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A River of Energy Solutions

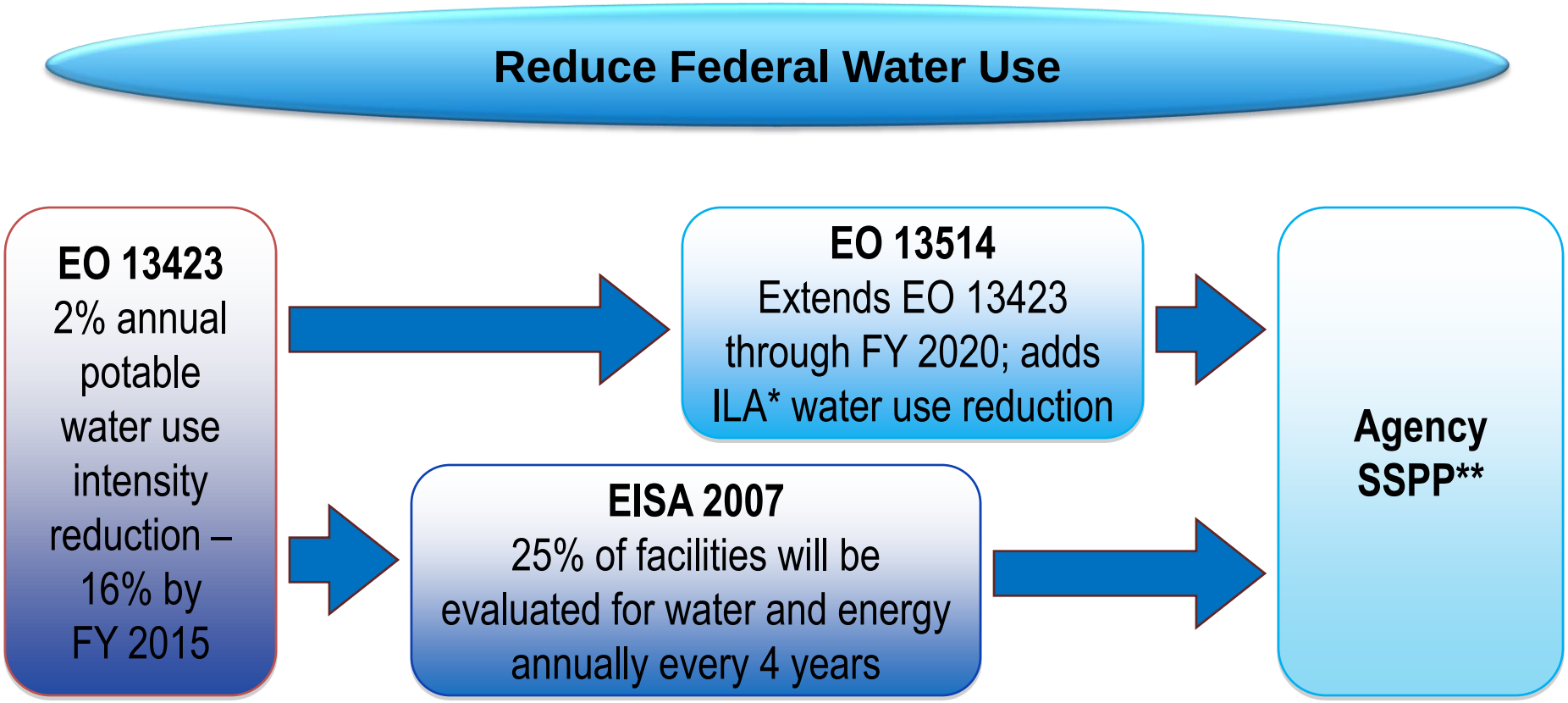
Federal Water Efficiency Requirements

Kate McMordie Stoughton – Pacific Northwest National Laboratory

Federal Energy Management Program

The mission of the Federal Energy Management Program is to facilitate the Federal Government's implementation of sound, cost-effective energy management and investment practices to enhance the Nation's energy security and environmental stewardship.

Federal Water Efficiency Legislation



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*Industrial, landscaping and agricultural
**Strategic Sustainability Performance Plan

EO 13514 Water Provisions

- **Reduce Potable Water Intensity 2% per year**
- **Reduce ILA Water Use 2% per year**
- **Implement Water Reuse**
- **Follow EPA Stormwater Guidance**

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Federal Water Use Baselines

What are agencies required to track?

Potable Water Use

Water Use Intensity Baseline
gallons/sqft

"ILA" Water Use

FY 10 [illegible]metric Water Use Baseline
gallons

Gross facility sqft – same sqft used for energy reporting

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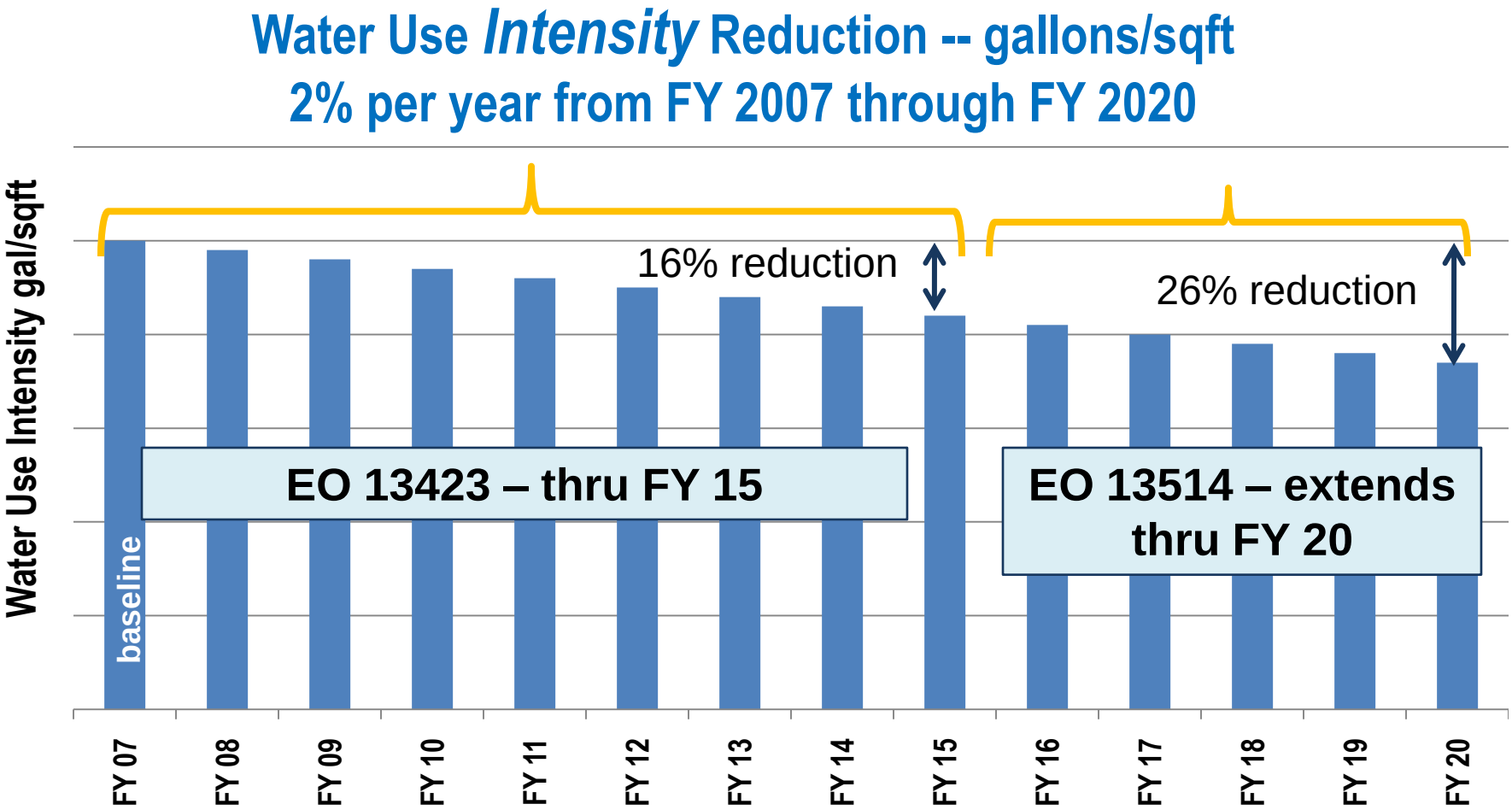
Potable Water Reduction



