

Calgary Community GHG Reduction Plan

Energy in the City

2011



Protecting what's precious.
Land. Air. Water.

calgary.ca | call 3-1-1



THE CITY OF
CALGARY

Table of Contents

Executive summary	3
Introduction	4
Our commitment	4
Scope of the Plan	4
Motivation for action.....	5
A collaborative effort.....	5
Vision, goal, objectives and targets	6
Key research findings	8
Sources of GHG emissions	8
Prioritizing options	9
Best ways to reduce emissions	10
Cost of reducing emissions	11
Key considerations for implementing the Plan	12
Roles for effective action	13
City of Calgary roles	15
Short-term actions for The City of Calgary (2012-2014)	16
Preparing for medium- and long-term actions for The City of Calgary (2015 & beyond)	18
Monitoring and reporting on Plan progress	18
Conclusion	19
The impact on Calgarians.....	19
A path forward	20
Glossary	21
Appendix A: Roles for effective action	24
Appendix B: City of Calgary focus area actions	30

© 2011, The City of Calgary, a Municipal Corporation in the Province of Alberta. All rights reserved.

The preparation of this Plan was carried out with assistance from the Green Municipal Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities, and from Alberta Environment. Notwithstanding this support, the views expressed are the personal views of the authors. The Federation of Canadian Municipalities, the Government of Canada, Alberta Environment and the Government of Alberta accept no responsibility for them.

Executive summary

The Calgary Community Greenhouse Gas (GHG) Reduction Plan was completed as a Council priority, with funding from the Federation of Canadian Municipalities and Alberta Environment. Supporting imagineCALGARY, the 2020 Sustainability Direction, the Municipal Development Plan and Calgary Transportation Plan, it provides direction on how to reduce community-wide GHG emissions in a focused and strategic way, over the short and long term.

The Plan was developed through a comprehensive process of research and collaboration with stakeholders.

The vision of the Plan is for energy used in Calgary to have a low impact on health and the environment, come from a diverse set of sources, be accessible, and support local prosperity and adaptability.

The goal of the Plan is to significantly reduce GHG emissions in Calgary while realizing other environmental, economic and social benefits. This will be accomplished through the Plan objectives of energy conservation and efficiency, and the development and use of low-carbon energy sources.

The targets of the Plan include the community GHG reduction targets referenced in the Calgary Climate Change Accord — a 20 per cent reduction by 2020 and 80 per cent by 2050, below 2005 levels — and the imagineCALGARY target of a 50 per cent reduction below 1990 levels by 2036.

In Calgary, GHG emissions mostly come from the use of electricity, natural gas, gasoline and diesel. Research and input from stakeholders identified four key opportunity areas for reducing these GHG emissions: the **provincial electricity grid, energy efficiency and conservation, distributed energy**, and **transportation choices and compact development**. These make up the focus of the GHG Plan.

Throughout the planning process, it was clear that The City cannot meet these community targets on its own; all stakeholder groups need to take action. Citizens, institutions, businesses, non-profit organizations, and all orders of government have important roles to

play. These roles and their associated actions were identified through research, work with stakeholders, and a triple-bottom-line analysis (i.e. environmental, economic and social).

A key commitment for The City will be the role of Plan manager, which means working collaboratively to initiate actions and remove barriers, build funding mechanisms for sustained action, and monitor, measure and report on progress. The City will also continue to reduce its own GHG reductions through a separate, existing corporate plan.

The priority actions within the Plan focus on areas that are already cost competitive with current practices. In fact, some even reduce overall costs. In cases where emission reduction opportunities are currently more expensive than conventional approaches, the Plan identifies early actions that can be taken to prepare for when these opportunities are more cost competitive.

For The City in particular, short-term actions include:

- implementing the Municipal Development Plan and Calgary Transportation Plans,
- increasing the uptake of combined heat and power (CHP) generation and district energy in large, dense new developments,
- increasing energy efficiency upgrades and distributed energy generation within buildings and industry,
- increasing energy conservation through specific, focused programs, and
- investigating opportunities to increase electricity generation from City facilities.

The overall effect of the Plan on Calgarians is projected to be positive, particularly given the social, economic and environmental co-benefits that can be achieved, such as cost savings, improved air quality and more sustainable neighbourhoods. Between 2009 and 2011, hundreds of stakeholders have participated in many discussions and workshops to identify challenges to reducing GHG emissions and find solutions. The City, sponsors and partners are ready to put the Plan into action with continued collaboration into the future.

Introduction

Our commitment

In 1994, The City of Calgary was one of the first cities in the country to sign up for the Partners for Climate Protection (PCP) program. This program is a partnership between the Federation of Canadian Municipalities (FCM) and the International Council for Local Environmental Initiatives (ICLEI): Local Governments for Sustainability. It involves a network of Canadian municipal governments that are committed to developing both corporate and community greenhouse gas (GHG) reduction plans. In 2004, The City was the first municipality to submit their corporate action plan, which was updated in 2006 to the Calgary Climate Change Action Plan Target Minus 50.

Since Target Minus 50, The City has been working with stakeholders on meeting the final milestone within the PCP program, a Community GHG Reduction Plan. This work began in imagineCALGARY, Calgary's community sustainability planning process, and was reinforced as a Council priority for 2009 to 2011:

“Develop a multi-stakeholder plan and implementation strategy to reduce community-wide GHG emissions in support of imagineCALGARY's long-term community goals.”

In 2009, The City of Calgary signed the Calgary Climate Change Accord.¹ This accord commits The City to corporate targets of a 20 per cent reduction by 2020 and an 80 per cent reduction by 2050 below 2005 levels, a commitment to pursue parallel GHG reduction strategies with their communities, and the creation of a plan to reduce GHG emissions and promote low-carbon living.

The Community GHG Reduction Plan contributes to fulfilling all The City's previous commitments to take action on reducing GHG emissions.

Scope of the Plan

The Community GHG Reduction Plan focuses on GHG emissions that occur within the boundaries of the city of Calgary as well as the emissions from electricity used within those boundaries. This includes emissions created by citizens, institutions, businesses, non-profit organizations and government (with the exception of City of Calgary facilities and fleet, which are addressed by the Target Minus 50 Plan). The scope of the Plan is in accordance with the PCP program and is consistent with how GHG planning has been approached in other cities around

the world. Care has been taken to ensure that the Plan does not accidentally increase GHG emissions outside of the city more than it reduces them locally.

It is important to note that GHG emissions also result from the creation, production and transportation of the products and services that we use in Calgary. These 'embedded' emissions were not investigated within the scope of this Plan (unless they are generated within city boundaries).

¹ World Energy Cities Partnership, “Calgary Climate Change Accord,” 2009, <http://www.energycities.org/accord.asp>

Motivation for action

Action to reduce GHG emissions in the community is about managing risks and capturing opportunities. The actions outlined in the Community GHG Reduction Plan are therefore designed to maximize the benefits to Calgarians while minimizing potential negative impacts.

The risks include:

- Climate change and its local and global impacts on water, food, forestry, health, the economy and severe weather events
- Provincial, national and international policies that penalize GHG emissions
- Reduced competitive advantage

The opportunities include:

- Reduced costs through increased energy efficiency and conservation
- Improved air quality, environmental protection and related health benefits
- Being proactive on provincial, national and international policies that reward reduced GHG emissions
- Attracting investment and people

The aim of the Community GHG Reduction Plan is to appropriately manage risks while maximizing opportunities.

A collaborative effort

Reducing GHG emissions cannot be accomplished by any single stakeholder group or organization. It requires the involvement of a wide range of stakeholders including:

- Citizens
- Businesses, not-for-profit organizations and institutions
- All orders of government

This Plan was developed through comprehensive collaboration with many stakeholders and needs to be implemented collaboratively with them as well.

