POLICY ANALYSIS
FOR THE
PUBLIC AND PRIVATE
SECTORS
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DATE: December 3, 2018
TO: Joe Berg, California Water Efficiency Partnership Board
Mary Ann Dickenson, California Water Efficiency Partnership
FR: David Mitchell (M.Cubed) and Tom Chesnutt (A&N Technical Services)
RE: Proposal to develop Tools for New State Urban Water Use Standards

Introduction

This letter proposal sets forth development of two independent but related tools:

1. A California WUE Standards Compliance Tool (CalWEP Tool) and
2. An updated California-specific version of the AWE Water Conservation Tracking Tool (AWE Tool)

The first tool would be used to determine compliance with new State Urban Water Use Standards. The second would be used to attain or ensure compliance through planned design of intentional WUE programs. Members of CalWEP and AWE would have access to these planning (AWE tool) and California WUE Standards compliance (CalWEP tool) tools. The CalWEP tool would necessarily be a work in progress as the Standards are being finalized. The AWE Water Conservation Tracking Tool is an Excel-based planning model that water suppliers can use to evaluate the water savings, costs, and benefits of conservation (WUE) programs. Using information entered into the Tracking Tool from a utility's system, it provides a standardized methodology for water savings and benefit-cost accounting, and includes a library of pre-defined conservation activities from which users can build conservation programs.

The Tracking Tool is used widely across the nation. Many utilities in California rely on it for conservation planning. Different versions of the Tracking Tool have been developed for unique state regulatory environments. For example, one version is specific to the plumbing codes, appliance standards, and landscape requirements in California. However, California is currently in the process of making significant changes to these regulations. Helping water utilities plan for compliance with these regulatory changes is one of the main purposes of the Tracking Tool.

This proposal describes the pending changes to California urban water conservation regulations and proposes modifications to the Tracking Tool to help California urban water suppliers plan their water conservation programs to comply with the new state requirements. The proposal sets out a modular approach that separates (1) California state compliance from (2) the task of conservation program planning to ensure compliance. This modular approach will allow urban water suppliers to use alternative approaches to compliance determination or conservation planning at their choice. The modular approach would also allow use of the California-specific tools for cross-checking and validation of alternative approaches.

Changing State Urban Water Conservation Regulations

A major change on California's urban water management horizon is the implementation of Executive Order B-37-16. The stated goal of the order is to "help Californians *adopt permanent changes* to use water more wisely".[1] Specifically, the Executive Order states:

> *The Department of Water Resources (Department) shall work with the Water Board to develop new water use targets as part of a permanent framework for urban water agencies. These new water use targets shall build upon the existing state law requirements that the state achieve a 20% reduction in urban water usage by 2020 … These water use targets shall be customized to the unique conditions of each water agency, shall generate more statewide water conservation than existing requirements, and shall be based on strengthened standards for:*
>
> *a. Indoor residential per capita water use;*
> *b. Outdoor irrigation, in a manner that incorporates landscape area, local climate, and new satellite imagery data;*
> *c. Commercial, industrial, and institutional water use; and*
> *d. Water lost through leaks.*

New Per Capita Water Use Targets for Indoor and Outdoor Water Use

Key to the Executive Order is the requirement that urban water suppliers meet new water use targets that will replace the 20x2020 targets set under Senate Bill X7-7 passed in 2009. Importantly, the new targets must result in greater statewide water savings than the 20x2020 targets they are replacing.

The state is developing new standards and targets for indoor residential water use and outdoor residential and non-residential landscape water use. Current law (AB 1668 and SB 606) sets an initial indoor residential target of 55 gpcd. The target would be reduced to 52.5 gpcd in 2025 and to 50 gpcd in 2030, if studies of residential indoor water use support lowering the targets. Currently, indoor residential water use is thought to average about 58 gpcd[2], which is about 14% greater than the target being proposed for 2030.

