



The Premier Energy Training Workshop
and Trade Show for Federal Agencies

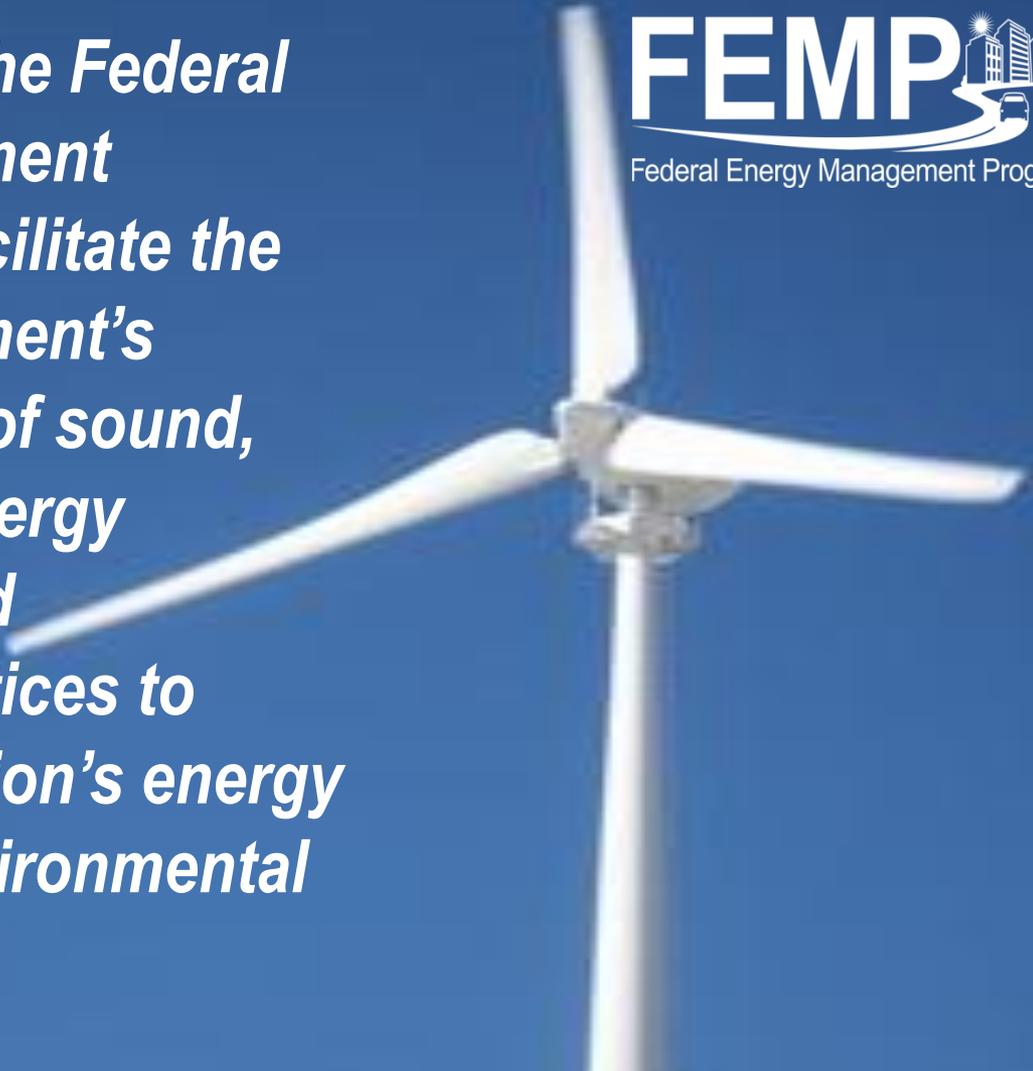
A River of Energy Solutions

Water Efficiency & Sustainability

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.

