



2014 Urban Municipal Water Conservation, Efficiency and Productivity Plan – Targets and Actions for the Urban Municipal Sector

July 2014



Executive Summary

Building upon the direction set out in the Water Conservation, Efficiency, and Productivity Plan of 2009, the renewed plan reflects an overall goal that Alberta's urban municipal sector¹ is recognized as a significant contributor to safeguarding the reliability of our water supplies, the stewardship of our aquatic ecosystems, and the health and well-being of Albertans, as set out in the provincial Water for Life Strategy.

The renewed plan proposes an outcomes-based approach to achieving water savings. The inclusion of volume-based water use and water loss targets further enables measuring and reporting of the urban municipal sector's contributions toward achieving the goals of the province's *Water for Life Strategy* (i.e., safe secure drinking water; healthy aquatic ecosystems; and reliable, quality water supplies for a sustainable economy).

Targets of the renewed AUMA plan are:

- 1) Alberta's urban municipal sector will achieve an average per capita residential water use of 195 litres/person/day and a total per capita water use of 341 litres/person/day (30% below reported water use 2001-2006) by 2020.
- 2) Alberta's urban municipal sector will maintain the volume of "unaccounted for" water at 10% of total water use (reported to be 10.1% in 2009).

In order to achieve these targets, the following actions are required:

- 1) AUMA member municipalities holding a water license(s) for municipal use will report water use data through the Government of Alberta's (GoA) Water Use Reporting System.
- 2) AUMA member municipalities will share water use information with AUMA so that AUMA may report on the aggregate water use and water savings of the urban municipal sector and work with the GoA to track and report on contributions of urban municipalities as a whole to the goals of the province's *Water for Life Strategy*.
- 3) AUMA will continue to partner with the GoA and other organizations to develop tools and share information to assist municipalities to achieve water conservation, efficiency and productivity, to measure their own water use and water loss, and to set targets for these.
- 4) AUMA member municipalities will continue to take action to increase water conservation by users, the efficiency of water distribution systems, and productivity of water and wastewater treatment systems, so as to contribute to the urban municipal sector collectively achieving its water use and water loss targets.
- 5) AUMA will advocate that the Government of Canada resume the Municipal Water and Wastewater Survey program as it provides a valuable benchmark for assessing the efforts of municipalities across the country and the effectiveness of water and wastewater management policies from other jurisdictions.

AUMA will work with our members to renew the targets and actions of this plan in 2020.

¹ The CEP plan only applies to municipalities with municipal water systems. It does not apply to summer villages whose residents have individual wells, as it is not possible for the municipality to track water use in this case.

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1.0 Introduction

Water is expected to be an increasingly scarce resource given Alberta's rapid population and industrial growth, limited availability of water supplies in many regions, impacts of climate change, concerns over aquatic health, and escalating cost associated with maintaining aging water systems. Having a reliable supply of safe water is critical for our communities.

Adopting a water conservation, efficiency, and productivity (CEP) plan is one the most effective means of managing demand within existing available supplies, and contributing to long-term municipal sustainability and environmental stewardship. It is therefore timely to renew the Water Conservation, Efficiency and Productivity Plan that was launched in 2009 for the urban municipal sector.

The renewed CEP Plan presents a path forward based on extensive consultation with municipalities. Additional direction came from an assessment of the current status of municipal water CEP efforts (as documented in the [*AUMA Water Conservation, Efficiency and Productivity Plan - Interim Report on Implementation*](#) released in October 2013), municipal feedback obtained through the [*Renewing AUMA's Water Conservation and Efficiency Targets Discussion Guide and Workbook process*](#), and research into the reporting of municipal water CEP activities in other jurisdictions. Feedback obtained from the workbook process and follow-up discussion with municipalities is documented in the [*Renewing AUMA's Water Conservation and Efficiency Targets – What We Heard Report*](#).

