



AUMA Water Conservation, Efficiency and Productivity Plan

*Prepared by: Alberta Urban Municipalities
Association*

*Adopted by the AUMA Convention:
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EXECUTIVE SUMMARY, TARGETS AND RECOMMENDATIONS

Water CEP: Conservation, Efficiency, Productivity

Water conservation: Any beneficial reduction in water use, loss, or waste. Water management practices that improve the use of water resources to benefit people or the environment.

Water efficiency: Accomplishment of a function, task, process, or result with the minimal amount of water feasible. An indicator of the relationship between the amount of water needed for a particular purpose and the quantity of water used or diverted.

Water productivity: The amount of water that is required to produce a unit of any good, service, or societal value.

Alberta's urban municipalities understand that their economic viability, environmental integrity, social and cultural vibrancy, and legitimacy to govern rely on providing citizens and businesses a safe, secure supply of water. ¹ The purpose of AUMA's Water Conservation Efficiency and Productivity (CEP) Sector Plan is to build the capacity of its members to develop and implement their own plans towards safeguarding this vital resource.

Section 1.0 of this Plan introduces why there is a need to take action and where this Plan fits within broader provincial initiatives. Reasons include concerns over the availability of water, the cost involved in treating and distributing water and the opportunity to prevent future environmental and economic problems. In addition, water conservation is one of the priorities of the province's *Water for Life Strategy*. AUMA's Plan aligns with the Alberta Water Council CEP Project Team's recommendations for CEP sector planning.

Section 2.0 provides information on the context in which municipalities will be developing their individual CEP Plans, including an overview of relevant legislation and a breakdown of the sources from which municipalities draw water.

Section 3.0 discusses the various approaches to measuring water use. Total water use, total per capita water use, and residential water use all have roles to play in tracking the progress towards CEP goals. However, they are not without their limitations. This plan sets the foundation for AUMA, Alberta Environment and municipalities to work towards the implementation of common terminology and methodology for monitoring water use.

Section 4.0 gives a brief history of CEP initiatives that municipalities have already implemented. From metering and full cost accounting to comprehensive conservation plans and awareness campaigns, many Alberta municipalities have already taken considerable steps towards improving water use. Their efforts provide valuable models for other municipalities to follow and AUMA has based this plan in part on the successes and lessons learned from these leaders.

Section 5.0 identifies the short-term targets and actions that will be taken towards improving overall water use. Information on why the targets were chosen, how achievement of the targets will be monitored and what support will be provided to municipalities is included in this section.

¹ For more information on the five dimensions of Sustainability (economic, environmental, social, cultural and governance) visit AUMA's Municipal Sustainability Planning Microsite: <http://msp.auma.ca>

TARGETS

The short-term targets for the AUMA CEP Plan are:

1. By December 2010, all AUMA member municipalities with water systems in place will report water use data through Alberta Environment's electronic Water Use Reporting System (WURS).
2. By December 31, 2011, AUMA member municipalities will develop Conservation, Efficiency and Productivity Plans according to the following participation rates:
 - 100% of municipalities with populations greater than 10,000
 - 75% of municipalities with populations between 2500 and 10,000
 - 50% of municipalities with populations under 2500
3. By December 31, 2011, AUMA member municipalities will estimate their Infrastructure Leakage Index (ILI) and identify ways to reduce leaks according to the following participation rates:
 - 100% of municipalities with populations greater than 10,000
 - 75% of municipalities with populations between 2500 and 10,000
 - 50% of municipalities with populations under 2500
4. By December 2011, AUMA member municipalities will implement incentives and/or disincentives of their own choosing to increase the uptake of water efficient fixtures and technologies. Different programs may apply to new and existing developments. Participation rates will be:
 - 100% of municipalities with populations greater than 10,000
 - 75% of municipalities with populations between 2500 and 10,000
 - 50% of municipalities with populations under 2500

The varying participation rates for municipalities of different sizes reflect the fact larger municipalities have made more progress toward meeting the targets. For example, 26% of the largest municipalities have already completed CEP Plans. Having the examples provided by these municipalities will make it easier for other larger municipalities to implement their own plans. With regards to implementing infrastructure leakage programs and encouraging water efficient fixtures, the larger centres have again led the way and, therefore, fewer municipalities will need to do the work to achieve a 100% participation rates.

Since there are fewer examples of smaller municipalities taking action towards the short-term targets it will take some extra time to build momentum towards achieving 100% participation. By providing different participation rates the AUMA is able to ensure that the short-term targets are achievable for the various sizes of municipalities. This approach is also in line with the recommendations of the Alberta Water Council that CEP efforts begin with the largest water users.

In addition, these short-term targets are just part of the first steps in AUMA's CEP initiative. It is expected that as the plan progresses and more tools are developed medium and long-term targets will include greater participation rates for smaller communities.

RECOMMENDATIONS

It will take a collective effort among municipalities with the support of AUMA and the Province of Alberta to meet the short-term targets and set medium- and long-term targets. Section 6.0 sets out recommendations for action.

Recommendations for AUMA Members

- Commit to the four water CEP targets
 - See "Appendix D" for a "Model Water Conservation, Efficiency and Productivity Motion"
- Update AUMA on progress towards short-term water CEP targets each April, for inclusion in AUMA's annual report.
- Work with Alberta Environment to ensure water use reporting data is meaningful and accurately reflects municipal water usage.
- Engage in dialogue (through the water Microsite, at AUMA events, etc.) about water CEP successes and challenges with colleagues across the province.
- Develop strategies to support the move towards full metering and full cost accounting as part of the CEP planning and implementation process.

Recommendations for Government

Alberta Environment

Alberta Environment's partnership has been invaluable in the creation of this Plan. Working under the auspices of the Alberta Environment and AUMA's Protocol of Cooperation, the Department has contributed to the Associations' technical and financial capacity to develop a plan. Ongoing collaboration will contribute to the plan's successful implementation. In addition there are a few specific areas where action by Alberta Environment is required:

- Coordinate with AUMA and member municipalities to ensure that WURS data is meaningful and accurately reflects municipal water usage.
- Supply municipal water use reporting data to AUMA every year, commencing in April 2010.
- Continue to support municipalities with drinking water operations by providing educational and technical resources, including full cost accounting workshops.

Alberta Transportation

- Continue grant support for municipal water infrastructure.
- Use provincial grants to incent CEP, as identified in the Alberta Water Council's Recommendations for Water Conservation, Efficiency and Productivity Sector Planning (2008)²

Actions for AUMA

The AUMA will focus on building the capacity of its members to meet the four short-term targets with the support of Alberta Environment. The Association will also track progress on meeting those targets and use information from this initial phase to inform future targets and actions.

² This report is available

at <http://www.albertawatercouncil.ca/Portals/0/pdfs/CEP%20Sector%20Plan%20Final%20Report.pdf>

AUMA activities will include:

- Water Microsite
 - Provide information on meeting each of the four short-term targets including models, templates, case studies and links to other resources.
 - Include an online forum where municipal CEP practitioners can share experiences and learn from each other.
- Learning Events
 - Given the success of AUMA's First Water workshop, held in November 2008, look for opportunities to hold similar events.
 - Use regularly scheduled events such as AUMA's Annual Convention and Mayor's caucus's to provide information.
 - Contribute to events hosted by the Alberta Water and Wastewater Operators Association (AWWOA), Western Canada Water (WCW) and other related organizations.
- Measuring Progress
 - Collect data from members indicating progress towards meeting the four targets and to identify barriers to meeting targets.
 - Coordinate the collection of data and track trends on municipal water usage from the WURS system in April of each year.
- Communications
 - Use the Weekly Digest and Small Communities newsletter to promote the Water Microsite and share key messages.
 - Use the weekly digest and AUMA events to get feedback from members on the support AUMA is providing and make improvements as necessary and appropriate.
 - Promote progress on targets to other orders of government and the public.

CONTENTS

Executive Summary, Targets and Recommendations	i
Recommendations for AUMA Members.....	iii
Recommendations for Government	iii
Actions for AUMA	iii
1 Introduction.....	1
1.1 Why Take Action.....	2
1.2 CEP Planning and <i>Water for Life</i>	7
1.3 Champions and Leaders.....	9
2 Context for Municipal Water Use.....	10
2.1 Water Legislation Related to Municipal Water Use in Alberta.....	12
2.1.1 Water Allocation.....	12
2.1.2 Water Quality	13
2.1.3 Plumbing	13
2.1.4 Bylaws.....	14
2.1.5 Other Legislation.....	14
2.2 Sources of Water.....	14
3 Measurement Methods and Challenges	19
3.1 Total Water Use	19
3.2 Water Use by Sectors.....	21
3.3 Establishing a Baseline Year	25
4 History of Municipal actions toward CEP	27
4.1 Availability Concerns	27
4.2 Financial Constraints and Full Cost Accounting	28
4.3 Environmental Concerns.....	30
5 Defining our Future.....	31
5.1 Identifying Actions to Achieve our Desired Future.....	31
5.2 Short-Term Targets.....	34
5.2.1 Water Use Reporting.....	35
5.2.2 Conservation, Efficiency and Productivity Planning	36
5.2.3 Infrastructure Leakage Index	37
5.2.4 Water Efficient Fixtures and Technologies	38
5.2.5 Other Efforts	39
5.3 Reporting on Progress.....	39
5.4 Defining Medium & Long Term Targets.....	40
6 Summary & Recommendations	42
6.1 Recommendations for AUMA Members.....	42
6.2 Recommendations for Government	43
6.2.1 Alberta Environment.....	43
6.2.2 Alberta Transportation	43
6.3 Actions for AUMA	43
7 Sources.....	45

FIGURES AND TABLES

Figure 1 Map of Alberta Showing Water Basins and Water Availability	4
Table 1 Population Ranges for Alberta Cities, Towns, Villages, Summer Villages and Specialized Municipalities in 2006	10
Figure 2 Alberta Water Allocation by Sector.	11
Figure 4 Distribution of water sources used by Alberta cities, towns and villages.	15
Figure 5 Water sources used in Alberta cities, towns and villages.....	16
Figure 6 Schematic of Regional Pipeline Systems	17
Figure 7 Pipelines Supplying Water between Urban Centres in Alberta.....	18
Table 2 Annual Water Use for 2006 as reported by selected Alberta municipalities.	19
Figure 8a Example breakdown of water use in EPCOR’s Capital Region.....	22
Figure 8b Example breakdown of water use in Calgary.....	22
Figure 9 Residential per capita water use by country	24
Table 3 Average Per Capita Water Demands in Alberta.	25
Figure 10: Comparison of International Water Price and Consumption	29
Table 4 Topics at the AUMA Municipal Water Conservation Workshop.....	31
Table 5 Alberta’s Urban Municipalities with greater than 10,000 residents	34
Figure 11 Manuals to assist municipalities in submitting water use returns	36

APPENDIX A: GLOSSARY

APPENDIX B: MUNICIPAL CEP PLANNING

APPENDIX C: CONTRIBUTORS TO THE AUMA CEP PLAN

APPENDIX D: WATER EFFICIENT FIXTURES AND TECHNOLOGIES

APPENDIX E: INFRASTRUCTURE LEAKAGE

APPENDIX F: MODEL WATER, CONSERVATION, EFFICIENCY AND PRODUCTIVITY MOTION



1 INTRODUCTION

Protecting water is one of the most important issues of our time. With concerns growing (both internationally and locally) over dwindling water supply, water plays a key role in the health of our environment, our economy and our society. And because Alberta's municipalities provide water services to the majority of the province's citizens and businesses, they have a central role to play in safeguarding this precious resource. But provision of this service comes with a cost – it's expensive, it creates greenhouse gas emissions, and there are worries there just won't be enough to go around. In response to these pressures, Alberta's urban municipalities are committing to water **conservation, efficiency** and **productivity** (CEP)³. This AUMA CEP Plan provides a background on municipal water use in Alberta and a framework for how water CEP efforts will be undertaken by AUMA member municipalities in order to continue to protect Alberta's water supply.

CEP planning aligns with the Government of Alberta's water management strategy *Water for Life: Alberta's Strategy for Sustainability*. Released in 2003, the Strategy includes a number of goals and outcomes related to water management in Alberta and one of the key elements of the strategy is conservation. A key body delivering on these goals and outcomes is the Alberta Water Council (AWC). This AUMA CEP Plan is based on the template created by the AWC in their document, *Recommendations for Water Conservation, Efficiency and Productivity Sector Planning* (2008). The AUMA is one of the first water using sectors in Alberta to look at water CEP planning. All major water using sectors are expected to develop and implement CEP plans in the next two years (Alberta Water Council, 2008). The alignment of this AUMA plan *Water for Life* is the focus of section 1.2.

AUMA's CEP Plan focuses on AUMA member municipalities, particularly those with municipal water systems; it is not intended to address individual water systems that serve only one household or business. Therefore, the particular measures laid out in the plan may not apply to all AUMA members, such as summer villages whose residents often rely on individual systems. However, aspects of the plan will still be useful. As this is one of the first sector plans in the province it is serving as a pilot project for other sectors. It is hoped that other sectors will be able to learn from the development process for this plan and borrow from the ideas contained here.

In the development of this plan, AUMA members were asked to prioritize short-term water CEP actions. These short-term actions, described in Section 5, focused on

CEP Definitions*

Water conservation:

1. Any beneficial reduction in water use, loss, or waste.
2. Water management practices that improve the use of water resources to benefit people or the environment.

Water efficiency:

1. Accomplishment of a function, task, process, or result with the minimal amount of water feasible.
2. An indicator of the relationship between the amount of water needed for a particular purpose and the quantity of water used or diverted.

Water productivity: The amount of water that is required to produce a unit of any good, service, or societal value.

*As defined in the Alberta Water Council's report *Water Conservation, Efficiency and Productivity: Principles, Definitions, Performance Measures and Environmental Indicators*.

³ Bolded terms and acronyms used throughout this report are defined in Appendix A.

understanding infrastructure leakage, developing CEP plans, encouraging water efficient fixtures and technologies, and understanding municipal water use. Through these actions, a better understanding of municipal water use will be realized, thus allowing for medium- and long-term goals to be established.

1.1 Why Take Action

Alberta's urban municipalities have said water conservation is one of their significant priorities. In fact, during the AUMA's 2008 Annual Convention, villages and summer villages rated water conservation as their top advocacy priority, while towns rated water conservation among their top four priorities. Many of Alberta's cities have demonstrated their concern with water conservation by developing conservation plans (as discussed in Appendix B).

A number of factors are driving municipalities' interest in water conservation. AUMA members have identified water availability, infrastructure costs, current water wastage and proactive water planning as their top water related issues. Municipalities recognize their role as stewards and understand the importance of preserving the water supply for future generations. This Plan will be an essential tool toward helping Alberta's communities achieve that goal.

Water Availability

Worldwide, societies are dealing with a lack of water. Although in Alberta water seems abundant, we are, in fact, no different. Water is a finite resource and we are already dealing with water shortages; municipalities in southern Alberta face limits on available water and it's not uncommon for water bans to be put in place during certain times of the year.

Ground and surface water supply in Alberta is divided into seven major river basins (also called watersheds). These are the Peace, Athabasca, Hay, North Saskatchewan, South Saskatchewan, Beaver and Milk river basins. Figure 1 shows the various basins and sub basins in the Province. Water management has been divided by these natural watersheds in recognition that water does not adhere to political boundaries, whether local, provincial or international.

Alberta also has apportionment agreements with its neighbouring jurisdictions. Apportionment Agreements commit nations and provinces/states to the amount of water that must flow across borders. One such agreement with Saskatchewan requires "half the natural flow of each watercourse to pass into... Saskatchewan" (Prairie Provinces Water Board, 1969). In the past it was not uncommon for more water to be allocated through southern region water licences⁴ than was actually available to meet the apportionment's requirement. In response, Alberta Environment initiated watershed planning for the South Saskatchewan River Basin.

As part of the South Saskatchewan River Basin Water Management Plan, stakeholders, including urban municipalities, recommended that there be a moratorium on new licences in the South Saskatchewan River Sub Basin, as well as in the Oldman River Sub Basin and the Bow River Sub Basin. In 2006,

⁴ For background information on how water is allocated in the Province see Section 2.1

Alberta Environment approved the plan and issued a moratorium on new water licence applications in the three sub basins.

As a result of this decision, municipalities in these sub basins have to work within the means of their current water licences or look to get more water through the water allocation transfer system (described in Section 2.1). However, these types of water transfers are expensive and therefore not always a realistic solution to the issue of availability. For example, the MD of Rocky View, in the Bow River Sub Basin, will have to pay \$15 million dollars for 6700 cubic metres of water per day (m³/d) to gain extra water allocation for a new mall, race track and casino (Calgary Herald, 2007). If populations and economies continue to grow and water conservation cannot keep pace with that growth, then the strain on water infrastructure and supply become a more pressing and expensive concern.

Figure 1 on the next page shows the areas in Alberta that are water short, or potentially water short. They extend across the southern and central region of the Province and also occur in patches farther north in the eastern part of the Province. While the creation of regional water pipelines offers the possibility of easing concerns with supply, these systems are often expensive and simply defer water supply impacts to other areas of the province.