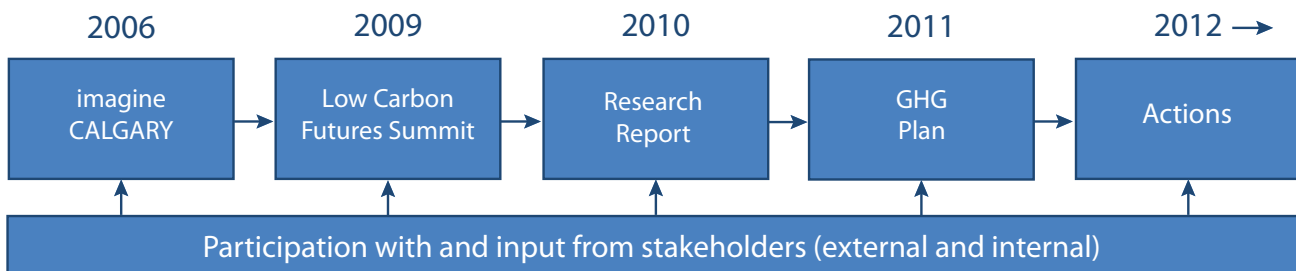


Figure 1: Plan development timeline ▲

It was clear through these discussions that stakeholders are already taking action in a number of areas, but that The City can add significant value to GHG emission reductions in Calgary by proactively reaching out and collaborating with stakeholders. The stakeholder groups that reviewed the Plan — the building industry, community associations, the development industry, economic development organizations, energy companies, environmental groups, the freight transport industry and government — are supportive of its direction.

Vision, goal, objectives and targets

Vision

Energy used in Calgary will:

- have a low impact on the environment and health
- come from a diverse set of sources
- be accessible
- support local prosperity and adaptability

Goal

To significantly reduce greenhouse gas emissions in Calgary while realizing other environmental, economic and social benefits from reducing GHG emissions

Objectives

1. Conservation — reduce the amount of energy used
2. Efficiency — do more with less energy
3. Low-carbon energy sources — develop and use energy from sources that are renewable or low-carbon

The vision, goal, objectives and targets of the Plan provide high-level guidance for the actions identified for each stakeholder group.

Targets

In alignment with imagineCALGARY and the Calgary Climate Change Accord, the targets of the Community GHG Reduction Plan are:

- 20% below 2005 levels by 2020
- 50% below 1990 levels by 2036
- 80% below 2005 levels by 2050

These reduction targets are in line with the federal reduction targets and are similar to commitments of other Canadian cities.

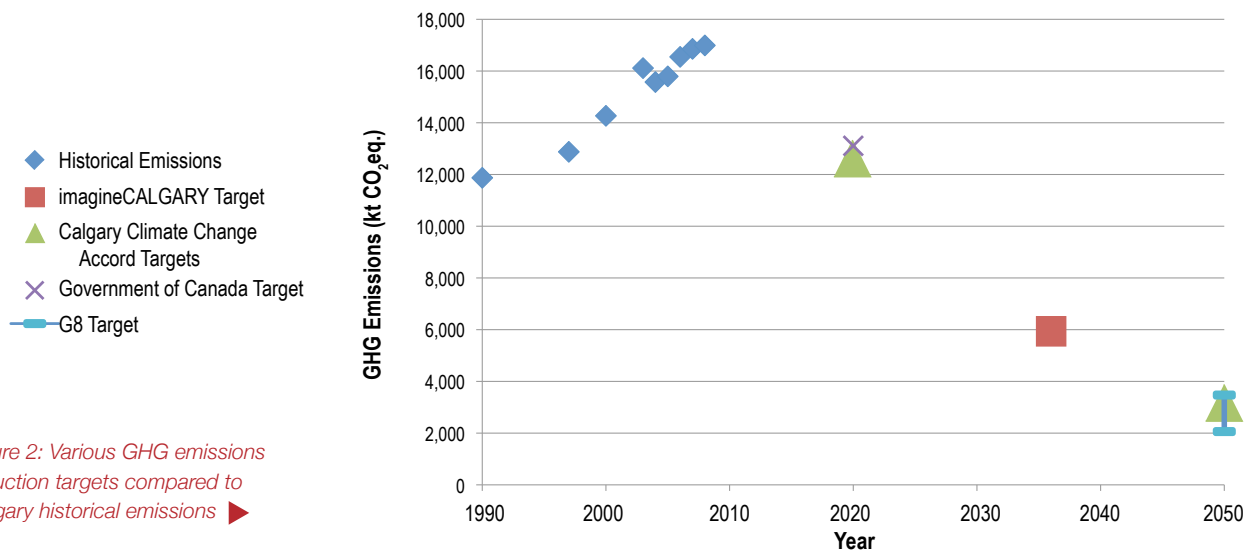


Figure 2: Various GHG emissions reduction targets compared to Calgary historical emissions ▶

Alignment

The Community GHG Reduction Plan will also contribute to meeting provincial and national climate change goals. The federal government has committed to reducing emissions by 17 per cent by 2020 and as much as 70 per cent by 2050 (below 2005 levels).

The Government of Alberta’s 2008 Climate Change Strategy includes the following goals:

- To reduce greenhouse gas emissions by transforming how we use energy, applying energy-efficient solutions, and conserving energy
- To transform the way we produce energy and to further introduce cleaner, more sustainable approaches to energy production

These provincial goals will also inform the development of regional plans that relate to Calgary, such as the South Saskatchewan Regional Plan and the Calgary Metropolitan Plan. Reducing GHG emissions will also support the Calgary Region Airshed Zone (CRAZ) Strategic Plan to improve air quality.

City of Calgary guiding documents such as imagineCALGARY, the 2020 Sustainability Direction, the Municipal Development Plan and the Calgary Transportation Plan will also be supported by this Community GHG Reduction Plan.

Key research findings

In early 2011, the research report *Options for Reducing Greenhouse Gas Emissions in Calgary*² was completed. This research report informed the development of this Plan. The key research findings are summarized below.

Sources of GHG emissions

Most of Calgary's GHG emissions are a result of using electricity, due to a high reliance on coal-fired power plants in the province. The rest of Calgary's GHG emissions come from using natural gas in buildings and industry, and gasoline and diesel in vehicles and heavy-duty equipment. A relatively small amount of GHG emissions come in the form of methane emissions from landfills.

GHG emissions in Calgary have increased over the past 20 years as population (and overall energy demand) has increased. The intent of the Community GHG Reduction Plan is to decouple GHG emissions from population growth.

Figure 3: Sources of GHG emissions in Calgary (2008) ▶

*The split between energy use in commercial buildings versus industrial facilities is approximated.²

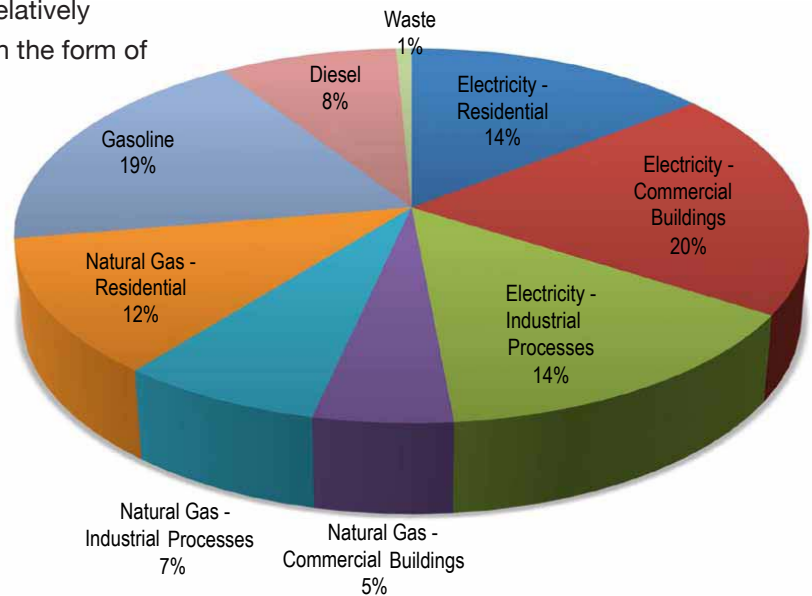
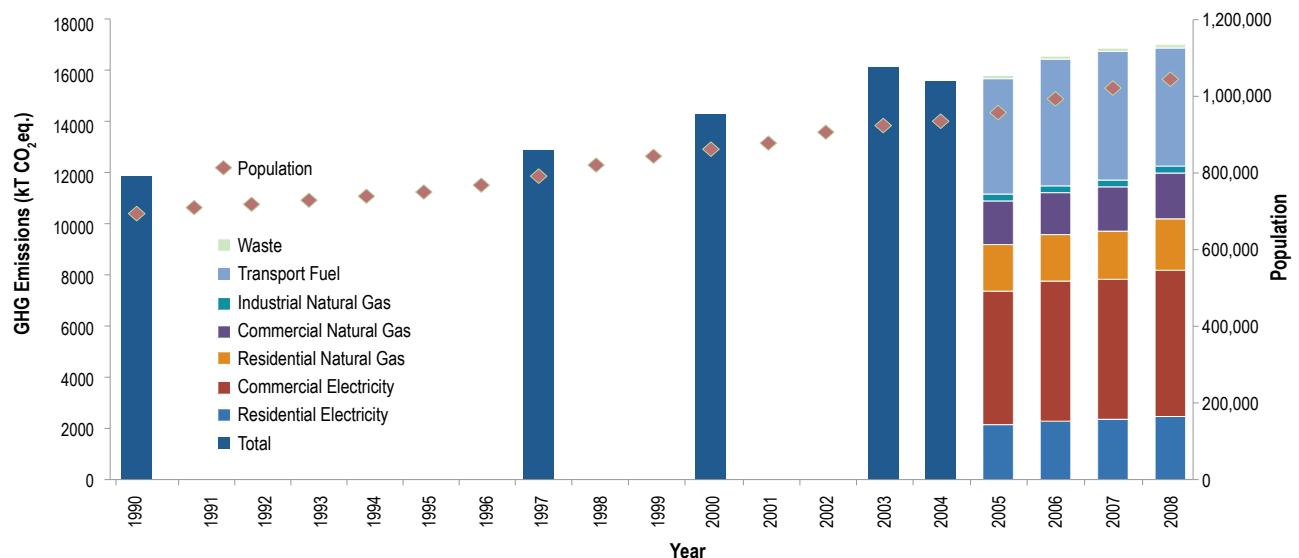