2.0 Background on Water Conservation, Efficiency and Productivity

2.1 Provincial Water for Life Strategy

The Government of Alberta (GoA) identified water conservation as a strategy to help achieve the goals of its *Water for Life Strategy*, emphasizing that “water conservation, efficiency and productivity are fundamental to any provincial water strategy”. The *Water for Life Strategy* (renewed in 2008) further set a target of achieving a 30% improvement in overall water CEP from 2005 levels by 2015, and called on all sectors, including urban municipalities, to contribute to this goal by demonstrating best management practices, and developing plans.

2.2 Alberta Water Council – Water CEP Planning

As a key body monitoring progress toward achieving the goals and outcomes of the *Water for Life Strategy*, the Alberta Water Council developed 2008 recommendations for water CEP sector planning and identified the seven major water-using sectors tasked with building water CEP plans for their respective sectors. These include: irrigation; upstream oil and gas (including oil sands mining); downstream petroleum products; chemical producers; forestry; power generation; and the urban municipal sector². Together these sectors account for most of the allocated water in Alberta.

Having developed their respective water CEP plans, each sector is required to report its progress to the Alberta Water Council. AUMA provided its interim report on the efforts and achievements of the urban municipal sector in October 2013 (see section 2.3); the next report to the Alberta Water Council is due in 2015.

2.3 AUMA’s 2009 Water Conservation, Efficiency and Productivity Plan

In 2009, following extensive member engagement, AUMA members adopted a CEP plan. As a framework for future action, the plan identified a number of water conservation and efficiency actions to be implemented by urban municipalities, and put forth a number of aggressive implementation targets.

From a municipal perspective, **water conservation** refers to a reduction in the total amount of water used by customers, while **water efficiency** refers to the amount of water being withdrawn from the source to satisfy a specific need. **Productivity** refers to what is done (or produced) with the water by the end-user.

To assist municipalities, the AUMA developed a suite of municipal water management tools. One of these resources, [*Planning for Water Conservation and Efficiency: A Handbook for Small*](#)

² Rural municipalities represented by AAMDC do not have a CEP plan and are not part of this plan because the major water users in their boundaries such as the irrigation and energy industries have plans of their own. Rural municipalities with water licences are required to provide water use data through the province’s Water Use Reporting System so that usage trends can be tracked. AUMA’s CEP resources have also been promoted to rural municipalities to use where applicable.

[Municipalities](#), released in September 2013, showcases a number of the more common supply-side and demand-management tools available to municipalities pursuing water conservation and efficiency.

While much progress was made, actual performance as of October 2013 fell far short of the targets (see Table 1).

Table 1: Status of Municipal Implementation of AUMA Water CEP Plan Targets (2013)

	Target >10,000	Actual >10,000	Target 2,500- 10,000	Actual 2,500- 10,000	Target <2,500	Actual <2,500
Report water use data through Water Use Reporting (WUR) System by December 31, 2010	100%	17/20 85.0%	100%	27/37 73.0%	100%	51/125 40.8%
Develop Conservation, Efficiency and Productivity Plans by Dec 31, 2011	100%	12/28 42.9% <i>(additional 3 plans in progress)</i>	75%	4/46 8.7% <i>(additional 2 plans in progress)</i>	50%	4/149 2.7% <i>(additional 2 plans in progress)</i>
Complete a water audit and identify ways to reduce leaks by December 31, 2012	100%	11/28 39.3% <i>(additional 6 audits in progress)</i>	75%	14/46 30.4% <i>(additional 4 audits in progress)</i>	50%	5/149 3.4% <i>(additional 5 audits in progress)</i>
Implement initiatives to increase the uptake of water efficient fixtures by Dec 31, 2011	100%	21/28 75.0%	75%	18/46 39.1% <i>(additional 2 municipalities in progress)</i>	50%	7/149 4.7% <i>(additional 3 municipalities in progress)</i>
Completed CEP Update Survey (original target April 2011)	100%	11% - May 2011 57% -Jan 2012 53.6% - Mar 2013	75%	5% - May 2011 9% -Jan 2012 30.4% - Mar 2013	50%	2% -May 2011 10% - Apr 2012 9.6% - Mar 2013

3.0 Measuring Municipal Water Use

Accurate water use information is one of the foundational elements that will help improve the management of Alberta's water resources. The ability to set meaningful water conservation and efficiency targets, and to measure progress toward the achievement of those targets, requires that municipalities have a thorough understanding of current water use.

