



ADMINISTRATIVE REPORT

Report Date: October 24, 2017
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Meeting Date: November 1, 2017

TO: Standing Committee on Policy and Strategic Priorities
FROM: General Manager of Engineering Services
SUBJECT: Water Conservation Program Update

RECOMMENDATION

- A. THAT Council receive for information the progress update for the City's water conservation program and preliminary projection of Metro Vancouver storage supply limitations.
- B. THAT Council direct staff to continue with planned water conservation programs to increase water efficiency across all sectors through to 2020.
- C. THAT Council direct staff to broaden the water conservation program beyond drinking water efficiency to further emphasize planning for long-term water resilience and integrated water resource strategies that reduce potable water consumption through the expansion of non-potable water resources such as:
 - (1) rainwater harvest and reuse;
 - (2) grey/blackwater harvest and re-use; and
 - (3) groundwater resources, to meet non-potable water appropriate uses.
- D. THAT Council direct staff to review the current water metering policy and develop implementation options including impacts to cost, resources, and affordability following Metro Vancouver's report on a regional assessment of residential water metering.
- E. THAT Council direct staff to report back in 2019 with details on an expanded comprehensive water conservation plan.

REPORT SUMMARY

This report provides an update on the Clean Water Work Plan, provides information on preliminary regional storage supply predictions, and describes an integrated water conservation strategy to guide the next phase of the City's efforts towards the Greenest City Action Plan (GCAP) Clean Water 2020 target and beyond.

The GCAP 2020 Water target of 33% per capita reduction is an ambitious goal given challenges of public perception of abundance and weather influenced water use behaviour. Being efficient with drinking water supplies is relevant more than ever with increased population growth, climate change, and the projected scale of expanding existing regional supplies.

Good progress has been made on the 2020 water target through a robust water conservation program. Continuing the course with planned policy implementation and programs is forecasted to generate a total per capita reduction of 23% below the baseline, leaving a shortfall of 10% toward the 2020 target. Current water conservation approaches would achieve the 33% reduction target by 2030.

Remaining options to meet the 2020 target include universal metering and implementing outdoor water restrictions beyond regional levels. These require either major financial investment (estimated at \$86 million) or have other negative consequences associated with a departure from regional restrictions. These conventional options are not recommended until a more comprehensive implementation plan is completed and incorporates forecasts for regional investments to build additional storage, expected in early 2018.

An opportunity exists to think differently about water efficiency in the City.

Currently, the vast majority of all the City's water needs are met by regional drinking water sources, despite the fact that many uses such as irrigation, toilet flushing, cooling system top-up and other industrial uses do not require the same level of treatment. Reviewing potential for alternate water sources such as rainwater, groundwater and locally treated greywater or black water in the City has significant potential to offset drinking water use. Using less regional drinking water for these uses will result in direct savings to residents who will be paying a smaller portion of the capital costs of regional upgrades. There are other benefits that include enhancing biodiversity, and increasing resiliency to the effects of climate change and associated drought conditions.

Given this potential, is it recommended that Council look past the 2020 target, 'staying the course' by approving the following:

1. Continue resourcing of planned water conservation programs to increase water efficiency across all sectors.
2. Direct staff to immediately initiate a comprehensive study of an integrated water management approach that could reduce potable water consumption through the expansion of non-potable water resources such as (1) rainwater harvest and reuse, (2) grey/black water harvest and re-use and (3) groundwater resources, to meet non-potable water appropriate uses.

The result of the recommendations in this report would allow staff to deliver an update on the City's long term water supply strategy to be completed in 2019. This work would inform the next phase of the Greenest City Action Plan that will also be updated during this time.

COUNCIL AUTHORITY/PREVIOUS DECISIONS

In August 2017, Vancouver Park Board endorsed the Park's Water Conservation Action Plan (2017 - 2020).

In April 2016, Council approved the prohibition of non-recirculating uses of drinking water and fixture water efficiency updates in the Vancouver Building By-law, in support of the Greenest City Action Plan.

