of factors. Biomass projects require a minimum size to be feasible as the equipment involved tends to be expensive and operates most efficiently at larger scales. Newer gasification and pyrolysis facilities can potentially be viable at smaller scales, but the technology is still under development for power generation from biomass. The cost of fuel depends on the type of fuel chosen, and the locations of the fuel source and the generating facility. While many fuel sources are currently considered waste products, widespread development of biomass energy may affect the cost and supply. Opportunities may exist at sawmills and pulp mills to share equipment, expertise and skilled labour to mitigate some of the capital and operational costs of biomass power generation.

Local Opportunities

Biomass co-products are integral to the economics of biomass power generation, such as developing potential markets for ash and char, and integrating residual heat generated into the local infrastructure. A recent estimate of costs for biomass power generation using conventional steam and turbine technology in remote British Columbia was $0.38 per kilowatt-hour[5].

The 2006 BC Biomass Energy Conversion Opportunity study conducted for the City of Fort St. John, estimated that there are enough biomass sources within a 75 kilometre radius to produce 9MW of energy per day. The excess wood residues available during the summer at the Canfor-LP OSB plant can potentially produce approximately 3000 GJ of energy, which would be sufficient to heat approximately 25 to 30 homes for a year.

Canfor is building a $13.5 million energy facility at the Fort St John sawmill. The proximity to the municipality and the new hospital and the proposed sustainable neighbourhood site offers potential opportunities for heat and power integration with the local infrastructure. In these locations, a district heating loop may reduce energy consumption for space heat and domestic hot water in buildings.

[5] BC Hydro Resource Options Report, 2005.

GEOTHERMAL

Description

Geothermal power production uses heat from the Earth's crust to drive utility-scale electrical generation. Depending on the geothermal potential of the area, a number of different methods have been developed that generally involve using a fluid (usually water) to transfer heat from the Earth's crust and generate steam to drive turbines. Technologies considered for British Columbia use fluids that are injected into wells bored up to three kilometres into the ground and heated to either high temperatures above 180°C or moderate temperatures between 100°C and 170°C.

Environmental impacts of developing geothermal resources are associated with extensive disturbance of the land for the drilling of wells and the installation of the central power plant. Land requirements will vary depending on geothermal reservoir conditions, but the land used for the well field could potentially be available for other purposes while supporting the power plant. Moderate temperature geothermal systems operate with a closed loop and thus are considered to operate with negligible emissions. As the Earth's crust maintains a relatively steady temperature, the power generated from geothermal resources is dependable as a primary source. A recent estimate of general unit energy costs for geothermal power in British Columbia was $0.06 per kilowatt-hour.

Figure C-6: A geothermal power installation

Local Opportunities

A number of studies have identified potential resources in northeastern BC and the Peace River Region. The province has also identified the northeast region as having potential geothermal resources in the BC Energy Plan released in 2008.

There are no current projects developing geothermal energy in or around Fort St John.

SOLAR ELECTRICITY

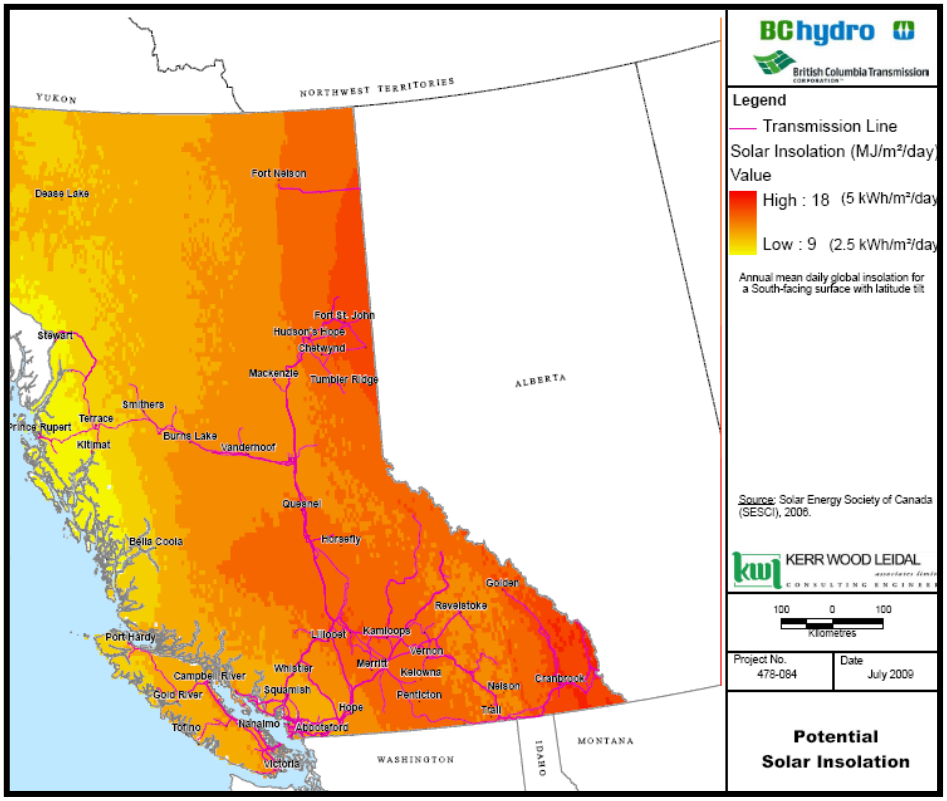
Description

Solar panels convert sunlight into electricity using photovoltaic cells. Current solar technologies are dominated by crystalline silicon photovoltaic cells, while thin film technologies are continuing to be developed and are becoming more economical. Industry estimates predict significant decreases in costs for solar technologies resulting from increases in performance and production volume. Site selection for solar generation installations is based on the insolation at a given location, or the amount of solar radiation power on a surface, taking into account the seasonal variation in sun angle, atmospheric haze and cloud cover.

To generate significant amounts of power with conventional solar technologies as a primary source, significant amounts of surface area would be required with respective environmental impacts on the land used for such a facility. Solar installations are often integrated into existing developed areas such as rooftop surfaces to reduce the demand on traditional power sources such as diesel. As the reliability of power generated by wind is dependent on seasonal and environmental availability of sun exposure, the costs for a solar generation system will depend significantly on the dependable source of supplemental power and the energy storage system chosen. An estimate of solar generating costs in remote areas of British Columbia can potentially range between $1.26 and $1.40 per kilowatt-hour for installations in favourable locations[6].