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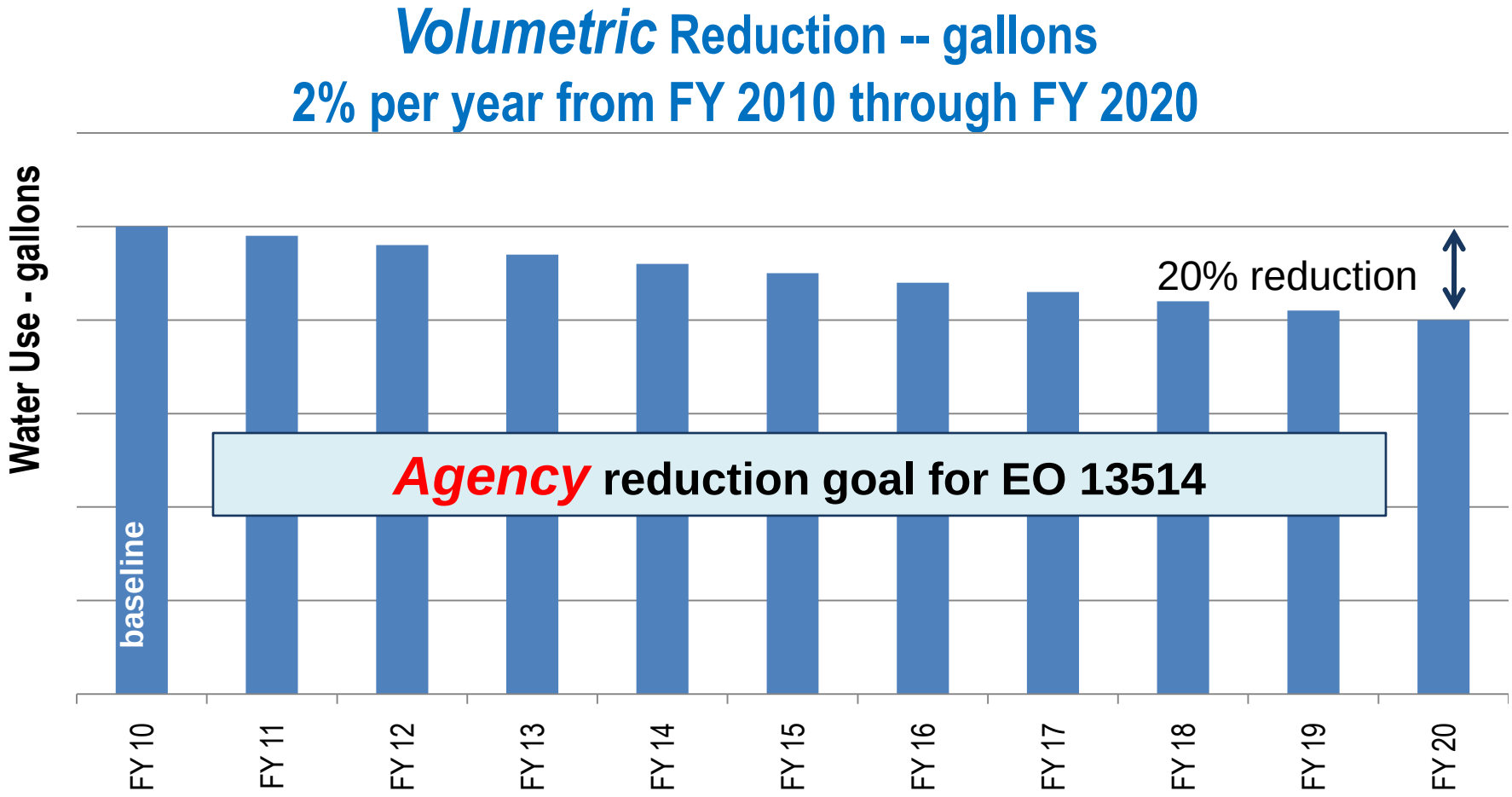
Industrial, Landscaping, and Agricultural Water Use Reduction



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ILA FY 2010 Baseline

What is the ILA FY 2010 baseline?

~~**FY 2007 Potable Water Use Intensity Baseline**~~ ***gallons***

No duplicate tracking!

FY 10 Industrial use

+

FY 10 Landscaping use

+

FY 10 Agricultural use

=

ILA Baseline

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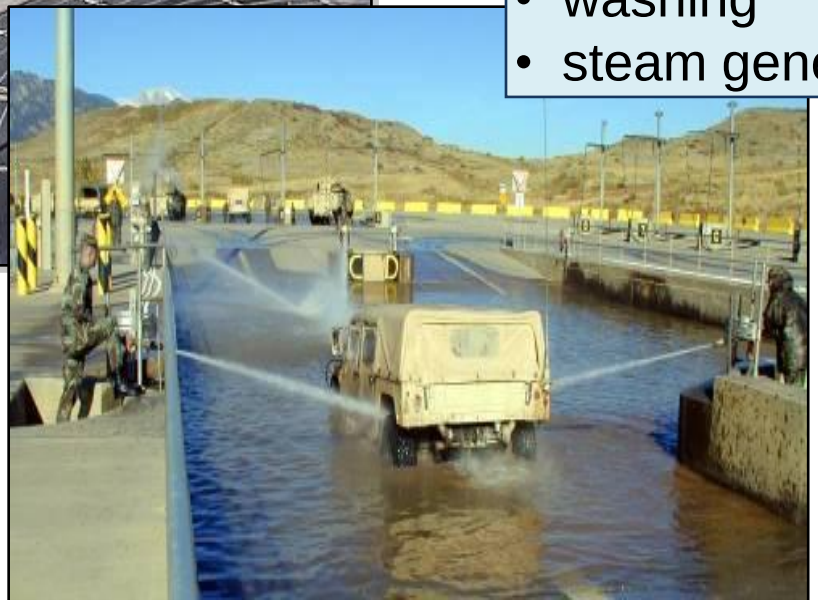
Potable vs. Non-potable

Potable: Sufficient quality and permitted for human consumption

Non-Potable: ***Not*** sufficient quality nor permitted for human consumption

Industrial Water Use



Industrial Water Use: fresh water used for the purposes of aiding in processes such as cooling, heating, washing, and manufacturing.

Examples:

- cooling tower make-up
- washing
- steam generation

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Landscaping Water Use

Landscaping: Controlled application of fresh water on outdoor spaces to supplement water requirements not satisfied by rainfall.

Examples:

- recreational and athletic fields
- parks
- golf courses
- building landscape beds

