Key Questions for Setting Efficiency Standards and Labeling Requirements for Landscape Irrigation Equipment

Staff Technical Workshop

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1. How do we define water "wastes", and how do these "wastes" occur in landscape irrigation practices? Runoff, deep percolation and overspray are examples of landscape irrigation waste. What are the different categories of wastes, and strategies for mitigating them? Direct waste occurs when tangible losses can be seen, such as overspray, leaks or runoff. Indirect or cultural waste occurs through poor scheduling when schedules are increase to compensate for areas of poor irrigation coverage. Strategies for mitigating such losses are the use of best practices and technology, consumer education, process automation, diligent maintenance and financial losses tied to water losses or inefficiency.
2. How are landscape irrigation controllers, both weather based and moisture sensor based or add-on devices, expected to help reduce these wastes? Through the use of data collection and interpreting such data in a manner that only necessary amounts of water are applied to landscape plants and turfgrass and by preventing runoff by the utilization of cycle and soak applications which are sensitive to soil, topography and plant characteristics. How effective are they in actually reducing waste of water in landscape irrigation? Situational, depending upon the irrigation management regime in place at the time such measures are applied and/or modified. Studies indicate these devices are very effective in eliminating waste, when waste is present.
3. Definitions of specific terms and equipment are required for any standards or labeling requirements. What are the applicable definitions for irrigation equipment, performance metrics and functions to be regulated? Are all the definitions used for the terms for this equipment agreed-to within the industry? If so, what is that terminology and what are the related definitions? Pressure, radius, flow, inrush current, holding current, precipitation rate, DU or distribution uniformity, irrigation adequacy and irrigation excess come to mind. The Irrigation has an online glossary of irrigation terms: http://www.irrigation.org/gov/default.aspx?pg=glossary.htm&id=106 We also suggest consulting DWR for previously vetted, California specific definitions related to irrigation.
4. How do we minimize water use increases and maximize water use savings with an efficiency standard for landscape irrigation devices? What performance metrics must be included in such a standard (i.e., flow or application rate, pressure, net volume applied, duration, etc…)? If efficient water use is the current practice, carving out additional

savings becomes difficult. The determination of success could be made through an analysis of site irrigation water use compared to a calculated site water budget. Irvine Ranch has a well tested example of such a calculation and IRWD takes this a step further by applying water price structures to this comparison.

5. What measurements/protocols are used to verify these savings? The IA's SWAT protocol is the most widely accepted test protocol for the performance of smart irrigation controllers. Can these methods be applied to all types of controllers? A variety of technology platforms can be evaluated with SWAT. If not, what adjustments must be made to more equitably compare different types of controllers? Sensors? Emitters? Valves? SWAT continues to evolve and more evaluation methods are forthcoming. There are some computer modeling tools available for evaluating distribution uniformity characteristics and individual sprinkler performance.
6. Do we have definite measurements of efficiency or quantity of water and/or energy being saved by the use of either aforementioned controllers? We have a means to verify irrigation adequacy and irrigation excess. Net savings and/or savings potential is a function of how much waste is present at the time the technology solution is applied. How does this compare to add-on devices to traditional timers? Could standard or traditional timer-based controllers achieve similar savings? If so, how? The target in this case is excess irrigation and many add-on devices show significant savings potential in curtailing excess application when applied properly.
7. Is there a common characteristic or operational element that can be defined between "smart" and "dumb" controllers that could be the basis of a performance standard for water savings? For energy savings? The ultimate determination of success or failure is the comparison of actual water use to a calculated water budget specific for the site. Clock and calendar based scheduling without equipment to detect rainfall and/or soil moisture will never achieve the savings potential of demand based irrigation control technologies if the goal is to have healthy plants.
8. What are the mandatory or required elements of an irrigation system to ensure increased efficiency? Demand based control technology, even distribution of water, ability to gauge application to soil infiltration rate, proper hydrozoning, proper operating pressure, regular maintenance and the ability to measure water use.
9. Are new controllers or add on devices compatible to existing irrigation systems? The irrigation industry has a multitude of retrofit solutions and the majority of equipment in service at this time operates on a 24 VAC platform. What difference in performance is there between new and modified systems? The performance potential is somewhat tied to system distribution uniformity, otherwise this is subjective.
10. Do we know whether the uses of the weather or moisture sensor based controllers (or add-on devices) would result in a statewide net saving of water use compared to current time setting or clock controllers? How much? What should be the minimum expected water savings and energy savings of an efficiency performance standard for controllers? Sensors? Emitters? Valves? This section is highly dependent upon what waste is present when efficient solutions are applied. There are pockets of the state where little more savings could be realized, but this is the exception, not the rule. The most recent study