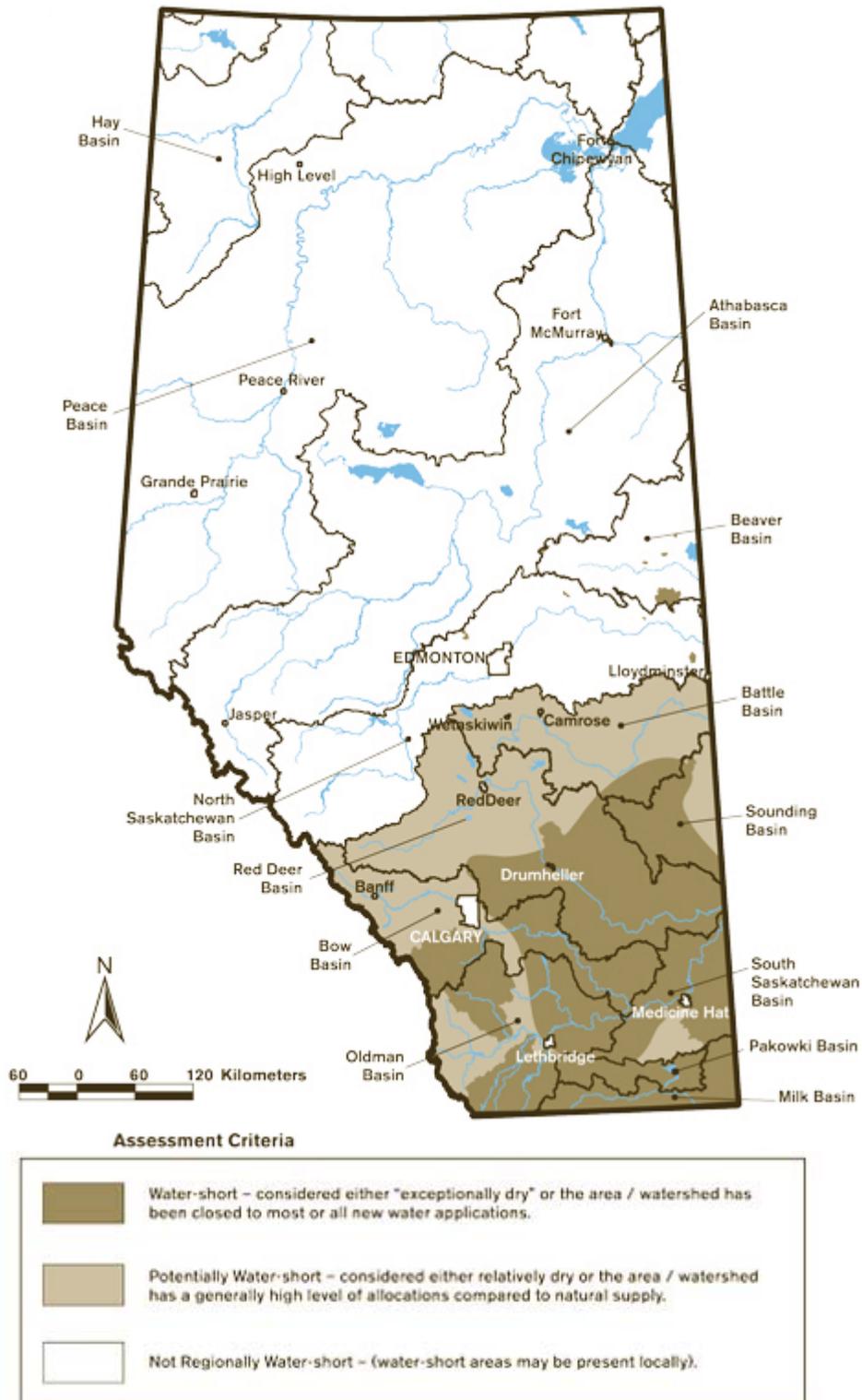


Figure 1 Map of Alberta Showing Water Basins and Water Availability (Alberta Water Smart, 2009)

An additional consideration for the issue of water availability is climate change. The following excerpt from Alberta Environment's website (2009) illustrates the concerns:

Warmer winters and less precipitation may impact our future water supply, and we need to be prepared to cope with longer, more extended periods of water shortage and adopt measures that maximize water use.

Rain and snow patterns are unpredictable, and building more infrastructure may not solve the problem if no water is available. Managing demand involves a number of measures, including using conservation, efficiency and productivity to optimize water use.

A Note on Water Quality

It is not just the quantity of water that is an issue for many municipalities, but also the quality. Issues include contamination of water sources, the availability of properly trained water operators and the need to upgrade systems to meet regulatory requirements. These are large issues on their own and addressing them directly is beyond the scope of this CEP Plan. AUMA acknowledges their importance and is engaging in a number of initiatives that do address the quality of water. Among these initiatives are the work of the Alberta Water Council's Healthy Aquatic Ecosystem Project Team and Alberta Environment's Drinking Water Program.

Costs

The treatment and distribution of water costs municipalities money, both for operations (associated with chemicals and energy use) and for capital expansions. Electricity costs account for a large portion of operating water and wastewater treatment systems. By reducing the amount of water consumed, municipalities can also reduce the energy and costs associated with wastewater treatment. In New York, electricity accounts for roughly "80% of the cost of processing and distributing of drinking water" and "25% to 40% of wastewater treatment" budgets (New York Power Authority, 2009)⁵. Reducing water use can therefore lead to major energy cost savings.

Keeping water use within the capacity of existing infrastructure alleviates the need for costly expansions or new treatment facilities. The costs to upgrade treatment plants vary depending on size and level of treatment but in one example, the Town of Taber spent in the order of \$15 million dollars to upgrade their plant to provide more capacity and increase the level of treatment (EPCOR, 2009).

Inefficient Use of Water

Given the cost of treating and distributing water, and the necessity of the resource, it is important that as little is wasted as possible. Currently there are a number of inefficient uses of water that cost individuals and municipalities money. Examples include:

- 20L and 13L toilets are still available in Alberta home improvement stores yet more efficient models exist (6L, 4.8L dual flush and 3L toilets). The

⁵ Alberta examples are used as much as possible in the report. It is hoped that Alberta examples illustrating the benefits and impacts of water CEP will become more readily available as the AUMA water CEP initiative moves forward.

more efficient toilets are the only legal options in Ontario, British Columbia and the United States.

- Treated water is often used for irrigation when rain or recycled water could be used instead. Over-irrigation is a related issue.
- On a large industrial scale, many cooling systems use treated water only once and discard it instead of reusing water.
- Leaks in municipal distribution pipes waste water.

Proactive Planning

Keeping these issues in mind, developing and implementing water CEP plans will help address the challenges around water availability and waste reduction. CEP planning means a municipality is being proactive, and that it is acting to prevent financial burdens, future water shortages, and negative environmental impacts.

There are costs to not taking action and many jurisdictions around the world are already paying the price. Two examples include:

- In Australia, a prolonged drought has forced spending on actions that will ensure water is available for the most basic needs. Government has spent enormous amounts of money to improve municipal water efficiency, develop desalination treatment plants and acquire water entitlements.
- In February 2009 the Los Angeles Department of Water and Power adopted in principle a plan to impose water rationing in the City. Under the plan homes and businesses would pay a penalty rate of nearly double normal prices for any water they use in excess of a reduced monthly allowance. The measure aims to cut citywide water use by 25% in order to reduce demands on reservoirs that are badly depleted due to a current dry spell. (Gorman, 2009)

Admittedly there are costs associated with CEP planning, but these examples serve as warning that failure to invest wisely now can result in circumstances that leave no choice but to hurriedly enact costly measures.

But conservation of water is not just about security of supply. Water conservation is also an effective method of reducing municipal greenhouse gas emissions (GHGs). Water and sewage treatment account for an average 21% of corporate GHG emissions (FCM 2003). For example, for every one million litres of water The City of Calgary treats, approximately 375kg of GHGs are released (The Natural Step Canada, 2008). In fact, CEP planning can serve as the cornerstone to any municipal climate change initiative as it addresses mitigation, by reducing GHG emissions, and adaptation, by controlling demand in the face of uncertain supply.

CEP planning should also be integrated with Municipal Sustainability Planning (MSP)⁶ in recognition of the importance of water to the economic, environmental, social and cultural well-being of communities. In terms of

⁶ See <http://msp.auma.ca> for information and resources related to MSP.

governance, providing a safe, secure supply of drinking water is central to a municipality's mandate. Citizens expect to have water when they need it and look to municipalities to provide leadership on wise water use.

1.2 CEP Planning and *Water for Life*

Part of the reason that municipalities have decided to take action now is that there is a broader awareness for the need to conserve. This urban municipal water CEP Plan is part of a province-wide initiative to achieve the CEP objectives set out in Alberta's *Water for Life* strategy. The Alberta Water Council (AWC), a multi-stakeholder partnership made up of representatives from governments, industry and non-governmental organizations is mandated to implement the strategy. The AUMA is an active member of the AWC with members participating on the council and its project teams.⁷

The Government of Alberta maintains accountability for implementing *Water for Life* but the AWC provides the venue for stakeholders to recommend implementation strategies. In turn the AWC creates project teams to develop strategies around achieving the goals of *Water for Life*. The CEP project is one such example. The introduction to the AWC 2008 report, *Recommendations for Water Conservation, Efficiency and Productivity Sector Planning*, provides context for how CEP planning fits with *Water for Life*.

Alberta's Water for Life strategy was adopted by the Government of Alberta in November 2003. The strategy contained the following three goals:

- *Safe, secure drinking water supply*
- *Healthy aquatic ecosystems*
- *Reliable, quality water supplies for a sustainable economy*

The strategy also contained three key directions to help achieve the goals, one of which was water conservation; the specific direction states that "Albertans will be leaders in conservation by using water efficiently and effectively." The strategy goes on to say that, "fluctuating and unpredictable water supply in recent years has stressed the need to make some major shifts in how we use and allocate this renewable, but finite, resource." A key action in the strategy is "to prepare water conservation and productivity plans for all water using sectors by 2010." These plans will contribute to achieving the strategy's target of a 30% improvement in overall water efficiency and productivity from 2005 levels by 2015. Water conservation was also identified by the Alberta Water Council as a focus for accelerated action in the *Water for Life* renewal.

The Alberta Water Council agreed that conservation, efficiency and productivity (CEP) plans for water-using sectors would contribute to achieving the *Water for Life* goals. The Alberta Water Council created the CEP Sector Plan Project Team in March 2007. The primary task for this multi-stakeholder

⁷ Information on the AWC and its project teams can be found on the Council's website at <http://www.awchome.ca/>

team was to develop a framework to guide sectors in preparing their CEP plans.

The framework provided in the AWC Recommendations Report includes options for stakeholder engagement, criteria for reviewing sector plans, and guidelines for implementing and measuring progress as well as an annotated table of contents that outlines the requirements of CEP plans. The purpose of

this framework is to provide consistency among sector plans in order to make tracking progress towards the 30% goal (stated in *Water for Life*) easier.

It is important to understand that achieving the 30% target by 2015 (as referenced in the report excerpt, above) applies to all water users in Alberta collectively. There is recognition that the timeframe of this objective may not be realistic for all sectors. Challenges for the municipal sector include lack of

Land and Water

Land management decisions also affect water and in December 2008, the Government of Alberta released its overarching plan for how cumulative environmental effects will be managed. The *Land Use Framework* provides a general guide for how *Water for Life* and other environmental strategies interact to manage Alberta's land, air and water. As the framework is rolled out in the coming years, it will become clear how the various strategies fit together and how different considerations will be managed. For example, the availability of water, decisions about allocation, and the ability to increase conservation and efficiency will dictate how much development can take place in any particular region.

Watershed Planning

In addition to establishing the AWC, the *Water for Life* Strategy established multi-stakeholder Watershed Planning and Advisory Councils (WPACs). These councils "assess the conditions of their watershed and develop plans and activities to address watershed issues" (Alberta Environment, 2009).

The exact roles of these councils are still being determined but municipalities will need to work with their WPACs (where they exist)* to ensure that municipal CEP plans integrate with broader watershed planning efforts. Many municipalities are members of WPACs.

detailed water-use data, the perception of water abundance held by many Canadians⁸, and the time it takes to implement comprehensive water CEP initiatives. These challenges, and solutions for them, are addressed in subsequent sections of this Plan. The implementation of this urban municipal sector plan will help to identify a more achievable date than 2015 and help municipalities achieve it.

Furthermore, the 30% improvement in efficiency is not the only objective of this plan. Other related *Water for Life* outcomes are:

- All sectors⁹ are demonstrating best management practices and improving efficiency and productivity associated with water use (2007-2010).

⁸ In the publication "Thinking Beyond Pipes and Pumps", the importance of education in changing this perception is stressed.

⁹ In its "Recommendations for Water Conservation, Efficiency and Productivity Sector Planning" the Alberta Water Council (2008) refers to the initial priority sectors for CEP planning as chemical and petrochemical, irrigation, forestry, mining/oil sands, municipal, oil and gas, and power generation.

*Alberta Environment maintains a listing of WPACs on its website at http://www.waterforlife.alberta.ca/543.html#Battle_River_Watershed

- Albertans have the knowledge, tools and motivation to implement actions that will maintain or improve the province's water resources.
- Water is managed and allocated to support sustainable economic development and the strategic priorities of the province (2010-2014).

Related actions highlighted in the plan include:

- Prepare water conservation and productivity plans for all water using sectors. (To be completed by 2010).
- Establish an on-going monitoring program to ensure all sectors are achieving water conservation and productivity objectives (To be completed by 2014).

The development and implementation of this AUMA CEP Plan provides a forum for municipalities to share best management practices and gain access to the knowledge and tools to implement actions that will maintain water resources, in accordance with *Water for Life* outcomes, for the future sustainability of the province.

1.3 Champions and Leaders

AUMA's Water Conservation, Efficiency and Productivity Plan is being developed for members, by members, in-line with the AUMA Strategic Plan. One of the objectives of the Strategic Plan is that Alberta communities serve as environmental stewards with "leadership and capacity to think and act long term in maintaining or improving the environment while addressing the needs of their citizens" (AUMA, 2006).

The AUMA is a provincial organization that represents and advocates the interests of member municipalities to both the provincial and federal governments as well as other provincial and federal organizations. AUMA's goal is to develop a strong partnership between all three orders of government through a shared vision with long term planning that will facilitate social and economic growth; a strategic and stable funding matrix for capital projects, vital emergency and social services; and implementation and coordination in the delivery of these services to ensure the sustainability of Alberta's municipalities.

The AUMA Board of Directors, comprised of elected officials, and the Sustainability and Environment Standing Committee, made up of elected officials and administrators, have provided input during the development of this Plan. Technical assistance and additional leadership have been provided by the AUMA Water Team of Experts which is comprised of municipal staff who have experience in planning and or implementing water conservation and efficiency in their communities. While the AUMA Board and Committee champion the plan, the Team of Experts also does this by leading the way for wise water use in Alberta municipalities.

For a complete list of those who have contributed to the plan, refer to Appendix C.

2 CONTEXT FOR MUNICIPAL WATER USE

The 2006 Federal Census data indicates that urban municipalities are home to 85% of Alberta's population (Statistics Canada, 2008 and Alberta Municipal Affairs, 2008a). These communities – villages, summer villages, towns, cities and specialized municipalities - are located in all 7 of the major river basins in the province¹⁰ and have populations ranging from 15 to nearly 1 million people. Details of the population ranges for the different types of AUMA member municipalities in 2006 are shown in Table 1 below.

Table 1 Population Ranges for Alberta Cities, Towns, Villages, Summer Villages and Specialized Municipalities in 2006 (Statistics Canada, 2008)

Municipality Type	2006 Federal Census Statistics			
	Minimum Population	Maximum Population	Median Population	Count
City	11,673	988,193	24,212	16
Town	415	17,145	2,398	110
Village	35	978	343	100
Summer Village	15	351	115	51
Specialized	4,265	82,511	30,749	4

According to Alberta Environment's 2007 study of water allocations, municipalities are one of the major licence holders in the province, behind irrigation and industry. This information appears as Figure 2, on the following page. It is important to note that allocation is different from actual use, a point which is discussed further in section 2.1.1.

¹⁰ For a map of Alberta's major water basins, refer to Alberta Environment's website at: <http://environment.alberta.ca/apps/basins/default.aspx> Note that the South Saskatchewan River Basin is further divided into four basins – the Red Deer River Sub Basin, the Bow River Sub Basin, The Oldman River Sub Basin and the South Saskatchewan River Sub Basin.

¹¹ Alberta Municipal Affairs (2008a) defines Specialized Municipalities as "unique municipal structures that can be formed without resorting to special Acts of the Legislature. Often, specialized municipalities allow urban and rural communities to coexist in a single municipal government. There are 4 Specialized Municipalities in Alberta. The Regional Municipality of Wood Buffalo and Strathcona County are two examples."

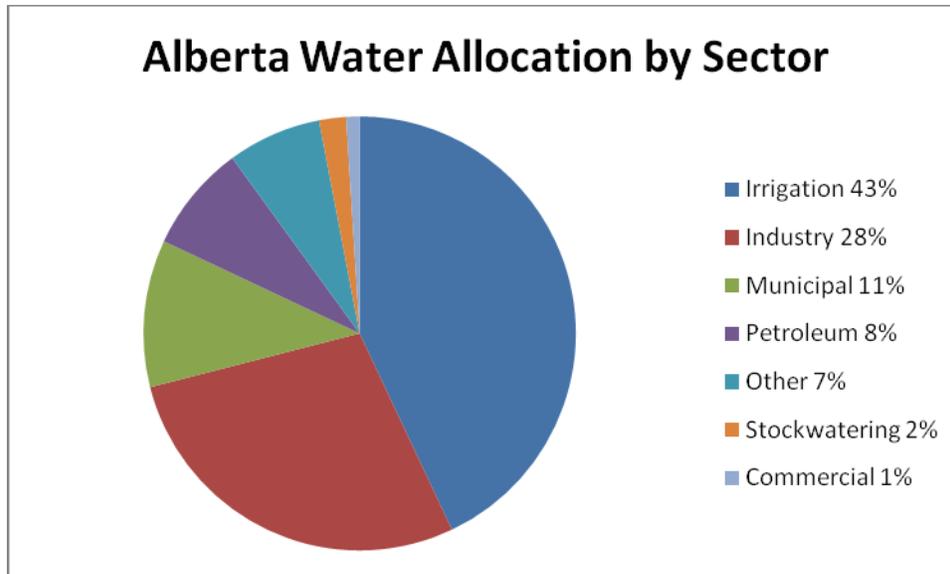


Figure 2 Alberta Water Allocation by Sector.
Adapted from Alberta Environment, 2007.