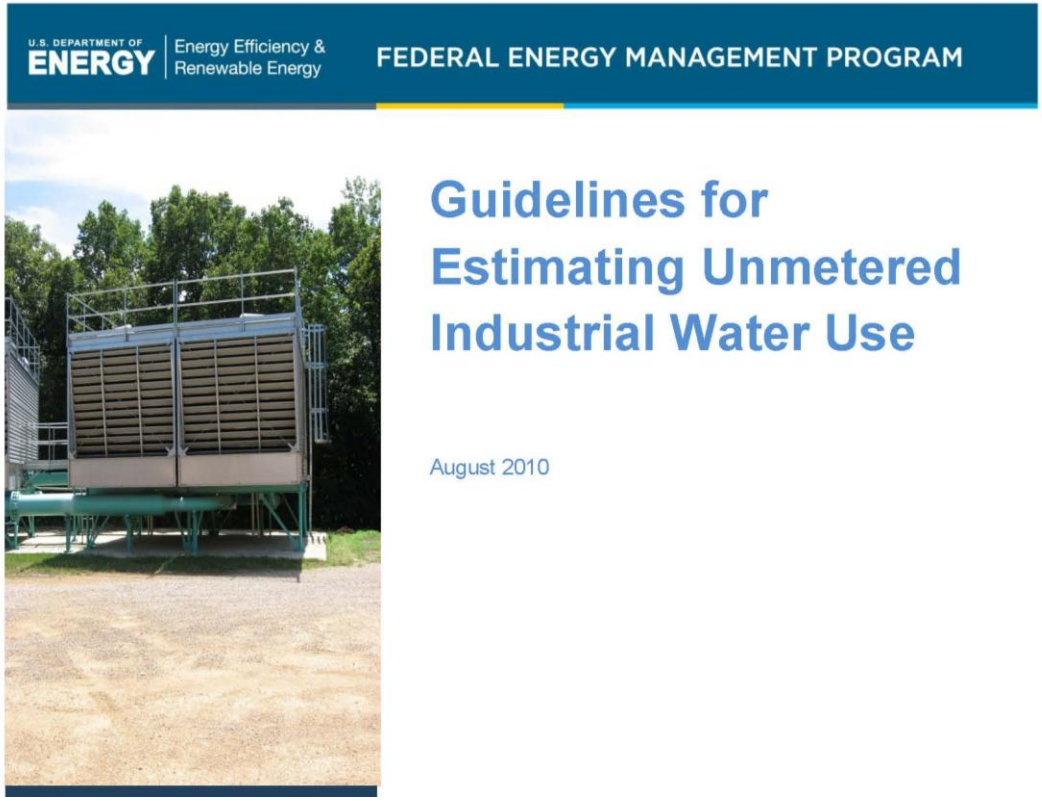
Agricultural Water Use

Agricultural Water Use:
fresh water used in production of agricultural products including food and goods through farming and forestry, related to animal and livestock operations, and agricultural research and development

Examples:
- crop irrigation
- greenhouse operations
- dairy operations
- livestock operations

ILA Water Use Estimating Techniques

- **Landscaping**: evapotranspiration method or irrigation audit
- **Industrial**: engineering estimates for open re-circulating cooling, steam, and wash systems



Find documents at:

http://www1.eere.energy.gov/femp/program/waterefficiency_baseline.html

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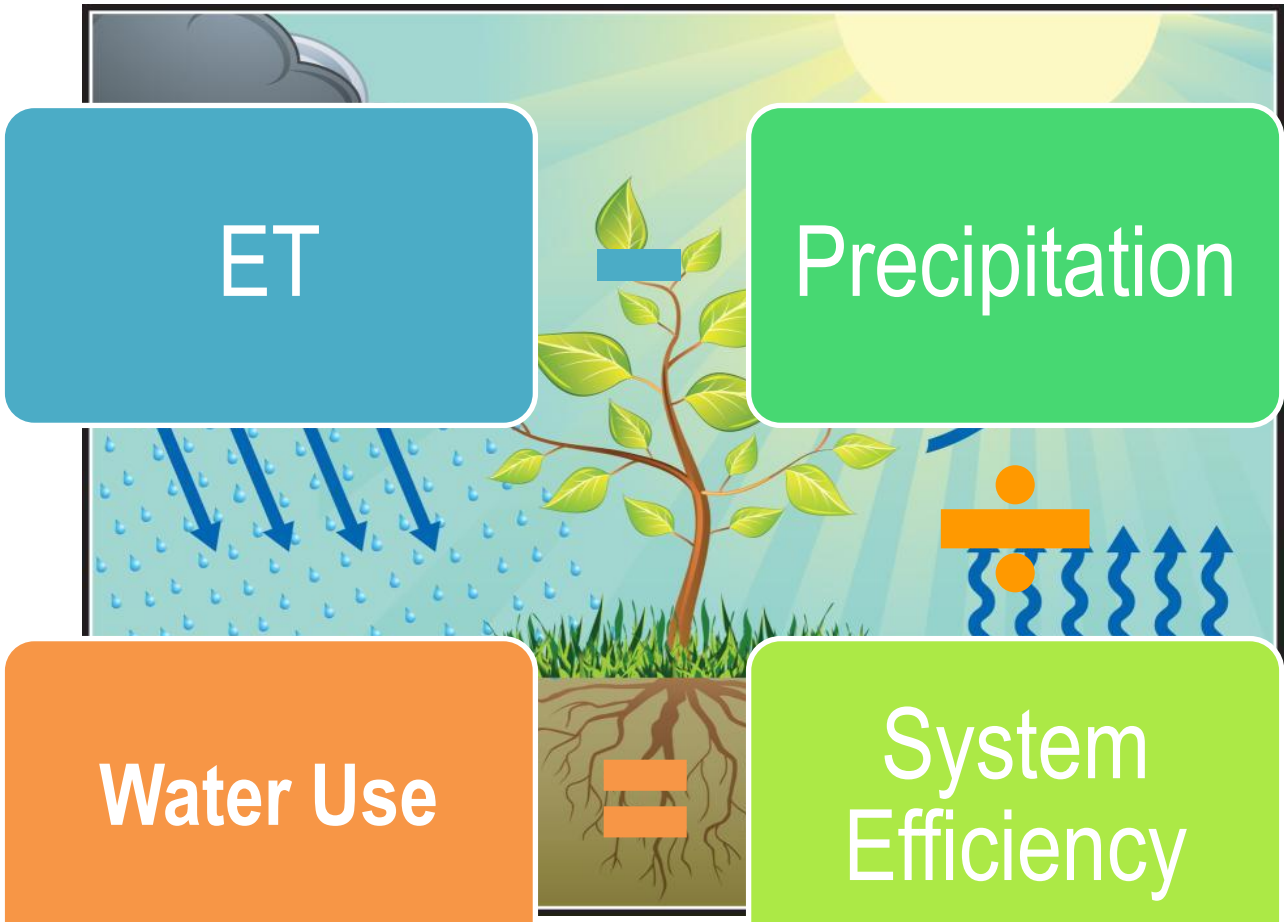
Estimating Landscape Irrigation



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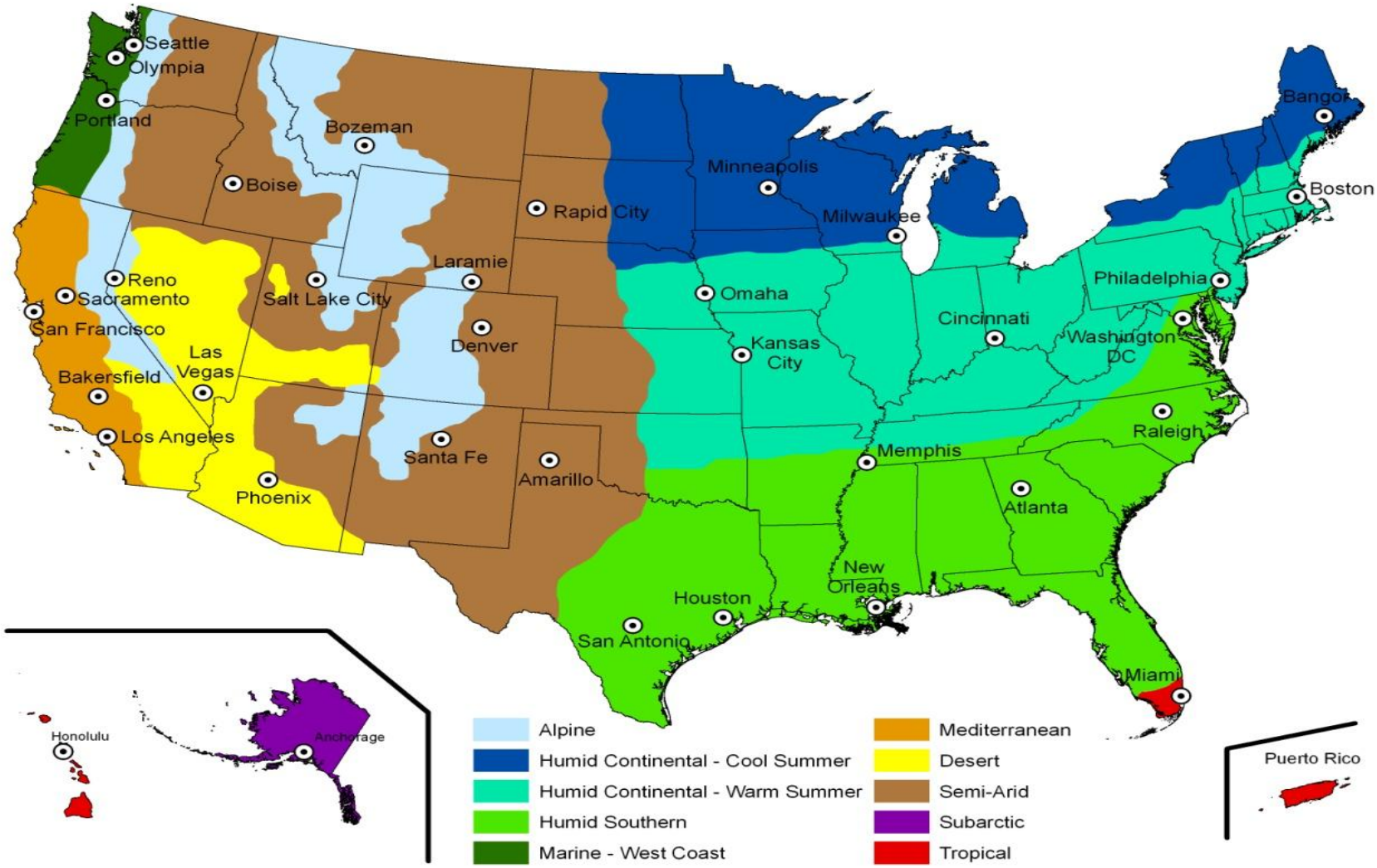
Estimating Landscape Irrigation



