



CENTRE FOR  
NATURAL  
RESOURCES  
POLICY

RESEARCH REPORT

APRIL 2014

# Buildings, Bicycles and 'Burbs

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An Overview of Urban Energy Management  
in Seven Western Canadian Cities  
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**CanadaWest**  
FOUNDATION

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The Foundation extends its thanks to a number of individuals who participated in meetings and interviews as part of the research. We would like to acknowledge the significant contributions of intern Pawel Mirski. Richard Laszlo, Mike Cleland, Len Coad, Robert Roach and Dylan Jones provided very thoughtful insights along the way. Any errors or omissions are the responsibility of the Foundation. The opinions expressed in this document do not necessarily reflect those of the Canada West Foundation's Board of Directors, donors or advisors. More information on the Canada West Foundation can be found at [www.cwf.ca](http://www.cwf.ca).



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ISBN 978-1-927488-10-2

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(#11882 8698 RR 0001)

### A Special Thanks

This project was made possible through the generous support of the Max Bell Foundation, Saskatoon Light and Power and the Environmental Services Branch of the City of Saskatoon. The Canada West Foundation would like to sincerely thank them for their commitment to informed discussion on pressing issues involving the West and its relationship to Canada and the World.

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CENTRE FOR  
NATURAL  
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POLICY

The Centre for Natural Resources Policy focuses on the economic importance of natural resources to Canada's prosperity and challenges the West to be a world leader in environmental performance and innovation.

## EXECUTIVE SUMMARY

Energy provides services essential to the way we live. It plays a key role in our residences, workplaces, recreation and mobility. However, there are smart ways to use energy, and less smart ways. Energy management is about finding and implementing smarter energy options – whether by not using energy, using energy more efficiently, combining uses to reduce waste, paying attention to proximity between work and home, or some other means.

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This report examines what western Canada's seven largest cities are doing to better manage energy within their boundaries. It is the result of many hours of analyzing public documents, interviewing experts and searching for common themes. This state of play report will be followed by additional interviews and analysis that will lead to recommendations for further progress.

All seven cities examined are engaged in urban energy management to a greater or lesser degree and these efforts are making a difference. Urban energy management is, however, a gradual process and improvements are typically evolutionary rather than revolutionary. This report provides a snapshot of what the cities are doing to improve energy management within their boundaries. At this stage, the purpose is to synthesize and report what is being done. A future report will provide analysis and recommendations.

Municipal governments have very limited control over most of the energy consumed within their borders. Cities must work within this limitation by using their influence, educating residents about the benefits of energy management and leading by example.

One way cities engage in urban energy management is by taking steps to change how the operations they *directly control* use energy. Cities can, for example, seek to reduce the energy consumed by the buildings and vehicles they own. Municipalities can also participate in pilot projects to test emerging energy technologies and provide support for innovative district heating or integrated energy projects.

Municipal governments can lead the way in *areas outside their direct operations* by influencing the design of the built environment and the modes of transportation used by residents. By influencing where people live, where businesses locate and how efficiently people and goods are able to move from place to place, municipal governments can play a significant role in urban energy management.

Our analysis has generated the following insights into the challenges municipalities face:

- **Traditional energy forms are cheap and abundant.** The relatively low cost of traditional energy negates much of the savings to be achieved through energy management initiatives, undermining the rationale for investment and conservation.
- **New technologies are tough to implement in small markets.** New technologies often need to spread learning and implementation costs over a large number of installations. Cities can help with this by participating in demonstration or pilot projects, but private investors are often reluctant to accept the risk of replacing a proven technology with something new. This slows the adoption of new technologies.
- **Resiliency matters.** Cities are preparing for a future that includes more variable and extreme weather, and energy systems are part of the infrastructure that must be made more resilient. This can be an advantage for district energy or other systems that operate in a stand-alone mode.
- **Cities cannot do it alone.** Municipal operations account for a small share of the energy consumed within a city. Influencing the decisions made by all stakeholders (and communicating and coordinating these decisions) could improve energy management.
- **Cities have limited ability to fund and legislate.** Cities view themselves as limited in their ability to set standards for buildings and vehicles. They must also ration scarce financial resources. Energy management and integrated solutions opportunities are constrained by these limits.

- **Past efforts to set targets undermine credibility.** Early targets to reduce greenhouse gas (GHG) emissions have been aggressive and have not been met. As a result of past failures, the public is less supportive of investing public or private funds in further initiatives.
- **City departments can do a better job coordinating their efforts.** The cities examined have long term strategic growth plans. These plans consider the key elements of where people live, where they work, how they move around, and the energy implications of those decisions. However, the effort to reflect energy management principles in the integrated planning process is an area for improvement.

These observations are consistent with the findings in our report entitled *The Missing Link: Constructive Ideas for Improving Urban Outcomes*, released in December 2013. It noted that the tools available to improve environmental outcomes in our cities are often underutilized. It argues that the main reason Canadian cities are generally behind the curve on the use of green tools is the tendency for short-term costs to trump long-term benefits.

Improved energy management will contribute to the resiliency of cities, but this will not happen on its own. The research to date identifies four key themes that need more work. The insights presented link directly to the research themes listed below. For example, there is a key leadership role for cities to play in encouraging and implementing integrated energy solutions. Energy is cheap, new technologies are expensive and uncertain, and cities consume directly only a small portion of the energy used within their boundaries. The leadership opportunity for cities in areas like energy mapping and pilot projects for new technologies could benefit from partnered with the stakeholders who will be responsible for broader implementation.

## INTRODUCTION

This report provides the state of play regarding urban energy management activities in seven western Canadian cities (Vancouver, Victoria, Calgary, Edmonton, Regina, Saskatoon and Winnipeg). In many cases, the stated purpose of these activities is to reduce GHG emissions rather than improve energy management, but the two objectives are jointly achieved.

The report is based on published documents supplemented by stakeholder interviews. The goal of this report is to highlight the context within which urban energy management is occurring in western Canada and to set the stage for a subsequent report that will explore opportunities for improvements to urban energy systems.

Section 2 outlines what the seven cities are doing in terms of urban energy management. Section 3 discusses insights generated by the interviews. Section 4 provides conclusions and lists the four topic areas earmarked for further discussion and review. The appendices describe the interview process, and provincial and federal policies as they relate to municipalities. A list of useful resource materials is also included.

Note that we have used the term “city” loosely to refer to the greater urban areas generally associated with each anchor city, such as Edmonton or Vancouver.

For the purposes of organizing what the seven cities are doing on energy management, we developed four functional groups and slotted the different energy management activities within them, recognizing that there is interaction and overlap across the groups. For each of the four functional groups, subcategories were created.

A description of each functional group follows.

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## Stationary Energy

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The stationary energy category primarily involves the built environment. It is about the forms of energy used to heat, cool and power buildings. This can be further divided into sectors – residential, commercial, institutional and industrial, which are then broken down further into building envelope, equipment and land use.

The majority of the initiatives in this category relate to rebates and grants for improving energy efficiency. In addition to rebates and grants, there are also several initiatives relating to land use and higher densities (achieved through zoning bylaws), zoning relaxation for secondary suites and a brownfield<sup>1</sup> redevelopment program that includes a grant.

The provincial impact on stationary energy is limited and mainly confined to energy matters within the parameters of the building code (although B.C. has implemented a carbon tax on fuel sold for most uses). The building code is created by the federal government and is mostly adopted “as is” by the provinces. Municipalities are then required to comply with the provincial code.<sup>2</sup> Municipalities provide input to the provinces to help ensure that the building code meets their needs. At this time, the (2010) National Building Code has been adopted by B.C., Saskatchewan and Manitoba. Alberta is operating under the previous building code and is reviewing the current version.

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## Mobile Energy

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Mobile energy consists mainly of alternative fuel use and multimodal transportation systems and includes all strategies that affect energy use in all forms of transportation. It includes transportation planning, urban planning that affects vehicle traffic, congestion management, alternative transportation modes and alternative fuels.

The provinces (and the federal government) are the major sources of capital for infrastructure and public transit vehicles (buses and trains). Their involvement in infrastructure applies to roads and bridge projects that are part of provincial thoroughfares, such as ring roads and roads deemed provincial or federal that pass through cities. The provinces share fuel tax revenue with the cities, which supports a variety of transportation infrastructure construction and maintenance. They also provide capital for the rails and the right-of-way portion of light rail systems. The other area of involvement at the provincial level is the funding of vehicles. Capital is provided for the purchase of buses and light rail cars. Funding for these initiatives may also come from the federal government. Cities are generally unable to provide significant funding for projects that require this level of capital without raising taxes and, as such, are reliant on the province and federal government. For example, the Calgary West LRT (Light Rail Transit) Project had a cost of \$1.4 billion. The province provided \$1.3 billion and the city \$0.1 billion. The shared funding for public transit means that projects must be negotiated between levels of government – a process that can lead to delays in making investments.