In April 2016, Council adopted the Vancouver Citywide Integrated Rainwater Management Plan which calls for a Green Infrastructure Strategy to improve Vancouver's water quality and enhance our resilience to rain and heat events, while supporting biodiversity and rainwater harvest and reuse opportunities. In addition, Council adopted the long-term target to capture and treat 90% of Vancouver's average annual rainfall through the implementation of green infrastructure on public and private property.

In October 2015, Council adopted the 2016-2020 Greenest City Clean Water Work Plan to expand water conservation programs in support of the Greenest City Action Plan. Key initiatives included expanding Industrial, Commercial and Institutional sector programs, adopting a corporate target of 33% water reduction, and development of a broader communications campaign leveraging awareness from the 2015 drought.

In December 2011, Council adopted the 2011-2014 Greenest City Clean Water Work Plan and approved requirement of new single family and duplex homes to be metered.

In July 2011, Council updated the prohibitions on wasting water in Water Works By-law 4848.

In July 2011, the Greenest City Action Plan was adopted by Council.

In January 2011, Council adopted 14 Greenest City targets as Council policy, including a target to reduce per capita water consumption by 33% over 2006 levels by 2020.

CITY MANAGER'S/GENERAL MANAGER'S COMMENTS

The City Manager supports the recommendations in this report.

REPORT

Background/Context

The Greenest City Action Plan (GCAP) includes a target to reduce total per capita water consumption by 33% from 2006 levels. This target was chosen to promote the sustainable use of the current water supply, aspiring to completely offset population and economic growth through efficient use of drinking water to avoid the financial, environmental and social costs associated with expanding water and sewer infrastructure.

At the end of 2016, the suite of initiatives and programs delivered by the Clean Water Conservation work plan has resulted in a 17% reduction over 2006 levels. A further 5% reduction is projected by 2020 from policies and programs realizing their full benefit over this period, leaving a gap of 10% from the target. Some conventional tools and programs exist to further manage the City's water demand to close this gap, however, information received from Metro Vancouver in 2017 and research into best practices among other leading jurisdictions warrants further analysis before recommendations can be made.

Metro Vancouver's current 10-year water capital plan of \$3.5 billion, includes expansion of the regional source capacity through the construction of new infrastructure at the Coquitlam Reservoir by approximately 2030, significantly increasing withdrawal capacity from the reservoir. In addition, Metro Vancouver is currently in negotiations with BC Hydro for additional withdrawal from the Coquitlam Reservoir in accordance with the Coquitlam Water Use Plan.

Supply expansion options beyond 2030 are expected to be even more significant in scale. Considering the scale of the infrastructure, environmental impacts, and their impact on water rates, an assessment of how the City's overall water demands are met in the medium and long term, beyond 2020 is recommended. Beyond the Metro Vancouver supply, considering water sources in all its forms will be necessary to secure a reliable source for residents and industries in perpetuity, to support long-term resilience and livability in the City.

Looking at water conservation through a new lens will be shared so ideally benefits can be extended to the regional level.

Strategic Analysis

Metro Vancouver Regional Supply Update

A review of regional supply expansion options to integrate with the existing regional water system is underway and will include an evaluation of various options for future storage including expansion within existing watersheds.

Metro Vancouver is currently confirming phasing/ranking of various supply options to meet long-term regional storage needs. A final report is anticipated in early 2018. This, along with the pending regional assessment for implementation of residential water metering study, will help inform the rate at which to install water meters and finalize the business case to include potential deferral of capital costs of source expansion beyond the current 10-year capital plan.