Figure 4: Historical GHG emissions in Calgary (for the years data is available) ▼



2 Row, J. et. al., "Options for Reducing GHG Emissions in Calgary – Research Report," 2011, Pembina Institute, http://www.calgary.ca/UEP/ESM/Documents/ESM-Documents/Calgary_GHG_Research_Report.pdf

Prioritizing options

Through engagement in imagineCALGARY, the Low Carbon Future Summit, and an extensive research study, stakeholders generated a large number of ideas on how to reduce GHG emissions in Calgary. An important step in the GHG planning process was to assess these ideas to determine which had the greatest potential to significantly reduce emissions.

This was done by filtering the ideas through a **triple-bottom-line (TBL) analysis** using a set of criteria to evaluate GHG emission reduction options. These criteria were:

1. Proven ability to reduce emissions (based on a compilation of best available information)
2. Cost effectiveness
3. Societal impact
4. Availability (e.g., maturity of the technology)

More information can be found in the research report *Options for Reducing Greenhouse Gas Emissions in Calgary*.

Based on this analysis, a number of emission reduction opportunities were identified to have the greatest potential to reduce GHG emissions in Calgary and then grouped into four key areas.

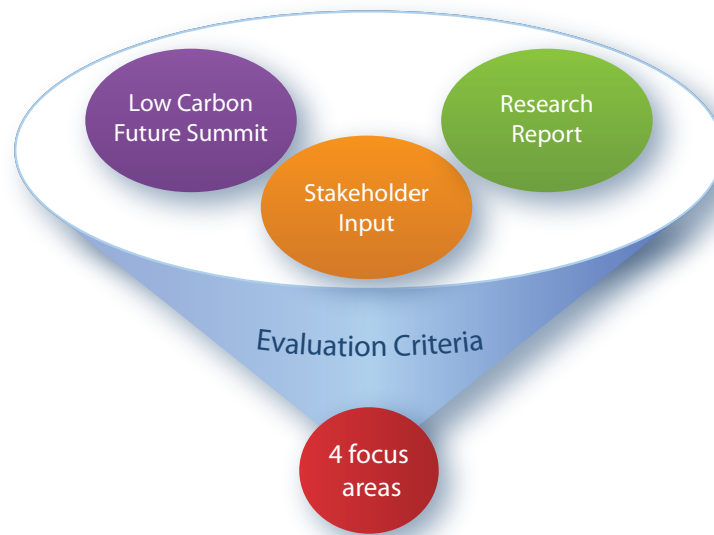


Figure 5: Evaluating high-priority GHG emission reduction opportunities ▶

Best ways to reduce emissions

Based on the triple-bottom-line analysis, a number of emission reduction opportunities were identified to have the greatest potential to reduce GHG emissions in Calgary. These were then grouped into four key areas. While these areas are the focus for the current Community GHG Reduction Plan, the Plan will need to be reviewed and revised periodically to ensure it is kept up to date as new technologies emerge, government policies are developed and market conditions change. The previously mentioned research report summarizes all of the emission reduction opportunities previously investigated.

These four focus areas are ranked in order of reduction potential. Deciding which opportunities to pursue first are dependent on many factors including the ease of implementation and the level of potential impact.

1. Provincial electricity grid

- Includes large-scale wind farms, natural gas cogeneration or combined heat and power generation (CHP), coal with carbon capture and storage (CCS), and nuclear power

2. Energy efficiency and conservation

- Include energy used in buildings, vehicles, and electrical and industrial equipment

3. Distributed energy

- Includes passive solar space heating, active solar water and air heating, photovoltaics, district energy and CHP

4. Transportation choices and compact development

- Include walking, cycling and transit and are influenced by land use and transportation planning and pricing policies

The following graph shows that actions need to be pursued in all areas. No single action will be enough. For example, increasing education and awareness is an important part of all focus areas, but will not achieve the goals and targets on its own. Each of these categories includes opportunities for action to be taken by individuals or organizations at the local, provincial and national levels.

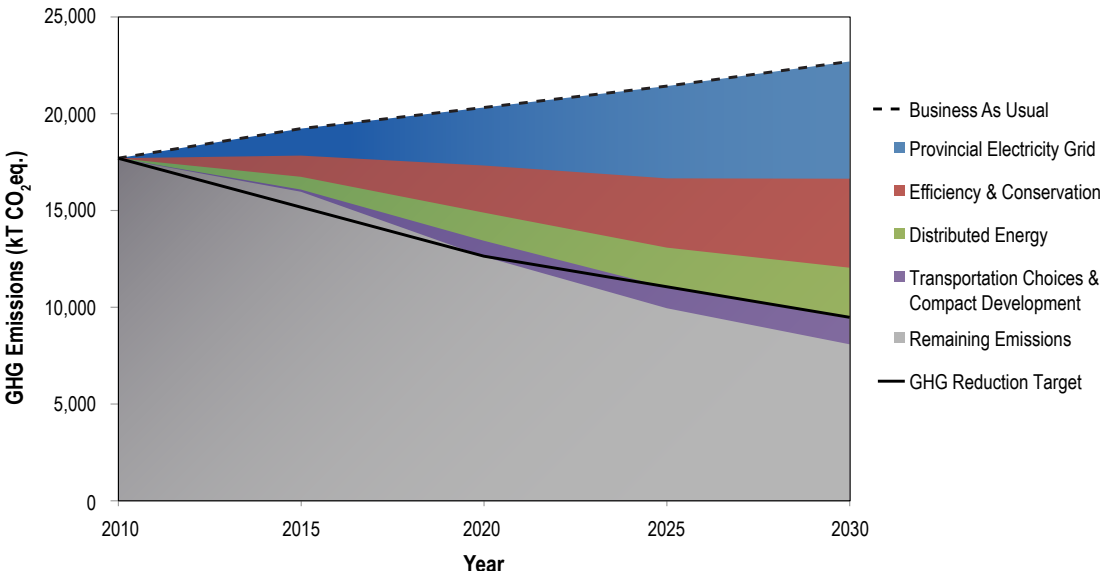



Figure 6: Estimated emission reduction potential for Calgary ▲

The ‘business-as-usual’ projection in **Figure 6** assumes that GHG emissions in Calgary increase at the same rate as population growth — the same growth pattern that has been seen over the past 20 years. It is important to note that past growth in emissions has occurred despite improvements in energy efficiency and a modest shift toward lower-carbon electricity sources in the province. This is mainly because, on average, we are driving more and have more energy-using devices. Current emission reduction programs are accounted for within the business-as-usual line on the above chart. Calgary’s new Municipal Development Plan and Transportation Plan were not considered business-as-usual as they are in the very early stages of implementation.

Cost of reducing emissions

A practical issue facing communities is what it will cost to reduce GHG emissions. The research identified that some of the approaches to reducing GHG emissions save people money, while others have a net cost.