Local Opportunities

Fort St. John has high potential solar insolation, though this varies significantly by season (Figure C-7). Although there may be more hours of sunlight in the winter, the energy of the sun's radiation reaching Fort St John may decrease significantly during the winter months.



Potential Solar Insolation in BC
Source: BC Hydro

[6] BC Hydro Resource Options Report, 2005

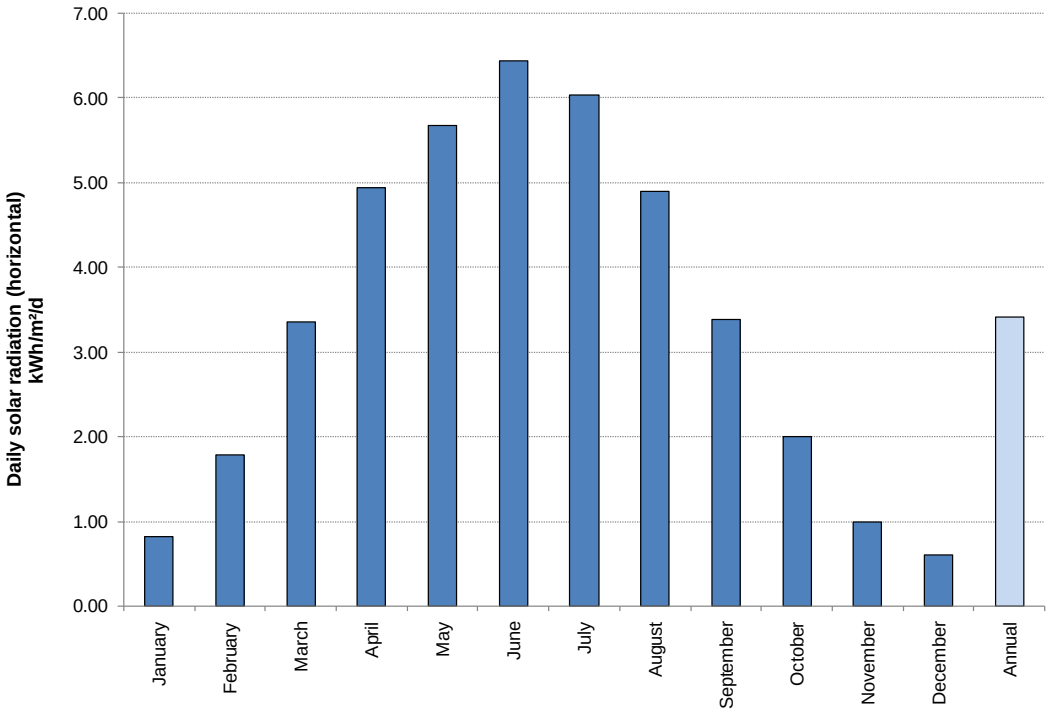


Figure C-7: Daily Solar Insulation (horizontal) in Fort St John

A photovoltaic installation was modeled using RETScreen based on two 175 kW arrays and a 90% inverter. This was modeled to resemble a typical installation on a single family home, and can be expected to deliver 1,800 kWh of electricity per year in Fort St John. The results of this exercise are presented in Table C-5.

Table C-5: RETScreen summary of solar electricity system

Total area (m^2)	5
Total capacity (kW)	350
Number of panels	4
Cost ($)	8,000
Total production (kWh)	1,800
% typical household consumption	18

WIND

Description

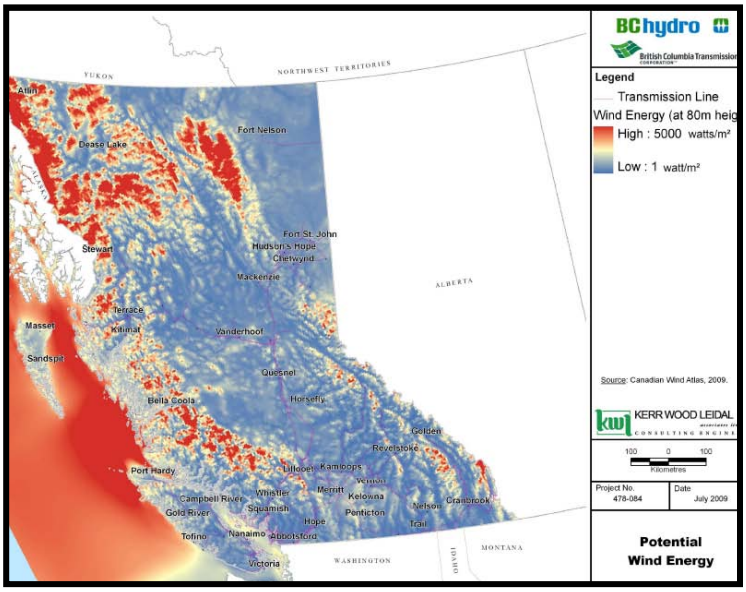
Wind Turbines
Source: Canadian Wind Energy Association

Wind generation uses turbines to convert the energy of surface winds to electrical energy. Turbine designs vary, but generally involve a variable pitch rotor and feathering blades to control and optimize rotational speed for power generation. Onshore turbines typically generate 1.5 to 3.0 MW in regions with good wind resources. Wind farms require sites with a minimum average annual wind speed of 4.5 metres per second to be marginally feasible, and must consider wind direction and obstructions, along with potential installation challenges such as slope and terrain. Current rules of thumb estimates for wind farm sizes are 10 hectares per 100 MW of installed capacity, including the footprint of turbines and new roads.