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## City Operations

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Energy management in this category focuses on building standards and operation, and fleet management. For most cities, this is a large component of their energy planning because it relates to the energy use that they control directly, and for which they have direct data. City operations include both stationary and mobile energy.

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<sup>1</sup> Brownfield development refers to re-development of previously developed sites.

<sup>2</sup> Vancouver is an exception as its charter allows a greater degree of autonomy.



There is reasonable variation across the seven cities with respect to energy management. For city buildings, the main areas of activity are in building management and efficiency, Leadership in Energy and Environmental Design (LEED) standards of construction, and converting street and traffic lights to LED bulbs.

Most of the cities are converting to, or purchasing, electric, compressed natural gas (CNG) or hybrid vehicles, as well as providing incentives for alternative transportation, car sharing, efficient driver training and reduced idling.

Energy is not a specific concern for water and waste water even though they may constitute up to 40 per cent of city energy consumption as reported by some of our interview participants. The primary focus in terms of energy management is reducing demand through reductions in consumption and use of energy saving devices. Water is the one utility all cities are in charge of, making it different from electric and natural gas utilities.

The provinces have no direct role of any consequence in this category.

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## Energy Distribution

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This is an important area for the provinces since they set policy affecting energy networks through the utility commissions. The important aspects are who has access, how access to the system is acquired and the operating conditions for the utilities and/or service providers. Historically, energy distribution has been a monopoly franchise granted to a utility. Other players are now producing different types of energy within the cities that must be accommodated within the existing energy network. Some of the cities are allowing solar electric power generation by residents for their own use as well as for sale back to the grid. This requires measurement of what is produced and

accounting for the net amount of energy sold back to the grid.

Severe weather events, including flooding in southern Alberta, have recently created a heightened interest in district energy systems due to their resiliency. Municipalities do not want to be out of commission for weeks on end when traditional energy delivery is disrupted by storms or flooding. Diversity in energy delivery, as opposed to reliance on a single source, is therefore attractive.

Integrated Community Energy Systems (ICES) are one type of energy network:

Integrated Community Energy Solutions (ICES) entail the planning, design, implementation and governance of energy systems at the community level in a way that maximizes energy performance while cutting costs and reducing environmental impacts.

ICES are energy systems that interconnect various energy sources, technologies and infrastructure in a way that is tailored according to the local context – including the nature of energy end use, patterns of energy demand and local renewable energy and waste management opportunities - in order to maximize energy performance, secure energy reliability, cut costs and reduce environmental impacts including greenhouse gas emissions.

At the community level, this means integrating existing and potential energy assets such as electric power, natural gas and local renewable energy opportunities while managing the energy needs and also harnessing the potential energy productivity of community assets such as land use, buildings, water and waste water, waste and transportation. (QUEST 2012).<sup>3</sup>

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<sup>3</sup> [questcanada.org/sites/default/files/publications/Fuels%20and%20Technologies%20for%20Integrated%20Community%20Energy%20Solutions.pdf](http://questcanada.org/sites/default/files/publications/Fuels%20and%20Technologies%20for%20Integrated%20Community%20Energy%20Solutions.pdf)

Although regulatory oversight is often a provincial responsibility, municipal policies, land use plans and other programs contribute to the success of these projects. Local electricity and natural gas infrastructure and the utilities that provide infrastructure services also play roles.

Traditional networks for electricity and natural gas have been around for a long time. What is different is the addition of district energy and distributed energy systems. Since they represent a new way of managing and providing energy, as well as allowing for diversification through local energy generation, they interest most of the cities. A number of issues make them more difficult to deal with. For district energy systems, scale (necessary density and number of users) and cost matter. Competitive pricing goes hand in hand with density. The ability to connect to and exchange energy with existing networks is also important. Most of the cities are moving to allow self-generation and/or micro-generation of electricity, which presents a number of issues, with the most important being two-way flow and load balancing. Pricing for self-generation creates management issues such as credit and price levels. Other initiatives include landfill gas-to-energy conversion projects (typically called biogas or renewable natural gas), pressure reduction turbo-expanders and heat capture from sewage.



## 2. FUNCTIONAL GROUP SUMMARIES

The single largest residential energy requirement is the heating and cooling of space. Buildings have long lives and building efficiency has been constantly improving, so energy management in this area is complex.

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### Municipal Policy Framework

Municipal governments make many decisions that impact energy use within their boundaries. Land use plans, transportation plans and energy policies each have influence and interact to impact how energy is used within a municipality. In addition, senior governments (both provincial and federal) play key roles in energy use and management (see Appendix A for a summary). Provincial governments set the overall policy framework for both energy production and consumption. Federal and provincial governments create programs that encourage investment, energy efficiency and energy literacy. The three levels of government are all involved with the building codes. This section focuses on the actions of municipal governments within the broader context established by all three levels of government.

The cities examined have implemented a broad range of measures covering land use, transportation and related energy management. However, these cities engage differently in the process of energy management and are definitely at different levels in terms of their action. Some of the reasons for these differences are discussed below.

The text and tables below summarize the urban energy management initiatives that cities are acting on (as opposed to those recognized as important for future action). Judgment was applied regarding

selection and position of activities in the various tables. Some activities did not exactly match the descriptions found in the tables. For example, in stationary energy, some programs are delivered by municipalities and others by energy service providers. For presentation, traditional stationary energy initiatives are separated from district energy and integrated energy management solutions.

Links to the many documents that were accessed to build the tables are listed in Appendix C.

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### Stationary Energy

Stationary energy refers broadly to energy consumed by equipment in fixed locations to provide heat, light, power for electric motors or energy required by industrial processes (see Figure 1). The majority of the initiatives in this category relate to rebates and/or grants for improving energy efficiency in buildings and equipment. There are several initiatives relating to land use and higher densities (achieved through zoning bylaws), zoning relaxation for secondary suites and brownfield redevelopment programs. Some initiatives are delivered by provincial authorities, some by municipal authorities, and some by utility companies or service providers.

FIGURE 1

STATIONARY ENERGY									
CATEGORY	SUBCATEGORY	POLICY TYPE	CITY						
			VICTORIA	VANCOUVER	CALGARY	EDMONTON	SASKATOON	REGINA	WINNIPEG
Residential	Building Envelope	Sustainability checklist as part of rezoning and DPA package review	X						
		Test and assess walls and windows for leaks	X	X					
		Draft-proofing	X	X					
		Provide audits	X	X	X	X			
		Grant program for energy efficiency upgrades	X		X				X
	Equipment	Test and assess energy efficiency of household devices	X	X					
		Install smart meters					X		
		Rebate for energy efficiency equipment	X	X					X
		Provide financing for efficiency upgrades							X
		Grant/rebate programs for energy efficiency upgrades			X	X	X	X	X
		Tax exemption bylaw for green energy equipment	X						
	Land Use	Increased density levels in zoning regulation bylaw	X	X					
		Grants for secondary suites				X			
		Zoning relaxations and construction grants for secondary suites	X				X		X
Commercial	Building Envelope	New building rezoning must meet LEED Gold standard		X					
		Provide audits			X	X			
		Upgrade building envelope							X
	Equipment	New building rezoning must meet LEED Gold standard		X					
		Provide savings guarantee from energy consumption reduction					X	X	
		Bonus funding for energy savings	X	X					
		Parking lot controllers					X	X	X
		Funding for high-efficiency equipment	X	X			X	X	X
		Capital incentive funding for natural gas conservation	X	X					X
		Energy study funding	X	X					X
		Payment to reduce or shift electricity demand					X	X	
		Rebate for programmable thermostat						X	
		Tax exemption bylaw for green energy equipment	X						
	Land Use	Downtown incentive density system		X	X				
		Brownfield redevelopment program to LEED Silver				X			
Industrial	Building Envelope	Provide audits			X	X			
		Incentive program for energy optimization					X	X	X
		Payment to reduce or shift electricity demand					X	X	
		Provide savings guarantee from energy consumption reduction					X	X	X
		Rebates for energy efficient lighting	X	X					X
		Rebates on energy efficient HVAC equipment	X	X			X	X	
		Energy study funding	X	X			X	X	X
		Commercial food service equipment rebates	X	X					X
	Equipment	Tax exemption bylaw for green energy equipment	X						
		Rebate for programmable thermostat						X	
	Land Use	Brownfield redevelopment program			X		X		

## Residential building envelope

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The single largest residential energy requirement is the heating and cooling of space. Buildings have long lives and building efficiency has been constantly improving, so energy management in this area is complex. Various federal, provincial and municipal programs have focused on residential buildings since the 1980s.

A combination of an energy audit program and incentives for efficiency upgrades can provide residences with a useful picture of where improvements are most needed, the benefits available, the relative costs and any available support. Of the cities reviewed, Victoria, Vancouver, Calgary and Edmonton have energy audit programs.