Table 1: Cost summary of emissions reduction options (includes all direct costs)

Option	Cost competitiveness	Focus of GHG Plan
Energy efficiency Transit, walking and cycling Idle reduction technologies Passive solar energy	Reduces overall costs	Shorter term  Longer term
Large-scale wind power and natural gas cogeneration	Cost competitive	
Solar air and water heating Behaviour change Natural gas vehicles Landfill gas capture	Range of estimates	
Coal with carbon capture and storage (CCS) Nuclear power Photovoltaics Biofuels	Currently more expensive	

The triple-bottom-line analysis found it is generally most beneficial to focus on GHG reductions that save people money or are currently cost-competitive. As a result, these options are the focus of the short-term actions within the Community GHG Reduction Plan.

Of the more expensive options, some may be more suitable to pursue than others. For example, the Community GHG Reduction Plan includes the development of a detailed action plan to increase the uptake of solar energy over time. Advancing opportunities such as these will become particularly important when, over time, their costs decline and the costs of GHG emissions rise.

Key considerations for implementing the Plan

There are certain **conditions** that contribute to reducing GHG emissions. These conditions support the advancement of conservation, efficiency and the development of low-carbon energy sources needed to achieve the targets.

- Creating **multi-sector partnerships** to facilitate cooperation and leverage common goals
- Generating and communicating **information** necessary for organizations and individuals to make well-informed decisions and use available resources
- Creating **economic signals** and funding for organizations and individuals that provide financial motivations to reduce GHG emissions
- Enabling government, businesses and not-for-profit organizations to institute **legislation, policies, programs and practices**, where possible, that support action by others. The research indicated that eventually, regulations and long-term price signals would be required to meet the GHG reduction goals and targets
- Building the technology, social, business, employment, institutional and physical **infrastructure** needed to support a transition to a low-carbon future

To increase the success of this Plan over the long term, a **market transformation approach** is needed. Such an approach works as a mechanism to identify what types of strategies will be most successful at a particular time.

Market transformation occurs as products, services or behaviours go from low market share to high market share (often following an s-curve, see **Figure 7**).³ This increase in market share typically occurs as the cost of implementation goes down and the market for the new product, service or behaviour increases.

Actions to assist market transformation include demonstrations, commercialization, removal of barriers, price signals, regulations, and information/awareness building.

Each product, service and behaviour is at a different stage of market transformation, so the actions to advance each will vary depending on their current position on the curve.

The stakeholders involved in each action vary depending on: the product, service or behaviour, the stage of market transformation, and the timing of the action. These roles are outlined within the Roles for effective action section of the Plan.

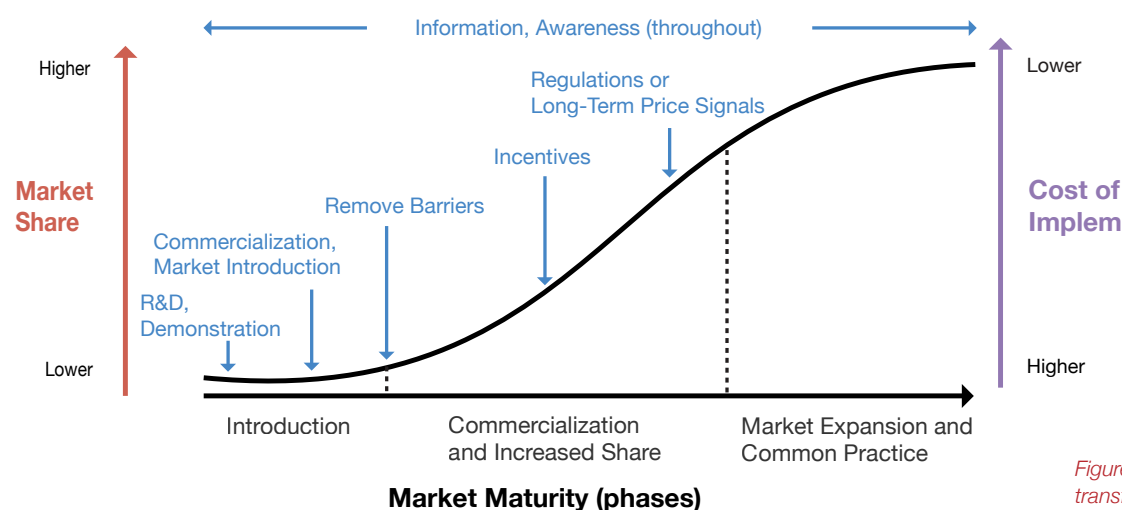


Figure 7: A model of market transformation ◀

3 International Energy Agency. 2010. *Transforming Global Markets For Clean Energy Products: Energy Efficient Equipment, Vehicles and Solar Photovoltaics*. http://www.iea.org/papers/2010/global_market_transformation.pdf

Roles for effective action

All stakeholder groups had a role in creating the vision, goal, objectives and targets in the Plan and need to work collectively to achieve them. However, there are also actions where specific organizations or sectors can be most effective; for example, energy producers and suppliers could develop and promote low-carbon energy sources, governments could use appropriate legislative tools, and retail outlets could offer a selection of energy-efficient products.

Specific actions for stakeholders are listed in detail in **Appendix A** for easy reference. They were informed through research and further developed in collaboration with stakeholders. A schedule for undertaking these actions is not provided as this is dependent on the individual or organization to determine, although the sooner the action is undertaken, the greater the GHG emission reduction expected. It is acknowledged that some actions may take longer than others to implement.

Individuals, business, industry and other organizations

All Calgarians and organizations within the city have the ability to reduce GHG emissions through their daily activities and the decisions that they make. These opportunities include:

- **Conserving energy** through such actions as turning off lights when not needed or driving less
- **Choose energy-efficient products** when purchasing buildings, appliances, equipment and vehicles
- **Using renewable or low-carbon sources of electricity and fuels** such as solar electric or solar hot water

It is also important for individuals, business, industry and other organizations to support broader changes⁴ needed over the long term, such as:

- Demonstrating and promoting new technologies and practices
- Removing barriers to new products, services and behaviours
- Supporting and building further support for:
 - low-carbon energy systems
 - compact development
 - transportation choices
 - energy labelling
 - appropriate regulations
 - price signals

4 See **Figure 7**: A model of market transformation, on page 12 of this document.

Government

Federal, provincial and local governments all have a role to play in:

- Engaging citizens, business, industry and other organizations
- Removing barriers to and building support for different ways to reduce emissions
- Putting in place regulations or price signals (where authority exists)

Generally speaking, all three orders of government have an opportunity to directly support emission reductions in all sectors of the economy, but there are a few areas where a particular level of government has a specific opportunity. Energy issues in Alberta are an example of where each level of government has a different role.⁵ In these cases, it is important to align areas where cities, provinces and the federal government can have the greatest effect.

Governance: working together effectively

Multi-sector action to reduce GHG emissions in Calgary requires systems to make it easy, increase efficiency, and motivate action to take place. These systems, or governance frameworks, are made up of:

- Federal, provincial and municipal policies, plans and legislation
- Organizational structures and management systems
- Relationships between individuals, organizations and governments
- Values, traditions and culture

The current governance framework (organizational and political) has resulted in some real emission reductions. It is clear, however, that changes to these systems are needed to achieve our goals. Some new changes are already underway, such as the Alberta Environment support for the Municipal Climate Change Action Centre housed within the Association of Urban Municipalities of Alberta. As part of the process to develop this Plan specific research was conducted to look at how governance systems effect reductions in GHG emissions at the community level. This work will be used to help guide the evolution of how governments can work effectively together on this issue in Alberta. In Canada and around the world, municipalities are being recognized as a driver for significant GHG reductions within their existing mandates. The Governments of Canada and Alberta can help realize GHG reductions by increasing municipal capacity to act. This position is supported by the principle of subsidiarity, which means that decisions should be made “at the lowest level of government or social organization where the issue can be effectively managed.”⁶

During Plan engagement, stakeholders were clear that an effective role for The City of Calgary would be to lead collaborative action to capture momentum from the creation of the Plan and ensure sustained, coordinated action. In response, The City of Calgary commits to being the Plan manager, as described in the following chapter.