All of this hinges on water withdrawal, demands, and releases being metered. Universal metering is common practice in most Alberta municipalities, but to effectively plan for and monitor progress toward water conservation and efficiency goals, the information being collected needs to be used for more than just billing purposes.

There are a number of ways that a municipality can measure, monitor, and report its water use; the challenge is achieving some consistency in how this is done.

3.1 Overall Water Use

Water use (in the municipal context) refers to the gross diversion of water withdrawn from all licensed sources and introduced into the municipal system for use. It is important to note that although referred to as 'use', the volume withdrawn may not be entirely consumed and some portion of it may be subsequently returned to the environment after treatment. For this reason, this volume of water is probably more appropriately referred to as 'water demand' but the terms are often used interchangeably.

In Alberta, roughly 90% of the population is served by a municipal water distribution system. Approximately 96% of the water in these distribution systems came from surface water sources such as lakes and rivers, while 4% came from groundwater sources³. The reporting of water use information by those who operate these utilities provides governments and the public with a better understanding of how water is being used in this province.

Recent amendments by the provincial government to Water Act licenses for municipal use now require that license holders report water use on a regular basis as a condition of that license.

Municipal water use data submitted to the provincial government's Water Use Reporting (WUR) System will be used to monitor overall water use volumes and trends and to report the urban municipal sector's contribution to achieving the GoA's target of a 30% improvement in overall water CEP from 2005 levels.

³ Source: [Environment Canada Municipal Water and Wastewater Survey](#) (2009)

3.2 Use of Municipal Water

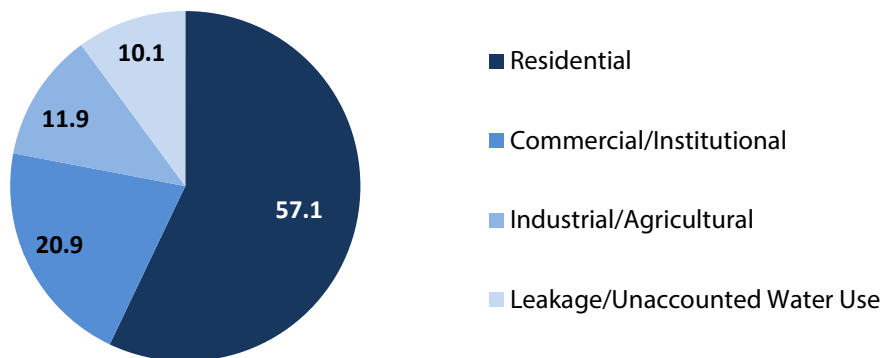
According to the findings of Environment Canada’s most recent Municipal Water and Wastewater Survey, the residential sector accounts for the bulk of municipal water use (57.1%) in Alberta. The commercial/institutional sector (including water used by the municipality) follows with 20.9%, while industrial and agricultural operations that are connected to municipal water supplies account for 11.9% of water used. The remaining 10.1% is that lost as a result of leakage and system flushing/maintenance.

The proportion of water used by the above noted sectors varies considerably from one municipality to the next. Typically smaller communities tend to have less commercial and industrial water use, and so the residential sector accounts for a greater percentage of water use than in larger communities.

Understanding who is using what, and how that water is being used is important in identifying appropriate water conservation and efficiency measures for achieving water savings. This is the type of information that is derived from developing a municipal water use profile (an important early step in water CEP planning) or conducting a municipal water audit. To do so requires that a community be universally metered.