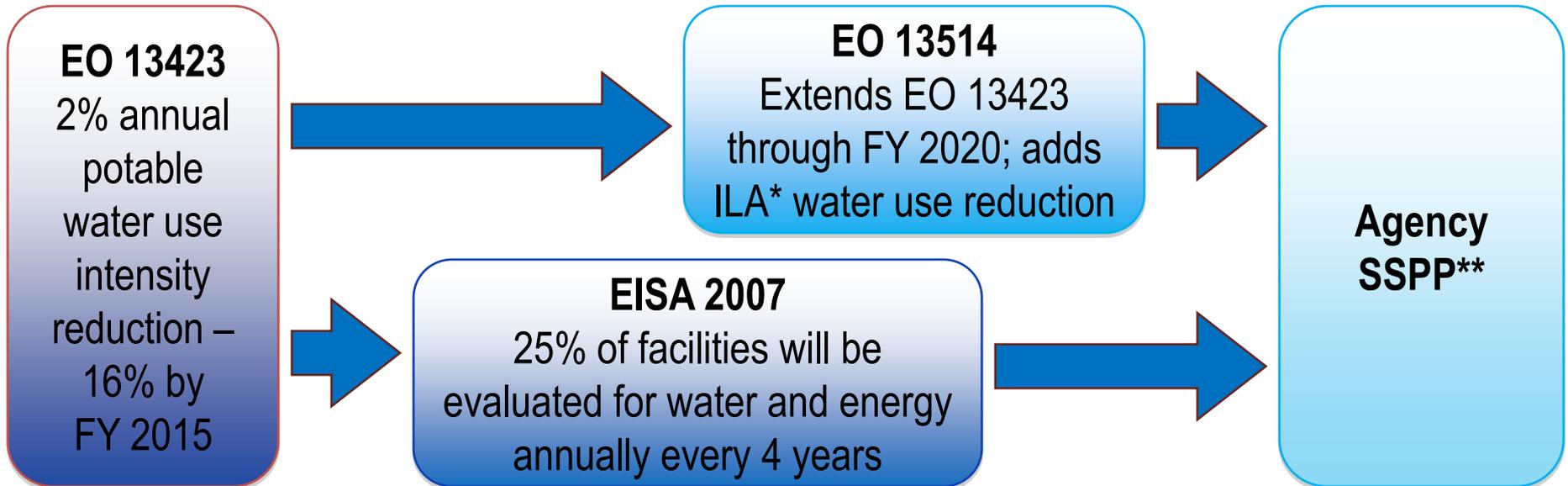


Presentation Agenda

- 1 • Legislative Overview
- 2 • Sustainable Water Management
- 3 • Water Assessments
- 4 • Sustainable Water Supplies
- 5 • Sustainable Codes and Standards for Water Efficiency
- 6 • Where to get more information