Estimating Landscape Irrigation

Irrigation Audit Method

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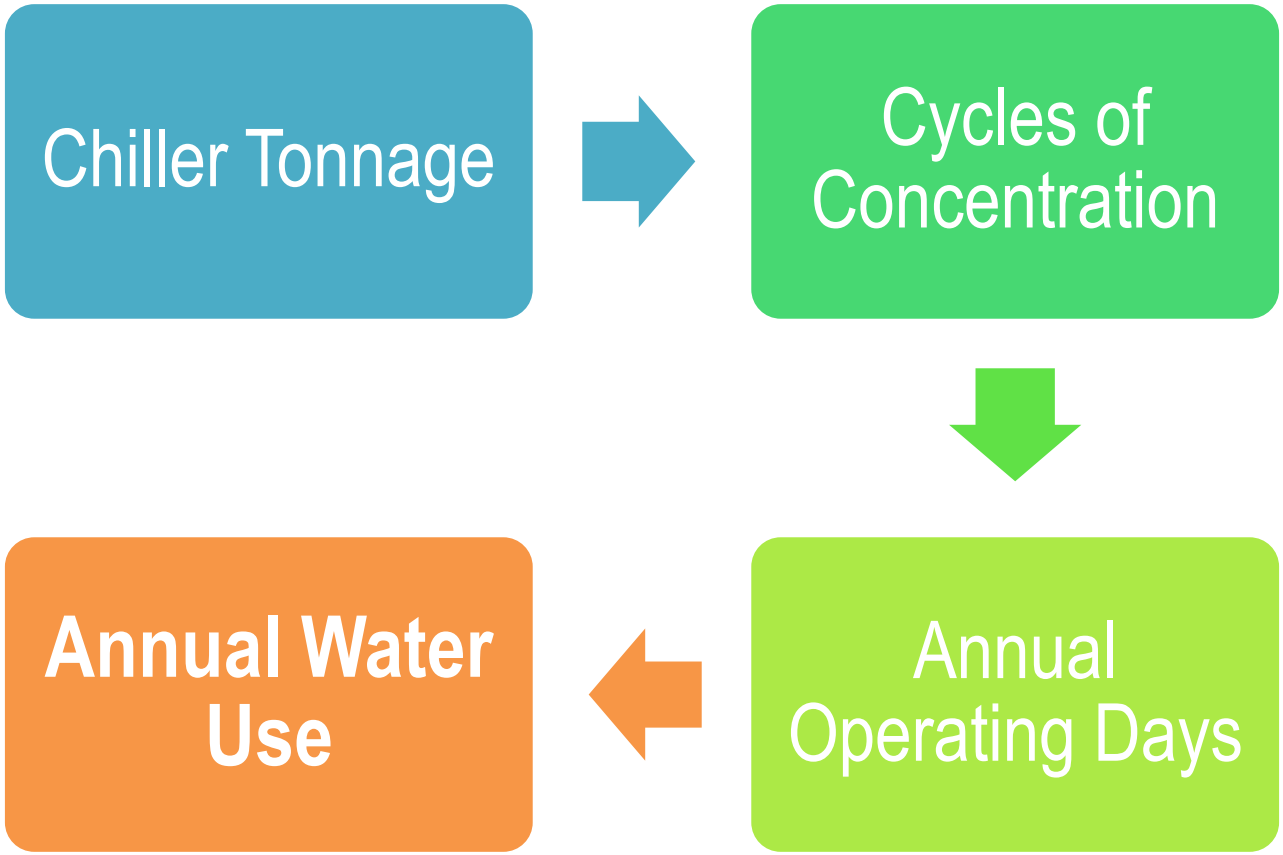
Estimating Industrial Water Use

Open Re-Circulating Cooling Systems



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Exemptions

Exemptions covered in Section 18 of Executive Order

Exemptions granted to:

- National intelligence
- National security
- Law enforcement
- Emergency response

For all other activities, Federal agencies must submit formal request for exemptions to the Chair of the Council On Environmental Quality (CEQ)

Water Reuse -- Terms

Alternate Water	• Sources of non-potable water other than freshwater surface and groundwater; typically on-site but may include outside sources
Recycle	• Discharge water from an application or process being used again in the same application (closed loop)
Onsite Reuse	• Discharge water from one application or process that is captured, minimally treated, and is utilized in another application
Reclaim	• Effluent generated by a wastewater treatment facility that is treated to a level that is appropriate for use in non-potable uses (can also be called “recycled water”)

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Water Reuse Examples & Applications

- Rainwater Harvesting
- Gray water
- Condensate Capture
- Process Discharge
- Wastewater Reclaim

Applications

- Irrigation
- Cooling Tower Make-up
- Toilet/Urinal Flushing
- Vehicle Wash
- Industrial applications

Water Reuse

Gray Water Reuse

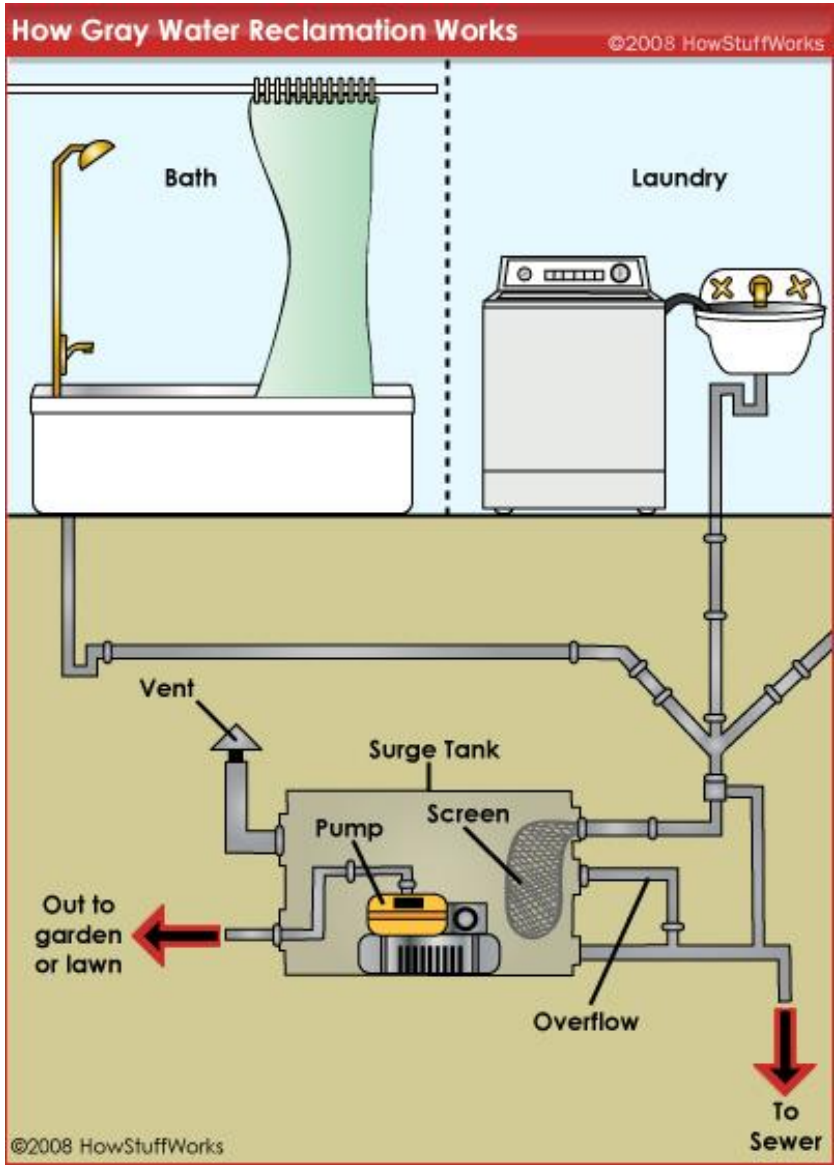
- Lightly contaminated water from domestic uses such as faucets, showers, and laundry