In all but the smallest urban municipalities, potable water is provided to residential, commercial, industrial and/or institutional users via municipal water systems. Municipalities withdraw water from their water source and treat it at their drinking water plants before sending it out to their customers. Much of the used water is eventually sent to the sewer and then to the wastewater plant where it is then treated before being returned to the original water source¹².

Water services are often managed by a municipality but utility companies and service commissions can also be involved. As not all developed areas have adequate local water sources or water licences, pipelines connecting these areas to communities with more abundant water supplies are becoming common.

This Plan focuses on those municipalities that supply water for domestic use (drinking, cooking, washing, bathing, toilet flushing, outdoor watering), fire protection, and/or industrial and commercial use. That is, they include one or more of the following elements:

- Drinking water treatment
- Water distribution (for potable and/or raw water)
- Wastewater distribution
- Wastewater treatment
- Stormwater

This Plan is not intended to address individual water systems that serve one household or business.

¹² See section 3.2.1 for further discussion on water use and return flows.

2.1 Water Legislation Related to Municipal Water Use in Alberta

Municipal water use is governed by a number of pieces of legislation. Individual municipalities are responsible for operating their drinking water systems within the parameters of the law and the conditions in their authorizations associated with the provision of water. The following sections describe some of these situations.

2.1.1 Water Allocation

The right to use water is currently governed by the *Water Act*. Water rights under this and previous legislation are subject to the “first in time, first in right” (FITFIR) principle. Water licences have been issued in the province since 1894 and allow for an individual or organization to withdraw water according to specified conditions. The amount of water specified for withdrawal in a licence is referred to as an ‘allocation’. Each licence includes a priority date which reflects when the licence was established. In the case of a water shortage, priority dates are used to assess who does or does not have a right to divert water. Therefore an older licence, which would have an older priority date, will be assured water before a newer licensee. Alberta municipalities often have more than one water licence and thus portions of their water allocations may be tied to multiple priority dates.

The majority of municipal water licences in Alberta have been issued under either the *Water Resources Act* from 1980 or the *Water Act*, which came into effect in 1999. Licences issued under the *Water Resources Act* do not have an expiry date and remain in effect in perpetuity provided the licence has not been disposed of and remains in good standing. The term good standing has not been defined but is generally understood to mean that the licence conditions have been met and the water allocation is still in use.

The *Water Act* came into effect on January 1, 1999 and in addition to requiring licence expiry dates it puts all licences on a level playing field; that is, no single licence purpose (such as municipal, industrial, or commercial) is deemed to have a higher priority over another use. However, there is a statutory right for individuals not served by municipal water systems to acquire water for household use. A licence is neither required nor permitted for this use.

Over the years that Alberta Environment has been issuing licences, the standard conditions have changed. Some typical conditions today include:

- Legal land descriptions for the point of water withdrawal and return
- Purpose for water use (e.g., municipal, irrigation, industrial)
- Reference to a report and/or plan that gives details of the water system
- Amount of water allocated
- Maximum rate of diversion
- Limits on when water can be withdrawn (e.g. only when a **water conservation objective, instream flow needs** or similar criteria is met)

Also, conditions vary across regions and watersheds to reflect unique stressors in different areas. Some other special conditions also address:

- Agreements with a third party (regarding right of ways or water sharing)
- Land ownership (that it must be maintained for the licence to be valid)
- The ability to supply sewage for irrigation
- Pumping rate analysis (for some groundwater sources)
- Amount of water to be returned to the source water
- Emergency water supplies
- Chemical analysis of water

For most larger licences, Alberta Environment requires that annual reports of water use be submitted. This helps licencing staff understand water demands in a local area. Additionally, tracking of information is vital to municipalities in managing supply and demand. However, the current method of collecting these annual reports in hard copy, as opposed to electronically, presents a number of challenges and in recognition of this Alberta Environment has established an electronic water use reporting system (WURS). At present, participation in this program is voluntary but a more formal requirement may develop. Increasing municipal participation in this program is one of the objectives of this AUMA Plan, as it will make it easier to show how Alberta's municipalities are contributing to the CEP goals of *Water for Life*.

2.1.2 *Water Quality*

The *Environmental Protection and Enhancement Act* (Alberta) and its regulations ensure the quality of drinking water in Alberta and also ensure waste water is appropriately treated before being returned to the environment.

Water quality is not the focus of this CEP Plan. Specific measures to ensure quality such as water and wastewater treatment standards are addressed by regulations and *Water for Life* provides the framework to further efforts. The AUMA participated on the Alberta Water Council's Healthy Aquatic Ecosystems Project Team. The report created by the project team, which includes recommendations, can be found on the AWC website.¹³ At the time of writing of this Plan, an implementation plan which relates specifically to water quality has not yet been determined.

2.1.3 *Plumbing*

Plumbing systems are governed by the *Safety Codes Act* (Alberta), the *Alberta Building Code*, and the *Plumbing Code of Canada*.

¹³ www.albertawatercouncil.ca

2.1.4 Bylaws

The *Municipal Government Act* guides how Alberta's municipalities operate and in some jurisdictions this legislation has been used to create bylaws to establish water rates, require water efficient fixtures and limit water wastage.

2.1.5 Other Legislation

At the federal level, the *Fisheries Act* and the *Navigable Waters Protection Act* may apply to water withdrawals and/or the construction of water intakes and returns. Similarly, the *Public Lands Act*, the *Water Act* and the *Fisheries (Alberta) Act* may also apply to these activities.

2.2 Sources of Water

An analysis of Alberta Environment's water licence data (2008a) for Alberta's urban municipalities indicates that nearly 95% of Albertans living in cities, towns or villages depend on surface water for drinking, cleaning and watering etc. This number includes 10% of the population which obtains surface water via pipeline from another community or utility. Urban citizens also acquire water from aquifers (groundwater) and, in the Town of Hinton, treated water is provided by a pulp and paper manufacturer. The relationship between Alberta's urban population and water sources is shown in Figure 3. This figure is consistent with the findings in Alberta Environment's 2007 evaluation of "Current and Future Water Use in Alberta" but goes into further detail by including the reliance on pipelines.

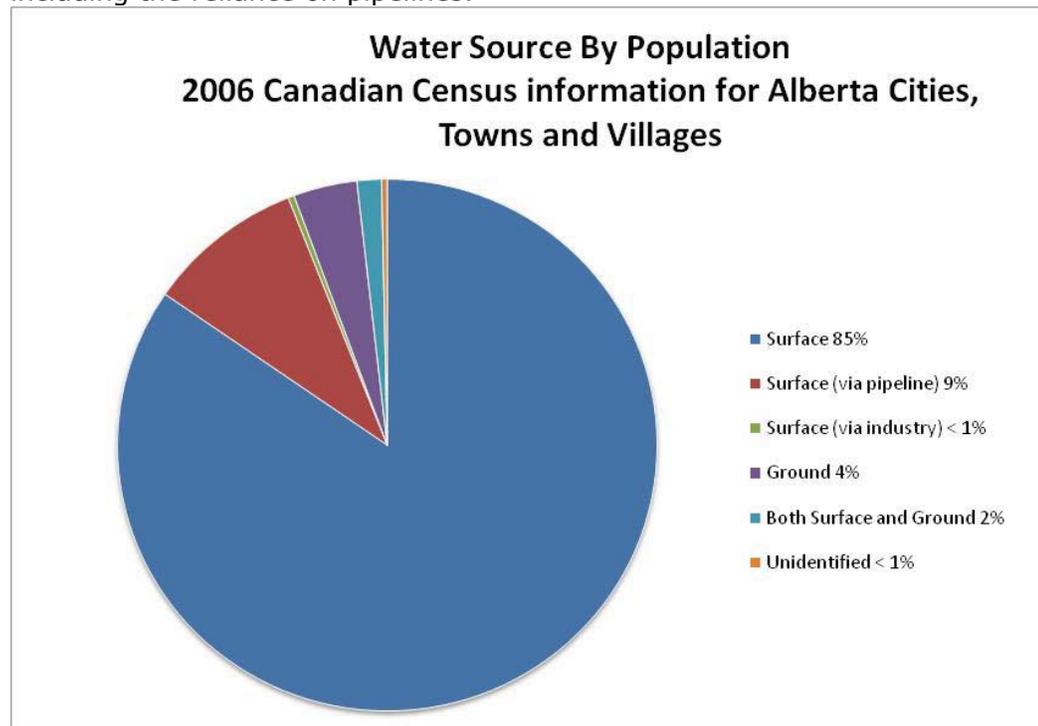


Figure 3 Distribution of municipal water sources by population¹⁴.

¹⁴ Sources used to develop Figures 2, 3 and 4 are: Alberta Environment, 2008, Alberta Municipal Affairs, 2008, Government of Alberta 1984, 1985, 1992, 1998, 2001, 2001a, 2002, 2003, 2003a, 2004, 2007, 2007a, 2007b, 2008, and Statistics Canada, 2008

A different trend emerges when we look at the proportion of cities, towns and/or villages that are supplied by surface water as opposed to looking at the proportion by population. Figure 4 shows that, based on 2006 data, the number of municipalities using surface water is almost equal to the number using groundwater. A much smaller percentage of cities, towns and villages appear to use a combination of surface and groundwater sources. Most, if not all, of the 4% with unknown water sources have no treatment or distribution system; individual property owners likely rely on their own wells for domestic water use. The same is true for summer villages.

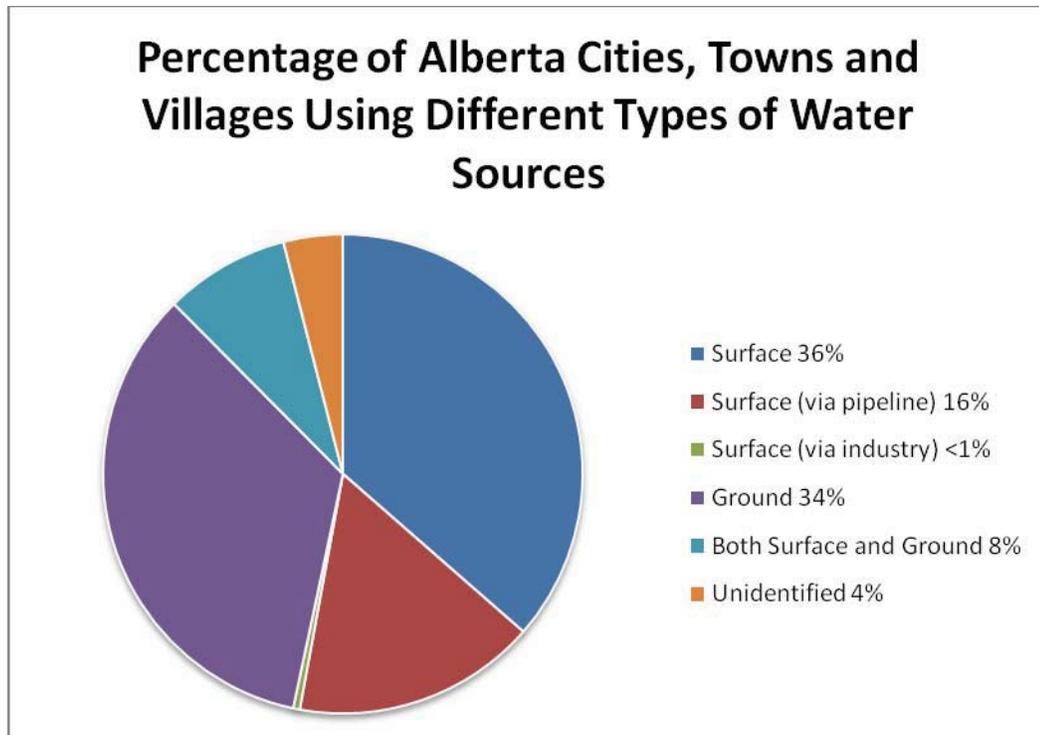


Figure 4 Distribution of water sources used by Alberta cities, towns and villages.

Figure 5 (on the following page) shows the breakdown of water sources for cities, towns and villages. As previously stated, summer villages do not appear to have municipal water treatment or distribution systems and presumably rely on household water sources that do not require a licence under the Water Act.

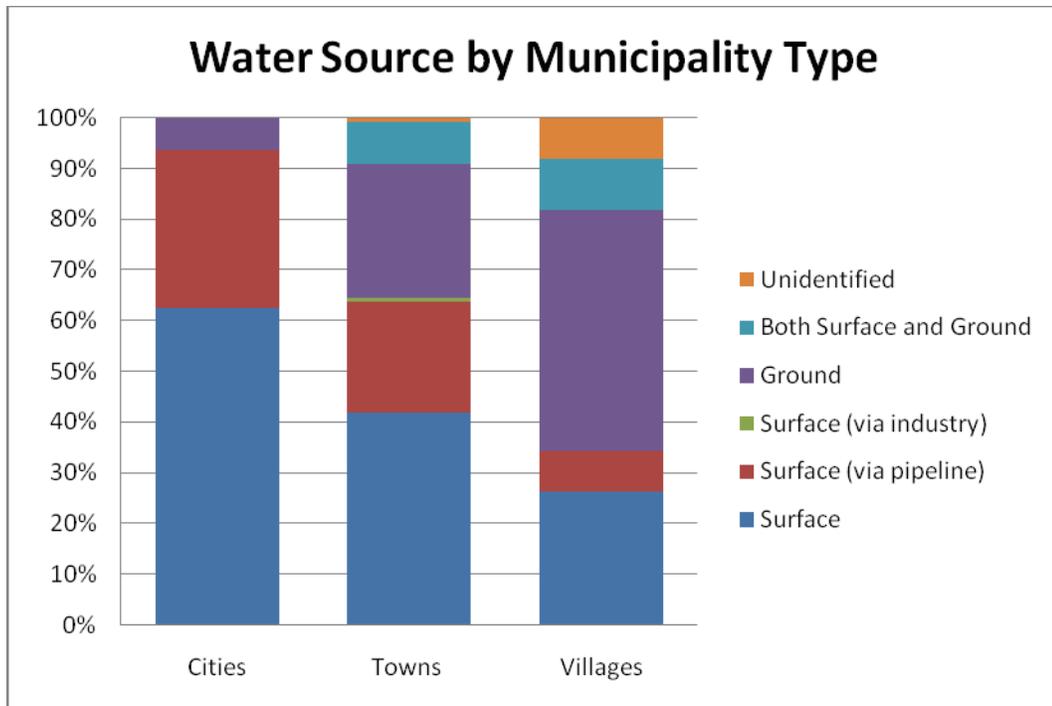


Figure 5 Water sources used in Alberta cities, towns and villages.

As Alberta’s population has grown, some municipalities have come up against poor water quality and/or inadequate supplies. In the past decade there has been more focus on assuring water quality and avoiding a scenario such as the Walkerton waterborne disease outbreak of May 2000. There is also a shortage of experienced water treatment plant operators. These and other factors have led to more municipalities combining resources, so much so that it is now common for regional pipelines to supply water to cities, towns and villages.

There is a heavy concentration of regional water pipeline systems in the Capital Region, details of which are shown in Figure 6 (below). Figure 7 (on the following page) shows the location of pipelines between urban municipalities throughout Alberta as well as some of the communities which are looking at joining regional systems.

