

# Charting a Course to Energy Independence

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# EPA – A Leader in Water Conservation

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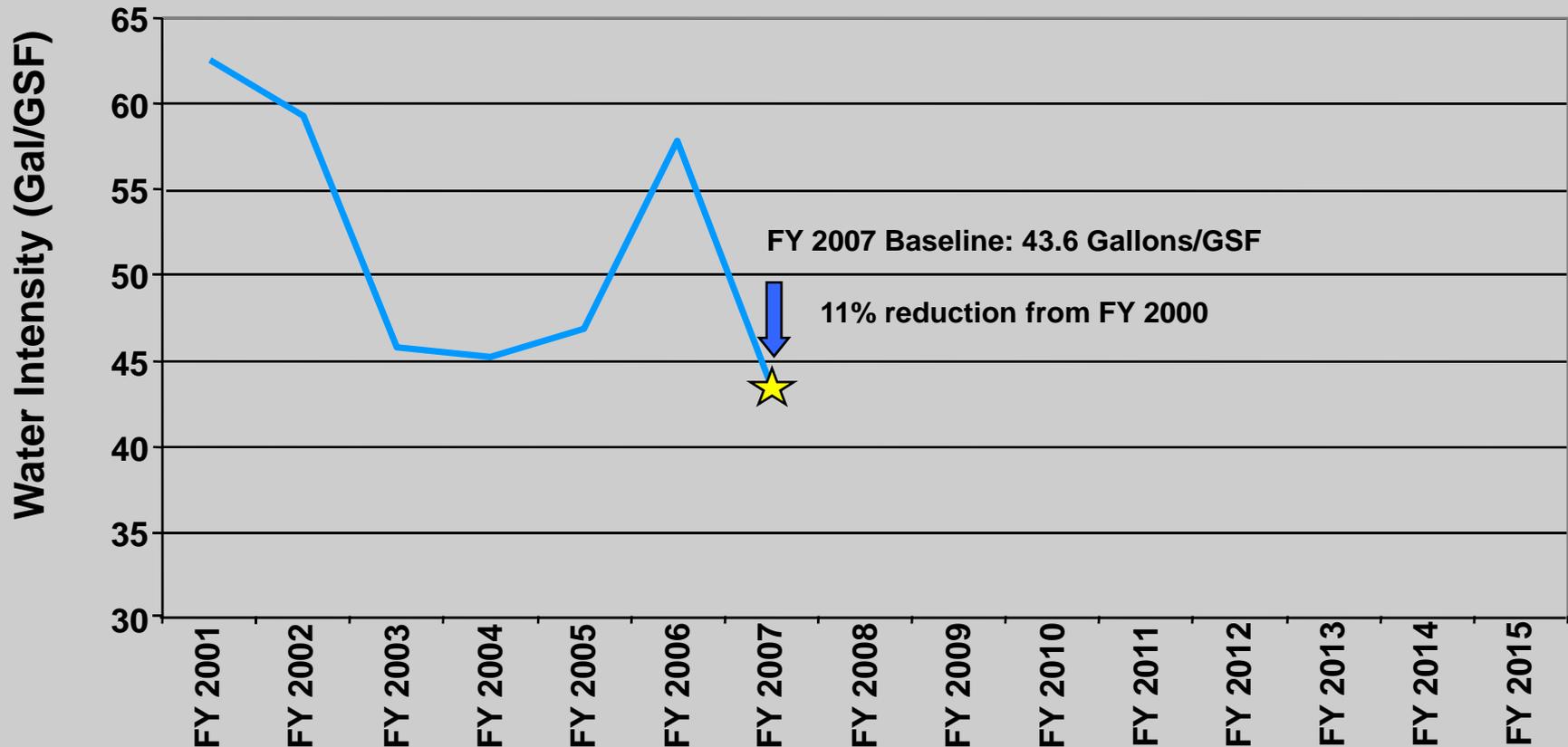
# Historical Perspective