The outdoor component of the target will be based on estimated landscape area multiplied by a fraction of a measure of evapotranspiration using the principles of the Model Water Efficient Landscape Ordinance. While the fraction of measured evapotranspiration that will determine the outdoor water, allowance has not been settled, it is likely to be somewhere in the range of 0.45 to 0.8.[3]

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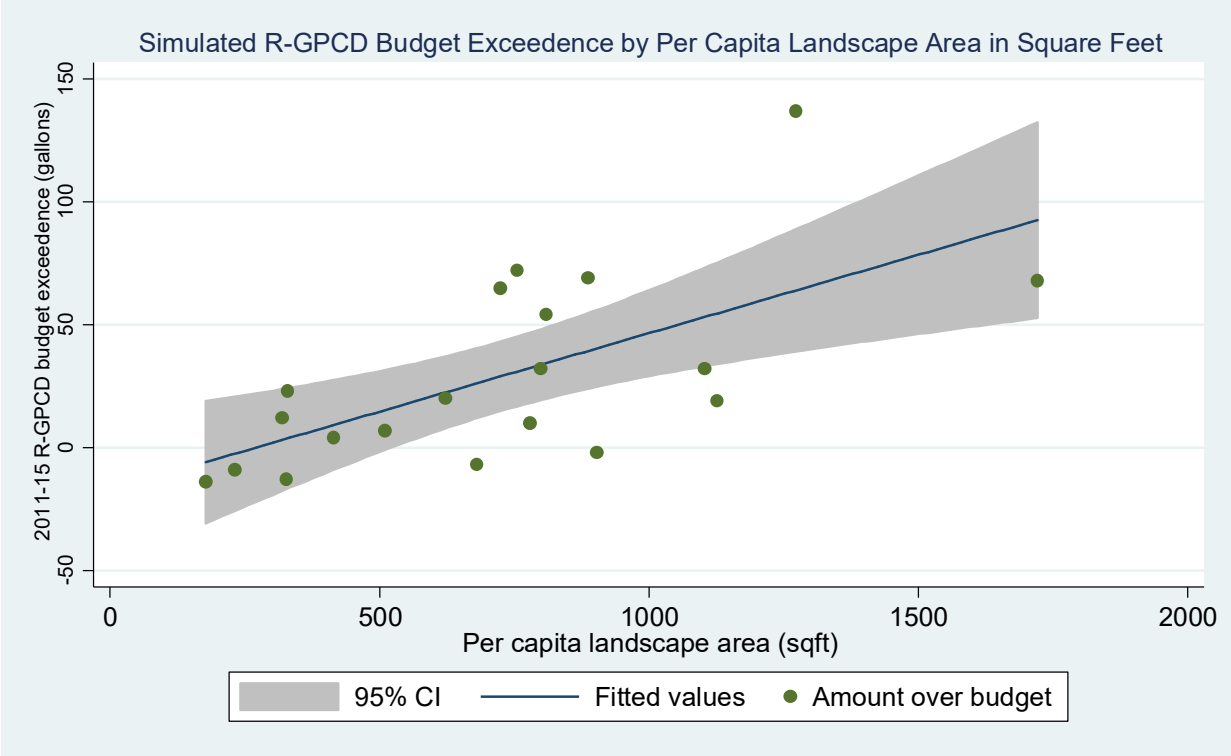
[1] State of California. 2017. Making Water Conservation a California Water of Life: Implementing Executive Order B-37-16. Prepared by California Department of Water Resources, State Water Resources Control Board, California Public Utilities Commission, California Department of Food and Agriculture, California Energy Commission.