A water audit refers to an assessment of the integrity of the overall water distribution system. A water audit measures and tracks the flow of water from the site of withdrawal or treatment through the water distribution system and into customer properties. In doing so, it calculates the volumes and variety of consumption and losses that exist in the system. This information enables a municipality to determine the most effective and efficient course of action to mitigate losses and improve the overall efficiency of the system. Further information on municipal water audits is available at <http://water.auma.ca>.

Table 2: Alberta's Municipal Water Use by Sector
(as a percentage of total water delivered to the distribution system)



Source – Environment Canada Municipal Water and Wastewater Survey (2009)

3.3 Per Capita Water Use

One of the most common measurements for monitoring and reporting water use is total per capita water use. **Total per capita water use**, typically calculated on a per day basis, is simply the total volume of water delivered through the water distribution system divided by the municipality's population served, and is presented in litres per capita per day (l/c/d). Although this measurement provides a general indication of the intensity of water usage in a municipality, it does not take into account the composition of the municipality in terms of its water-users. For example, a community that services a water-intensive industrial or commercial operation is likely to have a higher total per capita water usage than one that doesn't.

A more accepted measurement used as a basis for water use comparisons between communities, provinces, and even countries, is **residential per capita water use**. This measurement considers only the water usage of the residential sector, and thus captures an element common to every community. It is also the measurement typically used in establishing a water use benchmark to assess subsequent progress toward achieving water conservation and efficiency targets.

It is important to ensure consistency in the manner in which residential per capita water use is calculated – for example, to accurately reflect residential water use, the water use of multi-family residences should be included in residential sector calculations. At present, some municipalities consider these users as a component of the commercial sector.

In Alberta, total per capita water use in 2009 was 395 l/c/d, and residential water use 209 l/c/d. In comparison, the Canadian average for these same measures was 510 l/c/d and 274 l/c/d, respectively (Environment Canada, 2011). Alberta's per capita water use was (and continues to be) well below the Canadian average – a reflection of the success of municipal programs and efforts to date and of the commitment of this province's water users to achieve water savings.

In fact, the findings of Environment Canada's 2009 Municipal Water and Wastewater Survey reveal that of the provinces, Manitoba, Alberta, and Ontario have the lowest total water use per capita. Alberta, Manitoba, and PEI also have the lowest residential water use per capita (See Table 3).

Despite improvements in water conservation, Canadians have consistently ranked among the world's most profligate users of water, with per capita water use well above that of European and many other industrialized nations. Only the U.S. has a higher per capita water consumption level (Environment Canada, 2011).

Table 3: Total and Residential per Capita Water Use, by Province/Territory and Municipal Population

	Total Water Use			Residential Water Use		
	Number of Responding Municipalities	Responding Population	Total Water Use per Capita (litres per capita per day)	Number of Responding Municipalities	Responding Population	Residential* Water Use per Capita (litres per capita per day)
Newfoundland & Labrador	24	278 548	804	22	189 235	395
P.E.I.	4	52 582	505	4	52 582	189
Nova Scotia	18	436 981	512	17	436 120	292
New Brunswick	30	267 352	821	27	263 986	394
Quebec	272	5 465 132	706	225	4 393 874	386
Ontario	165	10 470 997	409	159	10 401 245	225
Manitoba	54	847 025	355	49	842 461	199
Saskatchewan	80	609 177	518	75	607 131	238
Alberta	124	2 837 712	395	115	2 756 461	209
British Columbia	87	2 766 835	606	86	2 764 564	353
Territories	6	39 448	599	6	39 448	391
Municipal Population						
Under 1000	154	74 099	756	136	65 249	426
1001-2000	142	159 338	528	120	135 276	371
2001-5000	172	446 134	712	157	410 304	385
5001-50 000	322	3 586 411	570	302	3 384 172	313
50 001-500 000	64	8 747 123	489	60	7 816 692	280
More than 500 000	10	11 058 686	497	10	10 935 416	251
Total, 2009	864	24 071 791	510	785	22 747 109	274
Total, 2006	1 082	25 183 363	591**	1 043	25 074 414	327**

Source - 2009 Municipal Water and Wastewater Survey. Aggregated to municipal level and imputed for non-response using 2006 MWWWS. Sustainable Water Management Division, Environment Canada.