Federal Water Efficiency Legislation

Reduce Federal Water Use



2007

2009

→ Present

EO 13514 Water Provisions

Reduce Potable Water Intensity 2% per year

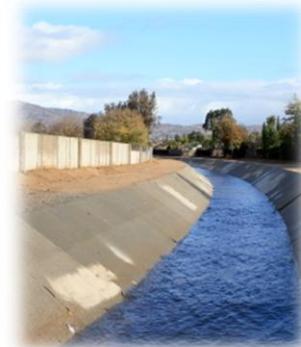


Reduce ILA Water Use 2% per year



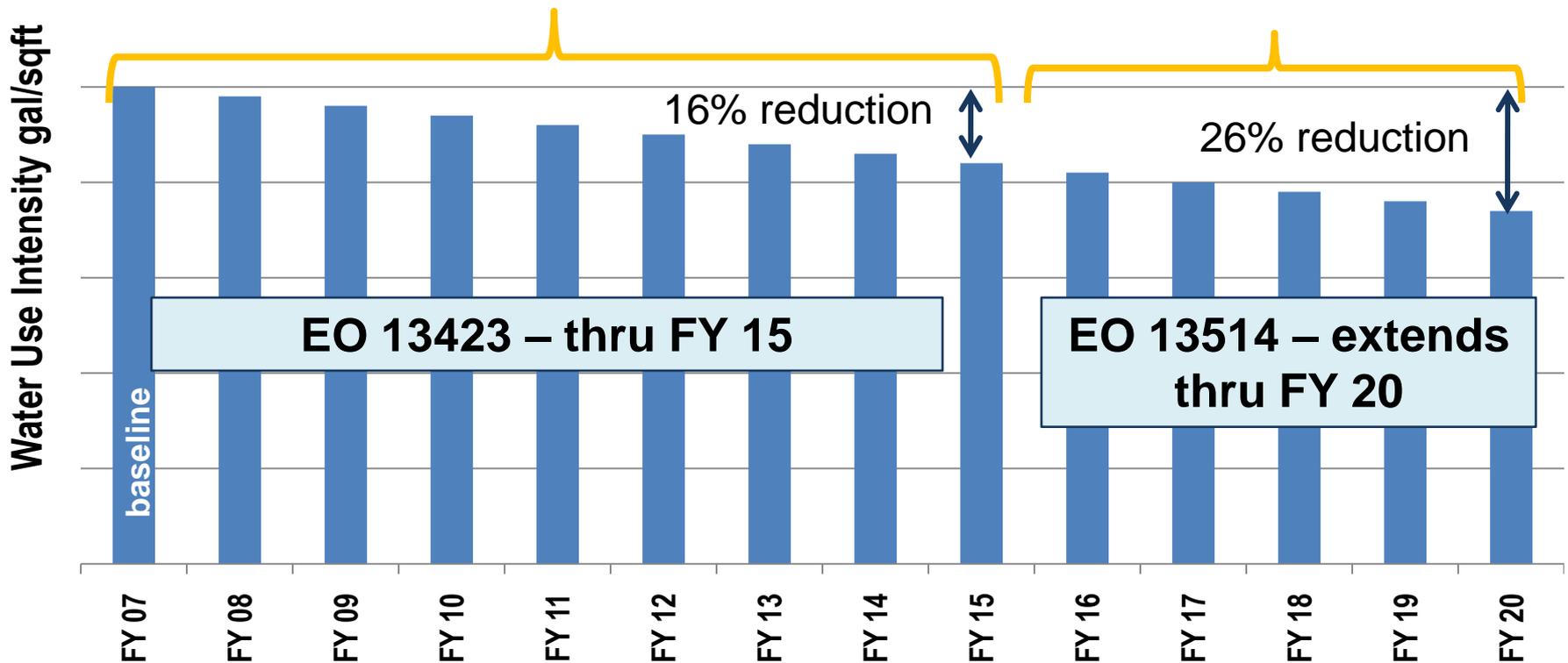
Implement Water Reuse

Follow EPA Stormwater Guidance



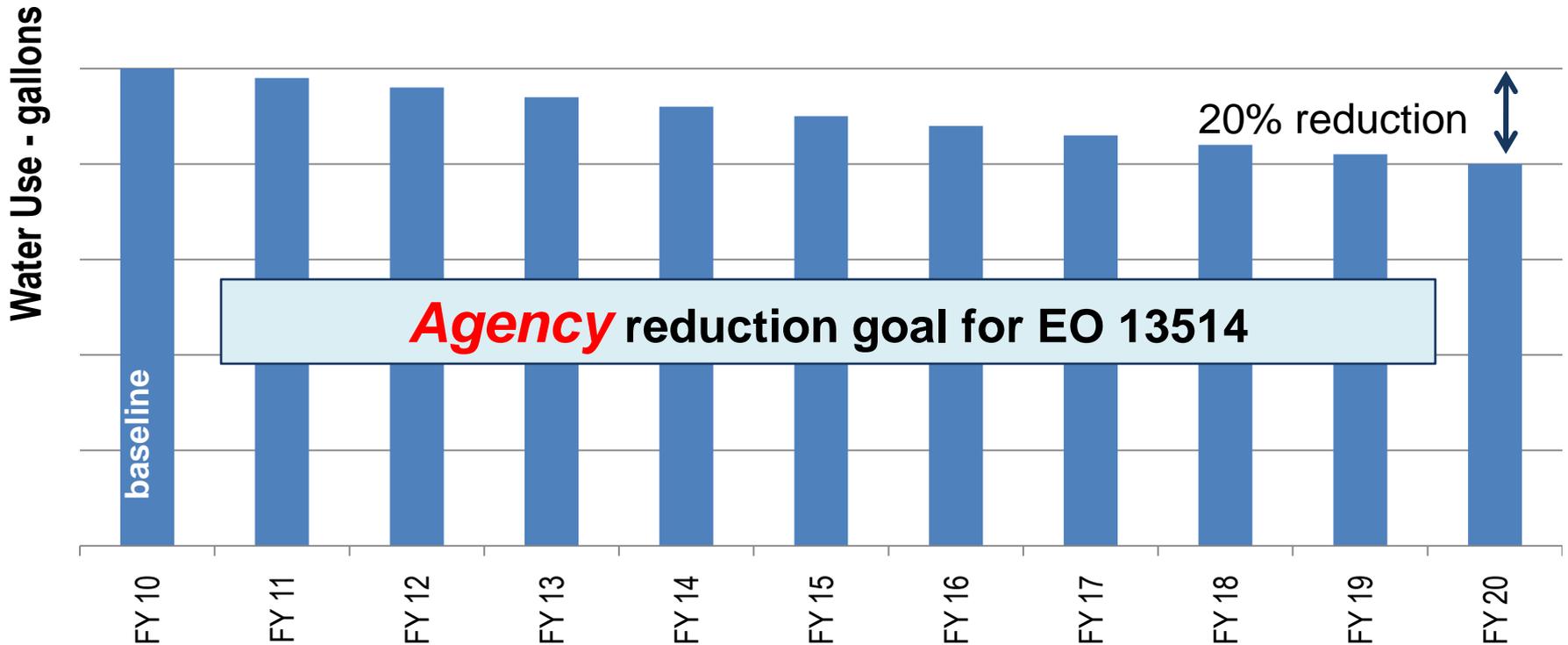
Agency Potable Water Reduction

Water Use *Intensity* Reduction -- gallons/sqft
2% per year from FY 2007 through FY 2020