Wind generation has typically been associated with noise problems, visual impacts to the landscape and effects on wildlife. Modern wind turbines have minimized mechanical and aerodynamic noise by reducing vibration and improved turbine blade design. Appropriate site selection to minimize conflicts with wildlife migration and habitats is essential to proper installation of wind generating facilities. Visual effects on landscapes can be challenging to address given the subjective nature of the problem, and requires significant local consultation regarding the design and siting of wind farms, and potential opportunities for landscape integration. Effective operation of wind power generating installations may require regular maintenance, which can be costly without local expertise. A recent estimate of wind power generation costs in remote British Columbia was between 24 to 26 cents per kilowatt-hour.[7]

Local Opportunities

Wind speeds for Fort St John are summarized in Table C-6, and qualify as a class 2 resource according to the US National Renewable Energy Laboratory. The NREL assessment recommends that a minimum class 3 resource is required for commercially viable wind power development. A 2008 analysis of wind resources near Dawson Creek by the Pembina Institute suggested marginally viable resources warranting further site-specific study (this is supported by the figure at right). As a minimum, one year of data is generally collected for prospective sites.



Potential Wind Energy
Source: BC Hydro

[7] BC Hydro Resource Options Report, 2005

Table C-6: Wind Speeds

Height	Fort St. John[8] (metres per second)	Class 3 Minimum[9] (metres per second)
30 m	3.78	5.1
50 m	4.29	6.4

A 100 MW wind farm is currently being developed 16 km southwest from Dawson Creek. The $190 million Bear Mountain Wind development includes up to 34 turbines that are expected to begin transmission of power in 2009. A RETScreen model of a representative wind power project in Fort St John (based on the Bear Mountain Wind development) supports the target capacity (see Table C-7). There is continued interest in investigating other sites in the Peace River region for further development.

Table C-7: RETScreen summary of wind energy system

Number of turbines	34
Cost ($)	190,000
Total production (MWh)	130

[8] Wind Energy Resource Atlas of the United States, National Renewable Energy Laboratory, United States Department of Energy, (http://rredc.nrel.gov/wind/pubs/atlas/tables/A-8T.html)
[9] Canadian Wind Energy Atlas, Environment Canada (http://www.windatlas.ca/en/maps.php)

Summary

This research is intended to provide the City of Fort St. John with a sense of the alternative energy resource options available and those options that are potentially viable for implementation in Fort St. John. Table C-8 provides a summary overview of the alternative energy resources profiled in this report, and gives an indication of options that may merit further investigation by the City. Should the City wish to pursue any of these options, further research and testing will be required (i.e. pre-feasibility studies, feasibility studies, field tests, and demonstration projects).

Table C-8: Summary of Alternative Energy Resources and Local Opportunities

Alternative Energy Resource Options	**Opportunity for Fort St. John** (low, moderate, high)	**Specific Opportunities or Considerations**
1 – Reduce Energy Demand		
Load Reduction	High	Key opportunities include building retrofits, improved energy standards for new buildings, fuel choice
2 – Reuse Waste Heat		
District Energy Systems	High	• Potential for downtown and new neighbourhoods • Feedstocks to explore include wood waste (Canfor OSB), agricultural residues, Integrated Resource Recover (sewage heat recovery)
Landfill Gas Recovery	Low	Limited gas in winter when most needed Coincidence factor with load is poor
3 – Renewable Heat Sources		
Solar Thermal	High	Capitalize on passive solar: • Existing homes - behavioural component (e.g., opening curtains) • Retrofits – choosing glazing • New buildings – optimize design of glazing, overhangs, envelope design
Geo-exchange	Moderate	BC Hydro maps (see Figure C-4) indicate there is moderate to high potential in the Peace region, but not necessarily in Fort St. John. Worthy of further investigation.

Alternative Energy Resource Options	Opportunity for Fort St. John (low, moderate, high)	Specific Opportunities or Considerations
4 – Renewable Energy for Electricity		
Biogas CHP Systems	Unknown	Biogas CHP is technically feasible, but may not be financially viable. The technology is not commercially available.
Biomass CHP	Unknown	2006 study commissioned by the City identified the potential to generate just less than 9MW per day using local biomass resources. Biomass is technically feasible, particularly with conventional combustion technology, and depending on the price of electricity it may be financially viable. BC Hydro issued a *Bioenergy Call for Power* in 2009 to utilize wood fibre and biomass fuel sources. Future opportunities like this may assist in making this a more financially viable option in Fort St. John.
Geothermal	Low	Fort St. John is not likely to have geothermal resources at 120 degrees in order to create steam
Solar Electricity (Building int. PV)	Moderate to High	Building-integrated photovoltaics are technically feasible, but not cost competitive. Costs for solar PV are expected to be competitive with electricity generation by 2025.
Wind	Moderate	Wind energy developments in the Region suggest that this is a viable resource, worthy of further site specific investigation.

Appendix D: Engagement Results

Task Force Participants

Targeted stakeholders representing various local organizations and businesses were invited to participate in two stakeholder workshops. Table D-1 lists the participants that signed in at one or both workshops.

Table D-1: CEEP Task Force Participants

Contact Name	Affiliation (Organization or Company)
Rob Schlitt	Sr. Property & Operations Manager, Totem Mall
Ken Myers	General Manager, Super 8
Todd Murphy	Facilities Manager, Super 8
Colin Montgomery	General Manager, Stonebridge Hotel
Bruno Bourassa	General Manager, Chances Gaming Centre
Harold Westwood	Diversified Transportation Ltd.
Moira Green	Manager, North Peace Savings & Credit Union
Greg Dueck	Aeolis Wind Power Corporation
Doug Gallanger	Manager, Home Hardware
Andy Becker	Plant Manager, Canfor
Russ Beerling	President, Fort St. John & District Chamber of Commerce; Moose FM (media)
Gail Lundquist	Representative of Public
Lanny Lundquist	Representative of Public
Moira Green	President, Rotary Club
Dianne Hunter	City Manager, City of Fort St. John
Don Demers	Director of Public Works, City of Fort St. John
Jeremy Garner	Utilities Superintendent, City of Fort St. John
Lori Ackerman	Councilor, City of Fort St. John
Gayle Clark	Constituency Assistant, MLA, Peace River North
Dave Conway	BC Hydro
Paul Bouman	BC Hydro
Kate O'Neil	Community Relations Manager, BC Hydro
Bob Cooper	Pacific Northern Gas
Connie Surerus	Surerus
Larry Espe	Superintendent of Schools, School District 60
Ivan Lewis	Facilities Administrator, School District 60
Don Soderlund	General Manager, Peace Valley OSB
Sarah MacDougall	Health Officer, Northern Health
Fred Burrows	Fire Chief, Fire Department
Kimmie Gulevich	North Peace Secondary, Student
Ian Zackodnik	North Peace Secondary, Student
Ben Stymiest	-