* Includes single-family and multi-family

The above table also shows that across Canada, larger communities continue to have relatively lower per capita water use than do smaller communities. This characteristic is consistent with the AUMA survey finding that most larger communities in Alberta have already taken (and continue to take) deliberate action toward achieving water conservation and efficiency targets, while smaller communities tend to comprise the next wave of implementation. This reality is often a reflection of municipal capacity, and highlights the opportunity that exists in continuing to extend support to Alberta's smaller municipalities.

3.4 Leakage and Other Water Loss

Every water system leaks. The extent of this loss can, however, vary considerably from one municipality to the next.

As implied in Section 3.2, the process of accounting for water usage by each sector also allows for calculating leakage and otherwise unaccounted for volumes. This "non-revenue" water is an important indicator of the condition and efficiency of the overall system.

In 2009, Environment Canada estimated that, on average, 13.3% of water from municipal systems across Canada, and 10.1% of water from municipal systems across Alberta, was unaccounted for. To help visualize this loss and opportunity, consider that in the U.S., the losses are higher at 14-18% which translates to 22.3 billion litres of expensive, treated water

lost each day - that's enough water to meet the daily water needs of 61 million Americans (Centre for Neighborhood Technology, 2013).

Identifying and mitigating water loss represents the single greatest supply-side opportunity for water providers to conserve water, recover lost revenues, and improve overall operational efficiency.

4.0 New Water Conservation, Efficiency and Productivity Targets

Recognizing that the sustainability of our communities is tied to the sustainability of our water supplies, and that municipalities are one of the province's largest water using sectors, AUMA has established the following goal to guide the renewed water CEP plan:

- **That Alberta's urban municipal sector is recognized as a significant contributor to safeguarding the reliability of our water supplies, the stewardship of our aquatic ecosystems, and the health and well-being of Albertans, as set out in the provincial Water for Life Strategy (2008).**

The renewed plan proposes an outcomes-based approach in setting water conservation, efficiency and productivity targets for the urban municipal sector. This approach allows for flexibility in how municipalities, water utilities and water users contribute to achieving the targets.

Setting clear volume-based water use and water loss targets for the urban municipal sector as a whole further allows AUMA to measure and showcase the collective efforts and successes of its members, rather than reporting on the status and/or actions of individual municipalities.

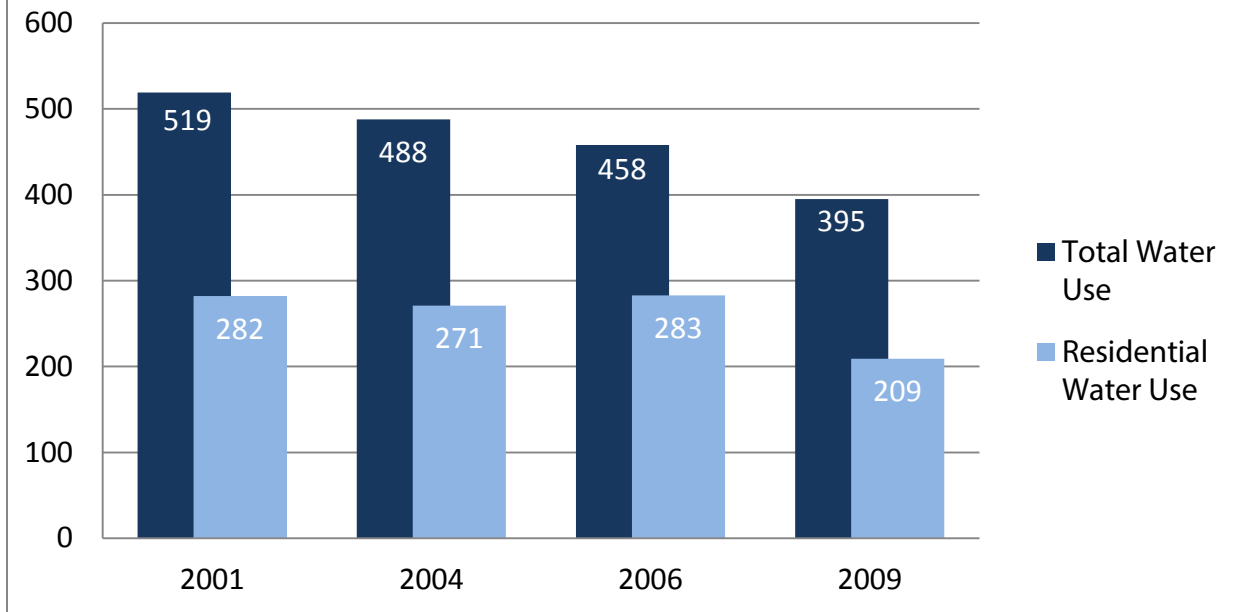
Proposed targets are:

- 1) Alberta's urban municipal sector will achieve an average per capita residential water use of 195 litres/person/day and a total per capita water use of 341 litres/person/day (30% below reported water use 2001-2006) by 2020.**

The total and residential water use targets listed above were calculated using the water use volumes reported for Alberta's municipal sector in Environment Canada's Water and Wastewater Survey (2001, 2004, 2006) as a baseline (see Figure 2). Alberta Water Council's *Recommendations for Water Conservation, Efficiency, and Productivity Planning* (2008) suggests that "a base year for documenting and measuring CEP gains be an average of any three years in the period 2000 to 2005"; in this case, data from 2001-2006 was used.

The proposed residential target of 195 l/c/d (30% below reported water use 2001-2006) by 2020 is also comfortably within the range of residential water use targets set by individual Alberta municipalities within their own water conservation and efficiency plans. The total water use target of 341 l/c/d by 2020 emphasizes the opportunity that exists to improve water conservation, efficiency and productivity amongst all municipal water users.

**Table 4: Alberta Municipal Water Use
(litres per capita per day)**



Source – [Environment Canada Municipal Wastewater Survey](#) (2009, 2006, 2004, 2001)

2) Alberta’s urban municipal sector will maintain the volume of “unaccounted for” water at 10% of total water use.

“Unaccounted for” water, also referred to as “non-revenue water” refers to water that has been produced and is “lost” before it reaches the customer. Losses can be real (as a result leakage) or apparent (through theft, metering inaccuracies, or authorized unmetered consumption). As reported in Section 3.4, unaccounted for water can amount to considerable losses for a municipality.

There are, however, limits to what even the most well-run water loss management program can achieve; zero water loss is not realistic or economical. Once the marginal cost of reducing non-revenue water exceeds the marginal benefits or water savings, there is often little incentive to further reduce water loss. Environment Canada suggests that in most cases a municipal leak detection and repair program is only cost-effective when the volume of unaccounted for water in a municipal system exceeds 10 to 15%. For this reason, the AUMA is proposing an “unaccounted for” water target of 10% for the urban municipal sector. Environment Canada’s 2009 reporting of Alberta municipalities as having 10.1% total unaccounted for water illustrates that this target is achievable (See Table 5).