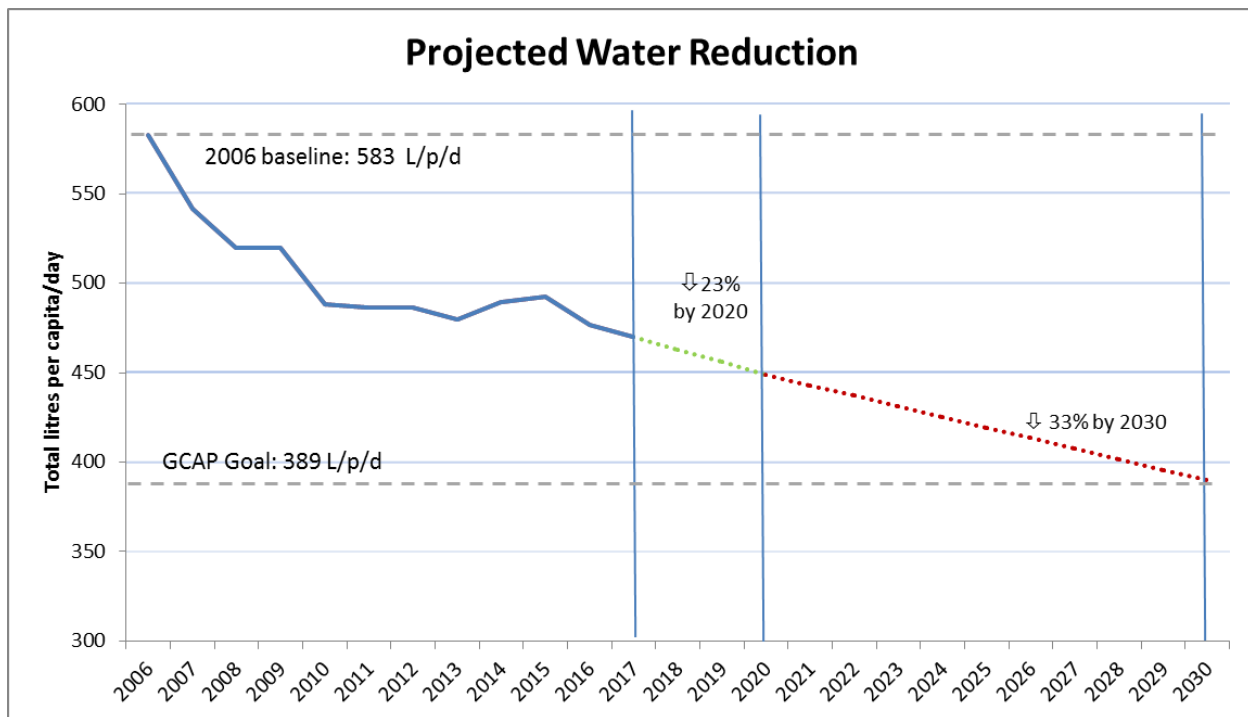
Metro Vancouver is also implementing a new regional Drinking Water Conservation Plan May 2018 which includes additional outdoor water use restrictions to further increase water efficiency.

Water Conservation Program Update

The water conservation programs developed and implemented to date target areas of high water use in each sector through a mix of education, policy, incentives and enforcement. Originally adopted in 2012, the suite of water conservation programs was reviewed and expanded in 2015. An expert consultant in water demand-side management programs was

commissioned in 2016 to conduct a national comparative scan of best management practices and identify gaps in Vancouver's proposed plan. Vancouver's proposed strategies were deemed robust and mature for a system where residential properties are partially metered. A detailed list of programs by sector since 2012 is given in Appendix A.

To date, the City's suite of conservation programs has achieved a 17% reduction in per capita water consumption. It is forecasted that as conservation programs currently underway or planned take hold, and as existing fixtures are replaced through redevelopment and renovations, that a 23% reduction will be achieved by 2020, leaving a 10% gap. Based on the current trajectory of water conservation program outcomes, it is projected that the 33% reduction target will be achieved by 2030.



Challenges and barriers to conservation

1. Public Perception of the Need for Water Efficiency

Water creates a significant portion of the City's landscape, and our seasonal rain often inspires a misconception of year-round water abundance. Appreciating and understanding this context has been important to the development of meaningful public education campaigns. Research into public perception and attitudes on water included using local focus groups, a survey through the City's Talk Vancouver survey platform, discourse with local industry, and literature reviews. The 2015 drought heightened community awareness of water supply limitations. Leveraging this and integrating the research, the narrative for the City's public messaging shifted from "save water" to encouraging "water wise" behaviour. This resonated more strongly in our local context and supports the importance of being thoughtful with how we use our high quality drinking water for where it's needed most: drinking, cooking, and cleaning.