Targets Discussion with City Council

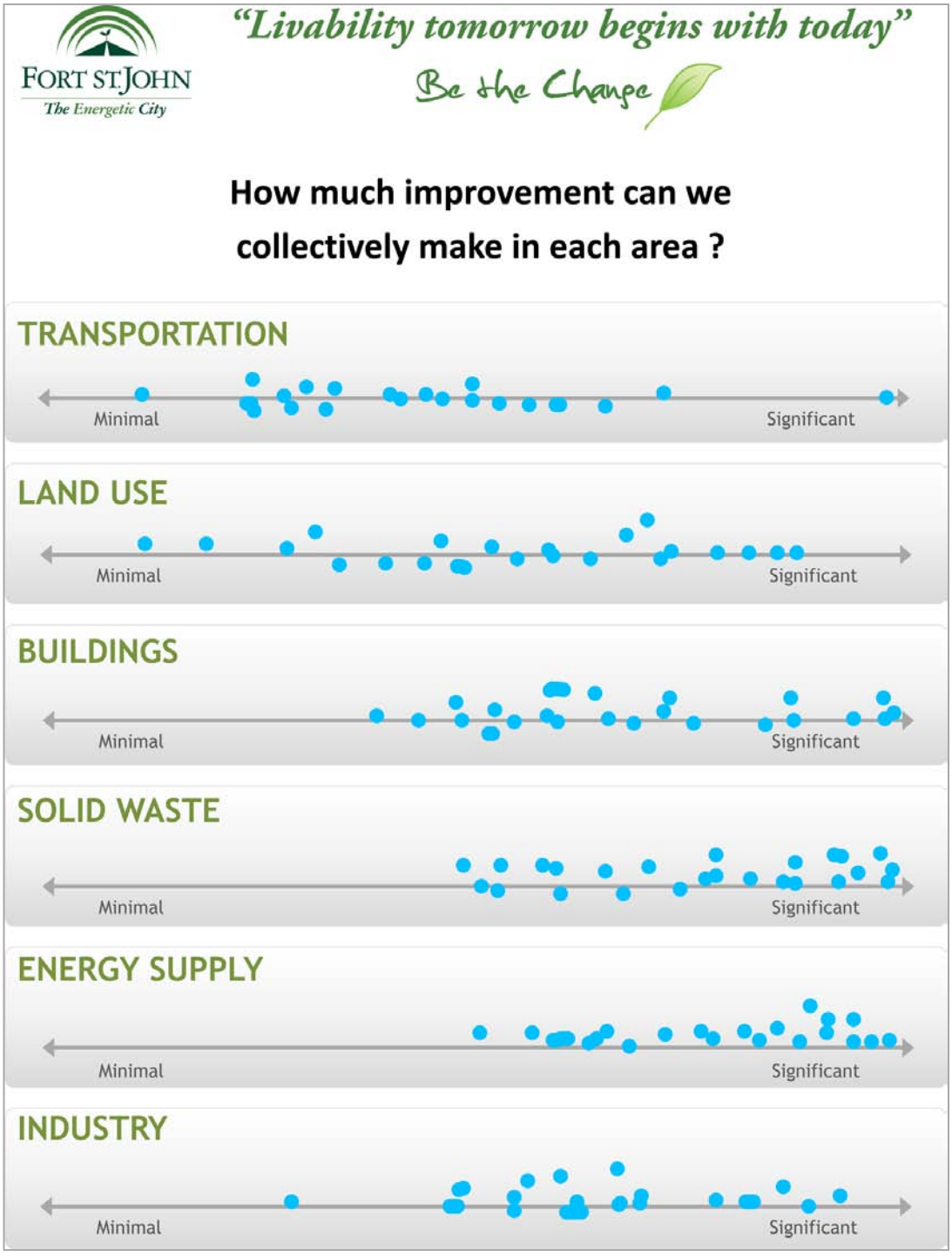
The GHG emissions reduction targets were developed through discussions with City Council around the types of change management tools that would be viable for implementation in the City of Fort St. John. Tools discussed included: information, non-financial incentives, financial incentives and regulation. City Council expressed interest in providing citizens with information (conducting outreach) to encourage energy conservation behaviours. Incentives (non-financial and financial) were acknowledged as policy instruments that had been successfully used in the past (i.e. the City's water conservation program). Regulation was recognized as an approach that would ensure action by citizens, though it was not Council's preferred policy instrument. Council expressed a desire to take a more encouraging approach, where it would achieve desired outcomes.

Various change management tools were applied to actions that impact scope 1 and 2 GHG emissions. The proposed GHG emissions reduction targets were arrived at though an interactive GHG calculator session with Council that assessed the impacts of various actions and the effectiveness of various tools used to bring about the change.

Combined, these actions and change management tools suggested a target of 12% below 2007 levels as an achievable GHG emissions reduction measures.

Poster Results from Task Force Workshop #1

At the October 2009 Task Force Workshop, participants were asked to discuss challenges and opportunities with regards to reducing energy and emissions in a number of topic areas. With this discussion in mind, participants were given stick dots and asked to place them on a poster in response to the question, *"how much improvement can we collectively make in each area?"* The results from this exercise are shown below.



Brainstorm Activity from Task Force Workshop #2

At the second Task Force Workshop (November 2009), participants worked in small groups to brainstorm actions for the Plan strategies. In addition, participants were asked to identify key partners for each strategy and discuss the City's potential role in strategy implementation. The results are presented by theme area on the following pages.

Theme: TRANSPORTATION

Strategy: CHANGE ATTITUDES AND BEHAVIOURS TOWARD THE PERSONAL VEHICLE

Brainstorm Actions

- Signage – "No Idle Zone" uniform.
- Expand PW Idle reduction campaign across City operation
- School-based Idle Reduction campaign
- Right-sizing vehicle
- Fines for idling
- Cost Benefit
- Drive-thrus – "cash only" (e.g. Nova Scotia, Tim's)
- Time spent in drive–thru (metro Edmonton)
- Carpool, ride share
- Pay parking @ parking lots, buildings
- Event specific transit (e.g. Air Show)
- Dispel diesel myths
- Company paid fuel for employees – restrictions on use/idling – remove incentive to drive
- Rent vehicle to haul trailer, horses etc.

