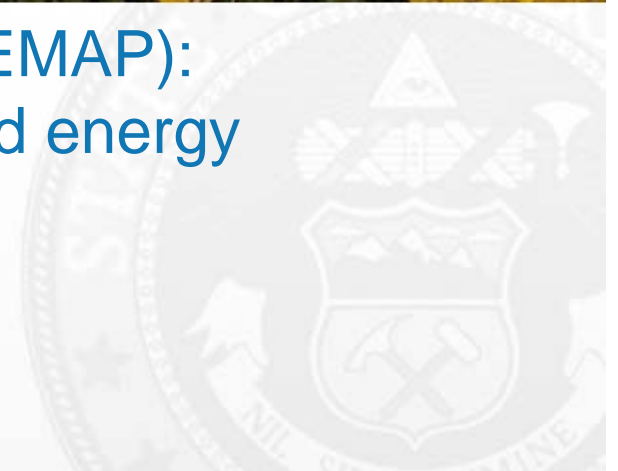Energy Management Assistance Program (EMAP): Helping K12 school districts save money and energy through energy efficiency upgrades

Vision

JOBS   **SECURITY**   **COST**   **ENVIRONMENT**

The Colorado Energy Office promotes sustainable economic development in Colorado through advancing the state's energy market and industry to create jobs, increase energy security, lower long term consumer costs, and protect our environment.

Colorado Energy Office

Why Save Energy in School Buildings?

- US K12 schools spend more on energy than on computers and textbooks combine (NREL, 2013)

- Average age of school building is 42 years, nearly equal to expected serviceable lifespan of the building (NREL, 2013)

- US EPA estimates that K12 schools waste 30% of energy through inefficient buildings.

Through HB 1309, the State legislature has dedicated funds to help support energy efficiency efforts in K12 schools. In response to this bill, CEO has created the Energy Management Assistance Program (EMAP).

How to Save Energy through EMAP

- Receive free technical assistance and energy management program development support

- Support services may include:

  - Utility bill tracking and high level M&V support

  - Energy education

  - Energy assessments

  - Strategizing, planning, and program development

  - Implementation support

  - Funding and financing support

Partnering with CEO can help Strengthen Energy Efficiency Efforts

- CEO can provide a step-by-step approach to develop and implement a customized energy management plan **OR**

- CEO can provide assistance to enhance existing programs

All programs are designed, managed, and carried out by school within its timelines and with support from CEO

EMAP is Designed to Meet School Needs

- Save MONEY by saving energy

- Improve building's energy performance and comfort

- Replace antiquated systems

- Address staff and student energy behaviors

- Better manage energy usage on an on-going basis

Before and after images of lighting upgrade in bus barn.
Savings will be reallocated to help pay for a new school bus.

Colorado Energy Office

Saving Money and Energy is Paramount

Simple no- to low-cost measures can greatly improve function of building

- In a LBNL study, K12 schools buildings achieved savings of 11%, resulting in an average payback of 1.5 years
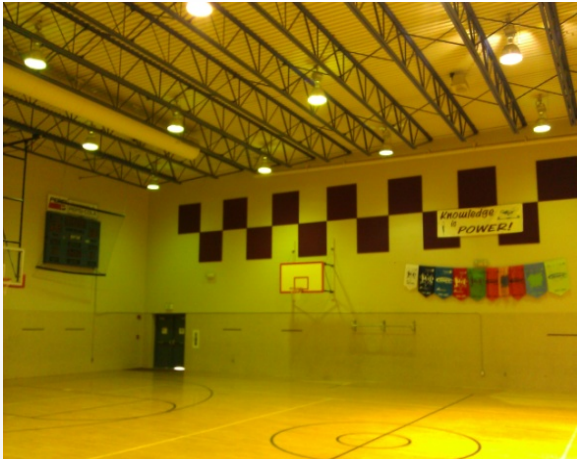
Before and after images of lighting upgrade at school gymnasium.