It *DOES NOT* include water contaminated with human waste or food:

Toilet & urinal water

Dishwashers

Kitchen sinks

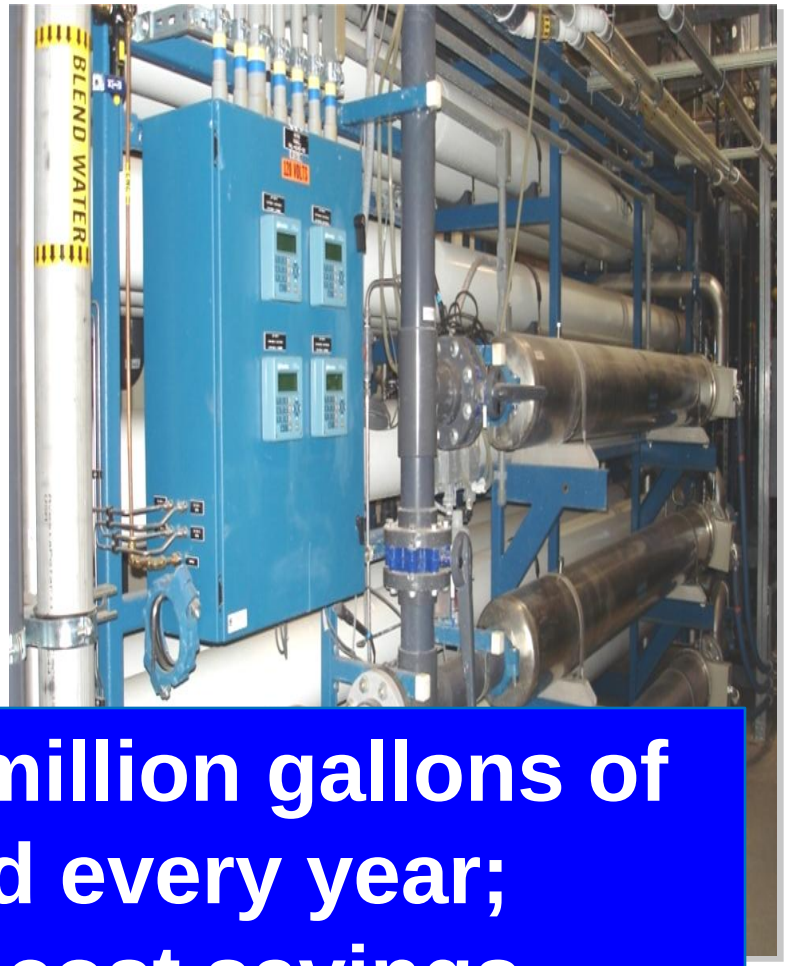


Water Reuse – Case Study

Recycle & Onsite Reuse

Sandia National Laboratory – Microelectronics Plant, NM

- Recycles spent rinse water in high efficiency reverse osmosis (HERO) system
- Reuses water from RO in cooling towers and scrubbers



Results: over 80 million gallons of water recycled every year; $160K annual cost savings

Water Reuse – Case Study

Onsite Reuse

Pacific Northwest National Laboratory – Washington

- Reuses cooling pond water for irrigation

Results: 15 million gallons of reduced fresh water use annually; $30K annual cost savings from reduced wastewater

Water Reuse – Case Study

Onsite Reuse:

Condensate Capture

EPA - Georgia

- Condensate is captured from AHUs and reused for cooling tower make-up

Results: 540,000 gallons captured in first year; duplicated project at other sites saving 3.3M gallons annually

Water Reuse – Case Study

Reclaim

Fort Carson, Colorado

- Reclaims wastewater effluent from treatment plant to irrigate golf course

Results: 100 million gallons of reduced potable water use annually; $215K annual cost savings

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Where to get more information

Water Reclaim Fact Sheet:
Step by step guide on how to get started on a water reclaim project

http://www1.eere.energy.gov/femp/program/waterefficiency.html


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FEDERAL ENERGY MANAGEMENT PROGRAM

Methodology for Use of Reclaimed Water at Federal Locations

A traditional use of reclaimed water is irrigation. Using native plants such as these with irrigating with reclaimed water will reduce a site's potable water and water demand in general.

The supply of freshwater has become a resource of concern on a global scale, whether because of future availability or

Water can be reused in three main ways:

1. Water Recycle: Discharge water from an application or process is

There are other legislative acts that Federal sites must comply with that do not delineate water reuse as a water source. To learn

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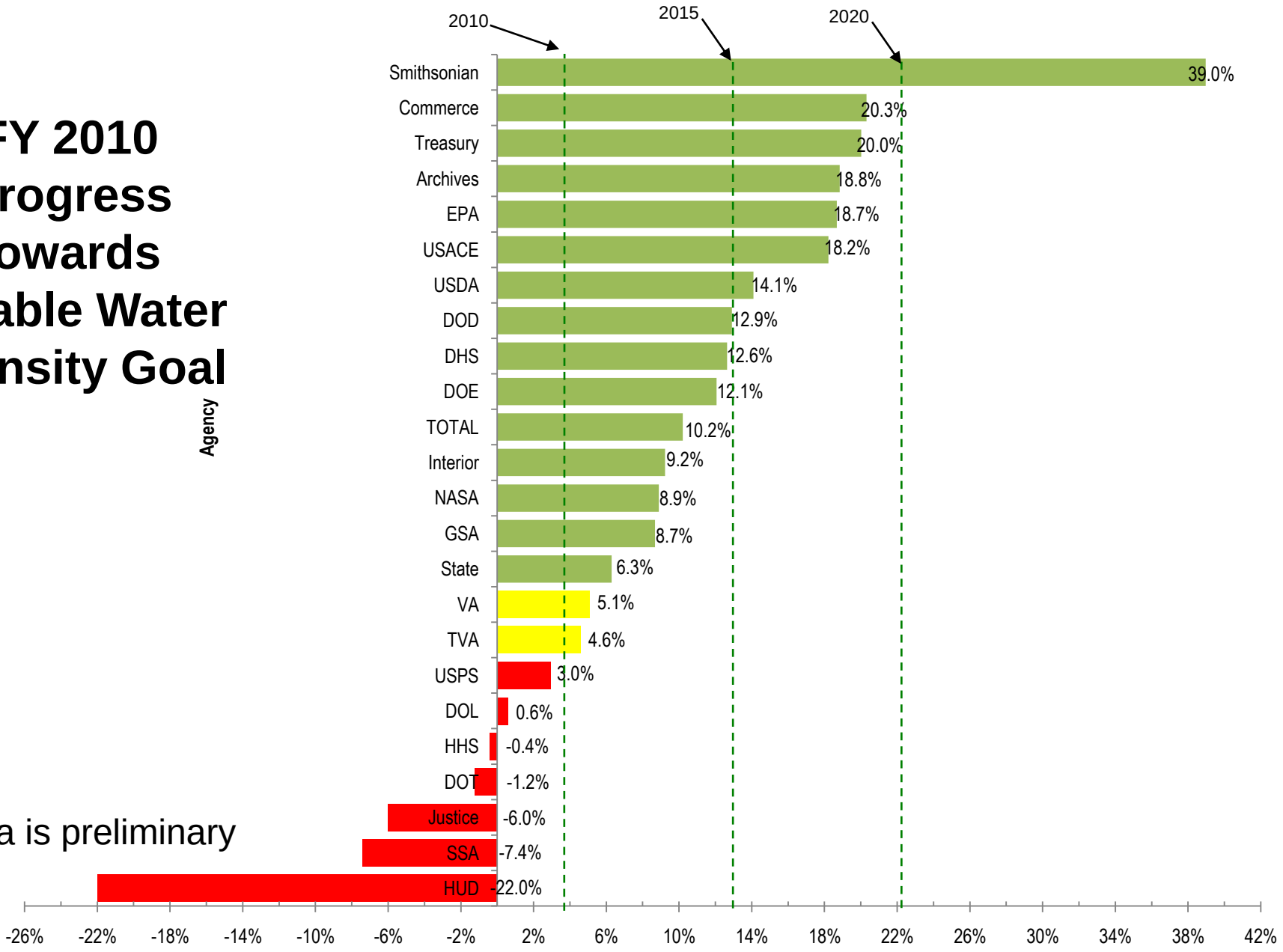
How is the Federal Government doing so far?