Table 5: Municipal Water Loss by Province/Territory and Municipal Population

	Number of Responding Municipalities	Responding Population	Percent Residential Water Use ^a	Percent Commercial / Institutional / Municipal Water Use ^a	Percent Industrial / Agricultural Water Use ^a	Percent Leaks / Unaccounted Water Use ^a
Newfoundland & Labrador	29	204 324	68.2%	13.9%	10.4%	7.5%
P.E.I.	4	52 582	40.0%	33.6%	13.8%	12.6%
Nova Scotia	19	437 291	58.2%	15.1%	7.2%	19.5%
New Brunswick	33	216 896	56.4%	23.3%	10.8%	9.6%
Quebec	248	4 498 065	52.7%	14.0%	11.2%	22.1%
Ontario	166	9 444 735	58.8%	20.2%	10.4%	10.6%
Manitoba	51	844 428	57.8%	18.6%	9.1%	14.5%
Saskatchewan	90	594 688	43.2%	30.7%	13.1%	12.9%
Alberta	125	2 712 552	57.1%	20.9%	11.9%	10.1%
British Columbia	90	2 939 748	62.5%	16.8%	9.3%	11.4%
Territories	5	38 690	60.1%	26.1%	5.0%	8.9%
Municipal Population						
Under 1000	156	73 309	68.0%	18.5%	5.9%	7.6%
1001-2000	147	164 845	70.9%	13.8%	7.2%	8.1%
2001-5000	167	413 881	65.4%	15.3%	11.2%	8.2%
5001-50 000	318	3 506 009	58.2%	17.4%	12.1%	12.3%
50 001-500 000	62	7 979 774	58.1%	19.5%	10.2%	12.2%
More than 500 000	10	9 846 181	56.0%	18.7%	10.4%	14.9%
Total, 2009	860	21 983 999	57.4%	18.7%	10.6%	13.3%
Total, 2006	1 009	24 021 196	57.0%	19.3%	11.5%	12.8%

Source - 2009 Municipal Water and Wastewater Survey. Aggregated to municipal level and imputed for non-response using 2006 MWWS. Sustainable Water Management Division, Environment Canada.

^a For properties connected to a municipal water system only. Does not include self-serviced residences, businesses or industries.

5.0 Imperative for Water Use Information

The greatest challenge associated with the adoption of the proposed targets will be the general lack of municipal water use information.

Accurate water use information is one of the foundational elements that will help improve the management of Alberta's water resources. The ability to set meaningful water conservation and efficiency targets and to measure progress toward the achievement of those targets requires that municipalities have a thorough understanding of the user and use of the water. Unfortunately, not all municipalities report their water use to the Government of Alberta, and fewer yet actually calculate water-use by the sectors (residential, ICI, municipal, non-revenue) served within the municipality. The lack of a complete data set complicates the process of calculating water use and the success of Alberta's municipal sector water conservation efforts. This data gap was acknowledged as a shortcoming in the 2009 AUMA CEP Plan, and also by ESRD, recommending that water use reporting by municipalities be improved so that water use and water loss measurements may be used as an indicator of the success of municipal water CEP efforts.

Until the program was terminated with the release of the 2009 report, Environment Canada regularly (every two or three years) conducted a municipal water and wastewater survey that provided much information concerning municipal water use, metering, population served by water and wastewater services, water sources, and wastewater treatment categories, presented by province/territory and size of municipal population. The response rate varied, but the survey typically collected information from 140 – 180 Alberta municipalities (rural and urban). Although incomplete, the information provided insight into municipal water use and management, and served as a benchmark for and performance indicator of the water conservation, efficiency, and productivity efforts of the municipal sector in this province and across the country. In the absence of the national survey, the impetus falls on AUMA, in cooperation with ESRD, to collect and report on municipal water use within this province.

6.0 Actions

In order to achieve the targets set out in this renewed AUMA Water Conservation, Efficiency, and Productivity Plan, the following actions (directed at both the AUMA and its member municipalities) are required:

- 1) AUMA member municipalities holding a water license(s) for municipal use will report water use data through the Government of Alberta's (GoA) Water Use Reporting System.
- 2) AUMA member municipalities will share water use information with AUMA so that AUMA may report on the aggregate water use and water savings of the urban municipal sector and
- 3) work with the GoA to track and report on contributions of urban municipalities as a whole to the goals of the province's *Water for Life Strategy*
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AUMA will renew the targets and actions of this plan in 2020.