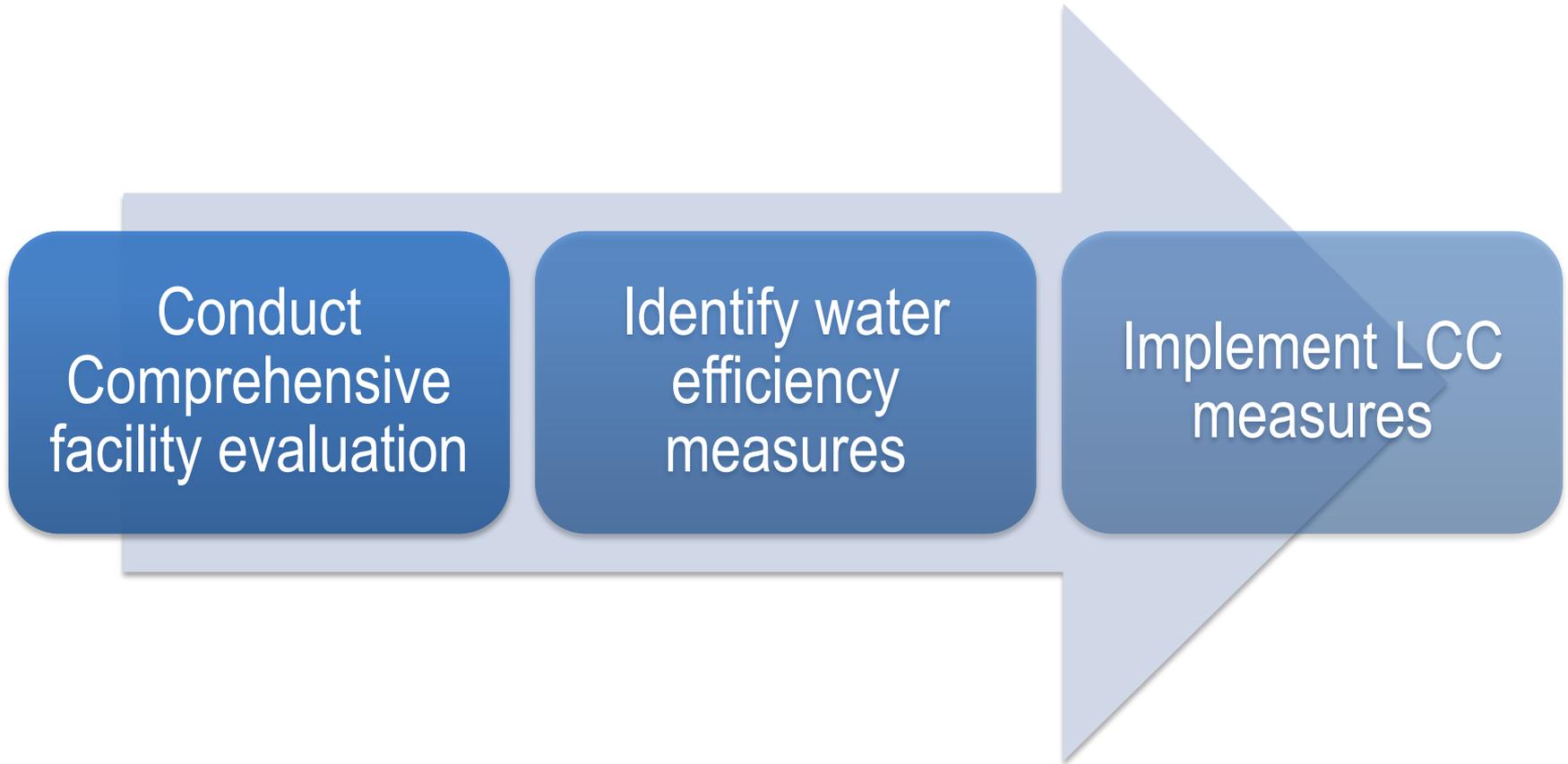


Agency Industrial, Landscaping, and Agricultural Water Use Reduction

Volumetric Reduction -- gallons
2% per year from FY 2010 through FY 2020



EISA 2007 – Water Evaluations



Sustainable Water Management

What is the goal?



