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# Green Codes and Standards: Impact on Landscapes & Irrigation

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# Codes and Standards

- Codes are mandatory and enforceable
  - Green building codes—above the base code
  - Adopted/modified locally
- Standards are voluntary
  - Trend is to write in mandatory language
  - When adopted into code, no longer voluntary



# Codes, standards, green initiatives

- IgCC
- ASHRAE 189.1
- CalGreen / MWELO
- NGBS
- GBI
- SITES
- LEED
- WE-Stand
- SWAT
- EPA WaterSense
- Rain Water Harvesting Standards



# Generalized Commonalities

- Reduction of urban heat island effects.
- Increased use of native plants.
- Limitation on ornamental turfgrass areas.
- Limit the use of potable/fresh water for irrigation.
- Develop alternate water sources for:
  - Indoor plumbing
  - Cooling
  - Irrigation
- Inspections or Commissioning



# International Green Construction Code-2015

- Section 404 Landscape Irrigation & Outdoor Fountains
- Reduce potable water use by 50% with exceptions
- Irrigation
  - Qualified professionals
  - Smart controllers
  - Hydrozoning
  - Pressure regulation
  - Sprinkler requirements—MPR, PR, DU, slopes, landscape dimensions
- Graywater and Rain Water have own sections



# IgCC-2015

- Section 405 Vegetation, Soils and Erosion Control
- Soil and water quality protection
- Soil reuse and restoration
- Tree protection



# IgCC-2018

- Will use ASHRAE 189.1-2017 for technical requirements
- Currently IgCC allows the use of ASHRAE 189.1 as an alternate compliance path when selected by AHJ





# CAL GREEN 2013 Residential

- 4.304 Outdoor Water Use (Mandatory) amended 6/1/2015 by Emergency Supplement
- Landscape >500 s.f. use MWELO
- ET adjustment factor 0.55
- A4.304 Voluntary Measures
  - Rainwater catchment system for 65% of roof area per CA Plumbing Code
  - Potable water elimination for landscaping
    - Captured rainwater
    - Recycled water
    - Irrigation water conveyed by public entity
    - Graywater



## Cal Green 2013 Non residential *mandatory*

- Section 5.304 Outdoor Water Use amended 6/1/2015
- Use MWELO or more restrictive
- New landscape areas >500 s.f. requiring permit, plan check or design review
- Rehabilitated landscape projects >2,500 s.f.
- Provisions for using non-potable water
- Outdoor potable water in landscapes of public schools, community colleges use ETAF of 0.65 and special landscape area get 0.35 extra



## Cal Green 2013 Non residential *voluntary*

- A5.304 Outdoor Water Use
- Meter/submeter for landscape areas > 500 s.f.
- Restoration of areas disturbed by construction
  - Use local adaptive and/or noninvasive vegetation
  - Previously developed sites—restore or protect 50% of site with adaptive/noninvasive vegetation
- Install graywater system
- Use recycled water



# CalGreen 2016 (effective January 1, 2017)

- Residential: use 2013 code as amended 6/1/2015
- Voluntary measures:
  - Potable water elimination per California Building Standards Code
  - Water meters on landscapes < 5,000 s.f. using potable water
- Non residential: Use 2013 code as amended 6/1/2015
- Voluntary measures: same as before



# Model Water Efficient Landscape Ordinance

- Modified in 2015 in response to executive order & drought
- MAWA reduced from 70% of ETO
  - Residential = 55% (high water use planting area 25% of landscape)
  - Non residential = 45% (high water use plantings limited to special areas)
- Irrigation efficiency per hydrozon:
  - drip irrigation 81%,
  - overhead irrigation 75%
- No high water use plantings in street medians
- No runoff



# MWELO

- Soil sampling/testing
- Soil amendment requirements
- Plant selection
- Irrigation
  - Dedicated meters/submeters
  - Pressure regulation
  - Emission devices meet ANSI standards
  - Flow sensors on landscape > 5,000 s.f
  - Minimum width for overhead irrigation = 10 feet
  - Auditing by third party and by a EPA WaterSense labeled program
- Reporting



# National Green Building Standard 2015

- Residential standard aka ICC/ASHRAE 700
- Rating system based on points
  - Bronze, Silver, Gold, Emerald
- Use EPA Water Sense Water Budget Tool for turf area
  - Less turf = more points



## NGBS irrigation related points

- Section 403.6 Landscape plan with irrigation provisions
  - Non-potable water to common areas 2 points
  - Non-potable water to lots 4 “
  - Hydrozoning 4 “
  - Designed to IA BMPS and use smart controllers 6 “
  - Graywater irrigation systems 7 “





# NGBS Chapter 8 Water Efficiency

- Irrigation Systems
  - Irrigation plan by WS labeled program professional      MANDATORY
  - Maximum precipitation rate 1.20 in./hr.      6 points
  - All irrigation zones use pressure regulation      3 points
  - Drip irrigation      13 max.
  - Irrigation system uses smart controller and labeled      10 points
  - No irrigation system installed      15 points
- Rainwater used for irrigation    more points for more gallons



# ASHRAE 189.1

## **Standard for the Design of High-Performance Green Buildings** Except Low-Rise Residential Buildings





# ASHRAE 189.1-2014

- Section 5 Site Sustainability
  - Vegetation biodiverse plantings of native and adapted plants
    - Shading of paved areas and walls
- Section 6 Water Use Efficiency
  - 60% of landscape area biodiverse plantings other than turfgrass
    - Exception for athletic fields, golf courses, parks, schools, residential common areas
  - Hydrozoning of plant materials
  - Use of smart controllers
  - Meters for landscapes > 25,000 s.f.