Once an audit has identified the opportunities to improve building efficiency, the consumer can turn to various sources to implement energy efficiency measures. All four provinces provide this kind of support, typically through a utility-administered program, such as Power Smart. These programs cover items such as additional insulation and draft-proofing. Some of the cities have established their own programs (for example, draft-proofing in Victoria and Vancouver).

Victoria has adopted a private sector green building policy that requires completion of a sustainability checklist as part of the staff review process for rezoning and development planning applications. There is, however, no compliance requirement for items on the checklist.

## Residential equipment

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Numerous programs focus on upgrading and/or replacing energy-using equipment at the residential level. These programs focus on furnaces, water heaters, efficient lighting, household appliances and plumbing fixtures (with energy being a significant cost of providing water services). Most should be viewed as energy efficiency measures, rather than broader energy management initiatives.

Rebate or grant programs are the staple of residential energy equipment support. These programs are provided by utilities in all four provinces with broad coverage of energy saving investments (through programs such as LiveSmart or Power Smart). Municipal programs are also available in all seven cities examined. The details of the programs vary. Some include minimum efficiency levels and device-testing programs (Victoria and Vancouver). Others are based on Energy Star ratings for the home (Saskatoon), or installing high-efficiency furnaces (Edmonton) or additional energy saving measures.

Victoria has a revitalization tax exemption bylaw for green energy equipment to encourage renewable energy use in buildings that applies to all three building categories. Saskatchewan also has a program that exempts equipment such as heat pumps from its provincial sales tax.

## Residential land use

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Population density is the primary link between land use and energy management for the residential sector. Density, in turn, is linked primarily to zoning bylaws. Victoria and Vancouver have zoning regulation bylaws that allow for increased density. Victoria has amended the zoning regulations for a defined downtown to reflect base and maximum density uses. Vancouver has increased density requirements, trading density for other things such as energy efficiency.

Edmonton is encouraging density by providing grants for secondary suites. The Cornerstones program will help upgrade more than 3,800 affordable homes and upgrade or create another 150 secondary suites for 2013. Victoria and Winnipeg have relaxed zoning and regulatory restrictions for secondary suites and provide grants for construction.

## Commercial building envelope

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Commercial buildings include offices, retail shops, educational facilities, health care facilities, warehouses, wholesale establishments, restaurants and institutional buildings. Space heating and cooling is a major use of energy in all these buildings. Energy needs for lighting and cooking vary, with lighting generally accounting for a more significant share of energy use in the commercial sector. In many cases, however, the building envelope represents a key opportunity for improving energy management.

Third party standards programs, such as LEED and BOMA BEST, encourage better energy management for commercial buildings. The building envelope is a key component of such programs, although they are much broader in scope. These programs encourage energy efficiency in design as well as in operations. In addition, they include consideration of land use and environmental impacts that capture some of the broader energy management opportunities in this sector.

Vancouver requires LEED gold certification for commercial buildings constructed on land which has been rezoned. This is an important example of leadership. Winnipeg has its own program for upgrading the commercial building envelope. In Calgary and Edmonton, ATCO, through its Commercial Energy Management Services, provides audits for commercial, institutional and industrial buildings.

Energy audits and retrofit programs are also broadly available across the cities examined. They are most often delivered by the private sector, but may also be administered or coordinated by energy utilities.

## Commercial building equipment

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The commercial sector includes an eclectic mix of energy-using equipment that includes everything from a conventional boiler, produce cooler, propane forklift, to a wood-fired pizza oven. This makes the energy audit or energy use study a key element of managing energy. To date, the initiatives that are available focus primarily on energy use at a particular facility, or a group of facilities owned or operated by the same company. Energy management practices often integrate all energy uses within the facility (building envelope and equipment) and support is available through energy utilities, consultants, equipment suppliers or internal specialists. The cities play a less active role in defining how and what to study, and tend to focus on financial support. For example, funding for energy studies and investment in high-efficiency equipment is available in most of the cities examined.

## Commercial land use

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There are only a few municipal initiatives that relate specifically to commercial land use. Incentives in Calgary and Vancouver focus on combined energy efficiency and density objectives. Calgary has adopted a revised downtown land use district with a density incentive system that includes green building features and an affordable housing fund. Vancouver allows taller buildings based on stated objectives to achieve a 40 to 50 per cent reduction in energy consumption from 2010 levels and to advance the carbon neutral objective for new buildings. Taller buildings are expected to also demonstrate leadership and advances in sustainable design and energy consumption.

Edmonton has taken a different approach, offering a Brownfield Redevelopment Grant Program that provides up to \$200,000 to assist in brownfield redevelopment with a LEED silver requirement.

## Industrial building envelope and energy equipment

The industrial sector typically has larger energy consumption per installation than either residential or commercial entities. As a result, utility and third party programs for energy audits, energy conservation and energy management originated in this sector. Municipal participation reflects the greater ability to pay and the longer history of energy management in this sector. Victoria, Vancouver, Saskatoon, Regina and Winnipeg provide funding for energy studies. Rebates are available for efficient heating, ventilation and air conditioning (HVAC) equipment in Victoria, Vancouver, Saskatoon and Regina, and rebates for energy efficient lighting are available in Victoria, Vancouver and Winnipeg. Saskatoon, Regina and Winnipeg have incentive programs for energy optimization and provide a savings guarantee for energy consumption reduction.

## Industrial land use

The cities do not have programs that focus primarily on industrial land use, with only one exception: Calgary's brownfield redevelopment program for industrial projects.

## Mobile Energy

Mobile energy refers mainly to alternative fuel use and multimodal transportation systems (see Figure 2). This includes strategies that affect energy use in transportation. It includes transportation planning, urban planning that affects vehicle traffic, congestion management, alternative transportation modes and alternative fuels.

FIGURE 2

MOBILE ENERGY									
CATEGORY	SUBCATEGORY	POLICY TYPE	CITY						
			VICTORIA	VANCOUVER	CALGARY	EDMONTON	SASKATOON	REGINA	WINNIPEG
Public Transit Fleet		Testing alternative fuel in buses			X	X	X		X
Land use planning (Includes alternative transportation and congestion management)		Adding cycling infrastructure		X	X	X			X
		Bus pass discount/trade for bus pass			X	X	X		
		Created car pool registry			X	X		X	
		Integrated long-term land use/transportation plan	X		X	X			
		Installing electric vehicle charging stations	X	X	X				
Vehicles	Light Duty	Car2Go			X				
		No idling bylaw	X	X	X	X			
		Vehicle efficiency education program			X			X	
		Idle-free awareness campaign		X		X		X	
	Heavy Duty	No idling bylaw	X		X	X			
		Vehicle efficiency education program			X			X	
		Idle-free awareness campaign		X				X	

Note that public transit has been included in the Mobile Energy category rather than in city operations.

The initiatives identified fall into four broad categories: encouraging use of public transit, encouraging use of alternative means of transport (such as cycling), encouraging use of alternative fuels (biofuels, electricity or others), and reducing fuel consumption (vehicle efficiency, car pooling). Examples of initiatives in each area are listed below.

#### Encouraging the use of public transit:

- Edmonton and Saskatoon are offering bus pass discounts to encourage transit use. Calgary offers city staff with assigned parking the option to exchange it for a bus pass.

#### Encouraging alternative means of transport:

- Calgary has worked with Car2Go through the Calgary Parking Authority to enable the service. The current fleet in Calgary numbers approximately 400 vehicles.
- Cycling initiatives in Calgary have resulted in construction of 15 kilometres of new cycling infrastructure and upgrading of regional pathways. Edmonton is adding cycling infrastructure. Winnipeg has a modest budget for annual cycling infrastructure. Calgary supports and participates in initiatives such as Commuter Challenge Week and Bike to Work Day. Calgary has a bike pool for city staff to get to downtown and inner city sites.
- Victoria, Calgary, Edmonton, Regina and Winnipeg have created an integrated, long-term land use and transportation plan. This recognizes the importance of linking these two departments which have tended to operate independently. There is a lack of initiatives aimed directly at energy management at the community level in this category. Results are measured based on GHG reductions, as opposed to conservation and efficiency metrics.

#### Encouraging alternative fuels:

- Vancouver has installed 40 electric vehicle charging stations and is working to install 40 more at city-owned facilities and those owned by private partners. All new city developments are required to provide charging stations for electric vehicles. Calgary is installing public charging stations in parking lots.
- Calgary, Edmonton, Saskatoon and Winnipeg are testing alternative fuels in their bus fleets and Saskatoon is trying biodiesel. There are pilot projects with a few buses running on compressed natural gas (CNG). Calgary is converting its bus fleet to CNG. One of the benefits of this action is the ability to contract for natural gas for up to 10 years versus one year for diesel fuel, reducing price volatility.