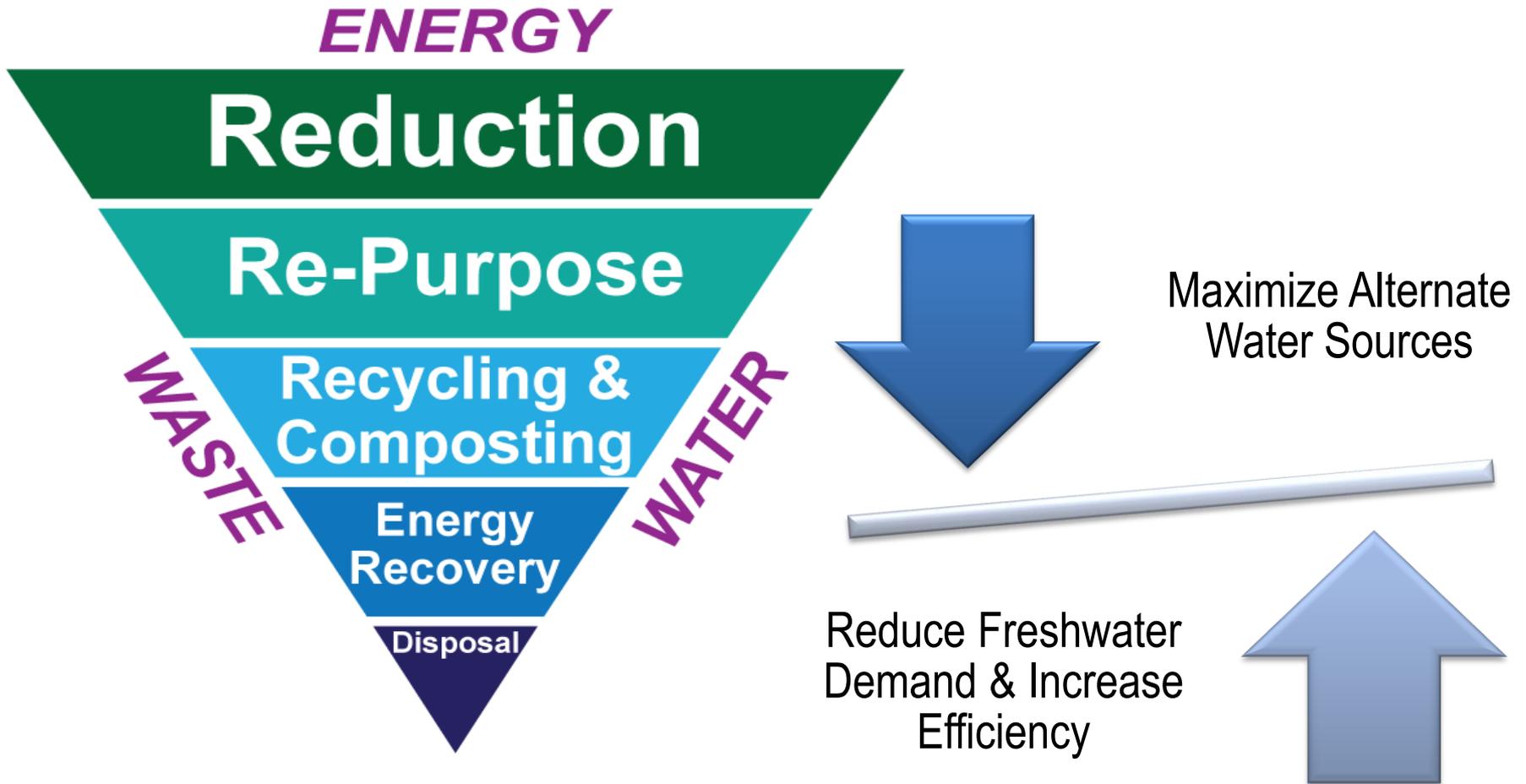
Sustainable Framework: *Net Zero Water*

Living Building Challenge Example

100% captured precipitation or,

Closed loop water systems that account for downstream ecosystem impacts