- ▶ EPA Water Conservation: FY 2002 to FY 2007
  - ◆ All EPA reporting facilities are laboratories
  - ◆ EPA expanded E.O. 13123 water conservation requirements and set an internal goal to reduce water use 15% by FY 2010 from a FY 2000 baseline
  - ◆ Water Management Plans completed at all 30 reporting facilities
  - ◆ Identified, established best practices
  - ◆ Reduced water use 11% by FY 2007
  - ◆ Established good understanding of status and future opportunities
  - ◆ Learned from North Carolina drought in 2007
  - ◆ 167 million gallons annual consumption (new FY 2007 baseline)



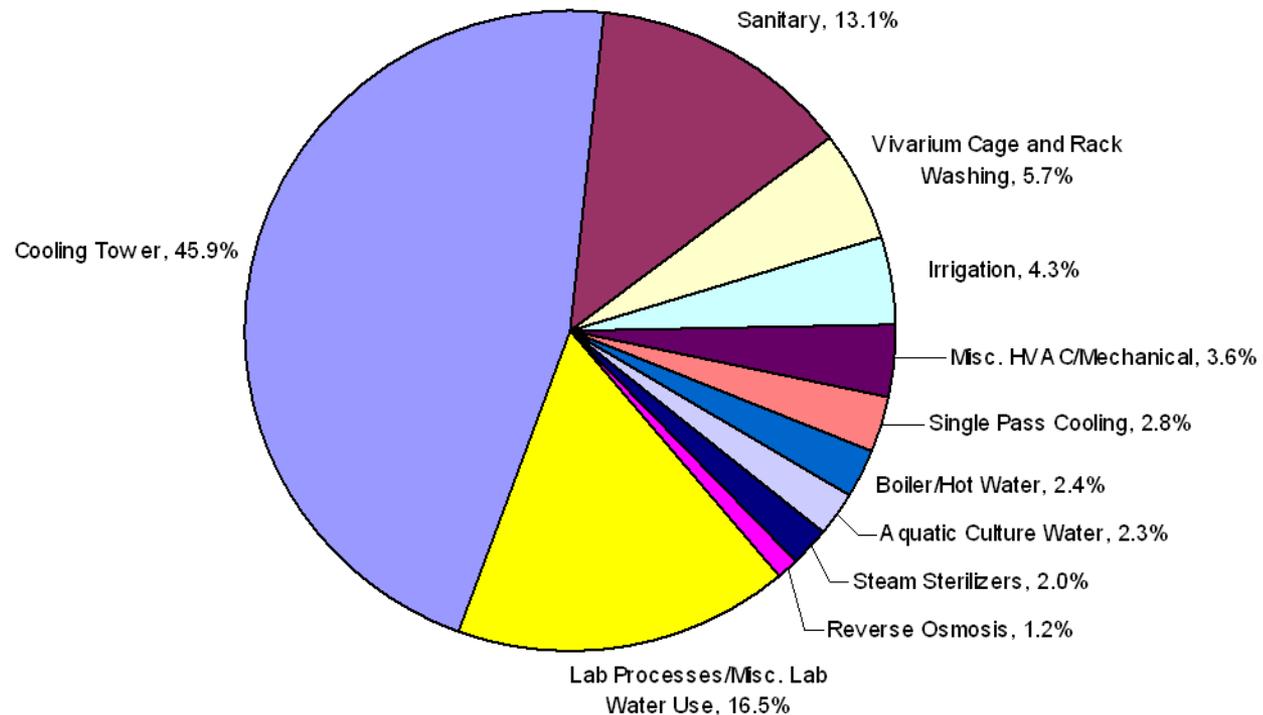
# EPA Average Water Intensity, FY 2001 to FY 2007

— Historical Water Intensity





# EPA Laboratory Baseline Water Use – FY 2007





# EPA Water Conservation Strategy

- ▶ EPA has to reduce water from 167 million gallons per year to 140 million gallons per year, a 27 million gallon reduction
- ▶ Started with good understanding of EPA's water budget
- ▶ Concerned whether EPA could meet the new goal
- ▶ Projected our potential savings for each approach and each facility
- ▶ Spreadsheet identified where opportunities were and where they weren't