FY 2010 Progress towards Potable Water Intensity Goal



Data is preliminary

FY 2010 Reductions in Gallons per Square Foot from FY 2007

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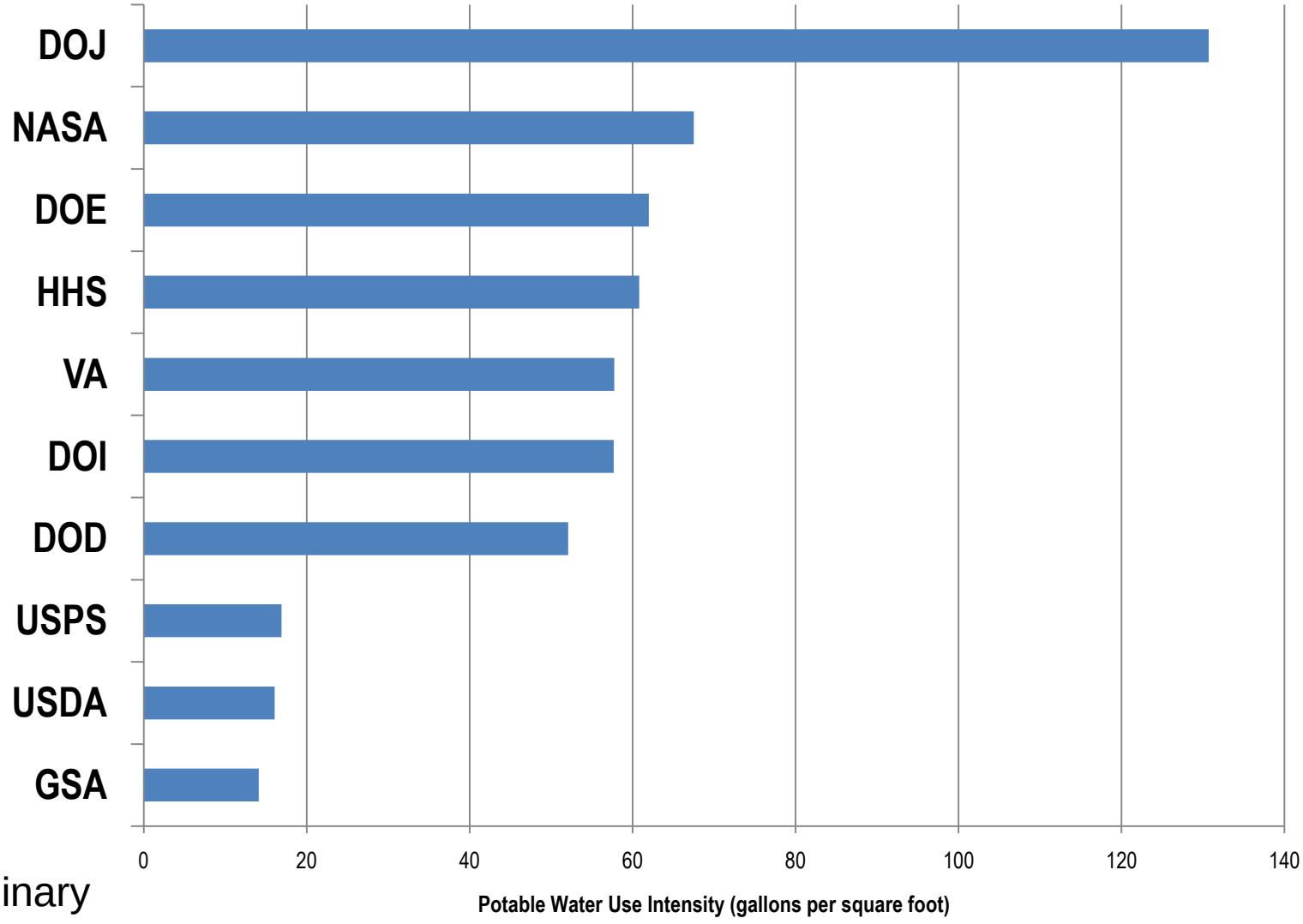
FY 2010 Federal Potable Water Use Intensity



Data is preliminary

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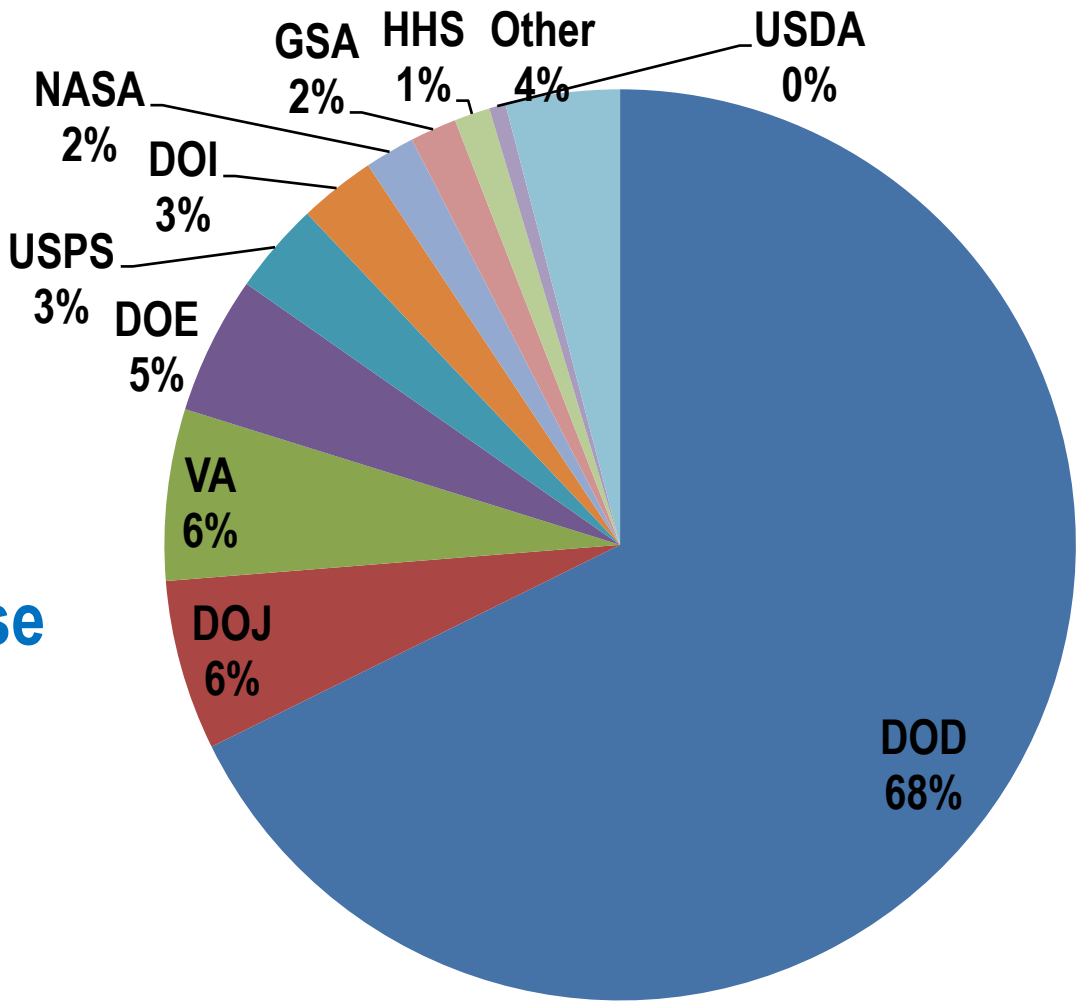
FY10 Federal Potable Water Use



Data is preliminary

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Where to get more information

FEMP:

http://www1.eere.energy.gov/femp/program/waterefficiency.html

- Federal directives and guidance
- Best management practices
- Training
- Resources
- Case Studies

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Web-Based Water Management Training

http://femptraining.labworks.org/

- Policy
- Planning
- Auditing
- Water efficient technologies
- Metering
- Project economics

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FEMP's Best Management Practices:

1. Water Management Planning
2. Information and Education
3. Leak Detection
4. Water-Efficient Landscape
5. Water-Efficient Irrigation
6. Toilets & Urinals
7. Faucets & Showerheads
8. Boiler/Steam Systems
9. Single Pass Cooling
10. Cooling Towers
11. Commercial Kitchens
12. Lab/Medical Equipment
13. Other Intensive Equip.
14. Alternate Water Sources

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Questions?