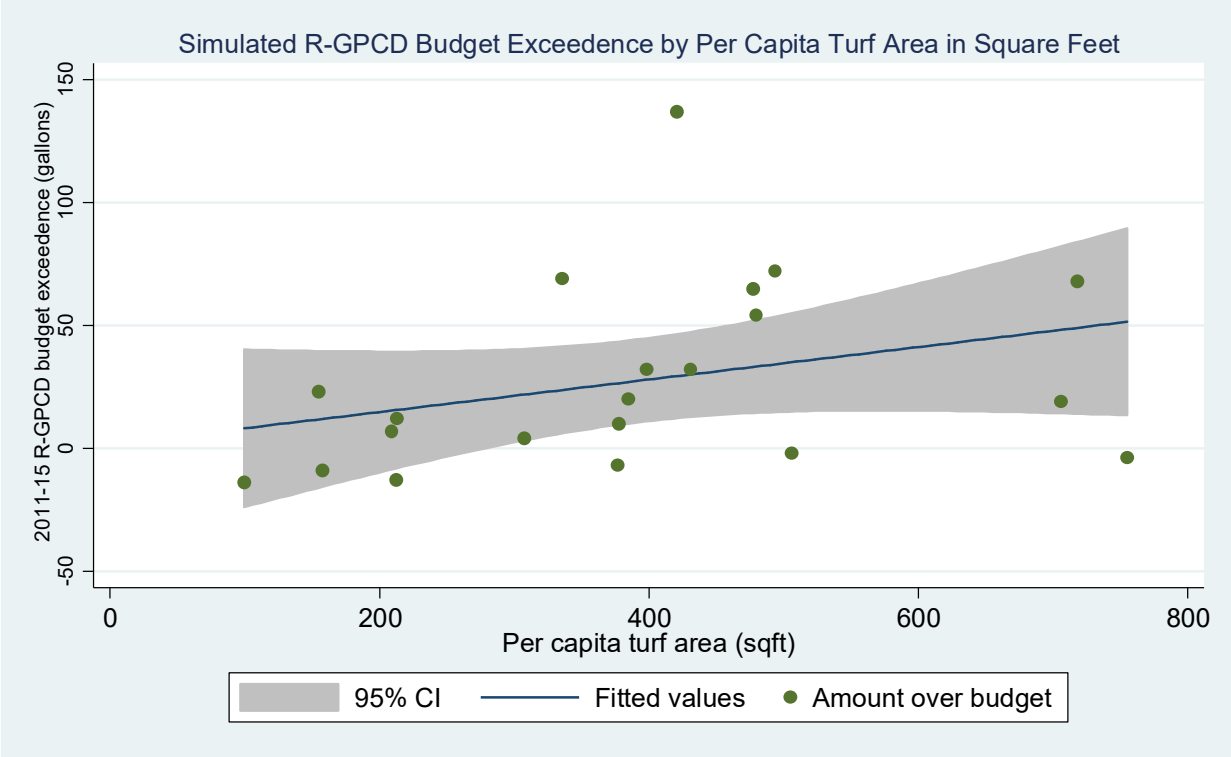
[2] M.Cubed. 2016. Projected Statewide and County-Level Effects of Plumbing Codes and Appliance Standards on Indoor GPCD. Prepared for the California Department of Water Resources.

[3] This is based on changes DWR is proposing to make to the maximum applied water allowance (MAWA) in the Model Water Efficient Landscape Ordinance (MWELO) which would serve as the benchmark for setting the outdoor urban water use targets. The pre-2015 MAWA was 0.7 of ETo. The current MWELO (effective Feb. 2016) lowered the MAWA to 0.55 for residential landscape projects and to 0.45 for non-residential projects. See https://www.water.ca.gov/LegacyFiles/wateruseefficiency/landscapeordinance/docs/2015%20MWELO%20Guidance%20for%20Local%20Agencies.pdf

Analysis of recent historical residential water use and landscape area for a statewide sample of 20 water suppliers indicates that regions with significant landscape and turf area per capita may be challenged to meet the new outdoor standards. For example, the following two charts show the results of a simulation examining the extent to which 2011-15 average R-GPCD for the sampled suppliers would exceed a hypothetical residential water target.[4] Simulation results are sorted by landscape and turf area per capita. The charts show a strongly positive correlation between the magnitude of per capita landscape and turf area and the magnitude of exceedance of the simulated target for the sampled districts. Moreover, budget exceedence in the simulation is commonplace even though residential demand was lower than normal in 2014 and 2015 due to drought water use restrictions.



[4] The simulated monthly outdoor budgets were set to measured residential landscape area multiplied by max(average monthly ETo x 0.55 – 0.3 x average monthly precipitation, 0). The annual budget is the sum of the monthly budgets. Indoor budgets were set to 55 gpcd. The budgets were compared to each supplier's average R-GPCD for 2011-2015.