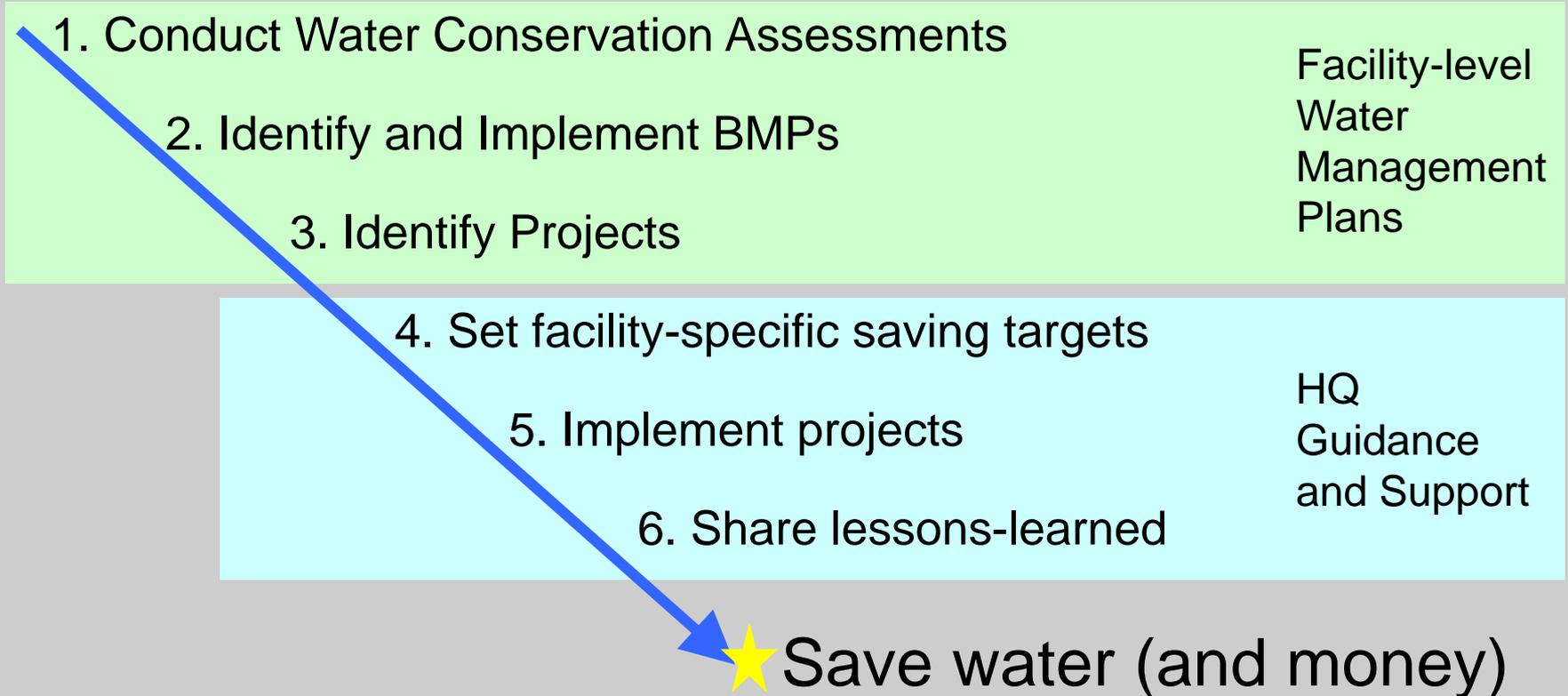


# Estimated Reduction Potential

Use	Agencywide Savings Potential (FY 2007 – FY 2015) (Million Gallons)	Method
Cooling Tower	3.2	Control/Optimization
	8.7	Energy Projects
	6.2	Condensate Recovery
Sanitary	1.5	0.5 gpm Lavatory Faucets
	3.5	High-Efficiency Toilet Retrofits
	2.4	0.25 gallons per flush (gpf) Urinals
Cage Washing	1.6	Control/Optimization
Irrigation	2.2	Upgrade or Eliminate
Misc. HVAC/Mechanical	1.6	Various
Single Pass Cooling	4.4	Eliminate
Steam Sterilizers	2.6	Retrofit/Optimize
<b>TOTAL</b>	<b>38</b>	<b>Represents 23% of 2007 Baseline</b>