Partners	*City's Role*
• Tim Horton's /McDonalds / A&W • NPSS • Provincial Government • NEAT • Idle Free BC • Diesel Mechanics / manufacturers • PRRD	• Marketing • Provision of uniform signage (Idle Free BC) • Education/public awareness

Theme: TRANSPORTATION

Strategy: IMPROVE ALTERNATIVE TRANSPORTATION AMENITIES AND SERVICES

Brainstorm Actions

- Bicycle lanes
- Active transportation plan (bike sharing, paths, etc)
- Carpooling
- Mass transit
- Car sharing coop
- "N" rule for young drivers inhibits car pooling
- Alternative fuels + electric cars
- Industry/business assisting
- Employees in mass transit
- Density infill to encourage walking
- City and school board sharing resources (bus)
- Rebate / $ to buy bikes, folding bikes.
- Add shelters at bus stops to protect from elements

Partners	*City's Role*
• BC transit • Province • MOT • School board • BC hydro • NEAT • NPSS – eco club	• Develop "active transportation plan" • Encourage use of transit • Higher density land use policies • Infrastructure for active transportation • Lead by example

Theme: ALTERNATIVE ENERGY SUPPLY

Strategy: ENCOURAGE IMPLEMENTATION OF RENEWABLE ENERGY

Brainstorm Actions

- Solar water heating – "ready" in new construction
- Solar panels on municipal Buildings
- Solar Space heating – South facing, orientation
- Solar tubes – small skylight
- Solar operated infrastructure i.e. street lights
- Consider low tech solutions i.e. laundry lines
- Solar PV plug-in chargers + solar walls
- Wind needs to be tested, not automatically viable $
- Outreach education to public
- Heat recovery – sewage line / ponds
- District energy
- Cogeneration
- Pellets, wood waste opportunity?

Partners

- Retailers
- Solar BC
- Provincial, Federal policies
- Tax credit opportunities
- BC Sustainable Energy Association
- NEAT
- Peace Energy
- Small Business Entrepreneurs
- Construction Association
- CHMC
- Northern Lights College
- UNBC
- SD#60

City's Role

- Facilitator / Educator
- Policy Development
- Financial Incentives
- Amortization through taxes
- Planning – subdivision orientation, density
- Facility Maintenance education

Theme: ALTERNATIVE ENERGY SUPPLY

Strategy: DEVELOP DISTRICT HEATING* OPPORTUNITIES

Brainstorm Actions

- Waste energy plant
- Solar heating
- Wind power
- Geothermal
- Run of the river projects
- Coal – technology has greatly improved
- Sewage capture? (warmer than river water)
- Biomass (stubble / wood)
- Encourage construction of energy efficient homes

Partners	*City's Role*
• Private / public partners • PRRD • Province • First Nations • Neighbouring communities • Industry (OSB, Canfor, O+G)	• Education / Demonstration • Finding funding partners / sources • Creating the 'environment; (so companies want to invest, have confidence.

* **District heating** is a system for distributing heat generated in a centralized location for residential and commercial heating requirements such as space heating and water heating.

Theme: LAND USE

Strategy: INCREASE DIVERSITY OF HOUSING OPTIONS

Brainstorm Actions	
• Develop low (affordable housing) rental and ownership • Develop supported housing • Incentives to builders (reduce taxes for % of affordable units) • Education • Develop cost charges to act as incentives against certain developments	
Partners	*City's Role*
• City • Developers • BC housing / Province • Abbeyfield Society (or others) • Builders • Construction association • Educational bodies (Gr. 12)	• Incentives conceptualize + market • Regulations • Education • DCC's

Theme: LAND USE

Strategy: INCREASE DENSITY

Brainstorm Actions
• Multi-use buildings – street level commercial and upper level office with residential above that • Infill current available lands – in municipal boundary • Evaluate available lands for 'planning' and usage definition • Trend setters housing development • 'Zoomer' community complex • Sewer water infrastructure and capacity • Rationalize city boundaries • Disperse amenities into neighbourhoods

Partners	*City's Role*
• Transportation • Community healthy living alliance – walking trails, roof top walkways • Developers • Property owners/management companies • Planners • Community action groups • PRRD / Taylor / 44	• Policy • Bylaws • Collaboration with RD • Incentive / taxation • Marketing plan, campaign, materials

Theme: SOLID WASTE

Strategy: IMPROVE WASTE DIVERSION OPPORTUNITIES

Brainstorm Actions

- Education – residential, commercial, school children
- Free cycle, swap N shop, reuse opportunities, share shed (freecycle.org)
- Universal curbside recycling program (residential) – peer pressure
- Glass recycling, reuse
- Commercial collection = recyclables inc. beverage containers
- Recycling collection bins attached to downtown garbage cans
- Incentives for reducing garbage – pay per bag, not flat rate on property tax notice.
- Waste to energy – investigate potential
- Composting programs (residential / backyards), community (yard debris), in-vessel / large scale.
- Methane gas capture at landfills

Partners	*City's Role*
• Northern environmental action team (NEAT) • Eco. Depot • PRRD • Private – public partnerships • CCS (Canadian Crude Separators) • School district • Chamber of Commerce	• Encourage changes – education and leadership • Garbage user pay regulation • Incentive for backyard composter (e.g. $25 each) • Implementing curbside recycling program at a fair price • Reverse incentive – recycling at no cost; garbage at higher cost.

