California Energy Commission

Proposed Landscape Irrigation Language and Requirements

Landscape Irrigation Equipment Workshop

California Energy Commission, Hearing Room A

June 30, 2009

Peter Strait
Process Energy, Appliances, & Load Management Office
Efficiency & Renewable Energy Division
pstrait@energy.state.ca.us / 916-651-9375

Landscape Irrigation: Terminology

There has been some desire to move away from the current terms of art: “smart” and “dumb”

- Terms are too broad and too vague
- Terms could be misleading to consumers
- Terms denigrate a large class of controllers

Landscape Irrigation: Terminology

The California Energy Commission recognizes the need for better descriptions

- Two broad classes do seem to exist: controllers that perceive and react to the outside world, and controllers that don't.
- Of those that do, some rely on direct sensing and others rely on "indirect" sensing through broadcast signaling
- Of those that don't, there is a potential for sophisticated pre-calibration that relies on soil, plant and ET templates

Landscape Irrigation: Terminology

The California Energy Commission proposes the following terms for discussion:

- Direct-sensing capable (on-site sensors)
- Indirect-sensing capable (broadcast signal)
- Pre-calibrated (pre-programmed with data)
- Manually-calibrated (“calendar and clock”)

Question: are these sensible distinctions? Is more specificity needed?

Landscape Irrigation: Basic Features

Despite the wide variety of controllers on the market, and the wide variety of irrigation considerations and needs, there are some basic features that could apply to all units

All units have a clock, and thus (should) know the time and date

Nearly all units are microcontroller-based

Landscape Irrigation: Basic Features

Clock and microcontroller potential features:

- Accurately tracking time, date, day of week, sunrise/sunset
- Allowing “blackout days” to be set, and displacing watering to next available day
- Allowing a manual “weather override” that does not disrupt scheduling and can be set for multiple days in advance

Landscape Irrigation: Basic Features

Clock and microcontroller potential features:

- Allowing “stuttered” watering
- Not watering between specific daytime hours (i.e. one hour after sunrise / before sunset)
- Adjusting watering based on date
- Retaining settings if power is interrupted

Question: are these features feasible? Are any already common? Are any prohibitive?

Landscape Irrigation: Basic Features

Add-on devices: many controllers are now sold in a modular format, and a significant market of add-on irrigation control devices exists.

- Are there any current industry standards or common formats for add-on devices?
- Should all controllers be easily upgradeable?
- If so, how, and how costly would it be?

Landscape Irrigation: Estimating Water Needs

The California Irrigation Management Information System (CIMIS) provides data and estimates of evapotranspiration, as well as equations for estimating landscape water needs. These estimates and equations could enable more accurate calibration of controllers that lack direct or indirect sensing.

Question: can controllers be improved by this?

Landscape Irrigation: Estimating Water Needs

CIMIS provides the following equation:

- **Ks** - Species factor (ranges from 0.1 – 0.9)
- **Kd** - Density factor (0.5 – 1.3)
- **Kmc** - Microclimate factor (0.5 – 1.4)
- Ks * Kd * Kmc = **Kl** - Landscape factor
- **ETo** – Evapotranspiration (inches; 18 zones, historical average available by zone and month)
- ETo * Kl = **ETl** - Landscape Evapotranspiration

Landscape Irrigation: Estimating Water Needs

Should controllers be required to allow setting according to the CIMIS formula (meaning, by entering Kc, Kd, et cetera)?

Should controllers contain the reference ETo table published by CIMIS?

Should sensing controllers, particularly those relying on subscription broadcasts, be able to use this data as a backup?

Can controllers know how much water is emitted?

Landscape Irrigation: Soil and Slope

An accurate estimate of water need is only part of achieving water savings. Irrigation efficiency also results from minimizing runoff and deep percolation. While not all causes of runoff and deep percolation can be addressed by the controller, the most common ones can.

Landscape Irrigation: Soil and Slope

Runoff often results from applying water too quickly, faster than the soil can absorb, and will depend on soil composition and slope

Deep percolation often results from applying too much water at one time, and will depend on soil composition and root depth

Both can be reduced by proper timing of irrigation events

Landscape Irrigation: Soil and Slope

Question: to what extent can **all** controllers address these issues?

- "Stuttered" watering (briefly mentioned before) can address runoff, but would need to be adjusted to match different soils and slopes
- Deep percolation can be reduced by increasing the number of irrigation events over a given time, but would need to be matched to different soils and plant root depths

To what extent should controllers be responsible for these scheduling adjustments?

Landscape Irrigation: Next Steps

The controller is only one part of a landscape irrigation system. This presentation has hopefully shown how the California Energy Commission is currently looking at this portion of the landscape irrigation efficiency picture.

Our goal is to determine what the minimum requirements of an efficient system should be.