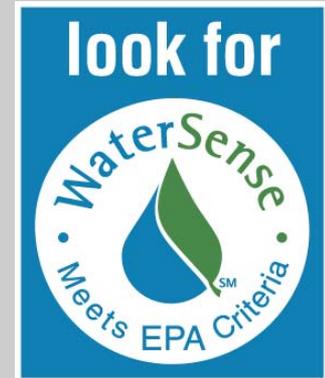
# EPA Water Conservation Strategy





# Executive Order (E.O.) 13423

- ▶ E.O. 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*
  - ◆ Water use intensity (gal/GSF)
    - Reduce 2% annually from FY 2007 baseline
    - 16% total between FY 2007 and FY 2015
  - ◆ Where applicable:
    - Purchase WaterSense® labeled products
    - Choose irrigation contractors who are certified through a WaterSense-labeled program





# Energy Independence and Security Act (EISA) of 2007

- ▶ EISA 2007 – Sec. 432:
  - ◆ Complete comprehensive energy and water evaluations at 25% of covered facilities each year
  - ◆ Implement life-cycle cost-effective measures
  - ◆ Measure and verify savings



# Sustainable Buildings Memorandum of Understanding (MOU) and Guiding Principles

## ▶ MOU Implementation under E.O. 13423

### ◆ Applicability:

- 100% of new construction and major renovations
- 15% of existing building inventory by FY 2015

### ◆ Requirements:

- Indoor potable water use: Reduce by 20%
  - Compared to building water use in FY 2003 or a year thereafter, or
  - Compared to a water baseline calculated using 2006 plumbing codes
- Outdoor water: Reduce by 50%
  - Compared to conventional methods, or
  - Compared to measured irrigation water use in FY 2003 or a year thereafter



# Key Water Saving Initiatives

- ▶ Air handler condensate recovery
- ▶ Faucet retrofits
- ▶ Irrigation system improvements
- ▶ Full court press at largest facility
- ▶ Mechanical system upgrades
- ▶ Catch and correct problems



# Air Handler Condensate Recovery

## ▶ Projects with verified savings:

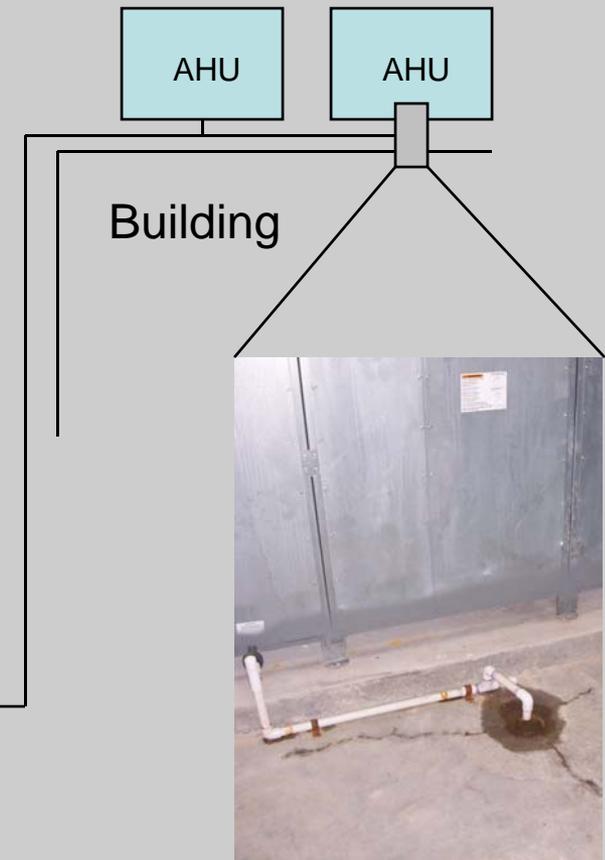
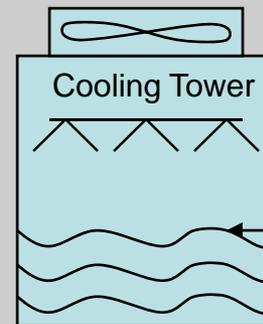
- ◆ Athens SESD: 550,000 gallons per year
- ◆ Houston: 1,400,000 gallons per year
- ◆ Kansas City: 240,000 gallons per year