that was summarized by Peter Mayer on 6/1 for CEC showed a net one year savings of over 100,000 gallons per controller installed. This is without any other documented performance upgrades or repairs.

11. What key elements or information are required for label content of landscape irrigation equipment (controllers, sensors, emitters, valves) to properly inform customers about potential of these devices to save water or energy? What content is required to ensure adequate understanding and installation to ensure desired performance? Where should labels be placed (on the device packaging, on the device itself, on informational documentation included with the device, etc…)? This will depend upon the type of equipment. Ideally, both the device and packaging with some exemptions for practicality and feasibility.

12. Is there adequate evidence to substantiate a specific standard of performance for all controllers? Sensors? Yes. SWAT characterizes the test, the values need to be selected for irrigation adequacy and irrigation excess. An effort is being made to select appropriate numbers through an ANSI standard being developed by ASHRAE as Proposed Standard 189.1P, *Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings* Emitters? Valves? If not, what analyses or evidence is required? This type of equipment should meet published catalog data and could perhaps be subject to some sort of life cycle analysis. The use an application is situational and would require modeling tools to project performance in potential arrays of system integration.

13. The Energy Commission must do a cost benefit analysis as defined by statute. What costs should be used for a unit of water saved (i.e., current average statewide average cost per gallon; marginal cost of next increment of new water to statewide supplies such as ocean desalination, etc…)? What costs should be used for a unit of energy (i.e., current statewide electric or natural gas average cost per watt; marginal cost of next increment of new generation or natural gas supplies, etc…)? Environmental cost/benefit?? All of these costs need to be calculated on replacement value of new water. Expanding access to resources is very difficult and this savings potential will prevent the need for expanding supply in many cases. All of this needs to be determined with the knowledge of the net ecosystem service benefits of California landscapes as characterized in AB 1881 bill text.

14. What is the expected average operational life of landscape irrigation equipment: controllers, sensors, emitters, valves? What is the designed life of these devices (required information to evaluate costs to consumers)? What are the retail costs of these devices? How are these costs expected to change over the next 10 years? Most manufacturers informally suggest a 7-10 year life cycle, depending upon the application and the specific product. Costs range significantly, depending upon the component and the nature of its construction.

15. AB 1881 requires the Energy Commission to prohibit the sale and installation of non-compliant equipment on or after January 1, 2012. How should the Energy Commission enforce the prohibition of the sale or installation of non-compliant devices? What partners should the Energy Commission collaborate with and what role should these partners play? Manufacturing and distribution are the easiest volume points of intervention, but there has to be a mechanism to address non-compliance at the consumer/contractor level. DWR, Water districts, SWAT, CLCA, IA, CUWCC are potential partners. Specific stakeholder input on this issue is necessary to determine best methods for fulfillment of this mandate.

16. Are there any special operational or regulatory considerations needed for systems that use recycled water? As defined in MWEO, additional leaching fractions are warranted to mitigate salinity issues. Equipment may require specific provisioning to tolerate to materials which may be contained in reused water. Equipment should also meet any labeling and color requirements that are currently in force.

17. What on-going data collection requirements are needed to ensure the compliance of regulated irrigation equipment with the standards? A site inspection by a qualified person who then submits an affidavit of compliance with CEC or partner agency would be the only way to determine full compliance. Water budget compliance, where applicable, is a good method to determine net success or failure.