Estimated savings of 75% for upgrade and lighting scheduling changes.

Saving Money and Energy is Paramount

Significant investments can create a high performance building that will continue to yield substantial energy savings for years to come

- In a LBNL study, K12 schools buildings achieved average savings of 20% or more when significant upgrades were made

LEED certified school building.

Example Project: Cripple Creek Victor Re-1

- Goals: lower energy usage and costs, boost equipment reliability, and improve comfort for staff, teachers, and students.

- Saved 20% electricity costs

- Received free energy assessment, energy education, utility bill analysis tool, implementation support

- Received 60% lighting rebate and interest free financing from utility company

- Upgraded lighting and building automation system

"Stuart Peterson, Maintenance Director, said the project was a 'great' experience and they are looking to continuing their energy efficiency efforts into the coming years."

Example Project: St. Vrain Valley School District

- Goal: help individual schools achieve energy reductions through behavioral measures via an energy competition

- 13 schools saved over 250,000 kWh

- Received free mentorship, energy assessments, energy education, and energy savings calculation support

- Program involved students, teachers, and maintenance and custodial staff

"Efforts will continue to inform teachers of wasteful energy practices and encourage efficient uses of energy for each class of students."

Colorado Energy Office

Example Project: Boulder Valley School District

- Goals: lower energy usage and costs, boost equipment reliability, and decrease maintenance costs.

- Received free technical feedback on sustainable energy plan and energy education (in progress)

- In-house energy team identified dozens of energy saving opportunities

"Support of CEO will help solidify the argument for the district to proceed with recommended improvements, while energy education will help improve the energy literacy of all energy champions."

Colorado Energy Office

How to Get Started

- Sign Agency/CEO Memorandum of Understanding and reference the EMAP Standards of Success

- Meet with CEO to develop program plan

- Implement changes!
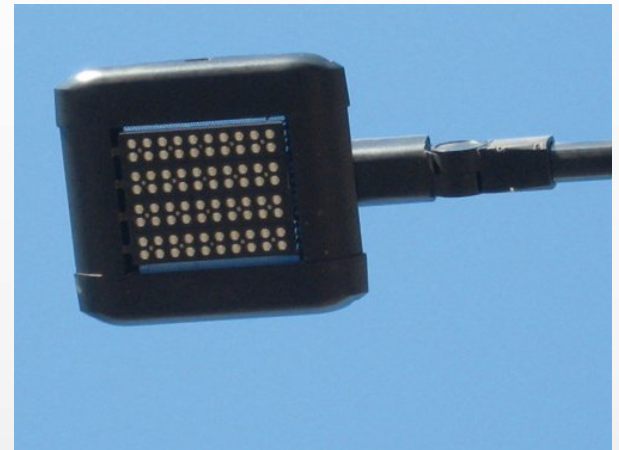
For More Information Contact Us