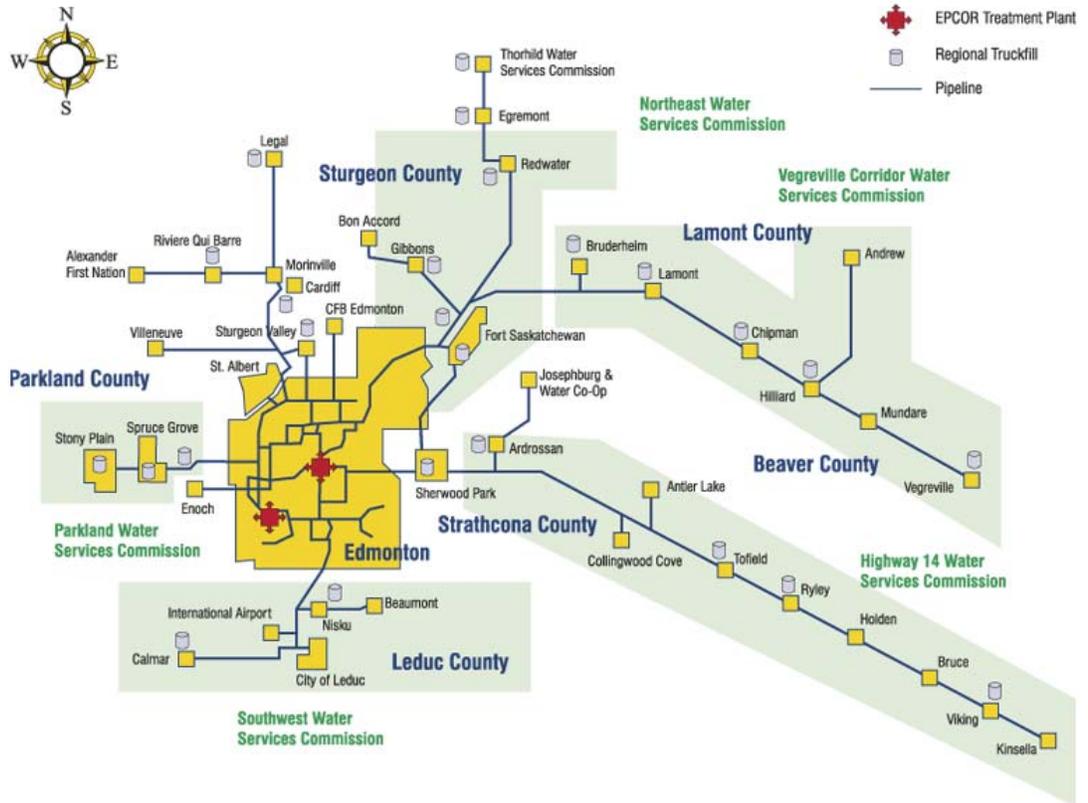


Figure 6 Schematic of Regional Pipeline Systems Beginning from Edmonton (EPCOR, 2008)

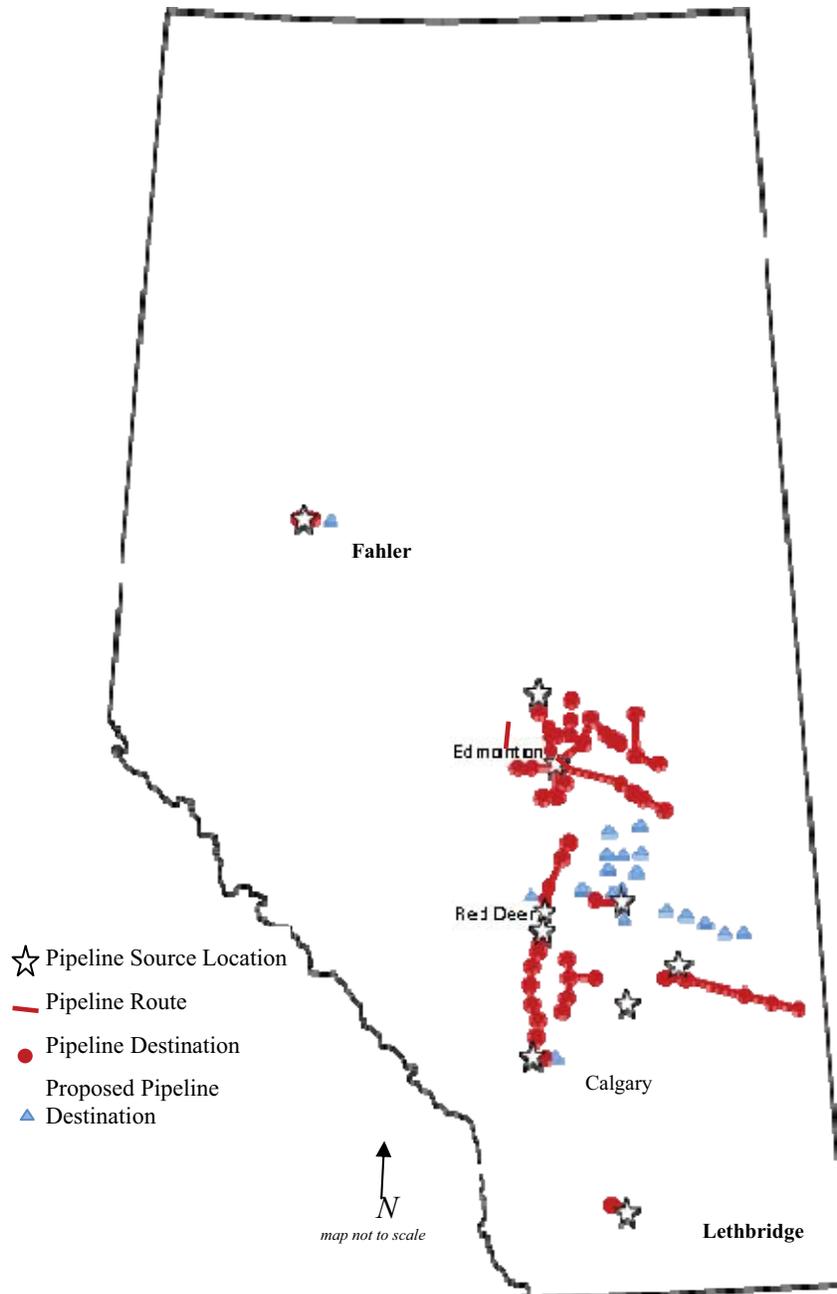


Figure 7 Pipelines Supplying Water between Urban Centres in Alberta (Adapted from EPCOR 2008, North Red Deer Regional Supply System, 2002, Government of Alberta, 2003, and Mountainview Regional Water Services Commission, 2003).

Despite the variation in sizes, the sources of water and the types of systems, all municipalities are governed by the same legislation and face similar environmental and fiscal concerns. Coupled with the need to collectively contribute to provincial water CEP goals, there is a great benefit in municipalities working together through regional systems, WPACs and this AUMA effort to maximize water CEP efforts.

3 MEASUREMENT METHODS AND CHALLENGES

Setting meaningful targets requires an understanding of current water use. There are a number of methods a municipality can use to track their water use; the challenge is in comparing usage in a meaningful way. This section describes current methods and challenges involved in measuring and comparing water use.

3.1 Total Water Use

It is important for a municipality to know how much of its allocation it is currently using and how much “room” remains. **Total water use** is the measure used to determine the amount of water diverted from all sources to its water system. It is used to calculate the amount of room in a licence and how demands change from year to year within a municipality. Alberta Environment currently collects total water use data for some licences as discussed in section 2.2.1 on water allocation.

Table 2 shows some examples of how water use can be tracked. Since accurate water use isn’t available for all licences these numbers were provided by municipalities following a request to members of the AUMA Sustainability and Environment Standing Committee and the AUMA Water Team of Experts.

Table 2 Annual Water Use for 2006 as reported by selected Alberta municipalities.

City/ Town/ Village	Municipality	Licensed Quantity (ML) ¹⁵	Amount Diverted (ML)	% of Licence Used	Return Flow (ML)	Consumptive Use (Diverted- Returned) (ML)	% Returned relative to diverted
City	Calgary	460088	197473	43%	184540	12933	93%
City	Edmonton	203528	140,000	68%	124137	15863	89%
City	Grande Prairie (licence 1 of 2)	7278	7278	100%	5628	1650	77%
City	Grande Prairie (2 of 2)	5618	511	9%	431	80	84%
City	Red Deer	27529	14863	54%	13991	872	94%
Town	Canmore	5066	2489	49%	2742	-253	109%
Village	Breton	126	77	61%	0	77	0%

The following describes the terms used in the table:

- The **licensed quantity** is the amount of water municipalities have access to through their licence. This is also referred to as an **allocation**.
- **Amount diverted** shows how much water a municipality has used (diverted) from the source into the municipal system.

¹⁵ One Megalitre (ML) is equivalent to 1000 cubic metres (m3) or 1,000,000 litres.

- The difference between the amount diverted and the licenced quantity is calculated in order to show the **percentage of licence used**. Municipalities' track this information carefully because exceeding these allocations can result in an Enforcement Order, requiring immediate actions to rectify the situation. CEP planning helps municipalities to avoid a situation where they are forced to implement potentially costly actions and instead allows them to implement methods of their own choosing.
- **Return flow** is the amount of water returned to a water source after treatment. Most water licences will stipulate a minimum return flow.
- The difference between the amount of water diverted and the return flow is **consumptive use**. This water may have soaked into the ground as a result of landscape irrigation or leaks in pipes, or it could have been used in industrial processes such as beverage production. The water is still returned to the ecosystem but not to the same water source, impacting aquifer levels in the case of groundwater sources and instream flows in the case of surface water.
- **Returned relative to diverted** shows how much water went through the municipal system and was "used" by municipal residents and businesses and returned through the wastewater system. The remainder, again, represents what was **consumed**.

As important as these numbers are for tracking overall use and consumption over time there are limitations to these measurements in terms of drawing conclusions about the efficiency of a system or making comparisons between municipalities. There are a number of special considerations which cannot adequately be described by the numbers alone. The following examples illustrate this point:

- Information on Grande Prairie's two licences are given separately to illustrate that their main licence is at full capacity (Aquatera, 2008) and they have been provided with an additional short term licence. This second licence has unique conditions including the requirement for a water efficiency plan¹⁶. Grande Prairie is not the only municipality with multiple licences that may have different conditions.
- In Red Deer, the return flow value includes a portion of water that is obtained through treating water for the North Red Deer Regional Water Line, which has a separate licence (City of Red Deer, 2008).
- In Edmonton, two drinking water treatment plants supply water to the city and more than 40 surrounding communities. Almost all of the associated wastewater is returned to the North Saskatchewan River after treatment.
- In Canmore, the amount of water returned exceeds the amount of water diverted. In this case, a high groundwater table results in a significant amount of fresh water reaching the wastewater treatment plant.

There are also broader considerations related to population and industrial development:

¹⁶ A link to the Aquatera (Grande Prairie's utility provider) efficiency plan is provided in Appendix B

- Municipalities experiencing high growth rates may suddenly find themselves using a higher proportion of their allocation and pushing the limits of their treatment and distribution systems even if they have put conservation measures in place.
- Municipalities with a higher proportion of industrial development may have proportionally higher water consumption rates and reduced municipal return flow.

It would be ideal for the type of information listed in Table 2 and the anomalies just discussed to be captured in Alberta Environment's Electronic Water Use Reporting System (WURS) in the very near future. Some information is already available electronically from Alberta Environment but there are some important hurdles that need to be overcome:

- Currently there is no common terminology and methodology among municipalities, making it difficult to compare values.
- Important details about a municipalities' water use are missing (as described above for Red Deer and Canmore) since numbers alone fail to portray unique circumstances or situations.
- In the case where a municipality has more than one water licence, the allocation needs to be recorded separately.
- Capturing water use reports that are submitted in conjunction with other authorizations is difficult. For example, some water use reports may be filed under *Environmental Protection and Enhancement Act* authorizations and not transferred to the water licence file.

It is hoped that through the implementation of this Plan, common terminology and methodology can be adopted thus forming the foundation for municipalities, Alberta Environment and the AUMA to work towards making WURS a more accessible reporting system.

3.2 Water Use by Sectors

Recording and reporting the components of total water use is an important step in understanding water use but further steps in the measurement process must be made in order to understand who or what is using water and then determining the appropriate CEP actions.

Municipalities supply water to a variety of different sectors, including residential, industrial, commercial and institutional. In addition, some larger municipalities supply other municipalities with water. Environment Canada (2004) reports that in Alberta, roughly 58% of municipal water is used for residential purposes, 35% for commercial and industrial purposes, and 8% of annual water use is attributed to system losses. Calgary and Edmonton report their numbers differently but, as Figure 8a and Figure 8b show, the break downs in these two cities are similar to the provincial average. Note that while system losses do exist they are not considered a sector and are not shown in either city's figures.

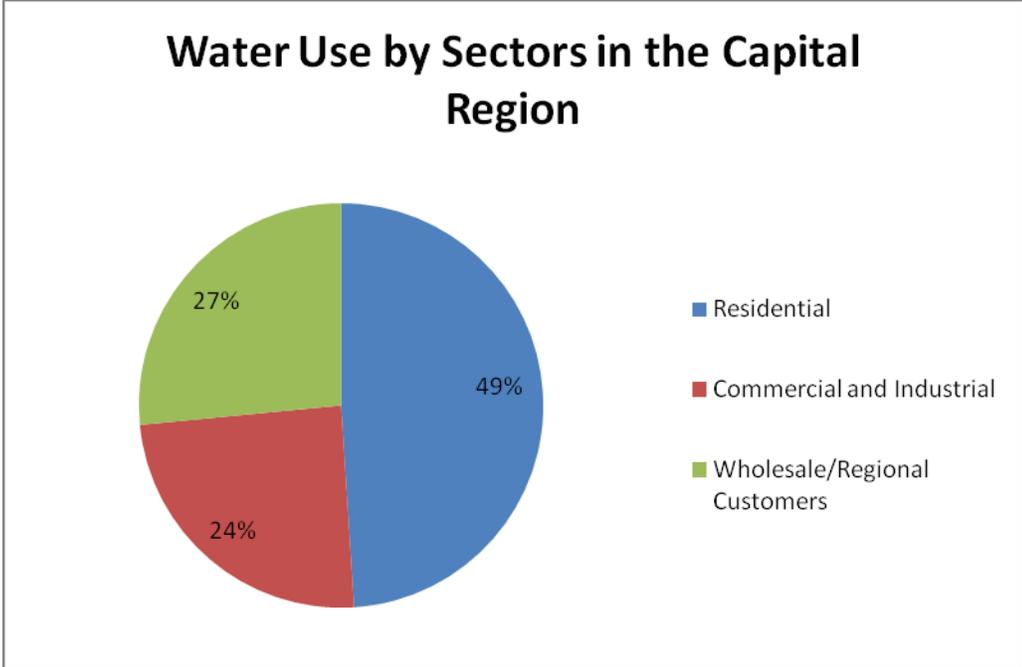


Figure 8a Example breakdown of water use in EPCOR’s Capital Region service area (adapted from EPCOR, 2008).

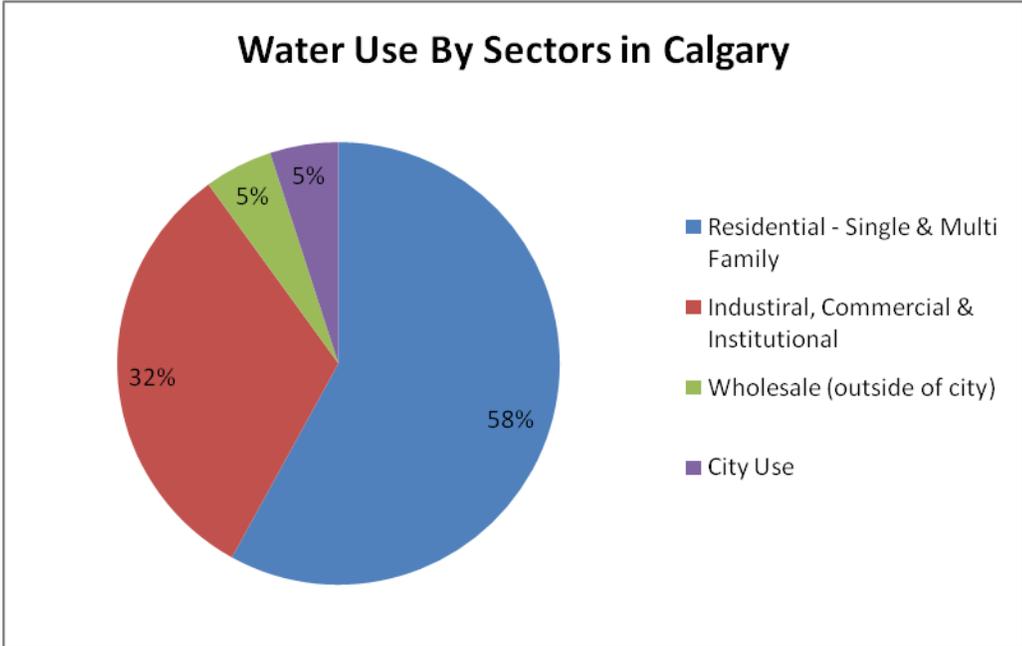


Figure 8b Example breakdown of water use in Calgary (City of Calgary, 2008).

Although the provincial average and numbers from Calgary and Edmonton are helpful in providing a general sense of the proportion of water used by each sector, the proportions may vary greatly in other municipalities. Some municipalities are made up of almost entirely of residences while others may have a strong industrial base. This is important to note because one of the

most commonly used measurements for tracking and comparing water use is 'total per capita water use'. **Total per capita water use** is simply the annual water use divided by population. Environment Canada (2007) indicates that the average total per capita water use in Canada in 2004 was in the order of 609 litres per day, yet as the previous charts show, relying on this measurement of water use alone can be misleading because it does not take the breakdown of sectors within a municipality into account. A story commonly used to illustrate the limitation of this measure is as follows:

There are two municipalities with the same population. One municipality has only residences and a few businesses. The other municipality has residences, businesses and a beverage bottling facility. Even if the two municipalities implemented equally effective CEP plans the latter would have a higher total per capita water use because of the bottling facility.

As residents are the common element between municipalities, using a measurement that focuses specifically on this segment of water use is one solution for setting common benchmarking targets for municipal water use. **Residential** (also known as domestic) **per capita water use** is the measure of water use by the residential sector divided by the population captured in that sector. Metering residential customers is an important step in determining this measure. Depending on how water use is tracked, the residential sector may just represent single family users or include multi-family residential water users.

Water Metering

Water metering is a crucial step in achieving water CEP. In addition to allowing municipalities to track where water is used, it provides the foundation for CEP initiatives relating to water pricing, full cost accounting and education.

Environment Canada (2004) reports in Alberta, 89% of residences and 99% of businesses are metered. For those municipalities that do not yet have full metering, this should be one of the goals of their CEP Plan.

Residential per capita water use has been used as a basis for comparison of water use between countries. While water use changes from year to year, it is generally accepted that residential water use in Canada is higher than necessary. Figure 9 (below) shows a comparison of Canadian water use to a handful of other developed countries.