#### Reducing fuel consumption:

- Edmonton has passed an anti-idling bylaw prohibiting idling in areas outside of schools and hospitals. Vancouver has a no-idling bylaw for light-duty vehicles as well as an idle-free awareness campaign. Calgary has an anti-idling bylaw which includes city vehicles. Regina and Edmonton have idling awareness campaigns. Victoria has an idling-control bylaw.
- Calgary and Regina have education programs on vehicle efficiency, as well as car pool registries. Calgary has Transportation Demand Management (TDM) staff who promote TDM initiatives and lessons learned to employers and building owners; they also run pilot programs. Edmonton has a car pool registry.



## City Operations

Energy management in this category focuses on building standards and operation, and fleet management (see Figure 3).

For most cities, this is a large component of energy planning because it relates to the energy use that they control directly, and for which they have direct data. City

operations include both stationary and mobile energy. The distinction here is that there is a limited amount of energy that is consumed by the city as an organization, typically around 2 to 4 per cent of all energy used in a city. This energy is often referred to as “energy used by the corporation.” Note that this differs from total energy used in the city or municipality (referred to as the whole community).

FIGURE 3

CITY OPERATIONS								
CATEGORY	POLICY TYPE	CITY						
		VICTORIA	VANCOUVER	CALGARY	EDMONTON	SASKATOON	REGINA	WINNIPEG
Land Use Planning	Civic facilities LEED constructed and/or renovated to Silver standard	X		X	X			X
	Building operation data collection	X						
	Energy audits conducted in civic facilities	X			X		X	
	Install more energy efficient space heating, lighting, and automation equipment in city buildings		X				X	X
	New renovations and buildings to be built to LEED Gold standard		X	X				
	Installing LED street lighting/traffic lights			X	X	X		X
	Solar panels on civic buildings					X		
	City hall is BOMA certified				X			X
	Strategic recommendations using benchmarked data for action and investment							X
	New city developments are required to have electric vehicle charging stations		X					
Vehicle Fleet	Dialogue with province on green building policy coordination							X
	Converting vehicles to CNG	X					X	
	FleetSmart driver training for city employees	X			X			
	Electric vehicles in fleet		X		X			
	Car sharing; available for public use after hours		X					
	Various incentives for city employees to use alternative transport		X					
	Actions to reduce energy consumption in the city vehicle fleet	X	X		X			X
	Use biodiesel			X				X
	Implementing vehicle technologies to reduce idling							X
	Gas-to-diesel conversion							X
Water and Wastewater Processing	Reduce energy consumption through better water management techniques	X	X	X	X	X	X	X
	Increase water rates to decrease consumption		X	X	X			
	Inter-jurisdictional cooperation on water management							X
Other	Purchase green energy for city operations			X	X			

Managing and reducing energy consumption in buildings involves two main areas of focus: including energy management in building construction or retrofits, and improving energy management through operating practices. Examples from the seven cities include:

- Edmonton City Hall and Winnipeg City Hall complexes are BOMA BEST- certified which has resulted in a major reduction in electricity use. Victoria, Winnipeg and Edmonton require civic facilities be constructed or renovated to LEED silver standard, Vancouver and Calgary to LEED gold. Vancouver requires new city developments to have electric vehicle charging stations. Victoria employs Pulse Energy monitoring at four of its largest buildings. This is a building energy monitoring program. The data collected are used for continuous optimization programs.
- Victoria, Edmonton and Regina conduct energy audits on civic facilities. Winnipeg is making strategic recommendations for action and investment using benchmarked data.
- Vancouver, Regina and Winnipeg are installing more energy efficient space heating, lighting and automation equipment in city buildings.
- Saskatoon has installed solar heating panels on the roof of the aquatic centre which provide 20 to 25 per cent of the pool's heating requirements.

The cities also focus on how their employees travel to work and how they travel as part of their jobs. The latter covers both the vehicles cities own and the driving habits of employees. Some examples of municipal initiatives in transportation are:

- Calgary and Winnipeg are using biodiesel in their fleets. Winnipeg is doing gas-to-diesel conversions. Victoria and Regina are converting vehicles to compressed natural gas (CNG). Vancouver and Edmonton have electric vehicles in their fleet. Vancouver offers car-sharing to the public after hours and provides various incentives for city employees to use alternative transportation.

- Victoria and Edmonton have driver training programs for city employees and are taking actions to reduce energy consumption in the city vehicle fleet. Winnipeg is implementing technologies to reduce idling in city vehicles.
- Calgary, Edmonton and Saskatoon are installing LED street lighting and traffic lights.
- Calgary and Edmonton purchase green power for their operations.

All the cities are actively engaged in water and waste water management and are actively working toward reducing energy consumption through better management techniques and increasing rates to reduce consumption. Victoria has a low-flow shower and tap replacement program for multi-unit residential buildings. Vancouver has a number of water conservation programs including increasing water charges by 50 per cent to recover costs of new water initiatives. Regina offers information on water saving tips, leak checking, low-flow water devices, leak checking and an alternate day outdoor watering schedule. Most of the cities are utilizing a variety of strategies aimed at reducing consumption and lowering costs. Other measures include requirement for water meters, installing low-flow equipment, water use restrictions and education and incentive programs. Reduced consumption, both per capita and overall, can provide cost savings for processing both water and waste water and allow deferral for new infrastructure, which is another cost saving method.

## Energy Delivery and Integrated Systems

Energy delivery includes conventional natural gas and electricity distribution systems, as well as energy delivery systems such as combined heat and power, district heating and waste heat-utilization projects. Because the existing networks carry the conventional energy supplies to end users, they are often involved in more advanced, integrated energy systems such as district heating (see Figure 4).

**FIGURE 4**

ENERGY DELIVERY								
CATEGORY	POLICY TYPE	CITY						
		VICTORIA	VANCOUVER	CALGARY	EDMONTON	SASKATOON	REGINA	WINNIPEG
Networks & Delivery Systems	Landfill gas-to-energy		X		X	X		X
	Electricity from pressure reduction-turboexpander					X		
	Purchase green power			X	X	X		
	Accept and pay for power between 5 and 1000kW					X	X	
	Micro generation policy credit for generation			X	X			
Vehicles	Low carbon strategy for district energy systems		X					
	Heat capture from sewage		X					
	District heat ready buildings						X	
	District energy system	X		X				
	Data network infrastructure			X				

The delivery systems in western cities are supplementing conventional energy supplies with renewable energy (primarily wind), or with alternative supplies (landfill gas, heat capture, waste energy recovery). Examples include:

- Landfill gas-to-energy conversion projects in Vancouver, Edmonton, Saskatoon and Winnipeg.
- Saskatoon has installed a pressure reduction turbo-expander that is generating electricity.
- Calgary, Edmonton and Saskatoon are purchasing green power for their own operations. These three cities are in provinces where there is a high percentage of coal-fired electricity.
- SaskPower (Regina, Saskatoon) has a Small Power Producers program for customers who wish to generate power up to 100 kilowatts. They can sell all of the power produced or just the excess. Saskatoon, through Saskatoon Light & Power, has arrangements in place to purchase electrical power that is intended to promote electrical power generation from renewable sources such as wind and solar.
- Calgary and Edmonton each have a micro generation policy which provides credit for power generation.
- Vancouver has a heat-capture-from-sewage project.

- Regina requires buildings to be district energy ready.
- Calgary and Victoria have installed district energy systems. Vancouver and other cities are identifying areas and/or projects where district energy systems could be used.
- Calgary's data network infrastructure is a partnership between ENMAX and Cisco. The project's goal is to build a next generation utility model to address energy efficiency and development for building and residential energy management, data centre readiness, system security and renewable energy optimization.

## Alternative Energy Programs

Provincial programs also support the use of alternative or renewable energy supplies (see Figure 5). Alberta and Saskatchewan both have net-metering programs to accommodate self-generation of electricity and sale back to the system. This permits residents or businesses with solar panels to sell surplus power to the grid, accelerating the payback of the initial investment. Similarly, Manitoba provides financing for geothermal heat pumps and solar water heating. Manitoba also provides grants for district and/or community geothermal systems. Saskatchewan has grants available for solar- or wind-powered pumps.

FIGURE 5

STATIONARY ENERGY UTILITIES						
CATEGORY	POLICY TYPE	UTILITIES				
		BC HYDRO	FORTIS BC	AB	SK	MB
Residential	Net metering			X	X	
	Financing for geothermal heat pumps and solar water heating					X
Commercial	Geothermal heat pumps					X
	Solar or wind-powered pump grant				X	
Industrial						

### 3. INSIGHTS FROM THE INTERVIEWS

Resiliency is becoming more of an issue due to the increasing frequency of severe weather events. Municipalities do not want to be without energy for weeks on end after events such as the southern Alberta flood of 2013 and the eastern Canada ice storm in 1998.

Interviews with key stakeholders were conducted to:

1. provide firsthand information and views from people who are involved in energy management matters as part of their daily job requirements; and,
2. fill in any information gaps in our survey of data and information.