5 Alberta’s electricity grid, for example, is managed primarily by the provincial government. The federal government does play a role as it has an ability to regulate emissions from power plants and can play a role in energy transfers between provinces. Municipalities have control over land use that can have an impact on how energy is used at both the city and the neighbourhood level. Municipalities are also well-positioned to work directly with the energy providers and local economic development organizations.

Land use and transportation planning, as another example, is largely managed by the municipal government, but the provincial government has an ability to be involved in this area as well. The federal government’s involvement in this area is typically limited to federally-controlled lands and some funding of infrastructure projects.

6 David Hunter, James Salzman and Durwood Zaelke, *International Environmental Law and Policy*, 3rd Ed., 2007, 521. It is also a core principle for operation of the European Union, whose constitutional document references the principle of subsidiarity.

City of Calgary roles

The City's contribution to community GHG reductions has occurred through a number of stages: first through membership in the Partners for Climate Protection program, second in getting its own house in order by making a 28 per cent reduction in its corporate emissions below 1990 levels, and third in the creation of the Community GHG Reduction Plan.

This section identifies two specific roles for The City of Calgary in advancing the Plan: 1) as the Plan manager, and 2) as one of the implementers of the Plan.

The City as a Plan manager

At this point, in order to influence GHG emissions in the community and meet the reduction targets, The City needs to work with stakeholders on multi-sector action. To accomplish this, The City will act as the Plan manager. In this role, The City will work collaboratively to:

1. Initiate actions and remove barriers
2. Build funding mechanisms for sustained action toward long-term targets
3. Monitor implementation, measure performance and report on progress

A plan-do-check-act approach will help to ensure that we continue to make progress as a community.

Working with other stakeholders also makes it easier to:

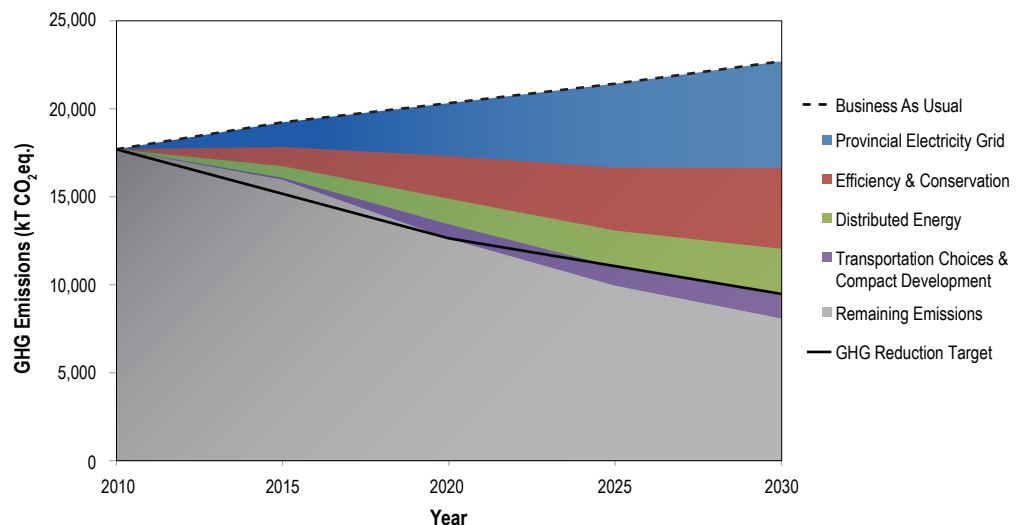
- Capture the co-benefits associated with reducing GHG emissions
- Increase cost effectiveness through multi-year partnerships and “community multipliers”⁷

The City as a Plan implementer

This section describes specific actions The City of Calgary will undertake as one of the implementers of the Plan. This includes both short- and medium-term actions.

The City has implementation opportunities in all four focus areas as shown in **Figure 8**.

Figure 8: Estimated emission reduction potential for Calgary ▶



7 Community multipliers occur when the effort of The City is matched several times over through the efforts of others.

Within each action area, The City of Calgary will undertake both short- and medium-term actions, as outlined here and in more detail in **Appendix B**.

Some of these actions are a continuation of ongoing projects or existing policies, such as the Municipal Development Plan and Calgary Transportation Plan. Others are conceptual and need to be further developed as the GHG Reduction Plan moves forward. In some of these cases, new relationships and ways of working with stakeholders will need to be developed.

Short-term actions for The City of Calgary (2012-2014)

For the short term, this Plan focuses on taking actions that are relatively simple and effective and that will save people money, like energy efficiency or district energy in high-density areas. These actions are also intended to maximize co-benefits such as improving people's health, the local economy and quality of life.

Most importantly, taking action now allows us to avoid more expensive actions in the future.

1. Provincial electricity grid

Greening the provincial grid is the largest emission reduction opportunity identified for Calgary. Therefore, it is important for all stakeholders, including The City, to consider their own opportunities to generate low-carbon electricity.

City of Calgary action areas

- The City will take a leadership role in establishing partnerships with other local governments, AUMA, provincial governments and the private sector to promote low-carbon electricity generation.
- The City will look into opportunities to increase electricity generation from its own facilities including landfills and waste water treatment plants.

2. Energy efficiency and conservation

Energy efficiency has the potential to save people money while reducing emissions.

City of Calgary action areas

- The City will work with energy retailers to enhance the type of information provided to customers through Consumer Feedback Systems. When people see how much energy they use and how this compares to others in their neighbourhood, they have been found to change their behaviours and consume less energy.
- In partnership with other organizations such as the Calgary Region Airshed Zone (CRAZ), The City will work to raise awareness of the benefits of idling reduction and explore the possibility of other instruments to significantly reduce idling.
- The City will pursue funding opportunities for programs that will advance energy efficiency and conservation within Calgary. Specifically, The City will work with the private sector to explore the feasibility of a fund that provides financial support for large-scale energy efficiency upgrades and building retrofits.
- The City will provide information to development and building approval applicants to raise awareness about the benefits and opportunities associated with energy efficiency and conservation.

3. Distributed energy

Constructing cogeneration or combined heat and power (CHP) plants in Calgary is another way to displace electricity with a higher GHG intensity from the grid, and facilitate the use of high-efficiency district heating or energy sharing.

The Energy Mapping Study⁸ completed for The City of Calgary in 2008 estimated a high potential for generating electricity, and heating both domestic hot water and buildings using solar energy.

City of Calgary action areas

- The City will promote the use and adoption of CHP and district energy for larger developments and work towards the establishment of CHP and district energy as a standard of practice where feasible in new developments.
- The City will work with industry during the development and building approvals process for larger developments to assure the feasibility of district energy is considered.
- The City will provide information to development and building approval applicants to raise awareness about the benefits and opportunities associated with distributed energy.
- The City will work with relevant members of the development and building industry to increase the amount of free heat from the sun in new buildings. The simplest way to accomplish this is through south-facing windows. This action also includes the consideration of passive solar energy design standards for new developments.

4. Transportation choices and compact development

The Municipal Development Plan and the Calgary Transportation Plan set out a vision and policies for sustainable growth in the city of Calgary over the next 60 years.

City of Calgary action areas

- The City will continue with the implementation of the Municipal Development Plan and the Calgary Transportation Plan. The implementation of these two plans will contribute to achieving emission reductions, increase quality of life for Calgarians, make the city a better place to live, and support economic growth and resiliency.

Other actions

In addition to the four focus areas, The City of Calgary will continue to reduce net GHG emissions by diverting organic material from landfills and by continuing to develop green spaces that absorb carbon from the atmosphere. These are areas where The City is already taking action for a number of reasons including, but not limited to, GHG reduction.

⁸ Canadian Urban Institute. 2008. Energy Mapping Study. Prepared for The City of Calgary. http://www.calgary.ca/docgallery/BU/planning/pdf/municipal_development_plan/plan_it/research/energy_mapping_study.pdf

Preparing for medium- and long-term actions for The City of Calgary (2015 & beyond)

To further increase the uptake of low-emission technologies and practices, actions are required by The City of Calgary past the end of the next business cycle. This will involve activities beyond those listed for 2012 to 2014. Further investigation and

collaboration with stakeholders is needed to develop detailed action plans for this time period. In the short term, The City of Calgary will pursue funding to develop these medium- and long-term action plans.

Monitoring and reporting on Plan progress

An important part of this Plan is to monitor, measure, report and publicly communicate Calgary's progress in implementing the Community GHG Reduction Plan.