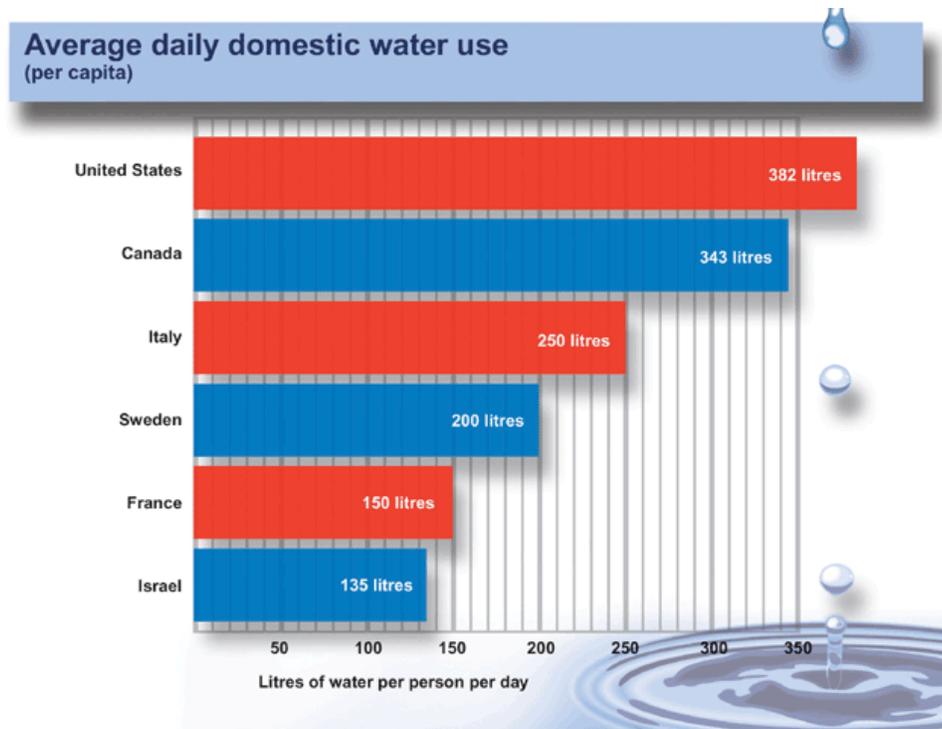


Figure 9 Residential per capita water use by country (Environment Canada, referenced in J. Kinkead Consulting, 2006).

However, residential per capita water use is not without its own limitations either. As Bill Gauley, of Veritec Inc., shared at the Municipal Water Conservation Workshop in 2008¹⁷, and as a recent report of the Canadian Water and Wastewater Association¹⁸ makes clear, comparing residential per capita water use presents a number of challenges. Some possible reasons for this are:

- Differing methods for measuring residential water use; some municipalities include multi-family homes in the residential sector, others include it in commercial
- Varying distributions between water-intensive single family housing (typically because of larger households and greater landscape irrigation demands) and less water-intensive multi-family housing
- Different ages of housing stock (with new homes tending to be more water efficient)
- Outdoor water demands, as a result of geography (arid areas tend to use more water)

¹⁷ Presentations from the workshop are available at <http://auma.ca/live/AUMA/AUMA+Presentations/Workshops>

¹⁸ This report can be found at http://cwwa.ca/pdf_files/CWWA%20Water%20Efficiency%20Benchmarking...Final%20Report%20v4.pdf

- Significant transient or tourist populations as is the case in places such as Banff, Canmore, Jasper and Wood Buffalo.

Because of how these differences influence per capita water use, many municipalities are hesitant to share this data. Perhaps one way around this problem is for AUMA to collect the data on a confidential basis and aggregate it to show sector-wide progress towards achieving an improvement on municipal water use. Organizations like the Canadian Water and Wastewater Association and the Ontario Ministry of Environment are looking at this same issue and their learnings will incorporate improvements into our CEP initiative as information becomes available.

In the meantime, comparing both residential and total per capita water use is a more common way to make comparisons. This method does not remove the inconsistencies mentioned earlier, but it is what we will use for now. In an effort to provide a gauge for what baseline data for residential and total water use might look like for 2006, AUMA looked at the aggregated demands for some of Alberta's largest urban municipalities. The results, compared to the national averages, are shown in Table 3.

Table 3 Average Per Capita Water Demands in Alberta.

Number of Municipalities Included in Data	Year Data Obtained	Average Residential Demand (L/c/d¹⁹)	Average Total Demand (L/c/d)
8 of the 10 largest municipalities ²⁰	2006	232	411
147 responding to Environment Canada Survey ²¹	2004	271	488

The differences in the values from the 10 municipalities canvassed in 2009 compared to the 147 that responded to the Environment Canada survey are likely the result of a number of different factors including those discussed earlier. To create a true benchmark for municipal water use that captures the range of water system sizes and situations in Alberta municipalities it will be important to compile this information for a greater number of municipalities.

3.3 Establishing a Baseline Year

2006 has been used as a reference throughout this Plan as a federal census was conducted that year and information from AUMA members was most

¹⁹ L/c/d or litres per capita per day, is the standard unit of measure for both total and residential per capita water demand.

²⁰ The 8 municipalities included are: Calgary, Edmonton, Red Deer, Strathcona County, Lethbridge, St. Albert, Medicine Hat, and Grande Prairie.

²¹ A summary of Environment Canada's survey of municipal water for 2004 is available at http://www.ec.gc.ca/Water/en/info/pubs/sss/e_mun2004.pdf

readily available for that year. However, the *Water for Life* strategy references 2005 as a baseline year and the AWC recommendations for CEP (2008) suggest establishing a baseline by using three years of data from between 2000 and 2005. AUMA, in consultation with its Team of Experts and Multi-Stakeholder Committee has decided that these years will not provide a good baseline because of the weather extremes and unprecedented population growth that occurred in Alberta during this period.

Dry summer periods between 2000 and 2002 increased water demand and, in 2005, record breaking droughts affected many areas of the province²². And, while the summer rainfall in 2004 was closer to average, the moisture deficit in the soil due to preceding dry years ensures data from that year is not reliable either.

With the rapid growth that has occurred in many Alberta municipalities in the past decade, reliable population data also becomes a factor in determining a baseline year for looking at municipal water use. Some, but not all, centres perform their own municipal census on an annual basis but a more reliable baseline can be established by using common data sets. 2006 was the year of the last federal census and since that time the number of municipalities conducting their own municipal censuses has dramatically increased.

Additionally, some municipalities have indicated that efforts to survey water use improved significantly following the release of *Water for Life* strategy in 2005.

Given the improved availability of data since 2005, municipalities who are developing a new Water CEP Plan should compile water use data for each year from 2006 to 2011 in order to establish a baseline. Establishing a baseline is the first step in determining appropriate water conservation targets.

Member municipalities will be asked to share their water use data from 2006 to 2011 so that AUMA can determine an average baseline water use among member municipalities. Depending on the results, an individual year or range of years within the 2006 to 2011 window may be chosen to establish the baseline for the AUMA members on an aggregated basis. The baseline will provide the benchmark for measuring the effects of CEP efforts and setting future targets.

²² Following the flood events of 2005, Alberta Environment analysed data from the peak flows in a number of rivers and compared these to peaks in other years. The peak flows from 2005 and the calculated likelihood of similar events occurring at these locations in any given year are published at <http://www.environment.alberta.ca/forecasting/advisories/summaryJune2005Detailed.html>

4 HISTORY OF MUNICIPAL ACTIONS TOWARD CEP

Initiatives to improve water conservation, efficiency and productivity have been taking place in Alberta municipalities for many years. These initiatives have taken many different forms and have been motivated by different drivers. The size of a municipality, its geography, its economic base and its source of water are all influences on what approaches it will take to conserving water. And with water services being such a fundamental part of municipal governance, there is enough commonality that municipalities can learn from each others' current and past efforts even if slightly different approaches are taken.

Early water management efforts have included water meter installations, pipe replacement programs and leak detection. Such improvements were not directly motivated by CEP but rather by the need to protect infrastructure investments. One early example was meter installation throughout the City of Edmonton in 1914, to correct revenue losses from water wasting (Edmonton Bulletin, 1918). The use of meters has allowed EPCOR (the utility provider in Edmonton) to implement full cost accounting, to track water use by sectors and to reduce per capita water use. In the City of Calgary, early water CEP efforts started much differently. In the 1980s, following a detailed water audit, Calgary focused on improving water system integrity by concentrating efforts on proactive main replacement and leak detection. The result was a 30% drop in per capita water use, 50% less leakage in the distribution system and 50% less water main breaks, in addition to a list of infrastructure expansions and upgrades no longer being needed as originally planned (City of Calgary, 2009).

The following sections include other examples of some of the recent water conservation initiatives in Alberta municipalities. For the purposes of organization they are grouped under the prime motivation for action although in reality there is a great deal of overlap between these drivers.

4.1 Availability Concerns

In the portions of the South Saskatchewan River Basin where a moratorium on new water licences is already in place, water availability is a concern for many water users. A number of municipalities have already taken action to manage the amounts of water they are currently allocated. Some of these programs include:

- **Water Conservation Programs:** The Town of Okotoks is a junior licensee on the Sheep River but has concerns over water availability and so has been focused on water conservation and efficiency for the past decade. The town tracks **consumption based water rates**, has implemented **leak detection monitoring**, and has approved a water efficient subdivision²³.
- **Community-based social marketing:** The City of Camrose was one of the first Alberta municipalities to develop a water conservation program when they developed their "Don't be a Drip" campaign in 2000. Camrose was in the midst of significant population growth and had limited access to

²³ Information on the various components of Okotoks' water sustainability work can be found on the town website at <http://www.okotoks.ca/default.aspx?cid=208&lang=1>

water. A main goal of the program was to increase water conservation awareness (CMHC, 2009). The Town of Cochrane has implemented a variety of water conservation programs since 1992 including educational campaigns, conservation based water rates, naturescaping requirements and low flow fixture rebates. To further improve water conservation, the town hired three conservation officers in the summer of 2008 to educate citizens and enforce the Outdoor Water Conservation Bylaw (Town of Cochrane, 2008)²⁴.

4.2 Financial Constraints and Full Cost Accounting

A common reason for municipal water conservation is to delay costly water infrastructure expansions, as has been the case in the Town of Drumheller. Through education and the installation of low flow water fixtures in residences, the town has been able to maintain total water consumption levels, effectively delaying the need for a \$16 million upgrade of the waste water treatment plant by 10 years (Town of Drumheller, 2009). In Ontario, the Regional Municipality of Durham estimated that ten years of commitment to long term water conservation could result in net savings in excess of \$100 million (Veritec, 2004 in Brandes *et al.*, 2006). Other municipalities in Alberta have taken similar approaches to delay the need for infrastructure investment. AUMA hopes to gather and share more examples as the CEP initiative continues.

Full cost accounting is one tool that is often connected to water conservation. Alberta Environment defines **full cost accounting** as “a method of accounting that captures all the costs (both cash and non-cash) relating to the provision of water services. It includes all operating and maintenance expenses, depreciation on assets, and provision (returns) for the replacement of capital assets employed in providing water services”. In many communities, utility bills only contribute to a portion of the cost in providing potable water. The remaining operating funds usually come from taxes with little or no money set aside to repair, replace or improve components of the water treatment and distribution system. Consequently, financial issues arise when maintenance or repairs need to be made to the system.

While the provincial and federal governments have been able to financially assist communities with water and wastewater treatment plant maintenance and upgrades in the past, the province has made clear that municipalities will need to implement full cost accounting to cover more of the costs of future maintenance and upgrades. As part of *Water for Life*, Alberta Environment has been providing educational sessions on the benefits of full cost accounting and how to budget for expected equipment replacement (Alberta Environment, 2008).

Many municipal utilities, particularly those which provide water services to other municipalities, use full cost accounting. For example, EPCOR Water

²⁴ Cochrane’s water conservation strategy is available at [http://www.cochrane.ca/municipal/cochrane/cochrane-website.nsf/AllDoc/E881E4DA41AA7CFB8725754B006AE6A7/\\$File/Water%20Conservation%20Strategy%202008.pdf](http://www.cochrane.ca/municipal/cochrane/cochrane-website.nsf/AllDoc/E881E4DA41AA7CFB8725754B006AE6A7/$File/Water%20Conservation%20Strategy%202008.pdf)

Services uses the full cost accounting approach to determine fees for water treatment and supply in the communities it serves. These include Okotoks, Canmore, Ft McMurray, Picture Butte, Strathmore, Chestermere and Edmonton and the Capital Region (Figure 5). EPCOR’s utility structure makes full cost accounting a natural fit.

There are other municipalities which have implemented full cost accounting, and their experiences provide lessons on how to avoid problems that can be associated with charging customers for the full cost of providing water. In municipalities such as Red Deer, the move to full cost accounting has taken place over a number of years. This has allowed the city to educate its customers about the need to cover the costs of water treatment and distribution. Municipalities that have tried to implement full cost accounting without public education have had to deal with a backlash from citizens.

Full cost accounting is primarily a financial tool to ensure that funds are available when maintenance or replacement is required. Research comparing water use and pricing also shows that price is an important factor in water conservation. Figure 10 provides one such comparison of water use and water pricing in various countries. Full cost accounting is not the only piece in water conservation but it is important.

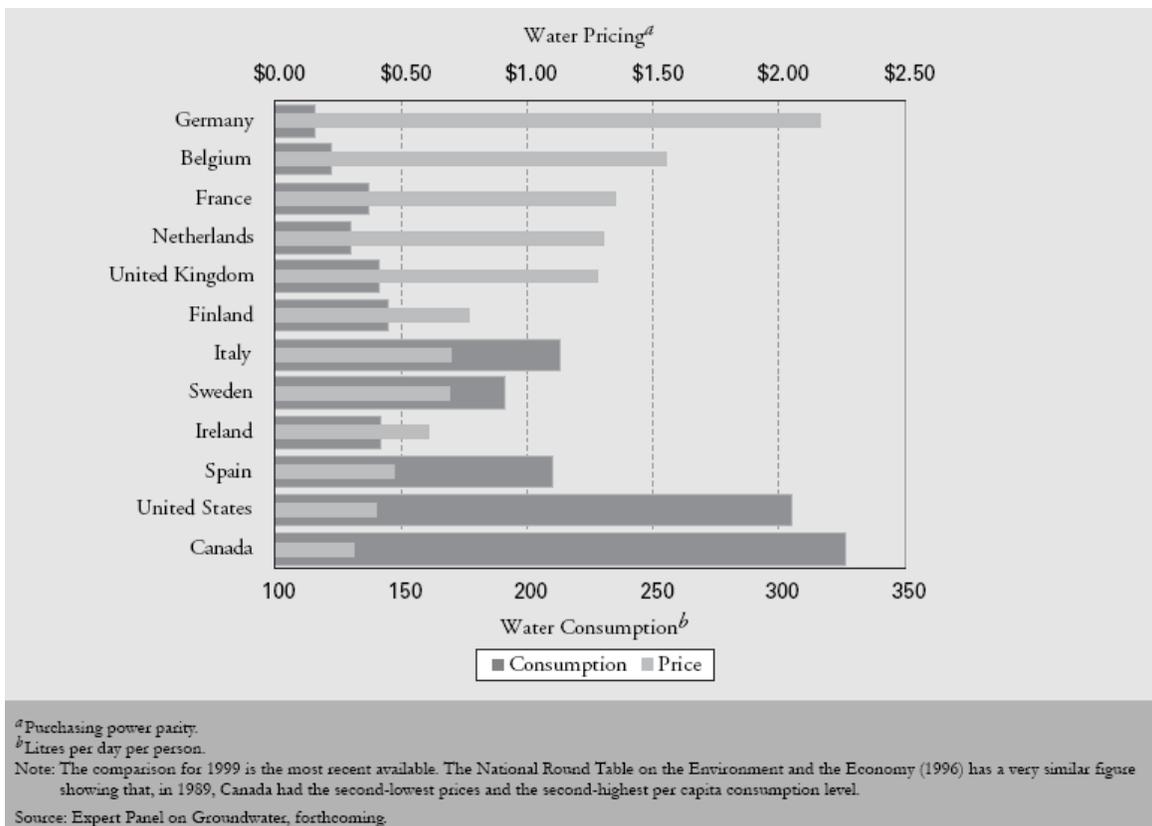


Figure 10: Comparison of International Water Price and Consumption, 1999 (Renzetti, 2009)²⁵

²⁵ The full report “Wave of the Future: The Case for Smarter Water Policy” is available at http://www.cdhowe.org/pdf/commentary_281.pdf

When pricing and good practices are partnered to ensure that finances are available at the time of replacement, full cost accounting can be considered another financially driven water conservation mechanism.

4.3 Environmental Concerns

Environmental concerns have also triggered water CEP activities and programs in Alberta municipalities. Initiatives range from full-out water efficiency plans to rebates and bylaws requiring water efficient fixtures and technologies.

Some of the larger initiatives include:

- In 2005, the City of Calgary developed a 30 year water efficiency plan which outlines how the City will make room for growth, while keeping river withdrawals below 2003 levels (City of Calgary, 2007)²⁶. While the City has a water allocation that exceeds their water use, maintaining the current water demand has the benefit of leaving water in the Bow and Elbow rivers to ensure ongoing aquatic health while also being less expensive than allowing water use to rise. Measures in the plan include leak detection and the replacement of water mains, metering and water use audits.
- In 2007, the City of Red Deer developed a water conservation strategy (City of Red Deer, 2007)²⁷ due to water supply concerns and interest in water management. In this strategy the city is leading the way in conservation by looking at opportunities for water efficiency on municipal sites first. Other important pieces of the strategy include low flow fixture requirements in new construction, toilet rebates and community based marketing to address high water using residential areas.

As of 2008, water-use bylaws existed in Airdrie, Calgary, Canmore, Cochrane, Edmonton, Nanton, Okotoks, Olds, Red Deer and Strathcona County and more municipalities are considering doing the same. Still others are running water efficient fixture rebate programs. Both bylaws and rebates are discussed in Appendix D.