# ASHRAE 189.1-2014

- Prescriptive Option
  - Site Water Use Reduction
  - Only alternate water sources for golf courses and driving ranges
  - All other areas of improved landscape-maximum one-third potable water
- Performance Option
  - Potable and municipally reclaimed water for improved landscape limited to 35% of water demand.
  - Water demand based on 70%  $ET_0$  for grass, 55%  $ET_0$  for plants after rainfall



# ASHRAE 189.1-2017

- Modifications are in process but not finalized
- Turfgrass limits modified or removed
- Performance option for water to become prescriptive
- Additional irrigation system requirements (where installed)
  - Requirement for design and installation professionals
  - Irrigation equipment
  - Irrigation management



# Green Building Initiative

- ANSI Standard updating 2010 version
  - 2<sup>nd</sup> draft out for public comment
- Points-based Green Building Assessment system
- Site—Landscaping
  - More native/drought tolerant plants = more points
- Water Efficiency—Irrigation
  - Use water budgeting
  - Alternate water to meet irrigation demand
  - Irrigation products that improve efficiency



# LEED v4

- Prerequisite Outdoor Water Use Reduction
  - Option 1 No irrigation required (after establishment)
  - Option 2. Reduced irrigation
    - Minimum 30% reduction for baseline calculation (EPA WaterSense WB Tool)
      - Plant selection
      - Irrigation system efficiency



## Credit: Outdoor water use reduction

- Option 1. No irrigation required—2 points
- Option 2. Reduce LWR by 50%
  - First 30% by plant selection, irrigation efficiency
  - Additional reductions via efficiency, alternate water sources, smart scheduling
  - 50% = 1 point, 100% = 2 points
- Exemptions: athletic fields, playgrounds, food production





## Additional strategies

- Metering (at least 80% of irrigated land)
- Use of WaterSense labeled or SWAT tested controllers
- Use of Drip irrigation
- Rainwater Management using GI or LID principles
- Non-potable water sources



## LEED v4 summary

- LEED v4 incentivizes non-potable water use
  - 1) Efficiency
  - 2) Alternate water sources
  - 3) Metering
- Smart irrigation: 6 points in BD&C, 7 points in O&M



# Sustainable Sites v2

- Section 3: Site Design—Water
  - Prerequisite 3.2 Reduce water use for landscape irrigation
    - Reduce or eliminate the use of potable water or natural water beyond establishment
    - 50% reduction from baseline using EPA WaterSense Water Budget Tool
      - Non potable water must meet health standards
      - Install water meters
    - OR design a landscape to not require permanent irrigation
    - Exemptions: non-commercial food production, fire-suppression, athletic fields



# Reduce potable water use strategies

- Maximize captured stormwater
- Plant and species selection
- Improve soils
- Hydrozoning
- High-efficiency irrigation equipment
- Reuse alternate water sources—assure quality
- Use publicly conveyed non-potable water



## Credit 3.4 Reduce outdoor water use

- Option 1 Reduce by 75% from baseline—4 points
  - Install water meters to compare to baseline
- Option 2 Significantly reduce outdoor water use—5 points
  - No potable water/natural water sources beyond establishment
  - After establishment only alternate water sources
- Option 3 Eliminate outdoor water use—6 points
  - Eliminate long-term irrigation
  - Use only alternate water sources for establishment



# WE-Stand (IAPMO) Draft

- Water Use Efficiency (from 2015 Green Technical Supplement)
- Irrigation
  - Qualified professionals
  - Smart controllers
  - Hydrozoning
  - Pressure regulation
  - Sprinkler requirements—MPR, PR, DU, slopes, dimensions
- Graywater requirements
- Rain Water requirements



# Water Efficient Rating System (WERS)

- Created by RESNET (Residential Energy Services Network)
- For residential properties
- Includes landscape and irrigation provisions



# Smart Water Application Technologies

- Collaborative initiative since 2004
- Create testing protocols for irrigation equipment
  - Weather-based controllers
  - Soil moisture sensors
  - Rain sensors
  - Pressure regulating sprinklers
  - Sprinkler nozzles
  - Check valves
  - Flow sensors in process





# EPA Water Sense

- Labeling of certification programs
  - Qualifying professionals
- Weather-based controllers
- Future products
  - Pressure regulating sprinklers
  - Soil moisture sensors



# Rainwater Harvesting Standards

- ARCSA/ASPE
  - #63 Rainwater
  - #78 Stormwater
- ICC/CSA Rainwater Harvesting Systems
  - Completed first public review