Theme: BUILDINGS

Strategy: RETROFIT EXISTING BUILDINGS

Brainstorm Actions

- **Outreach (education 10% awareness)**
  - Energy manager
  - LEED
  - Schools
  - Leadership
- **Incentives (30%-50%)**
  - Product incentive
  - Power smart partners
  - Solar hot water
- **Regulation**
  - Building bylaw
  - LEED

Partners	*City's Role*
• BC Hydro • Northern health • Oil and Gas • NEAT • Retail • School district • Builders	• Leadership • LEED • Facilitating / coordinating • Focal point / conduit • Incentives • Street light LED program

Theme: BUILDINGS

Strategy: INCREASE ENERGY EFFICIENCY STANDARDS FOR NEW CONSTRUCTION

Brainstorm Actions

- Building orientation
- Energy star appliances
- Building envelope
- Incentives
- Windows - low E / sun tunnels / types and orientation
- Shades to stop direct sun in Summer / solar heat in during Winter
- Passive mass heat
- Stormwater management / rainwater harvesting grey water systems
- High efficient furnaces
- Energy audits / EnerGuide rating
- Compact fluorescent lighting / LED
- Solar hot water
- Geothermal, heat recovery
- Use LEED standards

Partners	*City's Role*
• BC hydro Incentives – Solar BC • NEAT • BC Building Code • LEED • EnerGuide • Community • Schools (education)	• Education (with building permits) 2 way meters • Building bylaw – appendix – incentives list • Leadership demonstration projects

Theme: BUILDINGS

Strategy: AFFECT CHANGE IN BUILDING OCCUPANT BEHAVIOUR

Brainstorm Actions	
• Update skills / training of facility management • Telecommute for work • Off-peak hours use of buildings • Change in culture – mindset – decide on change • Make energy/water usage visible – let people know cost of heat, water use in public buildings, workspaces, etc. • Publicize best practices • Lunch & Learn sessions with staff • Website tips for public changes they can make at home	
Partners	*City's Role*
• BC Hydro • SD 60 • UNBC / NLC • Public outreach • Media • Construction Building Real Estate	• Recognition • Planning Department – zoning. Lot sizes, housing stock.

Community Input from Climate Café

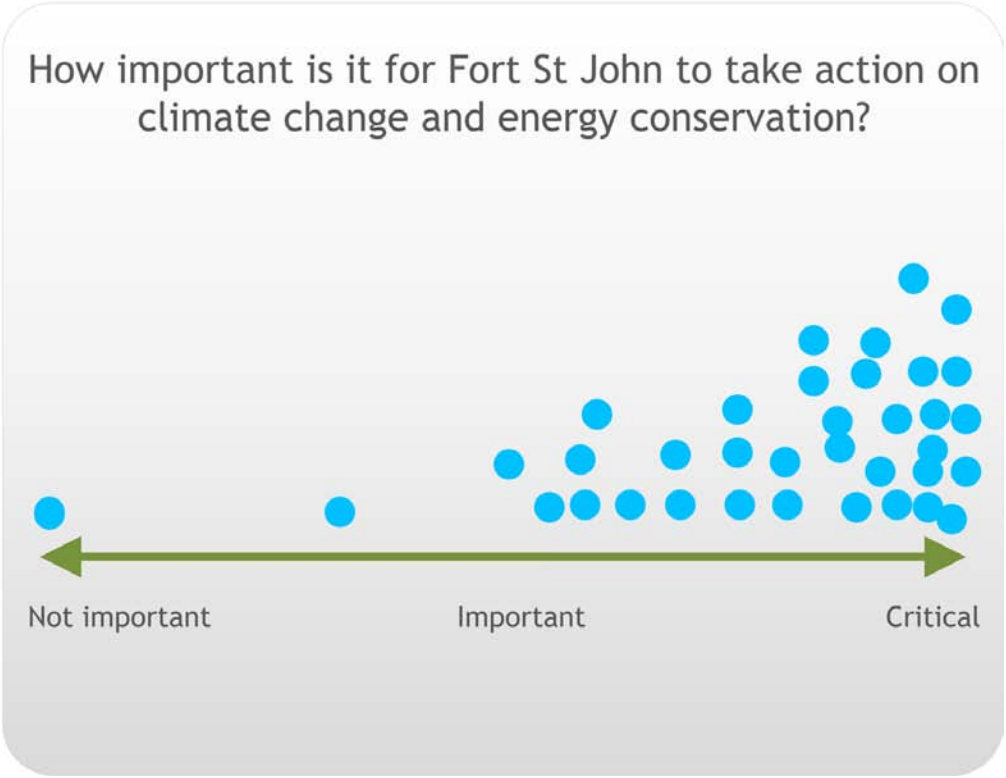
In October and November of 2009, the City held Climate Cafés at local coffee shops. These events helped to generate interest in the CEEP, and raise awareness about energy consumption and GHG emissions in Fort St. John. Residents were treated to coffee and tea and asked to provide their input on the following question: *"How important is it for Fort St. John to take action on climate change and energy conservation?"* The results are presented below.

FORT ST JOHN
The Energetic City

"Livability tomorrow begins with today"
Be the Change

FORT ST. JOHN COMMUNITY ENERGY AND EMISSIONS PLAN

Tell us what you think!



Community Survey Results

A survey was distributed in November 2009 to raise awareness about energy and climate change and solicit input from the community on actions they would be willing to take to reduce energy consumption and greenhouse gas (GHG) emissions. The results are presented below.

	I'm already doing this!	I'm willing to do this on my own	I'm willing to do this with support	I'm not willing to do this	Not applicable/possible	Total Responses
Making Changes at Home						
• Make energy efficiency improvements to your home or office (e.g., improving insulation; replacing windows; caulking around vents, etc)	49%	16%	24%	0%	11%	55
• Turn down the temperature in your home or office by 2°C in the winter (and up by 2°C in the summer).	70%	19%	0%	7%	4%	54
• Install a programmable thermostat	42%	22%	11%	2%	24%	55
• Replace your furnace with a high efficiency model with a variable speed motor	33%	19%	19%	0%	29%	52
• Set your water heater to 49°C	27%	27%	6%	15%	25%	52
• Install a solar water heating system to heat your water	4%	6%	48%	11%	31%	54
• Replace incandescent light bulbs with compact fluorescents	69%	15%	6%	7%	4%	54
• Install low flow fixtures and faucets in your home or office	33%	22%	24%	6%	15%	54
• Turn your computer & monitor off when not in use	69%	21%	2%	2%	6%	52
• Replace your computer monitor and TV with an energy efficient screen (LCD)	45%	13%	21%	9%	11%	53
• Plant deciduous trees to the south of your home or office building	27%	21%	23%	6%	23%	52
• Consider moving closer to the downtown where I can be close to shopping and amenities	42%	2%	2%	30%	25%	53
• Consider moving to an apartment, townhouse, or duplex instead of a larger single family house	23%	4%	0%	47%	26%	53
• Consider living in a 'green development' designed with the environment in mind, even if it means paying a bit extra	13%	15%	28%	25%	19%	53