## ▶ Projects recently completed:

- ◆ Edison: late 2008
- ◆ Athens ORD: late 2008
- ◆ Fort Meade: June 2009

## ▶ Planning underway at other locations:

- ◆ RTP, NC: up to 6,000,000 gallons per year





# Air Handler Condensate Recovery





# Faucet Aerator Retrofits

- ▶ Most facilities had 2.2 or 2.0 gpm lavatory faucets
- ▶ Plumbing Supply Fittings Standard ASME/ANSI 112.18.1/CSA B125.1
  - ◆ Requires that public use faucets flow at 0.5 gpm
- ▶ Retrofit lavatory faucets at all facilities
  - ◆ Restrict the maximum flow rate to 0.5 gpm
  - ◆ Annual savings per occupant is over 250 gallons/year
- ▶ 1 million gallons of annual savings in FY 2008
- ▶ 0.5 million gallons of additional annual savings projected in FY 2009





# Irrigation Status

- ▶ Most EPA reporting facilities do not irrigate
  - ◆ Seven have native or xeric landscapes
  - ◆ Others use acculturated plants, allow turf to go dormant





# Irrigation Status

- ▶ Four facilities have significant irrigation systems
- ▶ Where automatic irrigation is installed, irrigation water makes up 30 to 70 percent of facility water use
- ▶ Conducted irrigation audits at all four facilities in FY 2008 using WaterSense partners



# Irrigation Audits





# Irrigation System Improvement

- ▶ System redesign at Golden and Ada
  - ◆ WaterSense irrigation partners preferred for design/build work
  - ◆ Water-efficient system should save facility 50% in outdoor water use
- ▶ System repair/upgrade at Houston
  - ◆ WaterSense irrigation partner preferred
  - ◆ System repairs should save facility 25%+ in outdoor water use





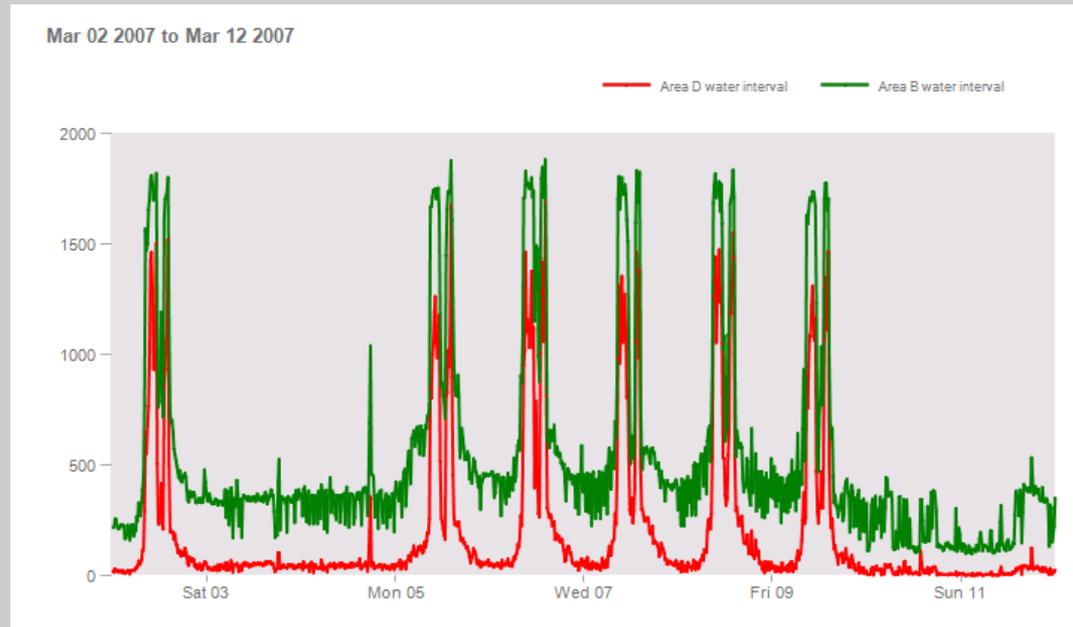
# RTP: Multiple Projects, Massive Savings