²⁶ Calgary's Water Efficiency Plan: 30-in-30 by 2033 is available at http://www.calgary.ca/docgallery/bu/water_services/conservation/planning/water_efficiency_plan.pdf

²⁷ Red Deer's Water Conservation Strategy is available at <http://www.reddeer.ca/NR/rdonlyres/9B3F3887-D699-4090-AF86-4792E3CF0CCA/0/WaterConservationStrategyfortheweb.pdf>

5 DEFINING OUR FUTURE

Water for Life makes it clear that municipalities will need to work with other sectors towards an overall improvement in water use of 30%. As discussed in section 2.2, our understanding of current municipal water use is deficient. Therefore, it is not yet possible to set a target date for urban municipalities to achieve a 30% improvement in efficiency, although this remains a future goal. In the meantime, the focus of urban municipal CEP planning is on implementing strategies to gain a better understanding of water use and to improve water CEP. Once there is a clearer understanding of water use and the results of initial CEP measures are recorded, AUMA and its members will be able to set concrete, achievable and measurable medium- and long-term targets. The sections which follow describe opportunities to better measure water use and improve CEP in the short-term.

5.1 Identifying Actions to Achieve our Desired Future

AUMA members have been directly engaged in developing this urban municipal CEP plan. Throughout 2008 and early 2009 water CEP was discussed in the Weekly Digest and at AUMA events, including the first ever Municipal Water Conservation Workshop in Red Deer on November 20 and 21, 2008.

The Workshop was designed by the AUMA Water Team of Experts to build capacity for water CEP among elected officials, administrators and water operators, and to identify the short-term targets for this plan. More than 110 people attended the event. Following each presentation, participants engaged in group discussions about what they learned. A summary of presentation topics and speakers is provided in table 4. The presentations are posted on the AUMA website at <http://www.auma.ca/live/AUMA/AUMA+Presentations/Workshops>.

Table 4 Topics at the AUMA Municipal Water Conservation Workshop, November 20 and 21, 2008 in Red Deer

Topic	Description	Presenter(s)
Keynote Address: The Value and Importance of Conservation, Efficiency and Productivity	Bob Sandford, with the UN International Water for Life Decade, spoke to the benefits of water conservation and efficiency to future social and economic development.	Bob Sandford, Chair, Canadian Partnership Initiative, UN International "Water for Life" Decade
Two Approaches to Municipal Water Conservation and Efficiency	Two Alberta municipalities shared their different approaches to developing municipal water conservation and efficiency programs. Implementing broad initiatives such as planning, metering and full cost accounting were discussed.	Dave Robertson, Operations Manager, Town of Okotoks & Nancy Stalker, Leader, Community and Customer Initiatives, Water Resources, City of Calgary
Civic Infrastructure: Leading by Example	By targeting municipal operations first, municipalities can demonstrate leadership and gain momentum for larger	Pam Vust, Environmental Coordinator, City of Red Deer & Chris Huston, Leader, Asset Operations, City of Calgary

	conservation initiatives. Pam Vust shared how Red Deer's Water Conservation Strategy was developed and Chris Huston discussed the importance of water loss management and leak detection.	
Indoor Water Efficient Technologies for Homes and Businesses: Myths and Realities	Early low-flow devices received a lot of bad press in the past. This presentation highlighted the benefits of new research in selecting new and improved products water efficient fixtures.	Bill Gauley, Veritec Consulting Inc.
System Water Audits	This session provided an introduction to the Infrastructure Leakage Index (ILI) which is a valuable tool in assessing priorities for leak management.	Chris Huston, Leader, Asset Operations, City of Calgary
Regulatory Methods	Enforcement is an important component in making bylaws successful. This presentation highlighted components of Cochrane's water conservation efforts with a focus on the water conservation officers they established in the summer of 2008.	Gary Wagner, Environmental Coordinator, Town of Cochrane
Water Pricing	Linda Chan discussed the processes EPCOR Water Services uses to set water utility rates that cover the full cost of providing water and wastewater services in Edmonton.	Linda Chan, EPCOR Water Services
Water Efficient Technologies for Outdoors	In this session Bill Gauley discussed some of the myths associated with outdoor water conservation technologies.	Bill Gauley, Veritec Consulting Inc.
Alternatives to Potable Water	Wayne McCaffrey provided an overview of plumbing legislation and the risks associated with residential grey water reuse.	Wayne McCaffrey, Senior Plumbing and Gas Inspector, Municipal Affairs
Social Marketing	This presentation featured an overview of the community based social marketing programs that have been used to change water consumption behaviours in Calgary.	Marg Beeston, Team Lead, Residential Programs, City of Calgary
Industrial Commercial & Institutional Sector	Some of the opportunities for improving water use in the ICI sectors were highlighted in this presentation.	Mike Meagher, ICI Customer Coordinator, City of Calgary
Measuring &	This session featured an	Bill Gauley, Veritec Consulting Inc.

Reporting Water Use	overview of the challenges in measuring and benchmarking municipal water use and a tutorial of Alberta Environment's Water Use Reporting System.	& Lorne Edinga, Alberta Environment
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Following more than a day of learning, and a presentation highlighting potential priorities, participants were asked "What top 3 targets are the most important for municipalities to work on collectively, in order to achieve the overall goal of a 30% improvement in water use efficiency?" The final rankings were as follows:

1. Municipalities calculate their infrastructure leakage index and identify ways to reduce leaks.
2. Municipalities agree to produce water conservation and efficiency plans.
3. Alberta residences are equipped with low flow water fixtures.
4. Municipalities commit to full water metering of customers.
5. Municipalities will have established provincial targets for total and residential per capita water use.
6. Municipalities report their water use data on-line.
7. Municipalities will have plans in place to limit their water demand to 2006 levels.

Breakout discussions on the top 3 choices yielded a list of strategies for achieving the target, as well as obstacles that might be required and resources that may be needed. These strategies and obstacles have informed the recommendations outlined in section 6 of this plan.

These initial priorities for municipal water CEP targets were endorsed at the AUMA Mayor Caucuses on February 4 and 5, 2009. The AUMA Water Team of Experts then met to further refine the targets. The team identified the need for better data to determine medium- and long- term goals, therefore a fourth priority regarding water use reporting was added, calling on all municipalities to report water use.

In refining the goals, the Team of Experts also considered specific items in the Alberta Water Council's "Recommendations for Water Conservation, Efficiency and Productivity Sector Planning" (2008), specifically:

- That an evaluation of sector planning will take place in 2012
- That early efforts focus on the largest water users in each sector

The following targets focus on actions that can be measured prior to 2012 and on getting full support from municipalities with greater than 10,000 residents. Approximately 72% of the population in AUMA member municipalities is represented by the 26 municipalities with populations in excess of 10,000 people as shown in Table 5 (Statistics Canada, 2008).

Table 5 Alberta's Urban Municipalities with greater than 10,000 residents
(2006 data, Statistics Canada, 2008)

Rank Size	Status	Municipality	2006 Population
01	City	Calgary	988,193
02	City	Edmonton	730,372
03	City	Red Deer	82,772
04	Specialized Municipality	Strathcona County	82,511
05	City	Lethbridge	74,637
06	City	St. Albert	57,719
07	City	Medicine Hat	56,997
08	Specialized Municipality	Regional Municipality of Wood Buffalo	51,496
09	City	Grande Prairie	47,076
10	City	Airdrie	28,927
11	City	Spruce Grove	19,496
12	Town	Okotoks	17,145
13	City	Leduc	16,967
14	City	Lloydminster	15,910
15	City	Camrose	15,620
16	City	Fort Saskatchewan	14,959
17	Town	Cochrane	13,760
18	City	Brooks	12,498
19	Town	Stony Plain	12,363
20	Town	Canmore	12,039
21	City	Cold Lake	11,991
22	City	Wetaskiwin	11,673
23	Town	Lacombe	10,742
24	Town	High River	10,716
25	Town	Strathmore	10,225
26	Town	Sylvan Lake	10,208

5.2 Short-Term Targets

The short term targets for the AUMA Municipal CEP Plan are:

1. By December 2010, all AUMA member municipalities with water systems in place will report water use data through Alberta Environment's electronic Water Use Reporting System (WURS).
2. By Dec 31, 2011, AUMA member municipalities will develop Conservation, Efficiency and Productivity Plans according to the following participation rates:
 - 100% of municipalities with populations greater than 10,000
 - 75% of municipalities with populations between 2500 and 10,000
 - 50% of municipalities with populations under 2500

3. By Dec 31, 2011, AUMA member municipalities will estimate their Infrastructure Leakage Index (ILI) and identify ways to reduce leaks according to the following participation rates:
 - 100% of municipalities with populations greater than 10,000
 - 75% of municipalities with populations between 2500 and 10,000
 - 50% of municipalities with populations under 2500
4. By Dec 2011, AUMA member municipalities will implement incentives and/or disincentives of their own choosing to increase the uptake of water efficient fixtures and technologies. Different programs may apply to new and existing developments. Participation rates will be:
 - 100% of municipalities with populations greater than 10,000
 - 75% of municipalities with populations between 2500 and 10,000
 - 50% of municipalities with populations under 2500

The varying participation rates are in line with the recommendations of the Alberta Water Council that CEP efforts begin with the largest water users. The participation rates also reflect the fact larger municipalities have made more progress toward meeting the targets. For example, 26% of the largest municipalities have already completed CEP Plans. Having the examples provided by these municipalities will make it easier for other larger municipalities to implement their own plans. With regards to implementing infrastructure leakage programs and encouraging water efficient fixtures, the larger centres have again led the way and therefore less municipalities will need to do the work to achieve 100% participation rates.

Since there are fewer examples of smaller municipalities taking action towards the short-term targets it will take some extra time to build momentum towards achieving 100% participation. By providing different participation rates the AUMA is able to ensure that the short-term targets are achievable for the various sizes of municipalities.

5.2.1 Water Use Reporting

Target: By 2010, all AUMA member municipalities with water systems in place will report water use data through Alberta Environment's electronic Water Use Reporting System (WURS).

Background: An accurate understanding of current water use is vital to developing medium- and long-term targets for water CEP. It is also key in refining short term goals and will allow municipalities to track the effects of water CEP initiatives. Water use reporting is a condition in most *Water Act* licences but Alberta Environment has been moving towards obtaining this data from all water using sectors using the electronic Water Use Reporting System (WURS). The WURS site is now available at <http://environment.alberta.ca/1286.html>

Monitoring: As the WURS data is accessible to the public, AUMA will use the WURS data to track progress on this target.

Each April, the AUMA will request data from Alberta Environment on who submitted returns and what the values are. Some coordination with Alberta Environment may be required to present the data in a way that shows meaningful progress on this target. Aggregated data will be provided in annual reports and be highlighted at convention.

Support: Alberta Environment has already provided tools to assist water licensees in reporting their water use as shown in Figure 11 (below).

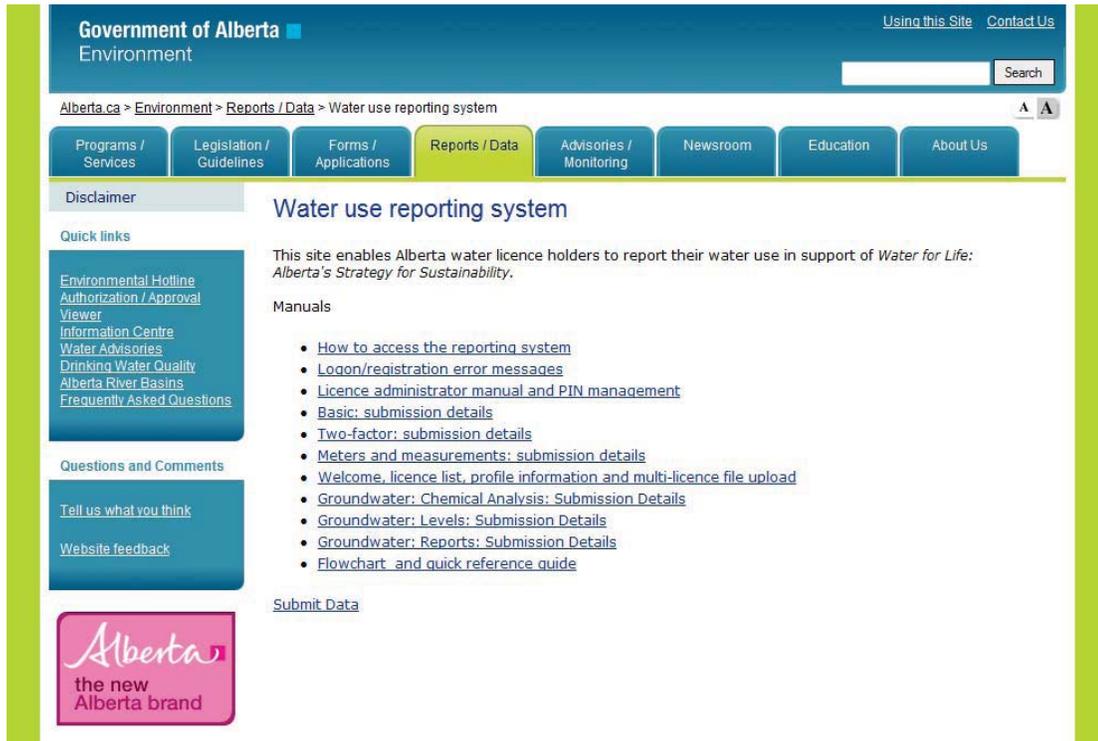


Figure 11 Manuals available at <http://environment.alberta.ca/1286.html> to assist municipalities in submitting water use returns (Alberta Environment, 2009)

AUMA will work with Alberta Environment to ensure that WURS accurately portrays municipal water use data and follow up with communities in order to encourage reporting.

5.2.2 Conservation, Efficiency and Productivity Planning

Target: By December 31, 2011, AUMA member municipalities will develop Conservation, Efficiency and Productivity Plans according to the following participation rates:

- 100% of municipalities with populations greater than 10,000
- 75% of municipalities with populations between 2500 and 10,000
- 50% of municipalities with populations under 2500

Background: A plan gives a snapshot of current water use trends and provides the framework for future water CEP actions. A plan needs to include a water profile, baseline information, a goal for future water use, an evaluation of CEP options and an outline of when the various CEP initiatives will be done. The plan should also indicate how the municipality will contribute to AUMA's other CEP targets regarding infrastructure leakage and water efficient fixtures and identify any other local targets. Efforts towards establishing full metering and full cost accounting should also be discussed. While metering and full cost accounting were not chosen as priorities by AUMA members, they are foundational to making significant improvements in water CEP.

Monitoring: Successfully tracking progress towards this target is dependent on AUMA members sharing their plans with the Association via the AUMA Water Microsite. In April of each year, AUMA will make a concerted effort to obtain information on progress towards this target for inclusion in the annual report.

Support: Appendix B of this report includes a listing of existing CEP plans and a discussion on some of the main items of a CEP plan. There are a number of planning guides in development across the country. The AUMA will be reviewing some of these plans and will provide the recommended template(s) on the AUMA water Microsite. The AUMA will also seek opportunities to host educational events to encourage progress on this target.

5.2.3 *Infrastructure Leakage Index*

Target: AUMA member municipalities will estimate their Infrastructure Leakage Index (ILI) and identify ways to reduce leaks according to the following participation rates:

- 100% of municipalities with populations greater than 10,000
- 75% of municipalities with populations between 2500 and 10,000
- 50% of municipalities with populations under 2500

Background: This area received the most interest among members at the AUMA Municipal Water Conservation Workshop. This is likely for a number of reasons, including:

- An estimate of ILI is relatively easy and inexpensive to obtain (the software is available for free from the American Water Works Association Website, www.awwa.org).
- Detailed data is not essential for an initial estimate.
- By calculating an ILI, a municipality is able to identify areas where leak detection can be improved.
- By taking care of municipal infrastructure first, municipalities are able to lead by example and get better buy-in from residential, commercial, industrial and institutional water users.

Monitoring: Each April, the AUMA will request data from members in regards to progress on this target. The responses will be used in AUMA's annual report. While individual numbers will be collected to track progress on this

goal and may help with determining a provincial target of ILI, the individual values will not be published in the report, at convention or on the water Microsite.

Support: Appendix E of this report includes some background information on ILI and AUMA's water Microsite will link to the software available from the AWWA and feature examples from Alberta municipalities.

5.2.4 *Water Efficient Fixtures and Technologies*

Target: By Dec 2011, AUMA member municipalities will implement incentives and/or disincentives of their own choosing to increase the uptake of water efficient fixtures and technologies. Different programs may apply to new and existing developments. Participation rates will be:

- 100% of municipalities with populations greater than 10,000
- 75% of municipalities with populations between 2500 and 10,000
- 50% of municipalities with populations under 2500

Background: Efforts to reduce unnecessary water consumption often include measures to increase the uptake of water efficient fixtures and technologies. In the home, toilet flushing is typically the largest contributor to indoor water use. In recent years, water efficient alternatives to 20 and 13 litre toilets have become available in Canada. Rebates and bylaws can be used to encourage developers and consumers to choose 6 litre and dual flush toilets. Organizations in the United States and Canada have supported studies to indicate the effectiveness of these toilets²⁸ and the resulting reports are the basis for most toilet rebate programs.

The question of what to do with old fixtures is often asked. Efforts are underway to address the waste that is created in toilet replacement programs and in the City of Red Deer a pilot program is underway to evaluate whether the ceramic from old toilets can be crushed and used as aggregate in concrete.

In the mean time the main focus of this target is get measures in place to encourage consumers to choose efficient fixtures when they making purchases for new homes, renovations or replace fixture that has stopped working.

Other opportunities for reducing waste include reducing "once through cooling" in industrial applications and encouraging the use of water efficient pre-rinse spray valves in commercial kitchens.

A range of incentives and disincentives can be used by municipalities to increase the uptake of water efficient fixtures and technologies, including:

²⁸ Maximum Performance (MaP) Testing of Popular Toilets is updated periodically. The May 2009 edition is available at http://cwwa.ca/pdf_files/Map-Report-14th-Ed-05-2009.pdf Watch the AUMA Water Microsite for future updates.