Making Changes to Getting Around						
• Walk, cycle or use active modes of transportation to get to work/school at least one day a week	33%	19%	6%	21%	21%	48
• Take transit/bus shuttles to work/school at least one day a week	46%	4%	4%	6%	40%	48
• Carpool to work/school at least one day a week	36%	6%	2%	15%	40%	47
• Telecommute to work (working remotely) at least one day week	6%	4%	6%	21%	63%	48
• Buy an electric bicycle or scooter instead of owning a car	2%	8%	8%	44%	38%	48
• Join a car-sharing co-op instead of owning a car	9%	11%	2%	34%	45%	47
• Park your truck and use a smaller vehicle or other means to get around town	33%	9%	9%	20%	29%	45
• Schedule or perform regular maintenance checks for your car	77%	6%	2%	0%	15%	48
• Buy an energy efficient vehicle when I buy my next car	38%	28%	9%	6%	19%	47
• Turn off your car instead of idling longer than 10 seconds (in temperatures > -10°C)	55%	17%	0%	13%	15%	47
• While driving, drive moderately and accelerate slowly	66%	13%	0%	13%	9%	47
Making Changes to My Waste						
• Compost organic wastes in your garden or with a worm composter in your apartment/school/office	28%	28%	24%	7%	13%	46
• Reuse products wherever possible instead of buying new ones	65%	20%	9%	7%	0%	46
• Buy good quality, long lasting products that you will not have to replace so soon	83%	15%	2%	0%	0%	47
• Buy products with minimal or recyclable packaging	59%	26%	11%	0%	4%	46
• Buy local, sustainable food whenever possible	71%	18%	4%	0%	7%	45
• Grow some of your own food in your home garden or community garden plot	46%	19%	13%	8%	15%	48
• Sign up for curb-side recycling or drop your own recycling at the local depot	47%	13%	22%	0%	18%	45

Appendix E: CEEP Framework

CEEP Framework

#	Proposed Strategies	Priority for action*	City Role	Partners	Measures of Success	Actions		Lead	Timeframe*	Cost		
Theme: LAND USE		**Goal: We will create vibrant, sustainable neighbourhoods through energy efficient planning, design and construction.**										
1	**Increase density**	High	This is a City-led strategy, which would require the City to define growth concentration areas through zoning bylaws and OCP amendments.	Local developers and builders, property owners and managers, and Fort St. John residents. Community organizations, such as the Community Healthy Living Alliance and Northern Environmental Action Team (NEAT).	Number of Development Permits issued in the downtown area	#2	Update OCP policies to meet sustainability objectives	Planning	Short-term	$15,000	and	$160,000
						#3	Establish growth concentration boundary in OCP	Planning	Short-term	NA		NA
						#5	Establish Development Cost Charge (DCC) Bylaw	Planning	Short-term	$50,000		
						#8	Establish comprehensive development (CD) zones, mixed-use zones and infill areas	Planning	Medium-term	$7,500	and	$15,000
						#12	Allow Amenity Density Bonuses	Planning	Short-term	$500		
						#16	Develop a Sustainable Development Checklist	Planning	Short-term			$7,500
						#17	Offer DCC and permit rebates	Planning & Eng	Short-term	$4,000	and	$5,000
						#20	Developer / builder community workshops	Planning & Eng	Short-term	$15,000		
2	**Increase diversity of housing options**	High	This is a City-led strategy, which makes use of regulatory powers available to local governments. The strategy also requires the City to consider possible incentives.	Local developers and builders, and property owners and managers. Organizations that exist to support housing options (e.g., BC Housing, Abbeyfield Society, etc).	Number of rental units per capita in the community % breakdown of building units by type	#2	Update OCP policies to meet sustainability objectives	Planning	Short-term	$15,000	and	$160,000
						#8	Establish comprehensive development (CD) zones, mixed-use zones and infill areas	Planning	Medium-term	$7,500	and	$15,000
						#16	Develop a Sustainable Development Checklist	Planning	Short-term			$7,500
						#17	Offer DCC and permit rebates	Planning & Eng	Short-term	$4,000	and	$5,000
						#20	Developer / builder community workshops	Planning & Eng	Short-term	$15,000		
Theme:		**Goal: We will ensure alternative forms of transportation are a viable and attractive choice for residents**										
3	**Change attitudes and behaviours toward the personal vehicle**	Medium	The City's role would be to establish partnerships and compile and provide educational information and materials to support outreach efforts.	Local organizations, businesses such as NEAT, School District 60 and local schools, Fort St. John Hospital and Health Centre, drive-through restaurants and other large retailers (e.g., Home Hardware, Canadian Tire, Walmart, etc). Idle Free BC, Natural Resources Canada and diesel mechanics (local tradespersons and students in the automotive service technician program at Northern Lights College). Large employers (e.g., Canfor and Peace Valley OSB).	NA (or via Survey if possible)	#7	Establish idling reduction bylaw	Planning	Medium-term	$15,000		
						#14	Preferential parking for low-emissions / car co-op vehicles	Planning & Eng	Medium-term	$7,500		
						#21	Establish a carpool / ride-share information portal	Energy Manage	Medium-term	$10,000	and	$5,000
						#23	Launch an idling reduction outreach program	Energy Manage	Medium-term	$10,000		
						#27	Explore an employer transit program	Energy Manage	Short-term	$15,000		
4	**Improve alternative transportation amenities and services**	High	The City will need to ensure the necessary capital funds are secured to support new and improved infrastructure. Outreach will be required to communicate alternative options to residents, while opportunities to provide further incentives should be explored.	Ministry of Transportation and BC Transit. Institutions and other local organizations can assist with outreach (e.g., School Board and North Peace Secondary School Eco Club).	Number of shelters, benches added / upgraded Total length of trails, bike paths	#6	Establish pedestrian and biking friendly standards	Planning & Eng	Medium-term	$20,000		
						#9	Develop an alternative transportation network plan and map	Planning	Medium-term	$15,000	and	$100,000
						#10	Establish an alternative transportation infrastructure reserve fund	Finance	Short-term	$10,000		
						#11	Improve pedestrian and transit amenities	Planning & Eng	Medium-term	$100,000		
						#16	Develop a Sustainable Development Checklist	Planning	Short-term			$7,500
						#21	Establish a carpool / ride-share information portal	Energy Manage	Medium-term	$10,000	and	$5,000
						#27	Explore an employer transit program	Energy Manage	Short-term	$15,000		
Theme: BUILDINGS		**Goal: We will improve the energy efficiency of buildings in Fort St. John**										
5	**Retrofit existing buildings**	Medium to High	Partnership-building and outreach; design and provision financial and non financial of incentives.	The Province of BC, the federal ecoENERGY program, and BC Hydro.	Number of ecoEnergy audits undertaken	#17	Offer DCC and permit rebates	Planning & Eng	Short-term	$4,000	and	$5,000
						#18	Promote the ecoENERGY for Homes Program	Energy Manage	Short-term	$7,500		
						#20	Developer / builder community workshops	Planning & Eng	Short-term	$15,000		