- ▶ Eliminated single-pass cooling
  - ◆ Used to cool laboratory equipment
  - ◆ By switching to recirculated, chilled water, combined savings of 500,000 gallons annually
  
- ▶ Steam sterilizer control optimization
  - ◆ Eliminated the continuous flow of tempering water
  - ◆ Instituted operational controls to limit cooling water flow to times when the sterilizer is being used
  - ◆ 860,000 gallons savings annually



# RTP: Multiple Projects, Massive Savings

- ▶ Cage and rack washing schedule changes
  - ◆ Adjusted the washing schedule from five days a week to four days a week
  - ◆ 1.6 million gallons savings annually





# RTP: Multiple Projects, Massive Savings

- ▶ Cooling tower control
  - ◆ Optimized use and control of ancillary cooling tower
  - ◆ 1.9 million gallons savings annually
- ▶ Pre-rinse spray valve retrofits
  - ◆ Replaced three non-efficient pre-rinse spray valves in the cafeteria
  - ◆ 60,000 gallons savings annually
- ▶ Faucet aerator retrofits
  - ◆ Replaced 2.0 gpm faucets with 0.5 gpm
  - ◆ 500,000 gallons savings annually



# RTP: Multiple Projects, Massive Savings

- ▶ Vacuum pump seal flow reduction
  - ◆ Adjusted the control timer sequence and reduced the water supply to a central laboratory vacuum system by two-thirds
  - ◆ 340,000 gallons savings annually
- ▶ RTP-Main saved a total of 8.1 million gallons in FY 2008, a 15 percent reduction!



# Mechanical System Upgrades

- ▶ Vacuum Pump Replacements
  - ◆ Cincinnati: replace with dry, “claw” technology, 200,000 gallons savings annually
  - ◆ Kansas City: replace with closed-loop system, 900,000 gallons savings annually
- ▶ Reverse osmosis system reject water reuse
  - ◆ Fort Meade: 100,000 gallons savings annually



# Catch and Correct Problems

## Small Facilities Can Cause Big Problems

	FY 2007 Baseline Use (1,000 gallons)	FY 2008 Excursion (1,000 gallons)	Percent of Total	Event
Facility 1	1,166	300	26%	Failure of level sensor
Facility 2	358	2,200	615%	Potable water used as backup cooling supply
Agency Total	166,600	2,500	1.5%	