The new indoor and outdoor targets will put new urgency on accurate assessments of the water savings potential and cost-effectiveness of conservation programs targeted to reduce residential and landscape water use. Modifications to the Tracking Tool are needed to better support indoor and outdoor water use accounting and to ensure that the Tracking Tool Library's indoor and landscape water conservation program specifications accurately incorporate the best available information on water savings and program implementation costs.

CII Performance Standards

The state is also proposing new performance measures for CII water use, including (1) classification of all CII accounts using the North American Industry Classification System (NAICS) and where feasible development of CII subsector water use benchmarks for identification of CII accounts with potential for water use efficiency improvements; (2) completion of water use audits or water management plans for CII accounts over a specified size, volume, or percentage threshold; and (3) conversion of all landscapes over a specified size threshold that are served by a mixed-use meter CII account to dedicated irrigation accounts.

It is not yet known what the threshold will be for completing water use audits or water management plans for CII accounts. The state indicated in its Making Conservation a California Way of Life report that it will develop regulations and guidelines by October 1, 2021 (CWC 10609.10(a)), though this may change under future legislation. It stands to reason that water suppliers with a high fraction of

commercial and industrial water use are likely to bear most of the burden of the new requirements. As a general rule, the top 10% of CII water users account for 70 to 80% of all CII water uses.[5]

Completing water use audits and management reports for these large CII customers will be a complex and expensive task which may require use of consultants with specialized knowledge in industrial process water use. Commercial and industrial audits and management plans can be highly technical and expensive to complete. Based on data compiled in 2005 by the California Urban Water Conservation Council, CII water use surveys and management reports were shown to have a median cost range of $1,000 to $30,000 and a mean cost range of $4,000 to $100,000 per intervention.[6] The wide cost ranges are primarily driven by the complexity of the water end uses under investigation – completing a water use survey for a large industrial refinery, for example, requires much more effort and time than completing one for a small commercial laundry or kitchen.

Currently, the Tracking Tool's program library does not include default entries for CII water use audits and management reports. It will be important to add new program specifications for these activities to the library in anticipation of the state requirements.

CII Mixed Meter Conversion

The state has also proposed that urban water suppliers convert all landscapes above a certain size served by mix-use CII meters to dedicated irrigation meters. While the landscape size threshold has not yet been determined, it is conceivable that individual water suppliers may have to convert hundreds if not thousands of acres of landscape from mixed-use to dedicated irrigation meters. This represents a potentially significant task and cost for urban water suppliers. Large landscaped areas often are served by more than one meter and determining which meter is serving which parts of a landscape can be complicated and often can only be accomplished through trial and error.

Whether this requirement will yield cost-effective water savings is an unsettled question. Modifications to the Tracking Tool are needed to help water suppliers accurately assess the expected costs and benefits of CII mixed-use meter conversion.

System Water Loss Reporting and Reduction

Executive Order B-37-16 places significant emphasis on accelerating data collection and reporting on system water loss and taking actions to minimize leaks. Specifically, it states:

> *The Water Board and the Department [of Water Resources] shall direct actions to minimize water system leaks that waste large amounts of water. The Water Board, after funding projects to address health and safety, shall use loans from the Drinking Water State Revolving Fund to prioritize local projects that reduce leaks and other water system losses. The Water Board and the Department [of Water Resources] shall direct urban and*

[5] Mitchell, David and Thomas Chesnutt. 2017. CII Water Use and Drought Response: Case Study of California Water Service. Prepared for California Water Service, Department of Water Resources, and State Water Resources Control Board.

[6] California Urban Water Conservation Council. 2005. BMP Costs & Savings Study: A Guide to the Data and Methods for Cost Effectiveness Analysis of Urban Water Conservation Best Management Practices. California Urban Water Conservation Council. Sacramento.

> *agricultural water suppliers to accelerate their data collection, improve water system management, and prioritize capital projects to reduce water waste. The California Public Utilities Commission shall order investor-owned water utilities to accelerate work to minimize leaks.*

Senate Bill 555, passed in 2015, requires the Water Board to develop water loss performance standards for urban retail water suppliers between January 2019 and July 2020. These standards are expected to be incorporated into the new water use targets (SB 606 & AB 1668) the state is developing for urban water suppliers.