and are properly purified without the use of chemicals

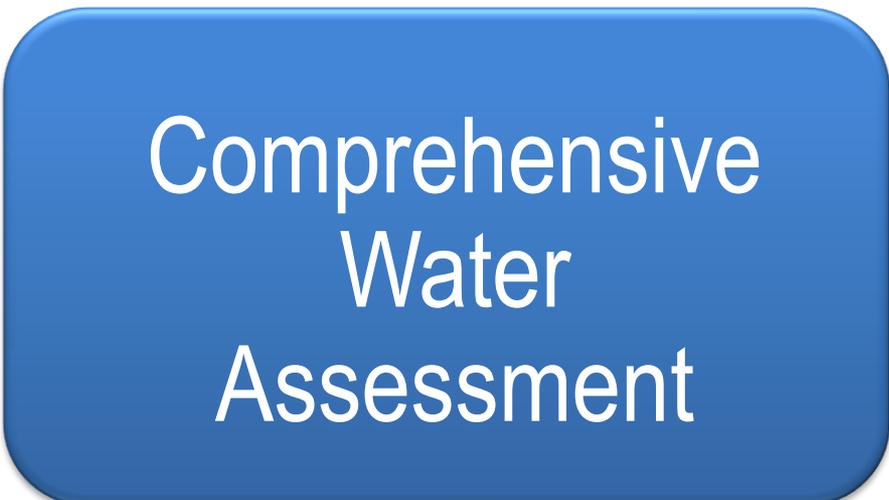
Net Zero Water – Army Example



Water Management Planning



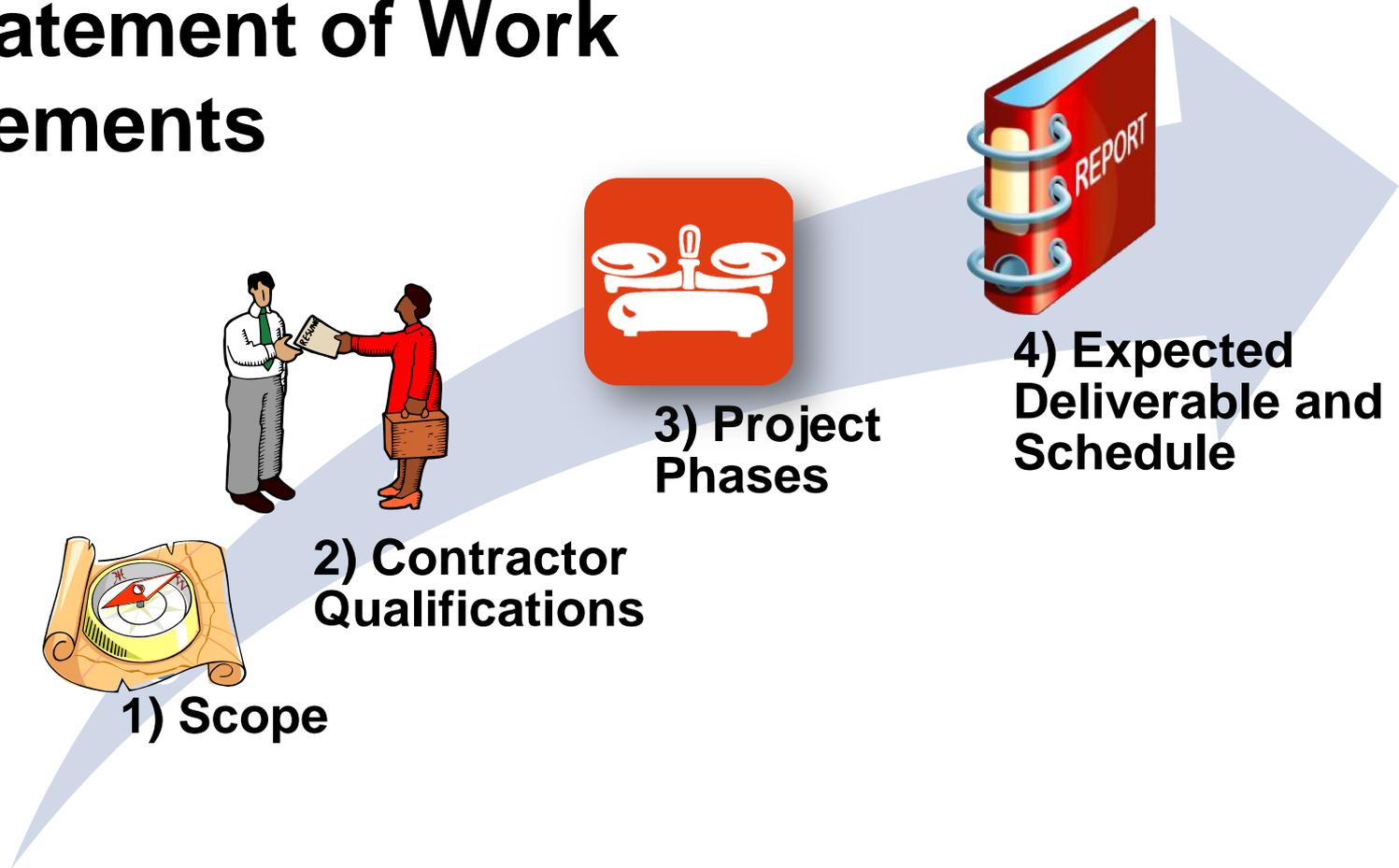
How do we
get there?