Even still there remains lingering misconceptions of water abundance. This will continue to be addressed through current and planned public education programs with the objective of fostering a more broad understanding of our water system, its current limits and the economic and ecological costs associated with inefficient water use.

2. Price of water

The price of water influences water use behaviour. In the absence of meters single-family homes pay an annual flat rate for water regardless of the volume consumed. Consequently there is no feedback on household consumption patterns (both regular use and inadvertent loss to leaks), and no price signal to encourage more efficient use.

3. Influence of weather on water use

Outdoor consumption makes up 60% of water use in the region, which during particularly hot, dry summer weather can surge, even doubling total demand when supply is strained. The drought conditions this summer would likely have prompted watering restrictions like 2015 to conserve storage supply, if not for the heavy snowpack of the previous winter.

Options to pursue 33% target by 2020

With regional storage supply projections, the need for water conservation through efficient and purposeful use of drinking water is more urgent. Within the 2020 time horizon, additional water use measures such as universal metering and more stringent outdoor water restrictions can be applied to help close the gap on the Greenest City target; however, these should be carefully evaluated against economic and social considerations and other longer term approaches with possible greater benefit.

1. Accelerating Water Metering of Single/Dual Family Homes

With the exception of the single/dual family homes, all other sectors of water use (industrial, commercial, institutional, and multi-family) are fully metered, representing approximately two thirds of overall consumption.

In 2012, water meters became mandatory for all *new* services for single/dual family dwellings which have resulted in approximately 800 new meters installed per year. As a result, 8% of single family/dual family homes are now metered, leaving 77,600 unmetered homes.

A literature review of residential water metering programs report the savings associated with meters at 15 to 30%. The actual savings are dependent upon variables such as the metered water rate and how aggressively water conservation efforts including conservation oriented pricing models are pursued. Transitioning to a fully metered single family residential sector is estimated to contribute a further 6% towards our water conservation target, at a cost of approximately \$86 million.

To verify actual costs of retrofitting existing homes with meters and to determine the extent of variability in household consumption including prevalence of leaks, 300 residential meters were installed in existing homes this year and the data is currently being analyzed.

Concurrently Metro Vancouver is preparing a regional assessment of the cost/benefits of residential water metering, using a triple bottom line approach of social, environmental, and economic impacts. The expected completion is in early-2018.

2. More stringent outdoor water restrictions

The Metro Vancouver Board approved a new Drinking Water Conservation Plan (DWCP) on June 23, 2017, to supersede the regional Water Shortage Response Plan, with the aim to further reduce consumption of water during summertime peak demand and during water shortages.

If the City were to go further than these regionally proposed amendments, it is possible that greater reductions in outdoor water use may be achieved; however, these would come at a cost in communication challenges and may conflict also with other city goals of biodiversity and food security.

The established regional approach on the enforcement of outdoor water practices provides benefits of regionally reinforced public notifications, communication and engagement. Breaking from this framework may cause fractured and confused public messaging.

Integrated water management approach

The conventional water management framework where drinking water, groundwater, rain water, and wastewater are managed separately is no longer considered best practice. This is in response to the pressures presented by increasing costs, supply uncertainty, and shifting demands and growth.

Rather, an integrated 'one water' approach is being adopted throughout leading jurisdictions internationally. This approach recognizes the interconnectedness of the urban water cycle and uses integrated planning and implementation to manage for water sustainability and resilience.

Under this approach, all water is managed as a resource and its use is matched with its level of quality - 'fit for purpose'. For example, rainwater sources are managed as a resource to augment water supply by matching quality to usage like irrigation, replenish aquifers, and support other ecosystem needs. From a water conservation perspective, end uses that don't require treated potable water can be served through thoughtful and well-managed alternative supplies. Vancouver, situated in a rain forest with well-developed district scale energy policies and precedents, is well positioned to succeed in this approach and managing and reusing water on-site helps reduce pressure on existing infrastructure capacity.