The summary tables that were produced and discussed in Section 2 for the four categories were sent to the interviewees who were asked to review them and advise if there was any key information or projects that might have been missed during our survey work relating to energy management.

A total of 28 interviews were conducted over a period of approximately two months between August and October 2013 using a questionnaire developed by the project team. Details of the interview process, questionnaire and project summary can be found in Appendix B.

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#### Interview Results

The interviews provided a rich body of comments and experiences. The remainder of this section comments on the key findings of the interviews, without quoting the interviewees directly. The information provided has been organized around eight key themes that emerged through the discussions.

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#### Energy is cheap

Canada is blessed with an abundance of relatively cheap energy in the form of oil (converted to gasoline), natural gas and hydroelectricity, particularly when compared to Europe and Asia. This has huge implications when considering energy management as it relates to the cost of alternatives. There is a much lower sense of the need to conserve energy when there is not enough economic pain. These comments were repeated by many we interviewed. They also recognized that individuals who struggle to make ends meet would strain to pay for higher cost green energy solutions. The relative cost difference between available energy sources and alternatives is significantly greater for cities in western Canada than those in Europe and Asia, which means it is more difficult to encourage conservation and efficiency. For example, gasoline prices in early November 2013 were approximately half of those found in Europe ([www.fuel-prices-europe.info](http://www.fuel-prices-europe.info)). Many of the alternative energy sources carry a significant cost premium over available sources of energy. The economics of energy conservation are far less compelling in Canada and are a factor in the lower level of political and public motivation to engage in more costly alternative choices.

## New technologies struggle

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Western Canadian cities have small populations compared to many urban centres around the world. This creates problems of scale when trying to implement or commercialize new energy efficient technologies. A number of energy management solutions require larger populations, concentrations of people or greater densities for them to be efficient. The same applies to efficiencies gained from more users, given the knowledge that is required for installation and servicing of the equipment.

Paybacks may be long-term or non-existent over the useful life of the initiative. This was another comment that was made by many of our interviewees. Projects are not necessarily evaluated on a full-cycle basis. The notion of full cycle accounts for all costs of the full life of the project and also externalities such as costs assigned for pollution and healthcare. There was general acknowledgement that conventional fossil fuel prices will increase over time. Technologies such as solar and wind have no ongoing fuel costs and may look more attractive compared to conventional technologies when the calculation is done over a longer period of time and externalities are accounted for. Consumers tend to be focused on the short-term. This means there is less uptake, which impedes the improvements and cost reductions that come with greater use. In addition, building regulations may inhibit application of new technologies. Approvals may be difficult to get and require time that could discourage builders. An abundance of cheap energy therefore acts as a barrier to technology adoption, which acts as a barrier to ongoing improvements that arise over time through learning by doing.

## Resiliency matters

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Resiliency is becoming more of an issue due to the increasing frequency of severe weather events. The Insurance Bureau of Canada released a report in June 2012 that details the costs resulting from severe weather events.<sup>4</sup> Municipalities do not want to be without energy for weeks on end after events such as the southern Alberta flood of 2013 and the eastern Canada ice storm in 1998. These events are costly and highly disruptive. Major disruptions such as these result in lost economic opportunity over and above the cost of repairing the damage. Resiliency is becoming part of the energy management conversation and has increased interest in district energy systems. This applies to distributed systems as well.

Resiliency involves alternative energy sources and delivery systems that provide diversity such that if one source of energy is disrupted, alternatives are available.

## City-controlled operations are small overall

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City operations, which are the activities the municipal government has direct control over, amount to a small percentage of the total energy consumption in the city. Interview participants claim this to be in the range of 2 to 4 per cent of the total energy consumed in the city. City operations mainly consist of city-owned and leased buildings and the city vehicle fleet. The fleet includes cars, trucks and motorized equipment as well as the transit fleet.

The cities are actively engaged in energy management within their own operations through initiatives such as mandating LEED and BOMA BEST building requirements, requiring use of alternative fuels in vehicles and higher efficiency and district energy systems. This includes water and waste water systems and their pumping, treatment and disposal.

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<sup>4</sup> Institute for Catastrophic Loss Reduction. 2012. "Telling the Weather Story."



There are individuals within the city who are focused strictly on city operations. Their work relating to energy management may not be integrated across other departments nor linked to the greater community.

The cities have an influence on energy management through traffic management by utilizing congestion management, optimizing transit use, as well as implementing parking initiatives and road network planning. They can also play a role in energy management through the land use planning process by increasing densities in new and redevelopment projects, encouraging multimodal transportation and optimizing transit-oriented development. This includes working with regional partners.

The reality of a city's ability to impact energy management is that it has limited control over total energy consumption in the overall community, so it must rely on two approaches: 1) lead by example; and, 2) encourage and influence energy conservation and efficiency. The cities examined are leading by example in the many energy management activities described above. This includes testing of new technologies and solutions through pilot projects. The other approach is to encourage and influence energy management, which occurs primarily through education and communicating the need to use energy wisely through greater efficiencies and conservation. Sharing what the cities are doing with the public and the benefits of this behaviour are important. This needs to occur at the community level. A strong communication and education program is invaluable.

Cities recognize that market and behavioural change are important elements of the energy management conversation and neither occurs at a rapid pace.

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### **Cities have limited ability to fund and legislate**

Cities have limited options to raise funds, which then limits their ability to fund the energy management activities they could reasonably undertake. The bulk of their funding comes from business and residential property taxes with a further, smaller

amount of funding from licensing and various user fees. The province, with some contribution from the federal government, provides the major funding for transportation and other infrastructure projects. There is no certainty of either amount or timing for this funding, which makes it difficult for cities to plan for the future.

Funds that would be available to a city from the normal revenue sources must compete with a long list of other items being demanded by residents. Many of the seven cities we examined are framing energy management projects in the context of financing them through savings that would result from reduced demand. With the exception of Vancouver, cities have a limited ability to pass legislation that would have a direct impact on energy management issues. Vancouver has the Vancouver Charter, a provincial statute that provides it with more and different powers than the other municipalities in B.C. As such, Vancouver has a larger range of options to engage in energy management, even beyond its own operations.

Cities are unable to go beyond the regulations and legislation provided by the provincial and federal government. Approximately 70 per cent of the Canadian population resides in Canada's 33 census metropolitan areas (CMAs) and this percentage is expected to continue to grow. There needs to be recognition of the role large cities play in energy management and for collaboration with higher levels of government.

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### **All seven western Canadian cities are engaged in energy management**

All seven of the large cities we examined are engaged in energy management in response to GHG and climate change concerns. Management of energy has been occurring since the 1973 OPEC oil embargo that led to the oil price shock of the mid 1970s. There are large differences in both the levels of engagement and the levels of experience in energy management amongst the cities. Several cities are engaged at a significantly higher level than other cities.

Vancouver has been working on energy management for almost 10 years. Victoria is very active on energy management and is noted for its cycling initiatives. It is considered to be the cycling capital of Canada and has achieved a high portion of total city trips done by bicycle (11 per cent). Winnipeg is aided by strong provincial and utility involvement in energy management. It is doing a lot of work utilizing geothermal systems. These three cities are trying to become leaders at a world level in the energy management area.

The remainder of the cities are not as advanced in their energy management initiatives in GHG reduction and wider community involvement. There is an obvious progression that occurs in terms of energy management. It starts with recognition of the importance of energy management followed by the setting of targets. In the West, these targets have been based on GHG reduction.

**The first stage in target setting resulted in targets that were too aggressive and therefore not achievable. When cities begin implementation and measurement, they learn how difficult it is to achieve the desired outcome, given the limitations they face.**

The first stage typically includes a long and unqualified list of green initiatives that have not been screened for achievability. A measured and more reasonable target in stage two takes into account what is doable, given the city role, finances and voter acceptance. This stage includes far greater involvement and engagement at the community level, which is necessary for success. Targets need to be set, measured and then reset. Targets need to be accompanied by an implementation plan that recognizes limitations, including funding and political will.

Cities should not necessarily have the same targets. Targets should take into account the unique economic and energy supply dynamics of each city. A city with a large amount of industrial processing will likely have higher emissions but may find large GHG reductions easier to achieve. As an

example, B.C. and Manitoba cities are powered by electricity almost entirely generated by hydropower with near zero GHG emissions. Conversely, Alberta and Saskatchewan receive the majority of their electricity from coal-fired power plants with a high GHG output. The cities in these provinces must reduce consumption to reduce GHG output or replace consumption with other sources of electricity in order to reduce GHGs. In B.C. and Manitoba, on the other hand, reduction of electricity demand does little to reduce GHGs.

Blanket reduction levels are inappropriate and will have different issues and costs.

GHG reduction is the focus of energy management in western Canada in terms of setting targets and measurement. Although the focus is not directly on specific energy items, the result is the same: energy efficiency and conservation is achieved through GHG reductions.