Comprehensive
Water
Assessment

Water Assessments

Statement of Work Elements



Water Assessments Project Phases

Phase I: Background Development and Preparation



Phase II: Walk-Through Audits

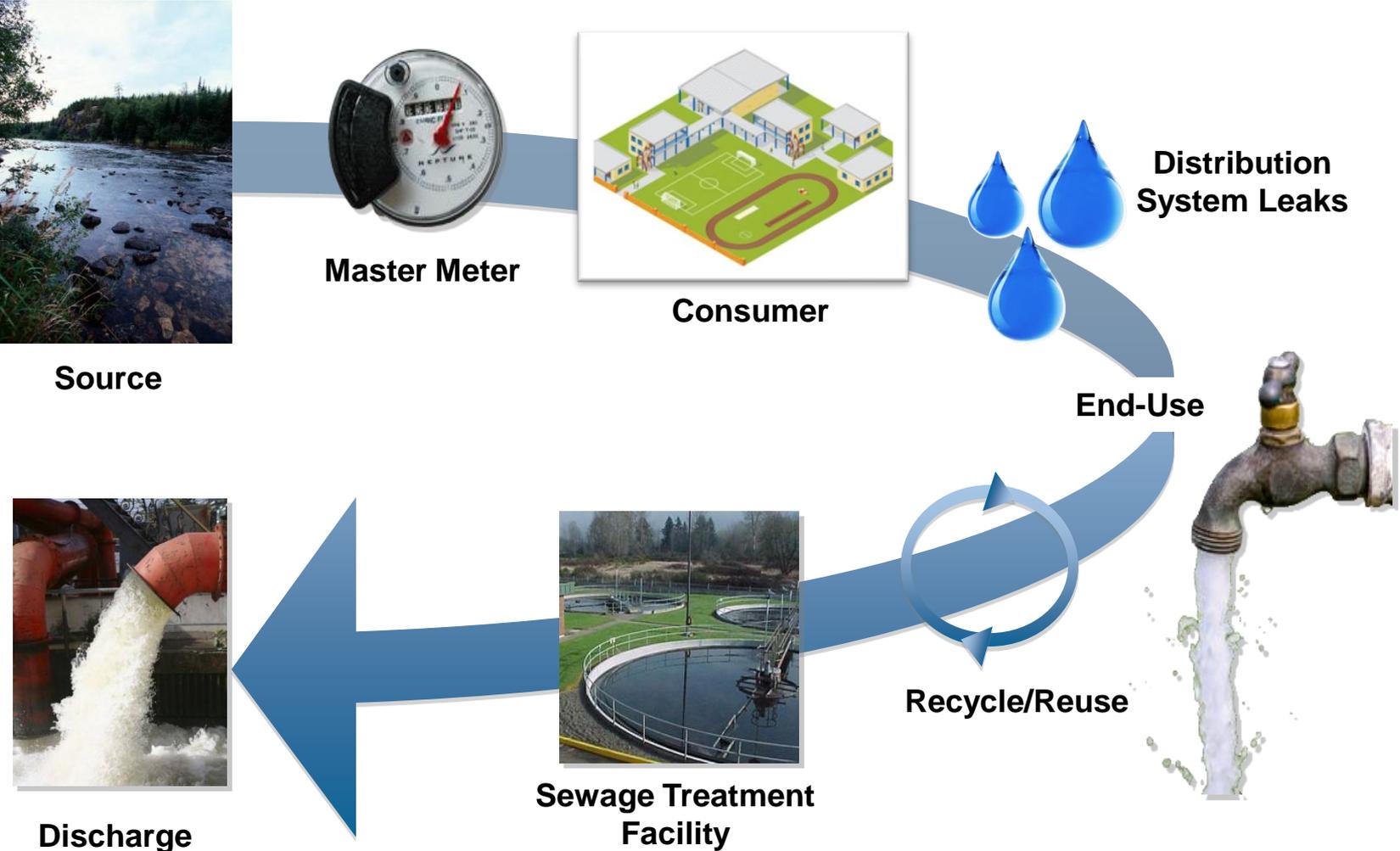


Phase III: Water Balance Development

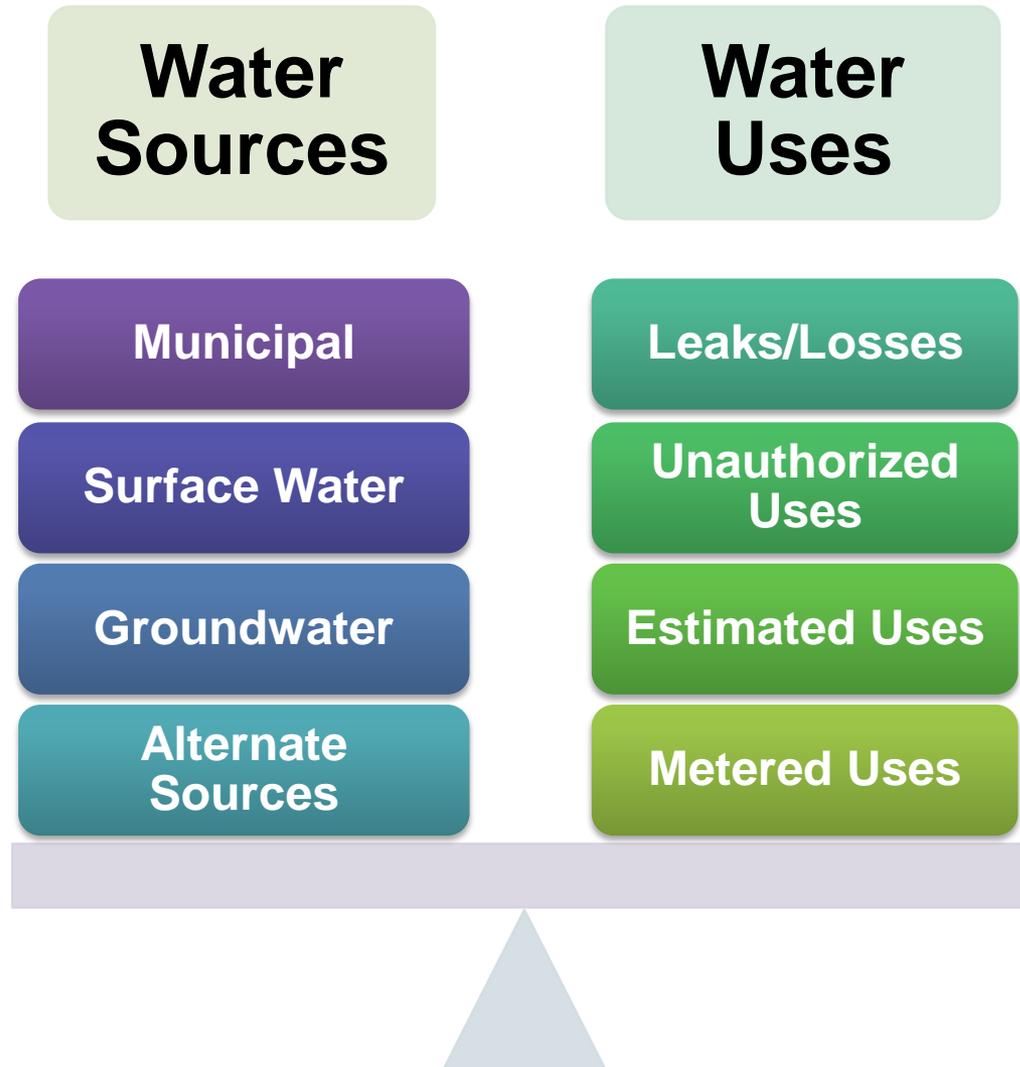


Phase IV: Water Efficiency Investigation and Economic Analysis

Facility Water Cycle



Water Balance



Y-12 Potable Water Distribution System

1,383,708 kgal (7 year historic average)

 Water Sources

Misc. Usage Unaccounted

224,161 kgal

Distribution System Leaks

55,348 kgal

Domestic Usage

(Plumbing, Kitchen Equipment, Janitorial, etc.)

49,833 kgal

Once-thru Process Cooling

477,426 kgal

Steam Plant

203,121 kgal

Cooling Tower Make-up

266,533 kgal

Once-thru Space Cooling

23,220 kgal

Irrigation

479 kgal

Demineralized Water

72,793 kgal

Boiler Blow-down

8,415 kgal

RO Reject

43,283 kgal

Evaporation

107,255 kgal

Steam Production

151,423 kgal

Process/Chiller Cooling

72,007 kgal

CT Blow-down

71,503 kgal

Basin Leaks/Overflow

15,768 kgal

Augmentation Water

1,593,444 kgal

RO/EDI Reject

25,456 kgal

Process Use

47,336 kgal

Leaks

Condensate

Rain Water

55 inches per year

Surface & Ground Water

Surface & Ground Water

Sanitary Sewer System

Storm Discharge via East Fork Poplar Creek

Sustainable Supplies: *Alternate Water Sources*

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”)