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GSA's Implementation of Water Management

- Setting the Baseline
- GSA's SSPP
- P100
- EISA sec. 438 implementation

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Setting the baseline

- GSA Owned – 1,530
- GSA Leased – 8,094
- Gross Square Footage – 414 million

- Full service leases - excluded
  460 buildings and 25.1 millions s.f.
- Only 173 million s.f. paid directly to utility

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Setting the baseline

2010

14.1 gallons/GSF

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Goal 2
Scope 3 GHG Reductions
Reduce 14.6% below 2008 levels

- By 2020, Contracted wastewater reductions of 5% per 2008 levels

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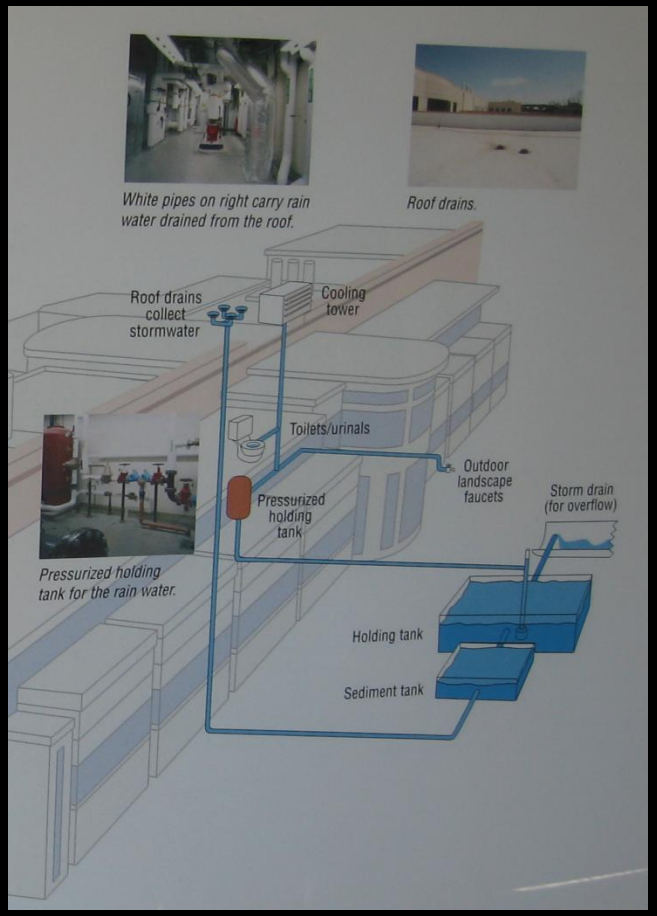
Goal 3
Sustainable Design, Green Buildings, and Local Planning

- 18% of inventory to meet Sustainable Guiding Principles
- 12 items for the Green Proving Ground
- Tenant E-Communication Handbook in 27 FB.



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Goal 3
Green Proving Ground

- Non-chemical Water Treatment
- Living Machine
- Membrane Bio-Reactor

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Goal 4
Water Use Efficiency and Management

- By 2020, Reduce interior water by 26% per 2007 baseline
- By 2020, Reduce exterior water by 20% per 2010 baseline

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Goal 4
Implementation Methods

Water management best practices

- **Update routine maintenance procedures**
- **Optimize irrigation equipment, scheduling, and plant health and selection**
- **Audit facilities with single-pass cooling systems and retrofit equipment to a closed-loop system that reuses potable water**

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Goal 4
Implementation Methods

Funding to water conservation projects

Increase Water Evaluations

- **Conduct water evaluations**
- **By 2012, advanced meters in all ARRA projects**
- **Integrate evaluations and meter data into decision making**

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P100
Facility Standards

- Follow local regulations
- LEED GOLD
  - Water use reduction of 20%
  - Landscape reduction of 50%
  - Stormwater quantity
  - Stormwater quality
- 25 year storm design
- EISA sec. 438

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P100
Site Best Practices

- Rainwater harvesting
- Permeable pavements
- Gray water for irrigation
- Utilize low impact development
- Utilize the ISBMP
- Nonpotable water for water features

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P100
Facility Standards

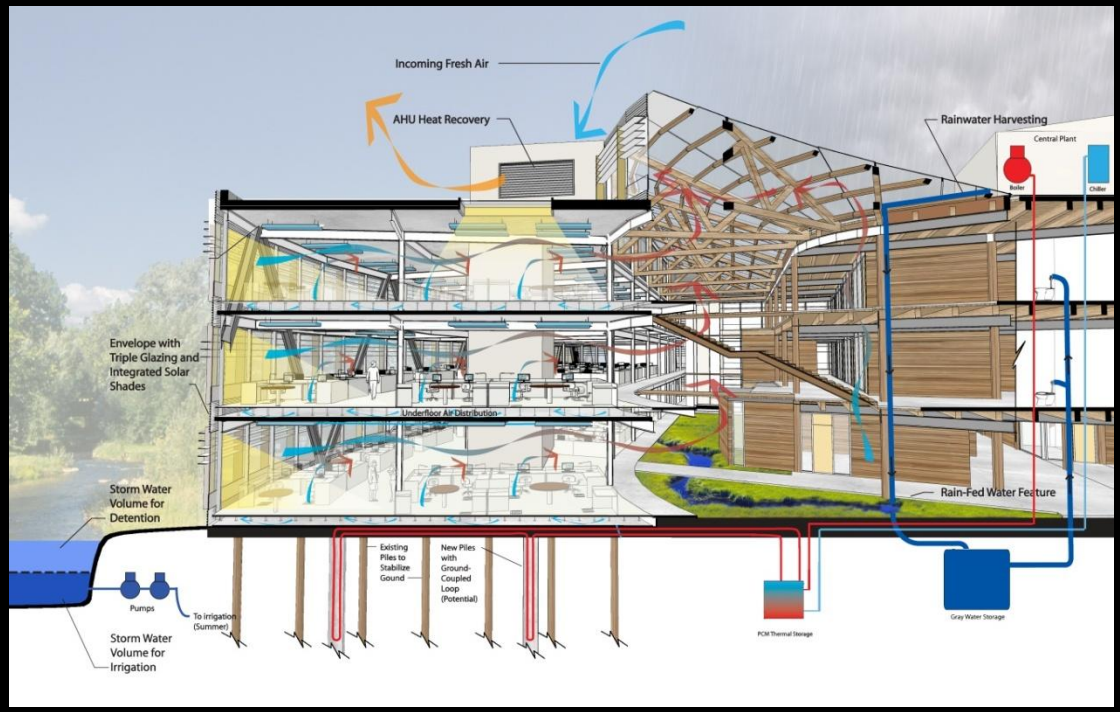
Irrigation

- Use non-potable where feasible
- Use rain sensors or moisture sensors for irrigation
- Use zones for irrigation
- Timed automatic controls
- Smart controller with evapotranspiration and weather data
- Commission system
- Design for expansion

P100
Facility Standards

Mechanical

- Condensate reuse
- Waterside economizers
- Smart water meters - potable, reclaimed, rainwater
- Submeters
- EPA Watersense



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EISA sec. 438

Designing excellence into water management

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Era of the Big Basin

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Example 95th Percentile Storms