Modifications to the Tracking Tool are needed so that users can accurately account for the costs of state water loss auditing and reporting requirements, the costs of leak detection and minimization actions, and the expected water savings from these actions over time. (Note: SB 555 requires life-cycle cost analysis, and the state will need to apply and interpret this requirement.) This will require updating the Tracking Tool Library to include new water loss management activities. It may also require the development a new Tracking Tool module specifically designed for water loss accounting and tracking of water savings from leak minimization activities.

Summary of Needed Updates and Modifications to Tracking Tool

In light of the above, necessary updates and modifications to the Tracking Tool include:

- Modular functionality that separates compliance detection and conservation planning to ensure compliance
- Improved indoor and outdoor water use accounting and GPCD target tracking;
- New functionality to evaluate costs and benefits of CII mixed-use meter conversion;
- New functionality to assess water savings and cost-effectiveness of CII water use audits and management reports for different types and sizes of commercial and industrial water users;
- New functionality for tracking costs and water savings of water loss auditing, reporting, pressure management, and leak detection and repair activities;
- Updates to the Tracking Tool Library to incorporate the most current information on implementation costs and water savings for conservation activities aimed at reducing residential indoor, landscape, and CII water uses;
- Updates to the Tracking Tool Library to incorporate the most current information on implementation costs and water savings for utility leak detection and repair activities including pressure management.

Proposed Scope of Work

The Scope of Work follows the standard software development paradigm, breaking work tasks into the following five categories:

1. Requirements Analysis
2. Design
3. Development
4. Testing
5. Rollout

Requirements Analysis

The requirements analysis is arguably the most important step since it will guide everything that follows. The purpose of the requirements analysis is to determine the changes that need to be made to the Tracking Tool from the perspective of the user.

Task 1 – Formation of Project Advisory Committee. The first step in completing the requirements analysis will be formation of a Project Advisory Committee (PAC) comprised of California Water Efficiency Partnership members and staff. In addition to general project oversight, the PAC will provide a forum for the identification and prioritization of Tracking Tool modifications. This will be done over the course of several meetings with the PAC early in the project.

Task 2 – User Interviews. Up to 10 interviews will be conducted with Tracking Tool users and state agency staff. These users will be queried about how they currently use the Tracking Tool for conservation planning, whether and how they intend to use it in their planning for compliance with future state water use regulations, and what changes to the Tracking Tool would best facilitate this planning. Interview results will be compiled and summarized in a Technical Memorandum that will be distributed to the PAC.

Task 3 – Documented Requirements Analysis

Upon completion of the user interviews and initial PAC meetings, we will prepare a draft Technical Memorandum documenting the requirements analysis and describing in detail the proposed updates to the Tracking Tool and its Program Library in terms of its functionality, design, and data structure. Following review and comment by the PAC, the requirements analysis memorandum will be finalized.

Design

Task 4 – Preliminary Re-Design. A preliminary re-design of the Tracking Tool will be prepared based on the results of the requirements analysis. This preliminary re-design will be presented to the PAC for review and input. The re-design will consist of mock-ups of the user interface and output worksheets of the Tracking Tool.

Task 5 – Final Re-Design. Based on PAC feedback on the preliminary re-design, a final re-design of the Tracking Tool will be developed and presented to the PAC for approval.

Development

Task 6 Compliance Module Coding. This stand-alone module can be used independently of the AWE tracking tool. The module will allow an agency to enter service area specific data (population, landscape area, Et, etc.) into state performance metrics to determine compliance with its potential urban water use objective. The module will allow an agency to choose different levels of indoor water use, MAWA and water loss, through user-friendly pull downs to calculate its urban water use objective. It will also require the user to enter water use by customer class to compare to the objective. Additional state efficiency standards for CII non-outdoor use, efficient water loss levels, and estimated use for approved variances will also be included to complete the calculation of the agency's urban water use objective.