The City has been reporting on community GHG emissions regularly since 1998 through the State of the Environment Report. Having monitored community GHG emissions for more than 10 years, The City of Calgary is in the position to build upon previous reporting approaches to develop a world-class GHG measurement and reporting system.

A review of the current community measurement system has been conducted as part of this Plan and its recommendations will be taken into account when emissions are monitored and reported back to Council and citizens. These recommendations include, among others, the inclusion of relevant and supporting indicators alongside energy and emission data, and the need for greater disaggregation of community-level electricity and fuel consumption data.

By regularly updating the methods used to calculate and report on community GHG emissions, The City of Calgary will improve its understanding of the sources and drivers of emissions, and will build better insight into behavior and areas where The City can have the greatest impact through local policies and programs. It also allows The City to compare its achievements with other cities in Canada and around the world.

Reporting on the status and progress of the Plan's action items will also inform the business planning process at The City.

The Plan will be reviewed and revised within five years to ensure it remains up to date with current legislation, approaches and opportunities for reducing GHG emissions. The City will also continue to monitor new developments in the field of GHG emission reductions and will take advantage of new opportunities when appropriate.

Conclusion

The impact on Calgarians

With such a big change in GHG emissions, many people are wondering what life will be like in 2020 or 2050.

While it's difficult to predict what the future will look like, the actions within this Plan are expected to have an overall positive impact on the lives of Calgarians.

For example, energy efficiency — one of the most significant opportunities for reducing emissions — offers consumers the same level of service in their homes, businesses and vehicles while using less energy. The most significant impact on the lives of Calgarians is lower energy bills.

Distributed energy generation is another significant opportunity area. This includes technologies such as solar heating and electricity, combined heat and power generation, and district energy.

Solar energy is expected to have little impact on Calgarians' daily lives, as the installations are generally on rooftops and operate independently. There is the possibility that solar energy may increase the cost of energy, but the GHG Plan has been designed so these technologies are phased in as they become more cost competitive.



For combined heat and power generation and district energy, the biggest difference to the lives of Calgarians may be the need to rely on others for their heat, and possibly cooling, and to increase the density of developments so that these systems are more economic to use. Since these technologies work best for large energy users, businesses and apartment buildings will be impacted the most. Of course, any system that is set up will need to be designed to provide reliable service to its

customers, so the impact will largely be on how the buildings operate rather than on the quality of their heating and cooling. The impact of increased densities is not expected to be any greater than what is already approved within Calgary's Municipal Development Plan.

Another significant opportunity to reduce emissions comes from changes that will occur as outlined within The City's Municipal Development Plan and Calgary Transportation Plan. This will include increased densities in both new and existing areas of the city, more mixing of land uses (residential, commercial and industrial), and increased use of transit, walking and cycling. The potential impact of these changes on the lives of Calgarians was closely examined and discussed with stakeholders during the development of these plans.



The final significant opportunity area involves changes that are likely to occur outside of the city as low-carbon power plants are constructed. These plants will need to supply Calgarians with the same quality of power they already receive – power that is reliable and affordable. These types of electricity systems already exist in other parts of the world and research has shown that they are possible within Alberta as well.

It is important for Calgarians to recognize that new power plants will have a direct impact on those communities in which they are built. In Alberta, power plants have typically been constructed in rural areas.



It is reasonable to expect that future power plants will also be built in these areas, but careful consideration and consultation will need to be undertaken to ensure these plants are developed with local support. Of course, this will need to be the case whether these plants are low-carbon or not. Old power plants will need to be replaced and demand for electricity province-wide is, by all accounts, expected to grow. Areas outside the city can thus expect more power plants under any future scenario. The big difference will be in the types of power plants built.

Given the overall impact of these changes and the associated co-benefits, it is expected that the Community GHG Reduction Plan will have a net positive impact on the daily lives of Calgarians.

A path forward

The Community GHG Reduction Plan was built with input from stakeholders and its success will depend on ongoing stakeholder action. The City of Calgary is committed to playing both a management and an implementer role when it comes to reducing emissions. The current and future actions of The City of Calgary, citizens, business and organizations are critical for success. This Plan provides focus, but does not intend to limit creativity and innovation in how we achieve goals, objectives and targets.

The City looks forward to working with partners to realize a low-carbon future.

Glossary

Biofuel

Biofuel is fuel that has been derived from biomass. Examples of biofuels include ethanol and biodiesel. Biofuels can be blended with conventional fossil fuels at concentrations dependent on the engines they are combusted in. Blending of biofuels with fossil fuels typically lowers the GHG emission intensity of fuel consumed.

Business as usual

In the research and modelling completed as part of the GHG planning process, business as usual was defined as a continuation of activities that contribute to an increase in GHG emissions for Calgary at the same rate as population growth. This includes an increasing number of vehicles, buildings and industry within the city as well as improvements in energy efficiency and conservation similar to what has been experienced over the past 20 years.

Calgary Climate Change Accord

On October 8, 2009, the mayors of nine cities in the World Energy Cities Partnership signed the Calgary Climate Change Accord. The accord commits the cities to GHG reduction targets for their corporate municipal operations as well as their wider community emissions. The signatory cities were Calgary, Canada; Houston, U.S.A.; Perth, Australia; Port Harcourt, Nigeria; Stavanger, Norway; San Fernando, Trinidad & Tobago; Aberdeen, U.K.; Halifax, Canada and St. John's, Canada.

Calgary Transportation Plan

The Calgary Transportation Plan (CTP) was adopted by City Council in September 2009. This policy provides direction on multiple aspects of the city's transportation system. It describes the vision for a long-term pattern of growth and development in Calgary over the next 60 years and provides policies that will start to create that form of city over the next 30 years.

Carbon capture and storage (CCS)

Also known as carbon capture and sequestration, CCS is a process where carbon dioxide from industrial processes is captured before it is released to the atmosphere, compressed, transported and sequestered in geological formations.

Combined heat and power (CHP)

Also referred to as cogeneration, combined heat and power is a process where a fuel is burned to generate electricity while the leftover heat is used in industrial processes or to heat buildings.

Community

The word 'community', as used in Community GHG Reduction Plan, includes all of the citizens, institutions, businesses and non-profit organizations within the city boundaries. It encompasses all buildings and vehicles within the city boundaries except those operated by The City of Calgary itself. The City of Calgary facilities and fleet are addressed by another GHG reduction plan.

Compact development

Compact development of residential and commercial properties uses less land than conventional development, and typically has higher average density.

Conservation

In this report, conservation refers to reducing the overall amount of service or products and thus the amount of energy used.

Distributed energy/distributed generation

Distributed energy is produced from many smaller, decentralized sources (in contrast to centralized sources such as coal-fired electricity plants). Types of distributed generation and distributed energy systems discussed in this document are combined heat and power plants, district energy systems or the use of solar energy within the city.

District energy

District energy is defined for this document as any sharing of energy between buildings, including sharing of heat or design for complementary electricity loads.

Energy efficiency

Energy efficiency refers to producing the same service or products while using less energy.

Greenhouse gas (GHG) emissions

Greenhouse gases are any of the atmospheric gases that contribute to the greenhouse effect by absorbing infrared radiation produced by solar warming of the Earth's surface. They include carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (NO₂).

Different greenhouse gases have different impacts on climate change. For example, methane is approximately 25 times as potent as carbon dioxide as a greenhouse gas over 100 years.⁹ Therefore, when the combined effect of different gases must be calculated, they are converted to their equivalent CO₂ value. This is represented as CO₂eq.

Ground source heat pumps

Ground source heat pumps, also referred to as geexchange technology, use the relatively constant temperature beneath the surface of the earth to heat and cool buildings. These systems are able to produce three to four units of free thermal energy from the ground for each unit of electricity input.

imagineCALGARY

imagineCALGARY began as an 18-month engagement process in 2005, in which 18,000 Calgary residents contributed to a 100-year vision for the city in the imagineCALGARY Plan for Long Range Urban Sustainability. Today, the imagineCALGARY partners are acting to bring the vision to life.

Low-carbon electricity production

Low-carbon electricity production for the Alberta grid is defined for this document as producing electricity in a way that results in GHG emissions less than or equivalent to those of a natural gas combined heat and power plant.

Market transformation

Market transformation occurs when a market, such as the market for energy-using and -producing devices, transitions from one set of products, services and behaviours to another. The transition is supported and even driven by market forces so the transformation is sustained even without continuous attention from government.