City	95th Percentile Event Rainfall Total (in)	City	95th Percentile Event Rainfall Total (in)
Atlanta, GA	1.8	Kansas City, MO	1.7
Baltimore, MD	1.6	Knoxville, TN	1.5
Boston, MA	1.5	Louisville, KY	1.5
Buffalo, NY	1.1	Minneapolis, MN	1.4
Burlington, VT	1.1	New York, NY	1.7
Charleston, WV	1.2	Salt Lake City, UT	0.8
Coeur D'Alene, ID	0.7	Phoenix, AZ	1.0
Cincinnati, OH	1.5	Portland, OR	1.0
Columbus, OH	1.3	Seattle, WA	1.6
Concord, NH	1.3	Washington, DC	1.7
Denver, CO	1.1		

The challenge:

make this…

…function like this

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Managing Rain with Natural Designs








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Bioretention

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Raingardens

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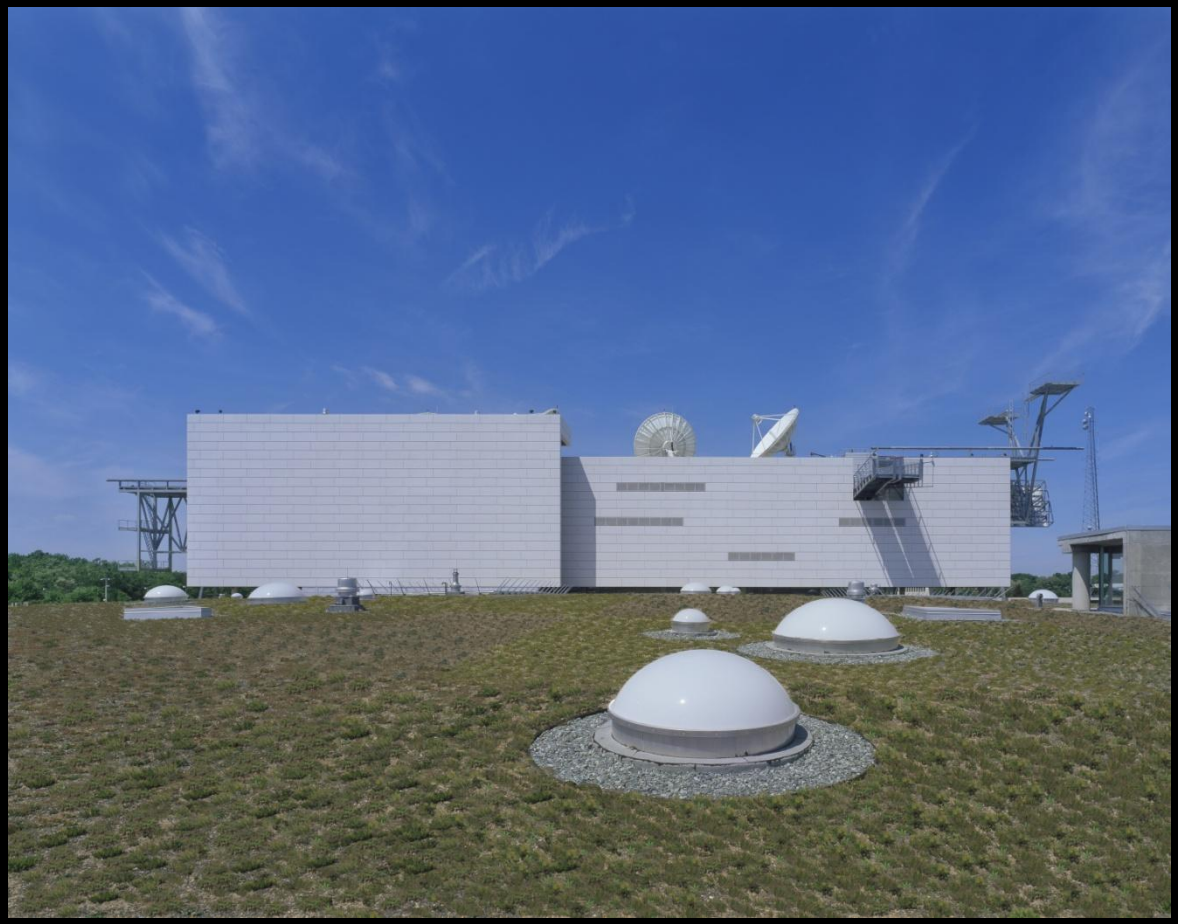
Planters

Planted Roofs



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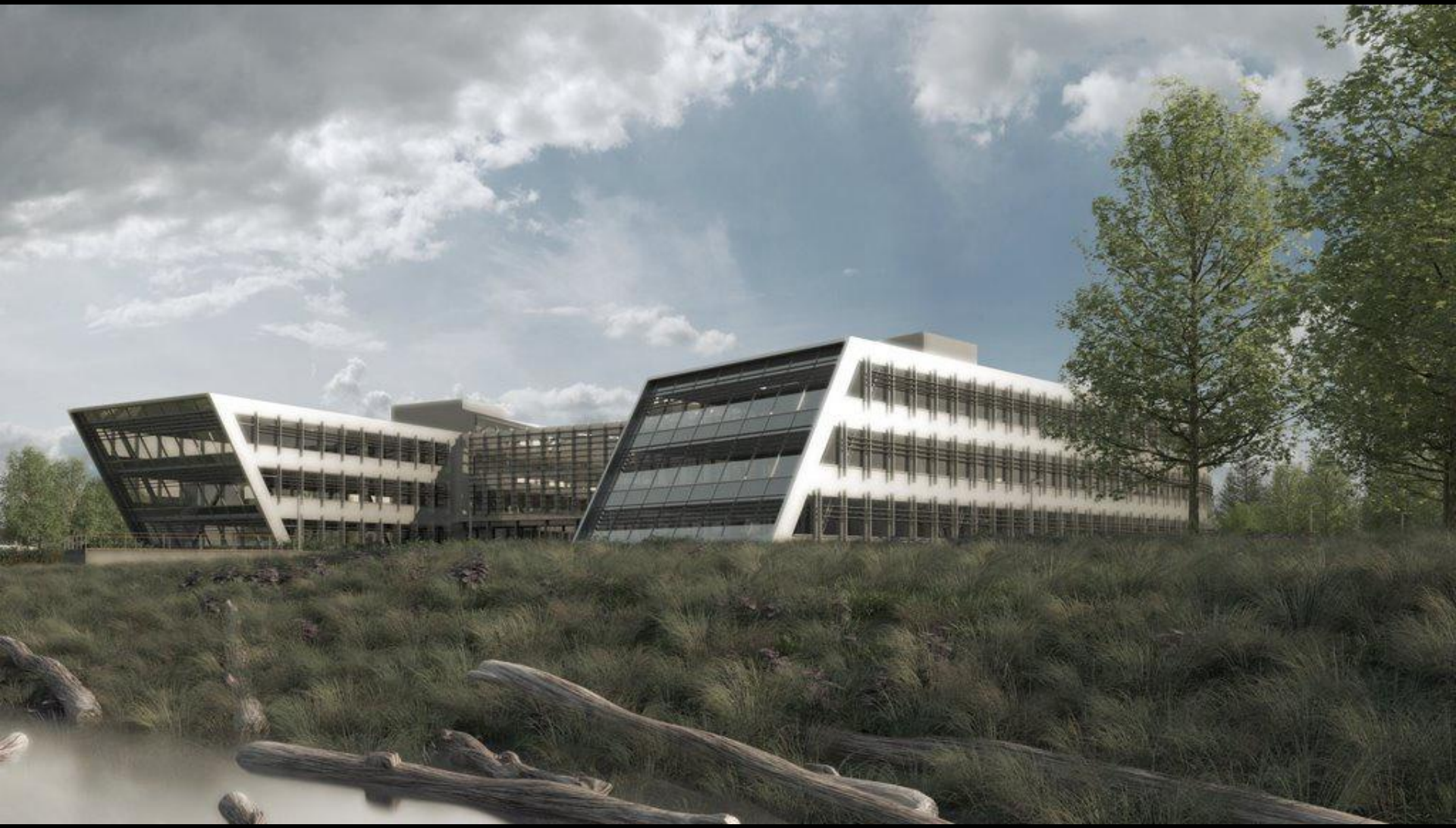
Plan for good design



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Questions?

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