#	Proposed Strategies	Priority for action*	City Role	Partners	Measures of Success		Actions	Lead	Timeframe*	Cost		
6	**Increase energy efficiency standards for new construction**	Low	The City's role in this strategy is to articulate the desired sustainable features for new construction in Fort St. John and to communicate this to local builders and developers. There is also an opportunity for the City to lead by example through the development of sustainable, energy efficient municipal buildings and facilities.	Local builders and developers, as well as students studying residential construction at Northern Lights College. Province of BC, BC Hydro, and Solar BC. Building rating systems such as Leadership in Energy and Environmental Design (LEED) and EnerGuide.	Total sq ft of buildings that exceed the building code standards for energy efficiency	#4	Include energy and water efficiency guidelines in DPAs	Planning	Short-term	$4,000	or	$8,000
						#5	Establish Development Cost Charge (DCC) Bylaw	Planning	Short-term	$50,000		
						#13	Establish a Revitalization Tax Exemption	Planning & Eng	Medium-term	$20,000		
						#16	Develop a Sustainable Development Checklist	Planning	Short-term			$7,500
						#17	Offer DCC and permit rebates	Planning & Eng	Short-term	$4,000	and	$5,000
						#20	Developer / builder community workshops	Planning & Eng	Short-term	$15,000		
7	**Affect change in building occupant behaviour**	Medium	Leading by example – implementing and broadcasting energy management activities in municipal facilities, communicating results, encouraging other local organizations to follow suit, and recognizing these efforts.	BC Hydro (i.e. Team Power Smart), the school district and local schools, local media, real estate, and local businesses and organizations.	NA (or via Survey if possible)	#20	Developer / builder community workshops	Planning & Eng	Short-term	$15,000		
						#28	Appoint an energy manager / sustainability coordinator	Human Resour	Short-term	$ 95,000 / annum		
Theme: ALTERNATIVE		**Goal: We will advance implementation of alternative technologies and truly position Fort St. John as "The Energetic City."**										
8	**Encourage implementation of renewable energy**	High	Outreach, incentives and policy development.	BCSEA, SolarBC, NEAT, Peace Energy, the Province of BC, the federal government (Natural Resources Canada, Canada Mortgage and Housing Corporation), BC Hydro, the Chamber of Commerce and renewable technology developers and entrepreneurs.	Number of solar hot water heaters in the community Percentage of community's energy supply from renewable sources	#5	Establish Development Cost Charge (DCC) Bylaw	Planning	Short-term	$50,000		
						#13	Establish a Revitalization Tax Exemption	Planning & Eng	Medium-term	$20,000		
						#15	Rebates for solar hot water heaters	Public Works	Short-term	$25,000		
						#16	Develop a Sustainable Development Checklist	Planning	Short-term			$7,500
						#17	Offer DCC and permit rebates	Planning & Eng	Short-term	$4,000	and	$5,000
						#19	Package, communicate information on solar solutions	Energy Manage	Medium-term	$7,500		
						#20	Developer / builder community workshops	Planning & Eng	Short-term	$15,000		
9	**Develop district heating opportunities**	Low to Medium	Education/demonstration, finding funding partners and creating the built and regulatory environment to support it. The City can also be a partner in the energy utility created.	P3s, PRRD, Province, First Nations, Neighbouring communities, Industry (Canfor, Peace Valley OSB, Oil and Gas), Federation of Canadian Municipalities, Infrastructure Canada, Terasen Gas, BC Hydro.	District energy feasibility studies completed / underway	#5	Establish Development Cost Charge (DCC) Bylaw	Planning	Short-term	$50,000		
						#6	Establish pedestrian and biking friendly standards	Planning & Eng	Medium-term	$20,000		
						#16	Develop a Sustainable Development Checklist	Planning	Short-term			$7,500
						#20	Developer / builder community workshops	Planning & Eng	Short-term	$15,000		
						#25	Explore a district energy system for Greenridge Heights and the Downtown	Engineering	Short-term (Gree	$4,000	and	$100,000
Theme: SOLID WASTE		**Goal: We will consider the life cycle impacts of our purchasing decisions and work towards becoming a waste free community.**										
10	**Improve waste diversion opportunities**	High	Outreach and explore opportunities to provide incentives to residents to encourage waste reduction, recycling and composting.	Peace River Regional District (and member municipalities), NEAT, Eco Depot, local retailers, and the Chamber of Commerce.	Amount of waste diverted from the landfill	#22	Promote product exchange / resale networks	Energy Manage	Medium-term	$10,000		
						#24	Undertake a recycling and composting awareness campaign	Energy Manage	Medium-term	$10,000		
						#26	Explore a community-wide recycling pick-up program	Planning & Eng	Medium-term	$15,000		
GENERAL												
					Number of CEEP committee meetings per year (with 5 or more people in attendance)	#1	Adopt emissions target in OCP	Planning	Short-term	$500		
						#28	Appoint an energy manager / sustainability coordinator	Human Resour	Short-term	$ 95,000 / annum		
						#29	Establish an CEEP implementation committee	Energy Manage	Short-term	$4,000		
						#30	Monitor progress annually	Energy Manage	Ongoing	$4,000		
						#31	Update CEEP in 3-5 years	Planning & Eng	Medium-term	$4,000	and	$60,000

* Priority of action is based on assessment against selected criteria (see Section 6 of the Report)

* Short = <3 yrs; Medium = 3 – 5 yrs; Long = > 5 yrs