Municipal Development Plan

Calgary's Municipal Development Plan (MDP) sets out the vision for a long-term pattern of growth and development over the next 60 years. This plan also puts in place a policy framework that will start to create a more compact, vital and quality urban form for Calgary over the next 30 years. The Municipal Development Plan outlines compact development strategies that include modest increases in land use

⁹ Intergovernmental Panel on Climate Change, *Climate Change 2007: Working Group I: The Physical Science Basis*, 2007, Section 2.10.2 Direct Global Warming Potentials, http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html

density and mix, development of population and employment centres and corridors, interconnection of streets, and the design of built form and spaces at a human scale. The provincial government requires that all municipalities have an MDP.

Natural gas cogeneration

Also referred to as combined heat and power, natural gas cogeneration is a process where natural gas is burned to generate electricity while the leftover heat is used in industrial processes or to heat buildings.

Passive solar heating

Passive solar heating is a method of designing a building to utilize the sun's energy directly for light and heat. Building and neighbourhood design including building orientation, window placement, thermal massing and shading can be optimized to use more of the sun's energy to meet the energy requirements of the building.

Pay-as-you-drive insurance

Pay-as-you-drive insurance is vehicle insurance that is based on the number of kilometres travelled, instead of a flat fee that is the current norm in Canada.

Price signals

Price signals can be implemented using taxes, fees, rebates or incentives, or by considering GHG emissions, for example, in setting pricing for goods and services.

Renewable energy

Renewable energy is an energy resource that is replaced rapidly by natural processes. Examples include solar energy, wind energy, geothermal energy and hydroelectricity.

Solar electricity

Solar electricity is generated using solar photovoltaic panels — devices that produce free electrons when exposed to light, resulting in the production of electricity from the sun's energy. Common applications include roof-top mounted solar panels in both the residential and non-residential sectors.

Sustainability Direction

Approved by City Council in 2011, the 2020 Sustainability Direction is a strategic guide for transformation that identifies what must happen at The City over the next 10 years to contribute towards the imagineCALGARY 100-year vision. The 2020 Sustainability Direction links imagineCALGARY's long-term vision and plan to The City's 3-year business plans and budgets. It is an integrated, innovative and long-term approach for achieving a more sustainable city.

Transportation choices

Transportation choices, in this Plan, refers to shifting the mode of transportation from automobiles to transit, cycling and walking, and to reducing vehicle trips through methods such as telecommuting.

Triple bottom line (TBL)

TBL is an approach that considers economic, social and environmental implications in decision-making processes. TBL is a departure from making decisions based only on the financial bottom line, reflecting a greater awareness of the impacts of our decisions on the environment, society and the external economy — and how those impacts are related

Appendix A: Roles for effective action

Actions relevant to any organization or individual

Building-related actions (residential or commercial)
Conserve energy by using less electricity, natural gas, gasoline and diesel
Buy energy-efficient products (buildings, vehicles, appliances and electronics)
Construct new buildings to make good use of free heating from the sun (i.e., passive solar heating)
Get a home/building energy assessment and make energy upgrades
Install solar air heating on buildings with a large south-facing wall and high volumes of air exchange
Install solar electricity or hot water heating panels
Try new high-efficiency and renewable energy technologies in addition to those listed above
Compost organic material instead of sending it to landfills
Plant trees or grow other vegetation to capture and store GHGs

Transportation-related actions
Take transit, walk, cycle, telecommute, combine trips
Locate near transit and regular destinations
Develop infrastructure for employees to take transit, walk, cycle, telecommute and combine trips
Purchase and use natural gas vehicles for high use applications

(continued next page)

Actions relevant to any organization or individual (cont.)

Other actions (individuals and organizations)
Note other opportunities to reduce emissions and adopt when appropriate
Build relationships with others to support actions
Identify and work to remove barriers to new products, services and behaviours
<p>Support and build further support for:</p> <ul style="list-style-type: none"> • the construction of new transmission lines to areas with good wind resources • the construction of low-carbon electricity projects • the development of more compact, mixed-use, walkable and transit-oriented neighbourhoods • energy labels for energy-using products • regulations or price signals for: <ul style="list-style-type: none"> ▪ low-carbon electricity production ▪ energy-efficient products ▪ distributed generation ▪ shifting away from driving (including incentives, disincentives and pay-as-you-drive insurance) ▪ compact, walkable developments that are integrated with transit and have cycling infrastructure
Promote and demonstrate good practices for low-carbon electricity production, energy-efficient products and practices, and distributed generation
Adopt smart grid and power storage technologies (long-term)

Actions relevant to specific businesses and organizations

Organization (Type)	Action
Energy producers	Build political support for low-carbon electricity production
	Develop low-carbon electricity and district energy projects
	Identify and work to remove barriers to low-carbon electricity
	Demonstrate emerging low-carbon technologies
	Promote the use of natural gas for vehicles and power generation
	Continue to monitor the ability of biofuels, electric vehicles and ground source heat pumps to result in life-cycle emission reductions
Transmission companies	Investigate opportunities to develop new transmission lines to deliver low-carbon electricity in the province
Energy retailers	Put in place feedback systems on energy use for consumers
	Purchase low-carbon electricity when feasible
	Demonstrate new technologies
Alberta Utilities Commission	Identify and work to remove barriers to low-carbon electricity where appropriate
	Help implement advanced grid management and power storage technologies (long-term)
Alberta Electric System Operator	Investigate opportunities to have new transmission lines built to deliver low-carbon electricity
	Identify and work to remove barriers to low-carbon electricity where appropriate
	Help implement advanced grid management and power storage technologies (long-term)
Energy-related product and service companies or organizations	Develop and offer: <ul style="list-style-type: none"> • feedback systems on energy use for businesses and individuals • financing programs or turn-key services for energy efficiency upgrades or distributed generation for organizations and individuals • solar electricity, solar hot water heating and solar air heating systems
	Build political support for energy-efficient products
	Identify and work to remove barriers to new products, services and behaviours
	Monitor other opportunities to reduce emissions and advance when appropriate

(continued next page)

Actions relevant to specific businesses and organizations (cont.)

Organization (Type)	Action
Building construction industry	Build energy-efficient buildings
	Provide information on building energy consumption to customers
	Integrate distributed energy into buildings
	Identify and work to remove barriers to new products, services and behaviours
	Demonstrate new technologies and new forms of development
Development industry (as applicable, depending on the type of developer)	Design and build compact, mixed use, walkable developments that are integrated with transit, have cycling infrastructure and are designed to use distributed energy technologies
	Provide information on energy characteristics of development to customers
	Identify and work to remove barriers to new products, services and behaviours
	Demonstrate new technologies and new forms of development
Manufacturers	Design efficient industrial processes and energy management structures
Fleet operators	Undertake driver training and feedback systems on driving habits
	Put in place idling and driving policies
	Install fuel saving devices such as auxiliary power units, on-board computers and truck plug-ins
	Keep vehicles properly maintained including proper air pressure in tires
	Identify and work to remove barriers to new products, services and behaviours
Companies with shipping	Undertake freight logistics management to reduce the shipment of partial loads
	Electrify loading docks and put in place idling policies
Rail operators	Use hybrid or genset switcher locomotives
	Install anti-idling devices such as auxiliary power units, automatic start / stop devices, rail yard electrification
	Identify and work to remove barriers to new products, services and behaviours
Insurance providers	Introduce pay-as-you-drive insurance
	Identify and work to remove barriers to new products, services and behaviours

Government actions

Action	City of Calgary	Alberta Government	Federal Government
Support the construction of new transmission lines to areas with good wind resources		√	
Build support for and put in place regulations or price signals for:			
• low-carbon electricity production (large scale)		√	√
• distributed generation	√	√	√
• energy-efficient products, services and behaviours	√	√	√
• shifting away from driving (including incentives, disincentives and pay-as-you-drive insurance)	√	√	√
• vehicle idling	√	√	√
• compact, walkable developments that are integrated with transit and have cycling infrastructure	√	√	
Advance and ultimately mandate energy labelling of buildings	√	√	√
Identify and work to remove barriers to new products, services and behaviours where appropriate	√	√	√
Support the development of financing programs or turn-key services for energy efficiency upgrades and distributed generation for organizations and individuals	√	√	√
Support the development of combined heat and power plants within the city	√	√	√
Divert organic material from landfills	√		
Consider appropriate green spaces as GHG sinks	√		
Build support for and integrate energy considerations into land use and transportation planning including: <ul style="list-style-type: none"> • compact development • intensification of vacant or underused lands • supporting density with transit • creating walkable destinations • providing cycling infrastructure • district energy • combined heat and power generation • passive and active solar energy use and shading 	√	√	

(continued next page)

Government actions (cont.)