### **Coordination is important**

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For energy management to be effective, coordination is important. Coordination needs to occur across the full spectrum of players, including all three levels of government, the community, businesses, industry, utilities, environmental groups and researchers. All these players need to be part of the solution since no one group can achieve urban energy management effectively without participation from several of the other players.

Coordination is not only important across these groups, but also *within* the various organizations. Cities, like other governments, have a history of doing business within departments and not necessarily across departments. In the past, the transportation department often acted independently of the land use and planning department. It is never easy to change behaviour or processes that have been a certain way for a long time. Municipalities are recognizing the need to integrate and coordinate activities in a collaborative way to solve urban energy management problems. This is true within the city departments as

well as relationships with external stakeholders. There is a need to involve utilities early on, to optimize energy management issues and coordinate with planning and transportation.

District energy and distributed energy solutions represent a relatively new and different way of doing business for municipalities and utilities, at least for the cities examined. The provincial and federal governments are equally important stakeholders as they may be providing funding. And regional issues extend beyond the control of the municipalities. The municipalities adjacent to core cities impact decisions around energy management. Coordination is necessary to address energy management on a system-wide basis, and it is something of a new notion. Greater efficiencies are possible in a system-wide approach.

Interviewees stated that the earlier the public is engaged in the process of energy management, the better. Researchers contribute to new technology and are actively involved in pilot projects. Many non-governmental organizations provide information and coordination. Cities and higher levels of government are engaged in different energy management initiatives and projects. All of these activities need to be coordinated to optimize results.

The energy manager position is becoming more common as a way to centralize and situate energy management activities within city administration. BC Hydro provides funding for energy managers for B.C. municipalities. The role energy managers play is new; it was previously handled within individual departments. These managers can ensure coordination occurs across departments and among the other players thus encouraging a system-wide approach.

## 4. NEXT STEPS

Urban energy management is rarely a strategic priority for cities when compared to managing growth, funding infrastructure and other responsibilities. Without a champion, urban energy management initiatives often fall down the priority list

The intent of this report was to review what the seven cities under consideration are doing in terms of energy management.

This was achieved first through a literature and information review conducted through web searches. The result of this work was compiled and summarized into five categories discussed in Section 2.

To further inform the literature search, interviews were done with a diverse group of individuals involved in energy management. This allowed for an in-depth discussion on the topic, summarized in Section 3.

The objective of this project is to make specific, actionable recommendations that can improve energy management in western Canadian cities.

To make useful recommendations, analysis of these activities focused on identifying several topic areas that would benefit from further, in-depth discussion with a group of qualified people involved in energy management. The second round of interviews will be done with the same group of people who participated in this report to discuss in greater detail the four topic areas that have been identified. The background information presented in this

report, together with results of the second round of interviews, will inform a second report that will develop recommendations for further action.

The four topic areas are:

### 1. Elevating the priority of energy management

Urban energy management is rarely a strategic priority for cities when compared to managing growth, funding infrastructure and other responsibilities. Without a champion, urban energy management initiatives often fall down the priority list at both the political and operational level. There is also a need to engage the public and industry to gain their support. Questions for further investigation include:

- Who is best positioned to be a champion?
- How can the importance of urban energy management be increased within the strategic planning process?
- What works when trying to inform the public about urban energy management?

## 2. Working together

Further investigation into best practices for improving coordination is warranted in the following areas:

- How can municipal departments work together to ensure that land use priorities and transportation options are complementary;
- How can municipal departments, utilities and service providers, provincial governments and private sector consortiums work together to implement new ways of providing energy through district and distributed energy systems;
- How can municipalities and senior levels of government work together on transportation; and,
- How can cities and their residents and businesses work together across the energy management spectrum, since residents and businesses consume most of the energy in a city.

## 3. Improving measurement

Effective measurement and reporting are keys to success in any effort to improve performance. This is just as true for energy management as it is for other endeavours. In addition to ranking options and evaluating individual projects, measurement can contribute to a better understanding of who is in the best position to manage energy within the city. Most cities are in the early stages of determining what and how to measure. Tools and measurements are not standardized and data are not always available for benchmarking. Questions for further examination include:

- Who should do the measuring and what should they measure?
- How can stakeholders best be engaged to improve data quality and determine the actions that will improve performance?
- What should the role of the municipal government be?

## 4. Enhancing municipal leadership

Differences of opinion exist around who should assume the leadership role in urban energy management. Leadership roles exist within municipalities at the administrative and political level. The private sector is also a source of potential leaders. This raises several questions:

- Who should take the lead on urban energy management?
- What factors will help ensure successful leadership?
- What is the link between leadership and sources of funding?
- What works when cities want to influence provincial energy policy-makers and their regulators?

# The Provincial Context

The provinces play key roles in energy management and engage in several areas that apply to urban energy management at the municipal government level: water management, transportation, land use, and building codes. They are also a major source of funding for transportation initiatives, in particular transit, as well as for creating strategic plans for energy management (sometimes by way of climate change initiatives). They are a source of grants and funding for energy management projects. The level of involvement varies from province to province and details of what each province is doing are discussed later in this appendix.

Each provincial government has developed a framework to govern energy production and use that includes legislation, regulation and guidelines. The provinces oversee energy delivery indirectly, setting the regulatory framework and establishing the regulatory agency (except in Saskatchewan). The regulatory agency then oversees the companies that own and operate the delivery infrastructure. The regulator also ensures that companies that sell natural gas or electricity to retail customers act in a competitive manner. Provinces typically determine whether energy commodities are sold and priced on open markets. (Natural gas pricing is market-based throughout the western provinces, although differing adjustment mechanisms make the consumer price more or less responsive to changing wholesale prices.) Provinces also determine how municipal franchises are determined and how the rates charged for delivery networks are set.

The two main players in the process of energy delivery and sale are: a utility company that owns the network, and a service provider that owns the commodity and is the customer interface. The service provider is the entity responsible for the delivery of energy management initiatives. The network owner, in addition to providing delivery infrastructure, also acts as a service provider. Each utility franchise area has only one network.

There are two basic models for energy distribution. In the first, a utility owns the distribution system (pipe or wires) and is also the service provider so it delivers and sells the commodity. The other possibility is that a utility owns the distribution system but a number of service providers compete for the sale of the commodity. Except in Alberta, the utility can also be the service provider. Electricity and gas utilities in all four western provinces operate as one of these two basic models, with slight variations. Where retail competition is permitted, the utility acts as a distribution system and a service provider.



The following tables summarize utility service providers for natural gas, electricity water and district energy in each of the seven cities.

## Natural Gas

CITY	DISTRIBUTION	SERVICE PROVIDER (RETAILERS)
Victoria	Fortis	Many retailers
Vancouver	Fortis	Many retailers
Calgary	ATCO	Many retailers
Edmonton	ATCO	Many retailers
Saskatoon	SaskEnergy	Several retailers
Regina	SaskEnergy	SaskEnergy
Winnipeg	Manitoba Hydro	Many retailers

## Electricity

CITY	DISTRIBUTION	SERVICE PROVIDER (RETAILERS)
Victoria	BC Hydro	BC Hydro
Vancouver	BC Hydro	BC Hydro
Calgary	ENMAX	Many retailers
Edmonton	EPCOR	Many retailers
Saskatoon	Saskatoon Light & Power	Saskatoon Light & Power
Regina	SaskPower	SaskPower
Winnipeg	Manitoba Hydro	Manitoba Hydro

## Water and District Energy

CITY	WATER AND WASTEWATER	DISTRICT ENERGY
Victoria	City	Yes
Vancouver	City	Yes
Calgary	City	Yes
Edmonton	EPCOR	Yes <sup>1</sup>
Saskatoon	City	No <sup>2</sup>
Regina	City	No <sup>3</sup>
Winnipeg	City	Yes

A description of provincial activities that impact the municipalities for each of the four categories follows.

<sup>1</sup> First district energy project is under construction.

<sup>2</sup> As of July 2012, the city is considering more analysis of district energy potential.

<sup>3</sup> Nothing was found confirming or denying the existence of district energy in Regina.

# British Columbia

## **B.C. has been extremely involved in urban energy management with numerous policies and programs centred on GHG reductions.**

The B.C. government has created a comprehensive and extensive energy plan which targets energy efficiency and conservation. The plan is based on two major policy actions: 1) commitment to conservation and building standards; and, 2) community action and industrial efficiency. The plan, which was initiated in 2007, produced 55 goals, many of which have an impact on both Vancouver and Victoria. These actions include, but are not limited to, providing 50 per cent of BC Hydro's needs through conservation by 2020, establishing new energy standards to be implemented by 2010 and electricity self-sufficiency by 2016, encouraging utilities to pursue cost-effective and competitive demand side opportunities, and providing funding and programs such as rebate programs aimed at energy efficiency and conservation in the consumption, building and transportation sectors.