- Amending existing bylaws or creating new bylaws
- Issuing rebates for water efficient fixtures (this is a labour intensive activity and some municipalities have partnered with Climate Change Central to defer that impact)
- Providing or installing water efficient fixtures
- Conducting educational campaigns (alone or in support other initiatives)
- Registering caveats properties for new homes and/or businesses
- Implementing building permit rebates that require the developer to demonstrate that best water practices are working in order to get a portion of their permit fees refunded
- Developing and maintaining municipal leak maintenance programs

Some of these examples are described in more detail in Appendix D.

Monitoring: Beginning in 2009, members will be asked to share actions towards this target via the AUMA water Microsite. Members will be asked to share links to their bylaws and promotional materials, where available so that these resources can be shared with other municipalities. In April of each year, AUMA will make a concerted effort to obtain information on progress towards this target for inclusion in the annual report.

Support: Model bylaws and templates via the AUMA water Microsite. Information will also be provided on programs delivered by Climate Change Central and the Government of Canada. Municipalities can use these programs to leverage their own efforts.

5.2.5 *Other Efforts*

The priority targets listed above will receive AUMA's greatest attention as they were chosen by AUMA's members as being the most crucial steps in CEP. However, this does not mean that other suggested targets will be ignored. For example, while the majority of municipalities already have full water metering, those that don't will need to address this in their CEP plans. The templates that AUMA provides around CEP planning will include reference to metering and other measures including full cost accounting. Both are important but metering is especially crucial as it allows CEP progress to be evaluated more easily, especially if targets around per capita water use are established in the future.

5.3 **Reporting on Progress**

Measuring and reporting progress is a crucial part of any plan. Tracking progress allows one to assess whether the right tools, resources and suggested measures are being provided to reach the desired outcome, or whether adjustments need to be made. The process of sharing progress also helps others learn from successes and mistakes. And of course, reporting on progress provides accountability, which is particularly important as AUMA and its members are part of a broad based effort to improve CEP of water.

To this end the AUMA and Alberta Environment are working to build measurements that are SMART²⁹. The two main mechanisms for capturing information related to SMART targets are the WURS and the Microsite, which have been mentioned in the discussion on targets. AUMA members can use the Microsite as well as AUMA events such as the Mayor's Caucuses to provide updates on targets, raise any issues or barriers, and discuss possible solutions. By sharing this information on the Microsite, municipalities will also be contributing to the development of a virtual community of interest and be able to benefit from learnings in other municipalities.

Progress on the short-term targets will be measured first by uptake (the number of communities undertaking an initiative); future targets will be developed to measure improvements in water demand. Action towards the targets will be collected for AUMA annual reports and shared through the AUMA water Microsite. Information on water use will be collected via Alberta Environment, provided that changes in Alberta Environment protocol and cooperation from municipalities will allow for more complete water-use data to be compiled.

In addition to reporting on progress to its members, the AUMA will also keep the AWC's CEP Sector Planning Team informed of progress. AUMA is a member of the team, which is mandated with evaluating progress on CEP. The AWC is planning to conduct a province-wide review of CEP progress, beginning in 2012. AUMA will need to develop a comprehensive report on urban municipal progress in 2011 in order to contribute.

5.4 Defining Medium & Long Term Targets

Until the outcomes of short-term targets are evaluated and baseline water use established, specific medium and long-term targets cannot be defined. At this point it seems likely that medium-term goals will include measurable improvements in infrastructure leakage and increasing the use of low flow fixtures. The *Water for Life* target of a thirty per cent improvement in efficiency will be incorporated into future targets, but it is not yet clear to what degree municipalities will contribute or what the timeline will be.

Medium-term actions will need to be expanded when this plan is next reviewed but right now they are anticipated to include:

- Identifying how improvements in water efficiency will be measured
- Measuring improvements in water use

²⁹ Specific (sectors)

Measurable (establish consistent criteria for measuring performance)

Achievable (challenging, but not unrealistic for best performing organizations)

Realistic (ensure the measures are practical and cost effective)

Timescale (targets need to be set against an appropriate time scale to provide optimum effect)

- Implementing strategies to overcome hurdles in achieving improved efficiency, to be identified as municipalities develop and begin implementing their own CEP plans
- Determining how to recognize water CEP efforts that took place prior to the development of this plan and determination of the baseline year, once it has been established
- Clarifying the relationship between water CEP, watershed planning and land use management in Alberta

Longer term actions cannot be identified accurately at this time as they are largely dependent on information obtained through the short-term targets. Communication between the AUMA and its members to identify progress and gaps and to ultimately determine appropriate medium- and long-term targets is key.

Eventually we will need to define a system for tracking this information. Data on progress will also provide a clearer picture of what future initiatives are being planned and what additional resources may be required. Annual reviews will encourage continuous water use improvements in the municipal sector.

Recognizing Historical Initiatives

A number of Alberta municipalities have led the way to water CEP initiatives of their own volition. These include universal metering programs, water efficiency planning, water efficient fixture bylaws and toilet rebate programs.

6 SUMMARY & RECOMMENDATIONS

Water Conservation is a high priority for Alberta's urban municipalities. AUMA and its members are eager to play a leadership role by being one of the first sectors to develop a Conservation Efficiency and Productivity (CEP) Plan towards achieving the Water for Life outcome of a 30% improvement in overall water efficiency and productivity. Challenges involved in accurately measuring and reporting water use mean that setting a realistic timeframe for achieving this outcome is not currently feasible for municipalities. Instead AUMA members have identified four short-term targets. By focusing on these targets and supporting Alberta Environment's Water Use Reporting System (WURS), municipalities will be able to gain a better understanding of current water use and the impact of CEP initiatives. Achievement of short-term targets lays the foundation for setting medium- and long-term targets.

As discussed in earlier sections of this plan, the initial targets for action are:

1. All urban municipalities will report water use data through Alberta Environment's (AENV) electronic Water Use Reporting System (WURS) by 2010.
2. Urban municipalities representing 80% of municipal water allocations will develop Conservation, Efficiency and Productivity Plans by Dec 31, 2011. To reach this target it is anticipated that 100% of municipalities with populations over 10,000 people will do this by the end of 2011.
3. Urban municipalities representing 80% of municipal water allocations will estimate their Infrastructure Leakage Index (ILI) and identify ways to reduce leaks by Dec 31, 2011.
4. Urban municipalities representing 80% of municipal water allocations will implement incentives and/or disincentives of their own choosing to increase the uptake of water efficient fixtures and technologies by December 2011. Different programs for new and existing developments.

Achieving these targets will require the coordination of the AUMA, its members and government as discussed in the following sections.

6.1 Recommendations for AUMA Members

- Commit to the four water CEP targets
 - See "Appendix D" for a "Model Water, Conservation, Efficiency and Productivity Motion"
- Update AUMA on progress towards short-term water CEP targets each April, for inclusion in AUMA's annual report.
- Work with Alberta Environment to ensure water use reporting data is meaningful and accurately reflects municipal water usage.
- Engage in dialogue (through the water Microsite, at AUMA events, etc.) about water CEP successes and challenges with colleagues across the province.
- Develop strategies to support the move towards full metering and full cost accounting as part of the CEP planning and implementation process.

6.2 Recommendations for Government

6.2.1 *Alberta Environment*

Alberta Environment's partnership has been invaluable in the creation of this Plan. Working under the auspices of the Alberta Environment and AUMA's Protocol of Cooperation, the Department has contributed to the Associations' technical and financial capacity to develop a plan. Ongoing collaboration will contribute to the plan's successful implementation. In addition there are a few specific areas where action by Alberta Environment is required:

- Coordinate with AUMA and member municipalities to ensure that WURS data is meaningful and accurately reflects municipal water usage.
- Ensuring that the data collected in WURS is in alignment with the data names and definitions used by municipalities when calculating ILI.
- Supply municipal water use return data to AUMA every year, commencing in April 2010.
- Continue to support municipalities with drinking water operations by providing educational and technical resources, including full cost accounting workshops.

6.2.2 *Alberta Transportation*

- Continue grant support for municipal water infrastructure.
- Use provincial grants to incent CEP, as identified in the Alberta Water Council's Recommendations for Water Conservation, Efficiency and Productivity Sector Planning (2008).

6.3 Actions for AUMA

The AUMA will focus on building the capacity of its members to meet the four short-term targets with the support of Alberta Environment. The Association will also track progress on meeting those targets and use information from this initial phase to inform future targets and actions.

AUMA activities include:

- Water Microsite
 - Provide information on meeting each of the four short term targets including models, templates, case studies and links to other resources.
 - Include an online forum where municipal CEP practitioners can share experiences and learn from each other.
- Learning Events
 - Given the success of AUMA's First Water workshop, held in November 2008, look for opportunities to hold similar events.
 - Use regularly scheduled events such as AUMA's Annual Convention and Mayor's caucus's to provide information.
 - Contribute to events hosted by the Alberta Water and Wastewater Operators Association (AWWOA), Western Canada Water (WCW) and other related organizations.

- The next AWWOA annual seminar is expected to take place in Banff in the spring of 2010.
- The next WCW event in Alberta is expected to take place in Calgary in the fall of 2010.
- Measuring Progress
 - Use the Water Website and AUMA events to collect data from members indicating progress towards meeting the four targets and to identify barriers to meeting targets.
 - Coordinate with members and Alberta Environment to collect data and track trends on municipal water usage in April of each year.
- Communications
 - Use the Weekly Digest and Small Communities newsletter to promote the Water Microsite and share key messages.
 - Use the weekly digest and AUMA events to get feedback from members on the support AUMA is providing and make improvements as necessary and appropriate.
 - Promote progress on targets to other orders of government and the public.

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Appendix A - Glossary

Commonly used acronyms

AENV – Alberta Environment

AUMA – Alberta Urban Municipalities Association

AWC – Alberta Water Council

CEP – Conservation, Efficiency and Productivity

IFN – Instream Flow Needs

ILI – Infrastructure Leakage Index

WCO – Water Conservation Objective

WURS – Water Use Reporting System

Glossary of Terms used in this report

A number of water CEP related terms have been devised by Alberta organizations. Rather than cause confusion by redefining these terms, definitions from other publications have been used in the creation of this document and are noted in quotations below.

Alberta Water Council. a multi-stakeholder partnership tasked to “monitor and steward the implementation of Alberta’s *Water for Life* strategy and to champion the achievement of its three outcomes” (Alberta Water Council, 2009).

CEP = conservation, efficiency and productivity – The individual terms are defined on page 1 and below using their individual terms (water conservation, water efficiency and water productivity)

Consumptive (water) use – Alberta Environment’s unpublished Glossary of Water Management Terms describes consumptive use as “The balance of water taken from a source that is not entirely or directly returned to that source” (Alberta Environment, 2008b). This represents the difference between the amount of water diverted from a source and the amount water returned. In a municipal context, consumptive water use can include water lost to leaks or evaporation (from storage or outdoor uses), or water that is incorporated into other products.

Full cost accounting - A method of accounting that captures all the costs (both cash and non-cash) relating to the provision of water services. It includes all operating and maintenance expenses, depreciation on assets, and provision (returns) for the replacement of capital assets employed in providing water services.” (Alberta Environment, n.d.)

Instream flow needs -The amount of stream or river “flow required to maintain aquatic ecosystems at a particular level...Instream flow needs are recommended for specific locations along a river and are based on natural flow. ..Recommended instream flows are typically identified in terms of weekly requirements in order to

provide long-term protection of the aquatic environment.” (Alberta Sustainable Resource Development, 2007, p. 1)

Infrastructure leak index - a measure of current losses compared to unavoidable losses in a municipal water system. It is recognized as a performance indicator by the International Water Association (IWA) and is a recommended water audit method by the American Water Works Association (AWWA). AUMA’s Water CEP Plan includes short term actions related to establishing estimates of the infrastructure leakage index for individual municipalities.

Per capita consumption - a way to relate water use in a municipality to the population. It is calculated based on the average volume of water used per day divided by the population served. Total (or gross) per capita consumption relates to the total amount of water used by a municipality whereas residential (or domestic) per capita consumption refers to the portion of water consumed in the residential market. It is usually expressed in L/cap/day or litres per capita per day.

Return flow - denotes water that is included in an allocation and is expected to be returned to a water body after use and may be available for reuse, although the water quality characteristics may have changed during use. Typical return flows include discharges from sewage treatment plants, run-off from irrigated fields, and water discharged from cooling ponds. Not all return flow, however, is returned to the original source of diversion or withdrawal.” (Alberta Water Council, 2008, p.46.)

WCO, Water conservation objectives - relates to the volume and quality of water to remain in rivers for the protection of a natural water body and its aquatic environment. They are flow targets under the *first-in-time, first-in-right* priority water allocation system and will apply to all new licences and existing licences with a retrofit provision. (Alberta Environment, 2008.)

Water allocation - the amount of water that can be diverted for use, as set out in a water licence and issued in accordance with the *Water Act* or earlier legislation. Allocations reflect the amount of water that will be consumed plus any losses that might occur, and may include an allowance for flows that are returned after use. An allocation is generally based on the maximum amount of water that an applicant expects will be required over the licencing period.” (Alberta Water Council, 2008, p. 46.)

Water efficiency - 1. Accomplishment of a function, task, process, or result with the minimal amount of water feasible. 2. An indicator of the relationship between the amount of water needed for a particular purpose and the quantity of water used or diverted.” (Alberta Water Council, 2007, p.1)

Water productivity - The amount of water that is required to produce a unit of any good, service, or societal value.” (Alberta Water Council, 2007, p. 2)

Appendix B – Municipal Water CEP Planning

Municipal Water CEP Planning

Individual municipal plans will vary in complexity depending on the size and complexity of the municipality and its water system. They may be a stand-alone plan or a component of a larger plan, as is the case in Edmonton. Table A1 provides a listing of CEP plans that have been created by Alberta municipalities.

Table A1: List of Municipal Water CEP Plans

Municipality	Plan Name	Weblink
Calgary	Water Efficiency Plan, 30 in 30 by 2033	http://www.calgary.ca/docgallery/BU/water_services/conservation/planning/water_efficiency_plan.pdf
Canmore	Water Demand Management Plan	http://www.canmore.ca/component/docman/doc_download/129-water-management-action-plan-.html
Cochrane	Water Conservation Strategy 2008-2009	http://www.cochrane.ca/municipal/cochrane/cochrane-website.nsf/AllDoc/E881E4DA41AA7CFB8725754B006AE6A7/\$File/Water%20Conservation%20Strategy%202008.pdf
Edmonton	Water Strategy (section 10 of the Environmental Strategic Plan)	http://webocs.edmonton.ca/Environment/ESP/2006_ESP.pdf
Grande Prairie	Water Conservation: 2008 Water Conservation Measures for Implementation	http://www.aquatera.ca/NR/rdonlyres/62B3BF4F-EA3D-4F49-A709-1447CD6A12E0/0/Aquatera2008WaterConservationStrategyOctober2008.pdf
Okotoks	Water Management Plan	http://www.okotoks.ca/data/1/rec_docs/134_WMPlanApr2008.pdf
Olds	Water Conservation Strategy: Policy Statement	http://www.olds.ca/policies/watrcons.pdf
Red Deer	Water Conservation Strategy	http://www.reddeer.ca/NR/rdonlyres/9B3F3887-D699-4090-AF86-4792E3CF0CCA/0/WaterConservationStrategyfortheweb.pdf

The essential ingredients for a CEP plan are:

- a water use profile which describes current water use patterns,
- a goal for future water use,
- an evaluation of the CEP opportunities, with special emphasis on the priorities of the AUMA plan (leak detection, efforts to increase the uptake of water efficient fixtures and technologies and water use reporting),

- a rationale for why each CEP opportunity will or will not be acted upon,
- an action plan detailing when various CEP initiatives will be done, with special emphasis on the priorities, and
- an outline of what monitoring and evaluation activities will be done and when.

The following sections describe some of the considerations that may be involved in developing a CEP plan.

Water Demand Forecasting

When planning for infrastructure improvements, utility operators look at a number of factors to understand design capacity and operational requirements. Designers start by looking at growth in the residential and industrial, commercial and institutional (ICI) sectors and the effect on overall water demand. As the treatment and distribution infrastructure needs to be designed for times of greatest need, this leads to looking at the peaking factor. This factor describes the relationship between the daily water demand when water use is at its highest, compared to the average daily water use in the year.

Demand Forecasting Methodology

Planning for water infrastructure has traditionally involved looking at future growth and anticipated increasing water use. Maintaining the status quo will mean that the incidence of costly infrastructure expansions and/or demand exceeding water supply will increase. Neither money nor water are unlimited resources so clearly another approach needs to be considered.

Since 2003, the POLIS Project on Ecological Governance has been looking at water sustainability with the goal of transforming Canadian water management “from supply to demand-side approaches” (Brandes *et al.*, 2006). The information made available by the POLIS Project on Ecological Governance will be of great benefit to municipalities in developing their own water conservation, efficiency and productivity plans. These resources can be found at <http://www.waterdsm.org>. To further assist municipalities, a sampling of demand management approaches is discussed here.

Supply-side Management describes the way most municipalities currently look at water demand. This method looks at population projections and designing infrastructure to accommodate expected increases in demand. It does not take into account reductions in average or peak demands from increased conservation, efficiency or productivity.

Rather than building the infrastructure to meet uninhibited growth, demand-side management looks at reducing demand. This can allow existing facilities to remain effective and thus save on capital investments.