Action	City of Calgary	Alberta Government	Federal Government
Promote good practices for reducing GHG emissions	√	√	√
Help implement advanced grid management and power storage technologies (long-term)		√	√
Support the demonstration of new technologies and new forms of development	√	√	√
Monitor other opportunities to reduce emissions and advance when appropriate	√	√	√
Communicate relevant actions to stakeholders	√		
Monitor and report on the implementation of the Plan	√		
Build relationships with others and between others to support actions	√	√	√

Appendix B: City of Calgary focus area actions

The following tables provide more detail on The City of Calgary action plan for working to reduce community GHG emissions. The business units that will be involved in implementation include Environmental and Safety Management (ESM), Development and Building Approvals (DBA), Land Use Planning and Policy (LUPP), and Transportation Planning (TP). It should

be noted that the relative level of impact on GHG emission reductions is different for each action.

The actions outlined within these tables are not final until approved as part of The City's business planning processes.

Focus area: Provincial electricity grid

Desired Outcome	0-3 year actions (2012-2014)	4-6 year actions (2015-2017)
The City of Calgary increases its generation of low-carbon electricity where they are uniquely positioned to do so	<ul style="list-style-type: none"> Identify and assess opportunities for The City to generate low-carbon electricity (eg. using landfill gas, municipal solid waste, waste water, wind power, natural gas cogeneration, solar power) Work with others to build political support for further regulations and price signals regarding low-carbon electricity production in the province 	<ul style="list-style-type: none"> Continue to build political support Pursue implementation of promising low-carbon power generation opportunities (possibly in partnership with others)

Focus area: Energy efficiency and conservation

Desired Outcome	0-3 year actions (2012-2014)	4-6 year actions (2015-2017)
Increased energy efficiency of all new buildings by 2013 and all existing buildings by 2025	<ul style="list-style-type: none"> • Work with stakeholders to develop (2012) and implement an action plan* (including pursuing funding opportunities) • Provide information on energy efficiency to development and building approval applicants to enhance awareness (not additional work) • Monitor the province's efforts to introduce a new building code by 2012-2013 • Adopt by-laws and development and building approval requirements for minimum energy efficiency levels and energy labelling of buildings in areas not already addressed by provincial regulations (by 2015) 	<ul style="list-style-type: none"> • Continue to implement the action plan
	<ul style="list-style-type: none"> • Support the development of financing and turn-key services that are able to facilitate the upgrade of a large number of buildings 	
Reduced energy use in buildings through feedback systems	<ul style="list-style-type: none"> • Work with energy retailers to increase the feedback provided to consumers on energy use • Work with energy retailers and building stakeholders to improve the quality of information on energy use in large buildings 	<ul style="list-style-type: none"> • Monitor the effectiveness of the feedback systems implemented • Enhance feedback systems to increase effectiveness

* action plan to include removing barriers, builder and consumer engagement, labelling, training, incentives, demonstrations, regulations and price signals

Focus area: Distributed energy

Desired Outcome	0-3 year actions (2012-2014)	4-6 year actions (2015-2017)	Long-term actions (beyond 2017)
Lower heating demand for most new buildings by 2014	<ul style="list-style-type: none"> • Research the benefits and challenges of increasing passive solar heating in new communities • Consider building orientation, design for solar energy and shading in most new developments (2012-2013) • Consider standards for building orientation, design for solar energy and shading for most new developments (by 2014) 		
Distributed energy (besides passive solar energy) on most new buildings by 2017, and added to 50% of existing buildings by 2025	<ul style="list-style-type: none"> • Monitor the effectiveness of solar energy and small-scale wind energy programs in the province • Investigate the opportunity to add solar hot water and air heating to existing distributed generation programs 	<ul style="list-style-type: none"> • Work with stakeholders to develop and implement an action plan* (including pursuing funding opportunities) • Support the further development of financing and turn-key services that are able to facilitate the installation of distributed energy • Provide information on distributed energy to development and building approval applicants to enhance awareness (not additional work) • Adopt by-laws and development and building approval requirements for minimum distributed generation for new buildings in areas not already addressed by provincial regulations 	<ul style="list-style-type: none"> • Continue to implement the action plan • Increase standards and requirements for distributed energy

* action plan to include removing barriers, builder and consumer engagement, labelling, training, incentives, demonstrations, regulations and price signals

Focus area: Distributed energy (continued)

Desired Outcome	0-3 year actions (2012-2014)	4-6 year actions (2015-2017)	Long-term actions (beyond 2017)
Combined heat and power (CHP) and district energy considered for most developments above a defined size by 2015	<ul style="list-style-type: none"> • Work with stakeholders to develop and implement an action plan* (including pursuing funding opportunities) • Continue to support the development of CHP and district energy within the city • Provide information on CHP and district energy to development and building approval applicants for developments above a defined size to enhance awareness (not additional work) • Support the development of financing and turn-key services that are able to facilitate the use of CHP and/or district energy (includes City investigating the potential to invest in or own district energy infrastructure) • Set standards for developments above a defined size that support the adoption of CHP and/or district energy (by 2015) 	<ul style="list-style-type: none"> • Continue to implement the action plan 	<ul style="list-style-type: none"> • Consider the adoption of by-laws and development and building approval requirements for CHP and/or district energy in certain types of developments

* action plan to include removing barriers, builder and consumer engagement, labelling, training, incentives, demonstrations, regulations and price signals

Focus area: Transportation choices and compact development

Desired Outcome	0-3 year actions (2012-2014)	4-6 year actions (2015-2017)	Long-term actions (beyond 2017)
Incentives and disincentives for road use that reduces personal vehicle travel	<ul style="list-style-type: none"> • Study incentive and disincentive options, effectiveness and implementation considerations • Raise awareness of the benefits of incentives and disincentives, and promote positive examples 	<ul style="list-style-type: none"> • Model the potential impact of specific incentive and disincentive approaches 	<ul style="list-style-type: none"> • Pilot the use of incentives and disincentives for influencing commuter behaviour
Reduced vehicle idling	<ul style="list-style-type: none"> • Partner with other organizations to pilot idling reduction through community based social marketing at select locations 	<ul style="list-style-type: none"> • Promote the benefits of reduced idling and consider introducing an idling bylaw 	
Reduced vehicle travel through more compact development	<ul style="list-style-type: none"> • Land use and transportation planning aligned with the MDP and CTP* • Measure and report on MDP and CTP implementation 	<ul style="list-style-type: none"> • Repeat 0-3 year actions • Consider strategies to accelerate progress towards MDP and CTP targets 	<ul style="list-style-type: none"> • Repeat 4-6 year actions

*key initiatives within the MDP and CTP implementation include:

- modest increases in land use density and mix
- development of population and employment centres and corridors
- interconnection of streets
- primary transit network
- transit oriented development
- parking policies
- complete communities and streets
- regional transit

Additional actions

Desired Outcome	Ongoing
Additional actions undertaken to reduce GHG emissions	<ul style="list-style-type: none"> Continue existing activities to reduce community GHG emissions and to create carbon sinks such as diverting organic material from landfills and green space policies

Plan manager actions

Desired Outcome	0-3 year actions (2012-2014)	4-6 year actions (2015-2017)
Actions taken by other stakeholders	<ul style="list-style-type: none"> Develop and implement an engagement and communications strategy for the Plan Establish The City as a convener of discussions with stakeholder groups on implementation of the Plan 	<ul style="list-style-type: none"> Review and revision of the engagement and communications strategy Continued communication and relationship building with stakeholders
Effective plan implementation	<ul style="list-style-type: none"> Finalize a strategy for creating a high-quality, standardized method of measuring and reporting on community GHG emissions 	<ul style="list-style-type: none"> 5-year review and revision of the Plan
	<ul style="list-style-type: none"> Monitor, measure and report on the implementation of the Plan to council and the public prior to each business planning cycle Embed City actions into City business plan Monitor other opportunities to reduce emissions and advance when appropriate 	