B.C. has a Climate Action Charter that 180 out of 188 local governments (including Vancouver and Victoria) have signed, committing their communities to voluntary requirements: achieving carbon neutral corporate operations; measuring and reporting on community GHG emissions profiles; and, creating complete, compact and more energy efficient rural and urban communities. All local governments are required to set GHG reduction targets at the municipal and regional district level.

B.C. has created an entity called the Climate Action Secretariat (CAS) that works with ministries and other jurisdictions to support the goal of GHG reduction. It coordinates activities across the provincial government and with stakeholders and provides information and resources through LiveSmart BC. Program offerings include grants, rebates, financing options and pilot programs designed to reduce

GHGs and provide savings for homes, businesses and vehicles. A key initiative of the CAS is the Community Energy and Emissions Inventory (CEEI) which provides every local government with a community energy and emissions inventory every two years. Results are measured against a base year of 2007 and, since 2010, are reported every two years with the 2012 report recently completed. A large number of municipalities have developed, or are developing, Community Energy Emissions Plans (CEEPs) and most have incorporated reduction targets into their official development plans.

Power Smart is a program managed by BC Hydro that offers programs and incentives for improving energy efficiency and providing savings in four areas: residential, business, builders and developers, and local government and district energy.

B.C. Hydro has a Community Energy Manager Program that provides funding to municipalities to hire a full-time energy manager for two years.

B.C. has an Air Action Plan and has committed \$14 billion to transportation infrastructure. The investments will be in public transit, cycling and pedestrian infrastructure (Clean Transportation) as well as in Clean Industry and Clean Communities initiatives.

B.C. has a carbon tax capped at \$30 per tonne of carbon-dioxide-equivalent emissions that is being charged on fuel sold in the province.

Clearly, the province is taking the lead on energy management in B.C. Cities are able to act and leverage what the province is doing, instead of going it alone.

# Alberta

**Alberta has chosen to allow the market to select appropriate energy management solutions and does not have much in the way of definitive programs and targets at this time.**

The Alberta Government had an energy efficiency rebate program for homeowners in place from Jan. 1, 2009 to March 31, 2012. Rebate programs were available on the following items: clothes washers, domestic hot water systems, furnaces and boilers, home energy evaluations, insulations, new homes and hybrid taxis. More than 173,000 rebates worth more than \$49 million were delivered through this program.

This program was run by C3 (originally Climate Change Central) which is a nonprofit organization created as part of the government's strategy to encourage small-scale use of alternative energy sources. There are no provincial rebates available.

The provincial government has initiated and supports the desire to reduce GHG emissions by encouraging Albertans to conserve and reduce energy use. The province requires LEED silver standard for provincially funded infrastructure.

The government is committed to developing, and is exploring, future energy savings initiatives.

In 2008, Alberta created Energy Future, its provincial energy strategy that provides a basis for future energy management in the province. The strategy is focused on three areas: carbon capture and storage, conservation and energy efficiency and greening energy production. These initiatives are intended to deliver a 50 per cent reduction in emissions by 2050, compared to the business-as-usual case for a total reduction of 200 megatonnes (mt) of GHG emissions. The majority of the reduction (70 per cent, 139 mt) was expected to come from carbon capture and storage (CCS). The area with the

greatest impact on municipalities is the Conserving and Using Energy initiative which accounts for 12 per cent of the proposed reduction. The goal is "to reduce greenhouse gas emissions by transforming how we use energy, applying energy efficient solutions, and conserving energy ([www.environment.alberta.ca/02250.html](http://www.environment.alberta.ca/02250.html)).

The province participated with the City of Calgary and the Federation of Canadian Municipalities (FCM) to create a GHG tool kit in 2011. The Greenhouse Gas Action Toolkit for Alberta Communities has been designed as a user-friendly way for municipalities to reduce GHGs at the local level. The provincial government provides fuel tax revenue sharing to Edmonton and Calgary. Funds are eligible for a broad range of transportation infrastructure. Both new projects and lifecycle maintenance are permitted. The province maintains the ring roads.

Alberta has a carbon pricing system in place. It charges \$15 per tonne for every tonne of emissions that exceeds the allowed limit and applies to companies that emit more than 100,000 tonnes of carbon dioxide emissions annually. Funds are used for projects that reduce GHG emissions or improve the ability to adapt to climate change ([ccemc.ca](http://ccemc.ca)).

The province has initiated a micro generation policy using net meters which allows customers to generate electricity and receive a credit for excess electricity sent to the grid.

The province is considering next steps.

# Saskatchewan

**The Saskatchewan government is undertaking a number of initiatives regarding energy conservation and efficiency at the provincial level that will have a secondary impact at the municipal level.**

The government has implemented strategies across government ministries to reduce GHG emissions, energy and water use, and waste generation. The strategies are focused on implementing environmentally friendly and sustainable practices in transportation and building construction and operation.

The government has adopted environmental building standards for all new construction projects including LEED certification and BOMA BEST certification. Its ministry, Central Services, has 11 buildings that are certified BOMA BEST. It is also providing leadership and promoting sustainable operations of the building portfolio through accepted environmental and conservation practices to reduce consumption, costs and environmental impact.

On the transportation side, one of the key goals is to reduce the impact of the government's footprint. A vehicle replacement and right-sizing guide has been developed to aid decision-making that meets client needs while protecting the environment.

The government created the Go Green initiative that provided a number of programs encouraging residents to green their activities. One component focused on energy conservation and included the following programs: the net metering program, new home energy efficient rebate incentives, the commercial boiler program, the HVAC program, the parking-lot controller, the municipal ice rink program, the solar- and wind-powered pump grant, the commercial lighting incentive and the industrial energy optimization program.

# Manitoba

**Manitoba is very involved in energy management and works closely with Winnipeg, where the majority of Manitobans live. Manitoba Hydro is the sole utility for electricity and natural gas and the only service provider for electricity.**

The Manitoba government is engaged in the area of energy management at both the provincial and municipal level with Winnipeg dominating urban centres in terms of its percentage of the total provincial population. The next largest urban centre is Brandon (2011 population: 46,000) followed by four other municipalities with populations of 11,000 to 14,000 and three municipalities with populations of 5,000 to 14,000.<sup>5</sup> Winnipeg is also the provincial capital so many provincial activities take place in Winnipeg and its buildings house provincial employees. The high percentage of people living in Winnipeg in addition to it being the provincial capital make it unique in the group of cities examined.

The following information from the provincial website provides a summary of the wide range of activities the province is involved in with respect to urban energy management.

Savings are being realized through energy efficiency programs offered by Manitoba Hydro (Power Smart) for communities and residents. Manitoba is active in geothermal systems for residential application and district community systems and it offers various grant and incentive programs. It has installed 11,000 ground-source (geothermal) heat pumps to date (2012). These systems reduce energy costs and GHG emissions.

New buildings which receive public funding will be required to meet LEED silver or better building standards with new energy standards for commercial buildings to follow. Manitoba has legislated the Green Building Policy, which came into effect on

April 1, 2007, covering non-residential building construction projects funded by the Province of Manitoba. It requires buildings to be 33 per cent more efficient than the 1997 national building code model. Other requirements include an integrated design process, minimum levels of energy efficiency, life-cycle costing of the building systems and a preference for low- or zero-carbon renewable energy systems.

The province is promoting green-heat technologies such as the use of solar energy for space heating and cooling and water heating in residential and commercial buildings.

Manitoba has a number of transportation-related initiatives. They mandated that 8.5 per cent of gasoline sales be replaced with ethanol. The Husky plant at Minnedosa has increased annual production to 130 million litres. They have eliminated the fuel tax on biodiesel. Manitoba provides funding for alternative transportation initiatives that include transit grants, support for diesel hybrid electric buses, tests of hydrogen hybrid fuel cell buses and plug-in hybrid electric vehicle trials. They are involved in initiatives to increase walking and cycling.

From 2008 to 2012, Manitoba piloted the Community Led Emissions Reduction (CLER) Program that provided tools and resources to assist communities in reducing GHG emissions. It allowed communities to hire CLER coordinators and to undertake a number of energy GHG reduction initiatives.

Manitoba, much like B.C., is actively involved in numerous energy management initiatives, many of which are occurring at the municipal level.

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<sup>5</sup> [www12.statcan.ca/census-recensement/2011/as-sa/98-310-x/98-310-x2011001-eng.cfm](http://www12.statcan.ca/census-recensement/2011/as-sa/98-310-x/98-310-x2011001-eng.cfm)

# The Federal Context

The federal government is involved in terms of setting policy and legislation in energy management. Ottawa establishes minimum standards that must be met in areas such as vehicle emissions and biofuels. They also produce building standards models that give direction to the provinces. These are updated on a five-year cycle and are typically adopted by the provinces. Involvement at the municipal level includes these areas: buildings and communities; clean fossil fuels; bioenergy; renewables; and transportation. The federal government also regulates equipment efficiency standards and labelling.