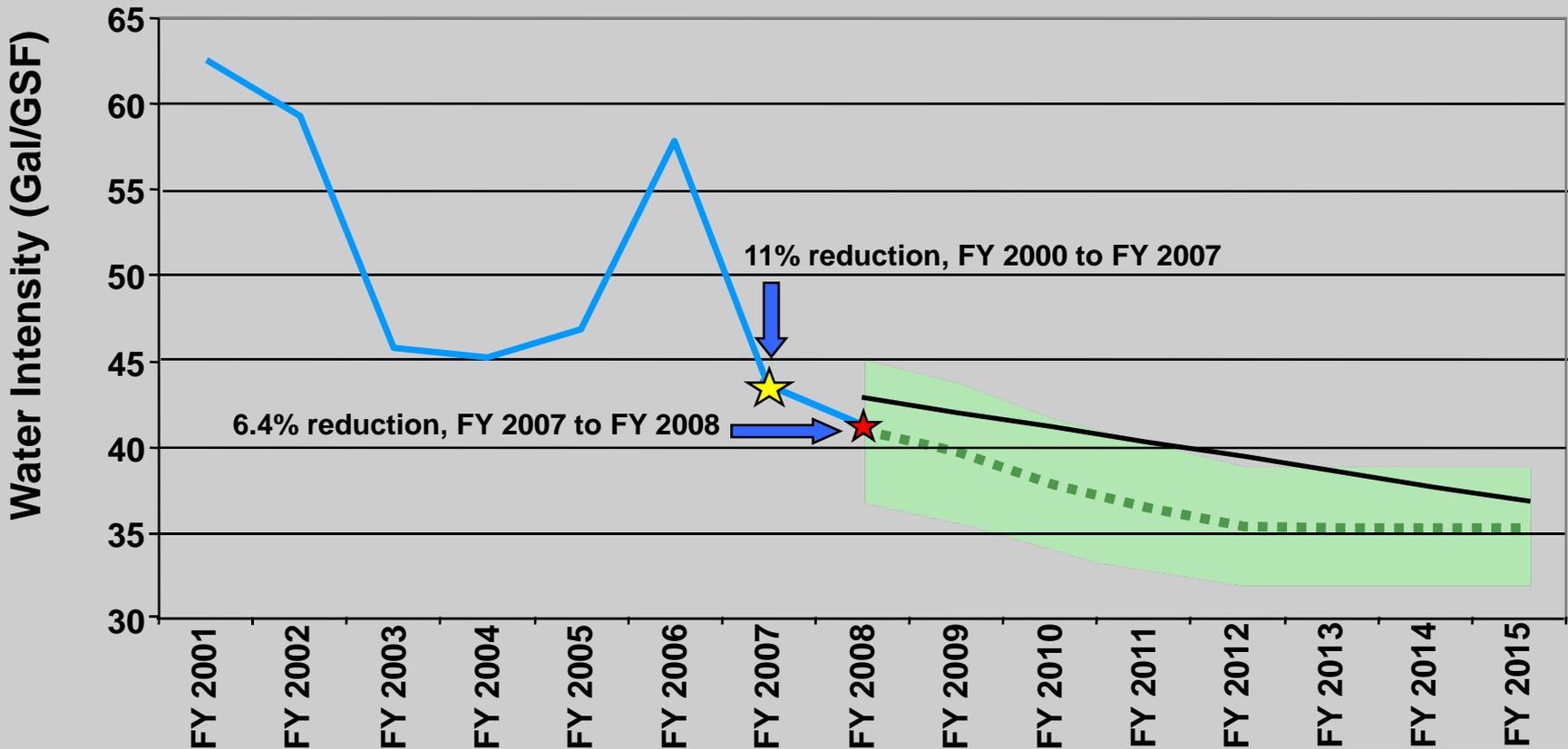
# What about Cooling Towers?

- ▶ 21 Towers in EPA portfolio
  - ◆ 18 with blowdown control using conductivity monitors
  - ◆ 5.0 median cycles of concentration – quality of supplied water plays an important role
- ▶ Operational efficiency improvement can be achieved at half
  - ◆ Under 100,000 gallons annual savings in most cases
  - ◆ Improved control yields 1,900,000 gallons annual savings in one instance
- ▶ Bigger savings will come from condensate recovery projects and energy projects that decrease load



# FY 2008 Results and Projected Future Savings

- Historical Water Intensity
- E.O. 13423 Target (2% annual reduction)
- Projected Water Intensity with Identified Water Savings Projects
- 10% +/- Natural Variation





# Conclusions

- ▶ Need to know how you use water
  - ◆ True at both facility level and Agency level
  - ◆ Build strategic plan from that knowledge
  - ◆ It's not just bathrooms and irrigation
- ▶ A comprehensive approach using projects and practices can generate significant water savings
- ▶ Need to drive savings throughout the organization
- ▶ 16% or greater reduction is achievable



# Conclusions

- ▶ Water use is much more variable than energy use at EPA facilities; need to monitor performance differently
- ▶ Small facilities can have big problems
- ▶ Need to have a bigger cushion of savings to ensure meeting the E.O. 13423 goal
- ▶ Field has played a much larger role in water reductions than they traditionally have in energy reductions



# Questions?

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