Sustainable Supply Examples

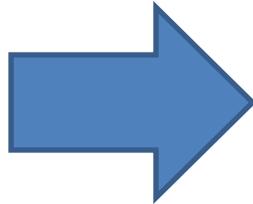
Rainwater
Harvesting

Gray water

Condensate
Capture

Process
Discharge

Reclaimed
Wastewater

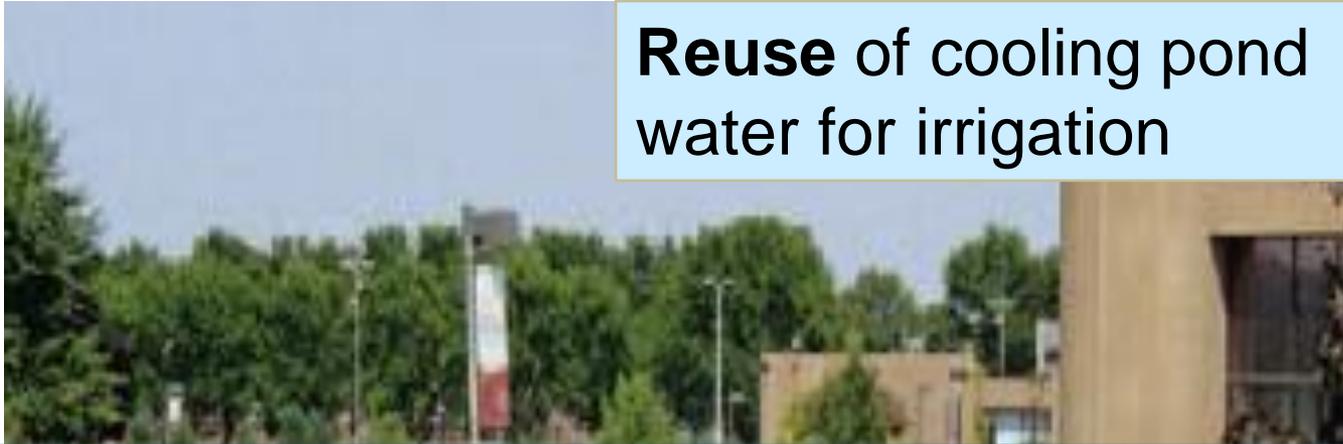


Applications

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

Federal Success Story

Pacific Northwest National Lab



Reuse of cooling pond water for irrigation

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

Federal Success Story

Sandia National Laboratory

Recycle water in HERO system
Reuse HERO reject water –
stored in tanks and used as
cooling tower make-up and
scrubbers



**Results: Annual saving
over 80 million gallons;
\$160K annual cost
savings**

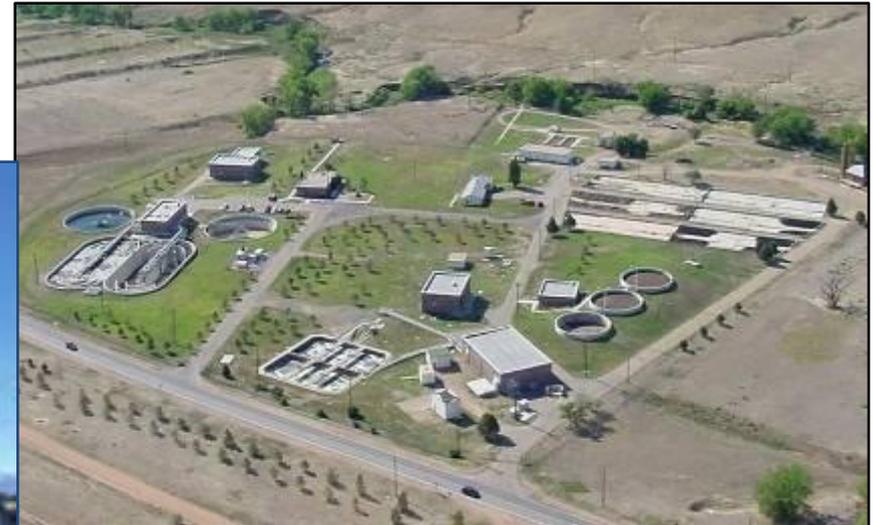


Large micro-electronics plant
– High Efficiency Reverse
Osmosis (HERO) System
with 90% recovery rate

Federal Success Story

Fort Carson

Reclaim: Wastewater effluent is reclaimed to irrigate Ft Carson's golf course



**Results: 100 million gallons of water reused annually;
\$215K annual cost savings**

Sustainable Codes, Standards, & Programs for Water Efficiency



Federal High Performance Building – Guiding Principles

Indoor and outdoor reduction requirements based on established baseline

Sustainable Codes, Standards, & Programs for Water Efficiency



LEED New Construction and Existing Buildings

Plumbing products and outdoor reduction *options*

Sustainable Codes, Standards, & Programs for Water Efficiency



Green Plumbing &
Mechanical Code
Supplement

Comprehensive indoor water
efficiency *requirements*

Sustainable Codes, Standards, & Programs for Water Efficiency



ASHRAE 189.1



ICC International Green
Construction Code

Comprehensive indoor and outdoor
efficiency *requirements*

Elements of green codes and standards – indoor water use

High efficiency plumbing fixtures



Commercial kitchen equipment



Cooling tower water management



Lab and medical equipment



Metering and monitoring

Elements of green codes and standards – outdoor water use

Climate appropriate landscape/limited turf



Efficient landscape design



Efficient irrigation equipment & design



Advanced controls



Use of alternate sources

EPA WaterSense Program



EPA WaterSense Program



Tank Toilets



Private Lavatory Faucets



Flushing Urinals



Showerheads



WaterSense Homes



Irrigation Professionals

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

Web-Based Water Management Training

<http://femptraining.labworks.org/>



- Policy

- Planning

- Auditing

- Water efficient technologies

- Metering

- Project economics

Questions?

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