It is of course true that ultimate compliance with California state regulations for "Conservation as a California Way of Life" cannot be specified with certainty until the California state regulations have been

finalized. Ultimately, the state may provide a tool to assist in compliance determination. That said, a reasonable forecast can now be made on where state regulations will end up. California water utilities need to be able to reduce the current state of uncertainty surrounding their compliance. This task will develop an urban water use objective calculator to fill this void in the interim. Should the state quickly provide a compliance tool, this task can be scaled back.

Task 7 – Tracking Tool Coding. Coding of the Tracking Tool will commence following PAC approval of the re-design. This will entail updating existing Tracking Tool worksheets, adding new worksheets (including inputs from the Compliance Module), updating the navigation system, and updating or creating new back-end Visual Basic code.

Task 8 – Update Tracking Tool Library. This task will update the Tracking Tool's library of conservation program activities to incorporate the most current information on implementation costs and water savings for conservation activities aimed at reducing residential indoor, landscape, and CII water uses. David Pekelney (A&N) will lead this activity. This task will also develop and add new water loss accounting, leak detection and repair, and pressure management activities to the library. We are currently checking with subject matter experts to add an additional team member to assist in defining water loss life cycle costs.

Task 9 – Update User Guide. Following completion of Tasks 6 and 7, the Tracking Tool's User Guide will be updated to reflect the changes to the Tracking Tool's design, functionality, and library.

Testing

Task 10 – Alpha Testing. Once the coding and library updating tasks are finished, the Tracking Tool will be tested for bugs and design flaws by the consultant team and CalWEP/AWE staff. Identified software bugs and design issues will be catalogued and fixes will be documented.

Task 11 – PAC Demonstration. Upon completion of alpha testing, the PAC will be given a demonstration of the updated Tracking Tool. This will be scheduled to align with one of the regular meetings of the California Water Efficiency Partnership, or will be done remotely via the internet to spare the PAC unnecessary travel and time away from work.

Task 12 – Beta Testing. Upon completion of alpha testing the Tracking Tool will be distributed to PAC members for additional testing and feedback. Again, any identified software bugs and design issues will be catalogued and fixes will be documented.

Rollout

Task 13 – Rollout Webinar. When the Tracking Tool is ready for public release, AWE will schedule a rollout webinar for California Water Efficiency Partnership members. The webinar will present the revised functionality of the Tracking Tool and illustrate ways it may be used to evaluate and plan for the new state water use regulations.

Development Team

The development team consists of staff from M.Cubed, A&N Technical Services, and AWE. David Mitchell of M.Cubed will serve as the project manager and will also be the lead on the requirements analysis, design and development tasks. Tom Chesnutt and David Pekelney of A&N Technical Services

will lead the library update and testing tasks. Bill Christiansen of AWE will support the requirements analysis and testing tasks and also will support the rollout tasks. Mary Ann Dickinson will provide general oversight and will be the primary liaison between the development team and the California Water Efficiency Partnership.

Schedule

Completion of the Scope of Work is expected to require 8 to 11 months from the project kick-off:

- Requirements Analysis – 2 months
- Design – 1 to 2 months
- Development – 3 to 4 months
- Testing – 1 to 2 months
- Rollout – 1 month

It is understood that initiation of the project as well as possible changes to the proposed schedule will be governed by the timing and content of state legislation and related regulations establishing the new urban water targets and reporting requirements.

Budget

Task budgets are provided in the following table. The total project cost is $205,500.

Budget to Update AWE Water Conservation Tracking Tool for New State Urban Water Use Standards

Requirements Analysis	**Task Cost**
Task 1 PAC meetings	$7,500
Task 2 User Interviews	$10,000
Task 3 Documented Requirements Analysis	$10,000
Design	
Task 4 Preliminary Re-Design	$15,000
Task 5 Final Re-Design	$10,000
Development	
Task 6 Compliance Module Coding	$25,000
Task 7 Tracking Tool Coding	$45,000
Task 8 Update Tracking Tool Library	$40,000
Task 9 Update User Guide	$10,000
Testing	
Task 10 Alpha Testing	$10,000
Task 11 PAC Demonstration	$5,000
Task 12 Beta Testing	$10,000
Rollout	
Task 13 Rollout Webinar	$5,000
Travel and Project Incidentals	$3,000
Total Project Cost	$205,500