By looking at a 30% improvement in water efficiency in the province we are starting to make the transition from supply-side management to demand-side management. When individual municipalities look at their own conservation and efficiency plans they will likely be looking to blend both supply and demand-side management strategies. It is helpful to analyse the different options by comparing various scenarios such as:

- Business as Usual (without CEP improvements)

- Pessimistic (with minimal CEP improvements)
- Optimistic (with maximum CEP improvements)

The circumstances vary from one municipality to another but these evaluations will be key to most water conservation, efficiency and productivity plans.

Identification of all CEP Opportunities

Municipalities in Alberta treat water to make it safe for drinking. Much of the water provided to industrial, commercial and institutional ICI and household users is consumed in other processes such as irrigation, toilet flushing, cooling, steam generation and laundry. Programs that reduce the reliance on drinking water for these secondary uses have the ability to reduce the demand for municipally treated water and the associated costs and green house gas emissions.

To date, such programs have focused primarily on collecting rainwater for irrigation and reducing outdoor water demand by selecting landscaping that requires less water to maintain.

In the discussions about water conservation, efficiency and productivity at the AUMA regional sessions in 2008, members indicated that grey water reuse at the residential scale should be a priority. Due to health concerns this type of water use is not currently permitted in Alberta residences but the Government of Alberta is currently developing a “framework to facilitate the safe use of reclaimed water” (Alberta Municipal Affairs, 2008c).

Industrial and commercial water use is regulated differently from residential so the same limitations don’t necessarily apply. Rather than running water through a system once, water may be recycled through a system, resulting in increases to water productivity and decreases in water diversions from natural sources. At this time, industry may be able to provide the most gains in this area; however, there will be challenges. The water-using industries in Alberta municipalities are varied and the technical details on how that water is utilized are not always available to municipal water operations staff.

There are a number of other opportunities for municipal water conservation, efficiency and productivity that have been implemented across Canada and abroad in response to water shortages. They generally fall under one of five types of CEP opportunities. These types are a few examples are provided in Table A2.

Table A2 Types of CEP Opportunities (Adapted from Alberta Water Council, 2008)

Type of CEP Opportunity	Examples
Conservation: Demand-Side Management	Reduce average annual day demand Reduce annual peak day demands and peaking factors Reduce wastewater flows Shift demand Reduce water lost through “consumptive uses” (e.g. evaporation, system losses)
Conservation: Supply-Side Management	Improve utilization of existing storage (on or offstream storage) New water supplies (e.g. regional pipelines)

Efficiency	<p>Enable or improve leak detection and repair programs (e.g. municipal leak detection, educational programs that target large water users)</p> <p>Increase recycling and reuse of water/wastewater where permitted</p> <p>Use bylaws and/or rebate programs to increase the uptake of water efficient toilets, showerheads, faucets, washing machines and dishwashers in residences; install water efficient pre-rinse spray valves in commercial kitchens and phase out once through cooling in industrial sites</p>
Productivity	<p>Increase productivity of output per unit of water (this applies primarily to industrial and commercial customers)</p>
Environmental	<p>Modify water management practices to protect aquatic ecosystems</p> <p>Build storm water retention ponds to improve water quality</p> <p>Improve wastewater treatment</p> <p>Explore opportunities to restore water back to a river</p> <p>Reduce winter diversion of water to address problems with dissolved oxygen levels</p>

Analysis of CEP Opportunities

As the conditions in each individual municipality vary, the appropriate water conservation, efficiency and productivity methods will vary as well. An analysis of the methods for conservation, efficiency and productivity needs to take these differences into account. To assist municipalities in making the best choices, this section highlights some of the ways that different elements can be evaluated. Table A3 shows some of the common criteria used to screen various potential CEP initiatives.

Table A3 Examples of CEP screening criteria (Adapted from Alberta Water Council, 2008)

Screening Criteria		Description
1	Water Savings	Estimate of total water use savings.
2	Net Cost	Evaluate the potential net \$ costs (anticipated expenditures minus savings in capital and operating costs) needed to implement CEP opportunities.
3	Cost (\$) / Benefit ratio	Compare the net cost (2) with the water savings benefit (1).

Screening Criteria		Description
4	Environmental Opportunities, Impacts & Considerations	<p>Identify the potential positive opportunities and/or negative impacts of CEP improvements on the natural environment. These include impacts on aquatic ecosystems, groundwater systems and the ecological services provided by aquatic ecosystems (e.g. wetlands help improve water quality, reduce flood peaks and recharge groundwater aquifers).</p> <p>e.g. What impact does the CEP opportunity have on meeting water conservation objectives³⁰, instream flow needs³¹ and/or a natural flow regime for a river?</p> <p>e.g. Is water use non-consumptive (returned to the source) or consumptive?</p> <p>e.g. What is the quality of water used to produce the good or service (e.g. can a lower quality water be used for the same service)?</p> <p>e.g. What is the quality of water returning to the environment after use?</p> <p>e.g. What impacts does your water use have at a watershed level (e.g. what are the positive and negative impacts on water runoff, aquatic ecosystems or wildlife)? In some sectors, these impacts may include land use considerations (e.g. groundcover practices to protect ground water quality).</p> <p>Describe any geographic considerations that may impact the applicability and effectiveness of CEP opportunities. For example, a CEP opportunity that is effective in one watershed may not be effective in another.</p>
5	Social Impacts	<p>Identify the potential positive and/or negative social impacts of CEP opportunities. For example, CEP opportunities may impact aquatic ecosystems that have cultural, heritage and scientific values, as well as a rich diversity of plant and animal life, and support a variety of human uses, such as fisheries and recreation.</p> <p>Increasing the price of water to encourage individual conservation efforts, may have unintended consequences for low income individuals, depending on the method of pricing used.</p>
6	Linkages with Other Sectors	<p>Identify the positive and/or negative impacts CEP opportunities may have on other sectors. For example, large increases in flows at certain times of the year may have positive or negative impacts on downstream neighbours.</p>
7	Barriers or Constraints	<p>Identify possible constraints to CEP opportunities and how they may be overcome. For example, in the case that a policy is outdated or does not exist, a new policy tool may be identified to make CEP more feasible.</p>

³⁰ As outlined in Alberta's *Water Act*, a water conservation objective is the amount and quality of water set by a Director for the protection of a natural water body or its aquatic environment; the protection of tourism, recreational, transportation or waste assimilation uses of water; or the management of fish or wildlife. (Glossary of Water Management Terminology - unpublished)

³¹ Instream Flow Need (IFN) is the scientifically determined amount of water, flow rate, or water level that is required in a river or other body of water to sustain a healthy aquatic environment or to meet human needs such as recreation, navigation, waste assimilation, or aesthetics. An in-stream need is not necessarily the same as the natural flow. (Water for Life)

Screening Criteria		Description
8	Percent Participation by Sector/Subsector	Describe the readiness of you sector to adopt identified CEP opportunities. For example, do sector members already believe in the benefits that may result in their investment in a new CEP technology or their adoption of a best practice?
9	Availability of Technology	Describe the availability of technologies needed to adopt CEP opportunities. Does tested and reliable technology exist?
10	Timelines for Implementation	How much time would be needed to implement CEP opportunities? Is this time frame conducive to achieving CEP goals and objectives? Are there things that can be done immediately, in the short term, and in the long term?
11	Available Resources	Is their sufficient funding and human capital available to implement and manage CEP opportunities?
12	Risk	Describe the potential risks related to CEP opportunities (e.g. economic, environmental, social). Describe options available for mitigating identified risks.
13	Sustainability of CEP Opportunities	Are CEP opportunities sustainable in the long term? For example, in some sectors a behavioural change to achieve CEP gains may be more sustainable in the long term than investing in new infrastructure that will have expensive maintenance costs in the future. In other sectors, the opposite may be true.
14	Public and Stakeholder Engagement/ Consultation	Describe any public and/or stakeholder engagement or consultation that your sector has undertaken relating to the CEP opportunity being analyzed and the results.

Appendix C – Contributors to the AUMA CEP Plan

AUMA Conservation, Efficiency and Productivity Team of Experts

- Mayor Darren Aldous, Village of Breton (Chair)
- Dr. Les Gammie, EPCOR
- Mr. Wayne Cooper, City of Brooks
- Mr. David Robertson, Town of Okotoks
- Mrs. Nancy Stalker, City of Calgary
- Ms. Pam Vust, City of Red Deer
- Mrs. Andrea Pagee, City of Red Deer
- Ms. Vanessa Higgins, Strathcona County
- Mr. Bernd Manz, Aquatera Utilities Inc.
- Ms. Lorelee Kloberdanz, Aquatera Utilities Inc.
- Ms. Erin Sanderson, Town of Beaumont

AUMA Conservation, Efficiency and Productivity Multi-Stakeholder Committee

- Mr. Dug Major,
- Ms. Giselle Beaudry, Alberta Environment
- Mr. Neil Wandler, Alberta Environment
- Mrs. Lisa Fox, Alberta Environmental Network
- Mr. Mike Yakemchuk, Alberta Transportation

AUMA Board of Directors

AUMA Sustainability and Environment Standing Committee

AUMA Advocacy Staff led by Lauren Baldwin Senior Project Coordinator Water, on secondment from Alberta Environment from January 2008 through July 2009.

Appendix D – Water Efficient Fixtures and Technologies

Water Efficient Fixtures and Technologies

There are many opportunities for improving water efficient fixtures and technologies. This appendix included information on existing programs being used in Alberta's urban municipalities. As AUMA becomes aware of new programs, updates will be made on the AUMA Water Microsite.

Table D1 shows a listing of water efficient rebate programs offered by member municipalities. Where there is a website link it has been provided. Table D2 provides examples of water efficiency bylaws that are currently in place. These tables will be updated on the AUMA Water Microsite (<http://water.auma.ca>) as new information becomes available.

Table D1 Existing Water Efficient Fixture Rebate Programs

Municipality	Toilet Rebate	Other Rebate	Weblink
Airdrie	\$50 for 6L, \$100 for dual flush		http://www.airdrie.ca/environmental_service/s/toilet_program.cfm
Beaumont	\$50		http://www.town.beaumont.ab.ca/PDF/Utility%20Insert%20-Toilet%20Rebate%20Brochure.pdf
Calgary	\$50 utility bill credit or instant rebate		http://www.calgary.ca/docgallery/BU/water_services/conservation/indoor/toilet_program/toilet_rebate_brochure.pdf
Camrose	\$80		http://www.camrose.ca/public_notices/toilet_rebate.htm
Canmore	\$75 for 6L, \$100 for dual flush (increased on Sept 5, 2007)	\$5 low flow shower head	http://www.canmore.ca/municipal-sustainability/environmental/rebates-and-conservation.html
Cochrane	\$100 for 6L, \$250 for dual flush		http://www.cochrane.ca/municipal/cochrane-website.nsf/AllDoc/87432060BDC5A10987256FAB00588028?OpenDocument
Grande Prairie		instant rebates for low flow shower heads	http://www.cityofgp.com/NR/rdonlyres/DCF0B4DC-6D02-427E-AFE8-0FB87B26DEC5/0/Environment.pdf
Hardisty	\$80		http://www.hardisty.ca/news_events/pdf/HardistyNewsletterJanuary2009.pdf

Okotoks	\$50, through Climate Change Central	\$50 off washers through Climate Change Central	http://www.okotoks.ca/default.aspx?cid=398&lang=1
Olds	\$50 for 6L, \$100 for dual flush		http://www.town.olds.ab.ca/pubworks/toilet1.pdf
Pincher Creek	\$50		(online source not found - call 403-627-3156)
Ponoka	\$70 for 6L, \$100 for dual flush		http://www.ponoka.org/municipal/ponoka/ponoka-website.nsf/AllDoc/006155C48B9735FB8725730D0072B86C?OpenDocument
Red Deer	\$50 for 6L, \$100 for dual flush		http://www.reddeer.ca/Connecting+with+Your+City/City+Services+and+Departments/Environmental+Services/Water+Conservation/Low+Flow+Toilet+Rebate+Program+coming+July+1+2008.htm
Redwater	\$50 for dual flush		(online source not found - call 780-942-3519)
Rocky Mountain House	\$100 for 6L and \$250 for dual flush		(online source not found - call 403-845-2866)
Strathcona County	\$50	25% off sprinkler timers (printed seasonally in the newspaper)	http://www.strathcona.ab.ca/Strathcona/Departments/Utilities/Water+and+wastewater/Water+conservation/Toilet+Rebate+Program.htm
Stettler	\$50 - \$100		http://www.stettler.net/admin/contentx/default.cfm?PageId=12635
Strathmore	\$75 for 6L, \$100 for 4.8L or dual		http://www.strathmore.ca/news.php?viewStory=81
Trochu	\$50		

Table D2 Existing Water Efficient Bylaws

Municipality	Water Efficient Fixtures Bylaw	Weblink
Airdrie	new or permitted renovation of residential, commercial, industrial or institutional	http://www.airdrie.ca/environmental_services/pdf/934_water_bylaw_amendments.pdf (near very end of document)
Calgary	new or permitted renovation of residential and commercial	http://www.calgary.ca/docgallery/BU/water_services/conservation/indoor/low_water_use_fixtures_07_05.pdf

Cochrane	new or permitted renovation of residential and commercial	http://www.cochrane.ca/municipal/cochrane/cochrane-website.nsf/AllDoc/2E9272FF64ADBBB38725715D0065E7FF/\$File/WCF%20Bylaw%2005%202006.pdf
Edmonton	new or permitted renovation of residential, industrial, commercial and institutional	http://webdocs.edmonton.ca/Bylaws/14571.doc
Okotoks	new residential, commercial and industrial	http://www.okotoks.ca/default.aspx?cid=322&lang=1
Olds	new or permitted renovation of residential, commercial, industrial, institutional and municipal (requires a plan for how water consumption reduced as well as fixtures)	http://www.olds.ca/bylaws/newwater.pdf
Nanton		http://www.town.nanton.ab.ca/Bylaws/Bylaw%201125.pdf
Red Deer	new or permitted renovation of residential and commercial	Section 53 of http://www.reddeer.ca/NR/rdonlyres/5BBA87D2-4BBC-4E90-A739-5E95CD60AABD/0/321598UtilityBylaw.pdf

For industrial users, the City of Calgary has provided a number of water efficiency measures for industry at:

http://www.calgary.ca/portal/server.pt/gateway/PTARGS_0_0_766_227_0_43/http%3B/content.calgary.ca/CCA/City+Business/Running+a+Business/Water+And+Sewer/Commercial+Use+of+Water/Water+Efficiency/Water+Efficiency+Measures+for+Once+Through+Cooling+Units.htm

Appendix E – Infrastructure Leakage

Leak Detection

Infrastructure Leakage can be a major source of water wastage. Traditional measures of water leakage simply evaluated the difference between the amount of water diverted from a source to that which was returned via the wastewater treatment plant. This measure failed to portray a solid understanding of how good a municipal distribution system was a municipal system with large water users and few pipes has less opportunity for leaks than a system with many pipes and many users.

The International Water Association and its partners, including the American Water Works Association have worked together to establish a more meaningful measure of infrastructure leakage that can be used to compare leakage from year to year within a municipality or from one municipality to another.

Through use of their free ILI software of the American Water Works Association website, municipalities can input data and acquire an estimate of their ILI. Some municipalities will have more solid data than others, but going through this evaluation can still provide valuable indications of where potential water savings can be made. A new version of the software which allows for varying confidence in input data was released in the spring of 2009. For now, the leak detection target for the AUMA Water CEP Plan is to have municipalities use the software and identify a baseline ILI but a provincial goal may be developed in the future. The 2009 report “Water Conservation and Efficiency Performance Measures and Benchmarks in the Municipal Sector” (Canadian Water and Wastewater Association) references an ILI of 3.5 in an international list of benchmarks. The software, and instructions for how to use it are available on the AWWA website at <http://www.awwa.org/Resources/WaterLossControl.cfm?ItemNumber=48511&navItemNumber=48158>

- AWWA Standards
- AWWA Manuals
- Small Systems
- Operator Assistance
- Water Science Topics
- Water:\Stats Surveys
- Partnership for Safe Water
- Utility Management
- Water Infrastructure Security Enhancement (WISE) Resources

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Version 4.0

The AWWA Water Loss Control Committee is pleased to offer Version 4.0 of its own Free Water Audit Software, available to all users. This page provides a gateway for water utility personnel and any other interested parties to download and use the software and provide feedback to the Water Loss Control Committee. The committee hopes you will find this software to be a useful and easy way to compile a basic audit of water supply and billing operations. The Free Water Audit Software is not intended to provide a full and detailed water

- Water Loss Control Links**
- [WLC Terms Defined](#)
 - [Apparent & Real Losses M36, Third Edition](#)
 - [Water Audit Method](#)
 - [Water Loss Control Basics](#)

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Appendix F: Model Water, Conservation, Efficiency and Productivity Motion

The following Motion is meant to serve as guide. Municipalities are encouraged to modify the guide as required.

WHEREAS supplying citizens and businesses a secure supply of water is fundamental to the *insert municipality type* of *insert municipality name*'s sustainability: economic viability, environmental integrity, social and cultural vibrancy and good governance

WHEREAS water is a finite resource

WHEREAS * insert preamble that may be related specifically to municipality's water situation*

THEREFORE BE IT RESOLVED the *insert type* of *insert name* take the steps required to:

- Report water use data through Alberta Environment's electronic Water Use Reporting System (WURS) by December 31, 2010
- Develop Conservation, Efficiency and Productivity Plans by December 31, 2011
- Estimate the "insert type here*'s Infrastructure Leak Index (ILI) and identify ways to reduce leaks by December 31, 2011
- Implement incentives and/or disincentives to increase the uptake of water efficient fixtures and technologies by December 31, 2011

FURTHER BE IT RESOLVED that the *insert type* of *insert name* will inform AUMA of its progress on each of the above items starting in April 2011