The federal government is also involved in clean energy research and development through CanmetENERGY (an arm of Natural Resources Canada), Sustainable Development Technology Canada (SDTC) and the National Research Council (NRC). Natural Resources Canada (NRCAN) “seeks to enhance the responsible development and use of Canada’s natural resources” and is involved in energy management through entities such as the Office of Energy Efficiency. The Office of Energy Efficiency (OEE) is involved in energy, efficiency and alternative fuels and they have a number of programs dealing with energy efficiency that are managed through their ecoENERGY Efficiency program.<sup>6</sup> They have recently acquired a building benchmarking tool, ENERGY STAR® Portfolio Manager™. OEE has the National Energy End Use Database and compiles the *Energy Data Use Handbook*.

The federal government provides funding for research and development projects through Sustainable Development Technology Canada (SDTC) whose mission is to “act as the primary catalyst in building a sustainable development technology infrastructure in Canada.” There is a tech fund and a biofuels fund available.

As an example of federal involvement, the federal government requires an average of 5 per cent renewable content in gasoline across Canada (set in 2010) and an average 2 per cent renewable fuel content in diesel fuel and distillate oil (set in 2012). The federal government also regulates vehicle emissions.

The federal government creates the National Model Construction Codes which currently consists of five codes: National Building Code 2010, National Building Code Revision 2012 (Part 9.36), National Fire Code 2010, National Plumbing Code 2010 and National Energy Code for Buildings 2011. The Model National Energy Code for Houses 1997 will no longer be published. Provisions dealing with energy efficiency have been incorporated into Part 9 of the 2010 National Building Code and were published as an interim change to that code in December 2012.

The Codes are developed by the Canadian Commission on Building and Fire Codes through a consensus based process that relies on voluntary contributions of public and private sector experts from across Canada. Provinces and territories regulate the design and construction of new houses and buildings and the maintenance and operation of fire systems in existing buildings. Adoption and enforcement of the codes are the responsibility of the provinces and territorial authorities having jurisdiction. The codes are reviewed and adopted with or without modification. The provinces review the codes and at this time B.C. is the only western province that has adopted all four codes plus the National Building Code Revision 2012 (Part 9.36), which relates to energy. Manitoba has adopted building, fire and plumbing codes, and Saskatchewan has adopted the building and fire codes. Alberta has adopted the current plumbing code and is reviewing the other codes.

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<sup>6</sup> [http://oee.nrcan.gc.ca/sites/oee.nrcan.gc.ca/files/files/pdf/publications/commercial/codes\\_eng.pdf](http://oee.nrcan.gc.ca/sites/oee.nrcan.gc.ca/files/files/pdf/publications/commercial/codes_eng.pdf)



Stability of funding from higher levels of government is an important issue. The federal government made the Gas Tax Fund permanent in 2008. The fund provides money (\$2 billion annually to 2014) for municipal projects that contribute to cleaner air and water and reduce GHG emissions in areas including public transit systems, waste water infrastructure, roads and community energy systems.<sup>7</sup>

In order to offset the global financial crisis and recession of 2008, the federal government, along with many other national governments, initiated stimulus spending to address the slowdown and job losses. One of the outcomes of this activity was the production of a report entitled Integrated Community Energy Solutions - A Roadmap for Action. The report was released in September 2009 at the annual meeting of the Canadian Council of Energy Ministers. This report created an integrated community solutions roadmap based on energy efficiencies on a sector basis. It addressed the question of what happens if you look at a community in an integrated way. Natural Resources Canada (NRCAN) worked on the project with QUEST. QUEST (Quality Urban Energy Systems of Tomorrow) describes itself as “a national non-profit organization actively working to make Canada a leader in the design, development and implementation of Integrated Community Energy Solutions” ([www.questcanada.org](http://www.questcanada.org)).

The other major federal initiative resulting from the 2008 recession was to provide the Federation of Canadian Municipalities (FCM) with an endowment of \$550 million for the Green Municipal Fund. This money is available to municipalities for three types of environmental initiatives: plans, studies and projects. The program is in the late stages and virtually all of this funding has been committed.

At this time, there are few new programs available from the federal government.

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<sup>7</sup> <http://www.infrastructure.gc.ca/prog/gtf-fte-eng.html>

# Interview Process

To achieve adequate representation across the spectrum of players who are involved in energy management, the target number of interviewees was set at a minimum of 25. A total of 28 people were interviewed by telephone between late August and early October 2013. Interviews lasted between 30 and 60 minutes, with most taking approximately 45 minutes.

We would like to extend our thanks to everyone who took time out of their busy schedules to answer the questions and share their thoughts and opinions with us.

At least one person was interviewed from each city and the majority of the people interviewed came from the administration side of the seven cities. There was representation from transportation, land use and planning, and city operations (building operations, transit and their own fleet operation). Other individuals interviewed were from the provincial government, federal government services, municipal and provincial utilities, and industry representatives.

Interviewees were advised they would not be named and quotes would be used only if authorized and reviewed. No direct quotes were used from the interviewees.

A list of candidates was created by the project team and individuals were provided with a brief background of the project, summary of the bucket categorization and a questionnaire. A questionnaire consisting of 18 questions organized into five categories was also created by the project team. The categories were:

- planning, strategy, policy, information and evaluation
- methods, tools and specific targets
- internal coordination
- external communication
- other

This work was valuable in shaping the four topics chosen for more in depth discussion.

# Questionnaire

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## Background:

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This project is focused on examining community energy policies and strategies, identifying success stories and exploring barriers to success and possible means to overcome them.

For the purposes of organization, we have categorized municipal energy use into four key areas. We recognize there is interaction and overlap between them. They were chosen because of their particular energy use characteristics or because of the policy and decision-making processes that apply.

The four areas are:

- 1) *Stationary energy*. The built environment. This can be further divided into sectors – residential, commercial, institutional and industrial. We start from a point of view that includes mixed energy uses in the urban setting.
- 2) *Mobile energy*. This includes all strategies that affect energy use in all forms of transportation. It includes transportation planning, urban planning that affects vehicle traffic, congestion management, alternative transportation modes, alternative fuels, etc.
- 3) *City operations*. For most cities, this is a large component of energy planning because it relates to the energy use that they control directly, and for which they have direct data. City operations include both stationary and mobile energy.

- 4) *Energy networks*. This includes conventional natural gas and electricity networks, as well as energy delivery systems such as combined heat and power, district heating, and waste heat utilization projects. Although regulatory oversight is often a provincial responsibility, municipal policies, land use plans, and other programs contribute to the success of these projects. Local electricity and natural gas infrastructure and the utilities that provide infrastructure services also play a role.

Please review the following list of questions in the context of the project objective relative to your area. We look forward to our conversation.

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## Questions:

Can you briefly describe your role and what work you are doing that relates directly to energy management?

### A. Planning, Strategy, Policy, Information and Evaluation

1. Does your city have an energy strategy or policy framework, what are its main elements, and is it formal city policy?
2. What do you do to engage various public/local groups such as business improvement districts, chambers of commerce, neighbourhood associations etc.?
3. Does your city have a comprehensive understanding of energy demand and fuel use within its own boundaries? Has your city done any energy mapping?
4. How are you measuring the success of your program(s)? Are you reporting the results of your measurement? How are you responding to the results?

### B. Methods, Tools and Specific Strategies

5. Are you using pricing/tax strategies in order to achieve energy efficiencies and conservation? Please describe.
6. Does energy management (e.g., conservation and efficiency, energy delivery, heat management, and transportation energy) get explicitly considered in land use planning and zoning?
7. What other regulatory tools do you use with respect to either stationary or mobile energy management?
8. Does your city coordinate with other levels of government with respect to energy programs such as information programs or incentive programs?
9. What roles do distributed systems play in your city and how are they being integrated into the delivery system?

10. Is district energy/heating a policy priority? If yes, who manages the process, policy issues, regulation, and implementation?

### C. Internal Coordination

11. How are various aspects of energy management coordinated and linked?
12. Are there internal committees at staff and council level that oversee initiatives?

### D. External Communication

13. Does the province have policies that provide guidance or authority to communities respecting energy management?
14. Does your city have mechanisms for regularly communicating with/coordinating with provincial agencies respecting energy management?
15. Does your city have effective linkages and networks to allow comparison of practices with other municipal bodies either in Canada or outside? Are you investigating best practices in terms of your initiatives or possible new initiatives?
16. How do your programs fit with provincial & federal initiatives? Are you partnering with them or other agencies (e.g., Federation of Canadian Municipalities)? How is that working?

### E. Other

17. Have you established priorities (ranking) in your energy efficiency and conservation initiatives? How are you doing this? What methods are you using? Is the implementation of your projects based upon this ranking?
18. Are you investigating best practices in terms of your initiatives or possible new initiatives?

Is there anyone else you think we should be talking to for our project?

*Thank you for taking the time and participating in our project.*

## APPENDIX C – DOCUMENT LINKS

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