An integrated approach aligns well with the Green Infrastructure "Rain City Strategy" mandate to guide sustainable urban rainwater. It also informs broader strategies that include how the City invests in drainage infrastructure to eliminate combined sewer overflows and the ongoing efforts to improve the health of our surrounding foreshore and recreational waters.

Further analysis and development of a business case is recommended be pursued to evaluate cost-effective integrated approaches on a city-wide scale.

CONCLUSION

This report provides an update on the Clean Water Work Plan, provides information on preliminary regional storage supply predictions, and describes an integrated water conservation strategy to guide the next phase of the City's efforts towards the Greenest City Clean Water 2020 target and beyond.

The recommendations detailed in this report will develop a long term water supply strategy that is specific to the Vancouver context, for all the ways the City is dependent on water in support of long term resiliency.

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Residential	Metering of new single/dual family dwelling	~800 new meters per year since 2012 Additional 300 installed in 2017 as part of pilot study
	Water restrictions education and enforcement	~ 750 reminder letters sent to residents every year; 200+ tickets issued per year.
	Incentives and rebates	Laundry machine rebates (435+/yr); rain barrel sales (~550/yr); toilet rebates older rental stock (2000 since 2015)
	Leak detection	167,000 dye strips mail out with property tax notice to detect toilet leaks
	Irrigation Assessment	Free service to program irrigation systems and test for efficiency (50 participants in 2017 pilot year)
	Education	School-based theatre presentation and workshops since early 1990s (~30 every second year); neighbourhood scale garden workshops from 2012-2014 (130 workshops), social media campaign, Pop-up City Hall, new Waterwise web portal, interactive game/tips
	Policy	VBBL update on irrigation efficiency
Commercial, Institutional, Industrial	Incentives and rebates	Pre rinse spray valve installation and fixture audit for restaurants (2014, 500 participants; 2017 program currently being offered)
	Policy	Prohibition on single pass water systems and phase out of existing by January 1, 2020; VBBL update on fixture efficiency (applies to residential too)
Civic	Green Operations	Corporate Water Reduction Plan with commitment to Greenest City water target (19% reduction to date attributed to turning off or retrofitting single pass water features, civic metering, and quarterly performance tracking)
	Parks	Water Conservation Action Plan adopted by Park Board on Sept 18, 2017; commitment to Greenest City Water target through priority projects including phase out of single pass water features and more efficient irrigation.

Residential Sector

Within the residential sector, outdoor water use continues to be the greatest portion of use. Programs include: coordinated education campaigns with Metro Vancouver promoting 'water wise' behaviour and Vancouver own tagline 'Water doesn't just fall from the sky' to build awareness on the significant infrastructure to treat and deliver water regardless of whether it is raining, dedicated enforcement of the water regulations, and free irrigation assessment service for residents to inspect their irrigation system and teach them how to program their automated systems to match the restrictions.

The Waterwise pages on the City's website were redesigned to provide interactive access to various water saving tips and case studies across all sectors.

Industrial, Commercial and Institutional Sector (ICI)

In the Institutional, Commercial and Industrial sector (ICI), in April 2017 Council approved a prohibition on single pass water systems and phase out of existing units by January 1, 2020, and VBBL update fixture efficiency (applies to residential too).

Corporate Water Use

The City and Parks Board are attempting to take a leadership role in applying the 33% reduction by 2020 target to its own operations. Priority projects are focusing on eliminating water wastage by retrofitting and phasing out non-recirculating ornamental fountains and potable water top-up of streams and lakes; and expediting retrofits with high-efficiency fixtures. Simultaneous to these efforts, a civic metering strategy has been embarking upon to better track and monitor water consumption. Currently only 50% of water using civic properties (including parks) are metered. Civic properties are being metered at a rate of 30 per year and usage of all metered civic properties is being monitored and reported quarterly. As of 2016, a 19% reduction in civic use has been achieved from baseline.