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The Colorado Energy Office

@coenergyoffice

Drought Response and Water Efficiency

DENVER WATER

438 Schools

SCHOOL ENROLLMENT

2012 Enrollment

- • 1 - 250
- • 251 - 500
- ● 501 - 750
- ● 751 - 1000
- ⬤ 1001 - 2500

CITY & COUNTY OF DENVER
TOTAL SERVICE
READ & BILL
MASTER METER
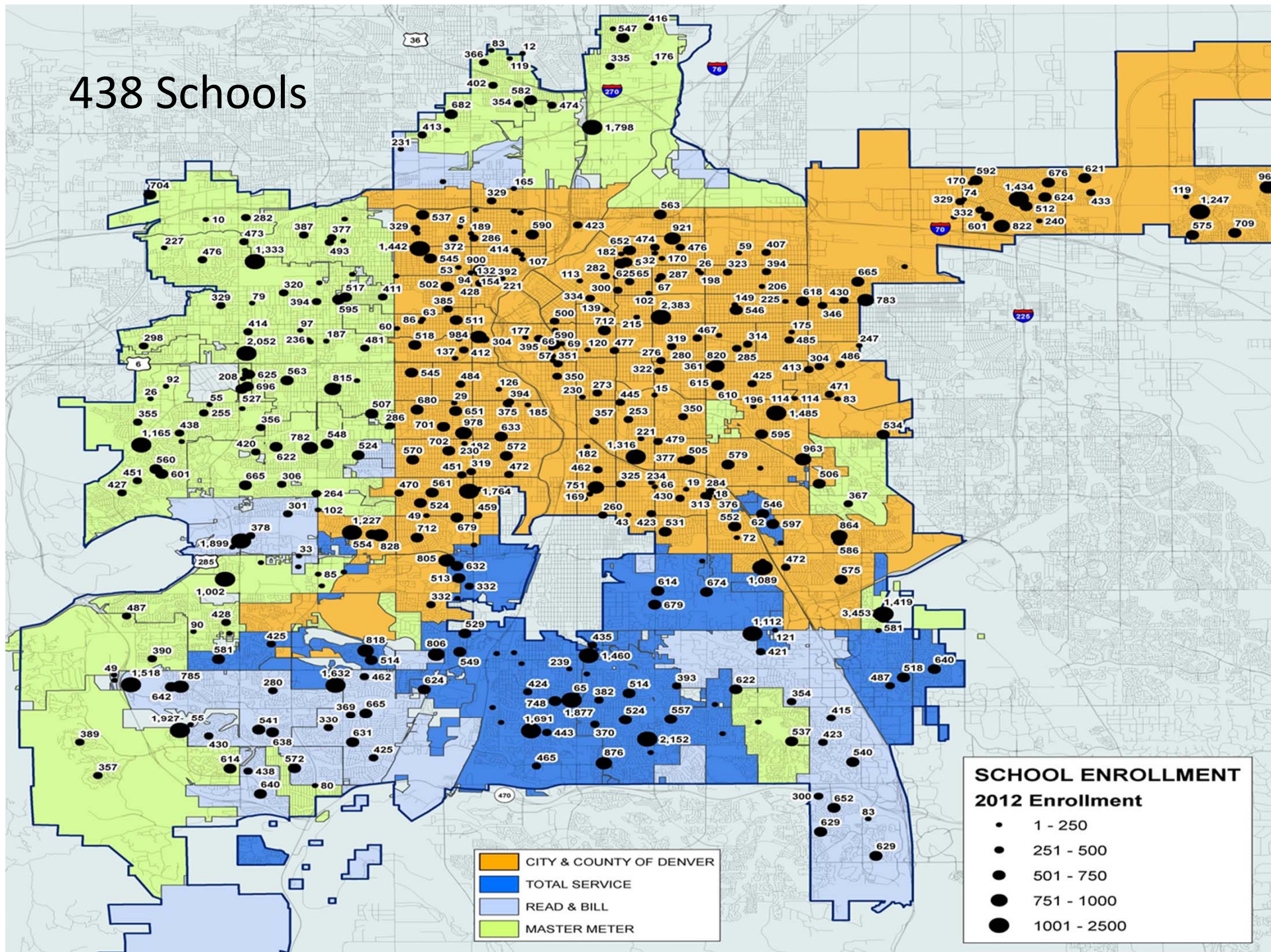
Drought Response verses Water Efficiency

- **Drought Response**
  - **Short-term**
  - **Prioritization**
  - **Sacrifices**
  - **Impacts**

  Limited irrigation, behavior changes

- **Water Efficiency**
  - **Long-term**
  - **Based on ROI**
  - **Lower Bills**
  - **Negligible impacts**

  Fixture retrofits, improved irrigation, landscape changes

DENVER WATER

Supply Reservoir Contents

Acre-Feet (y-axis)

- Full
- 2012
- Historic Median
- 2013
- 500,000
- 400,000
- 300,000
- 200,000
- 100,000
- 0

Strategic Water Reserve

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
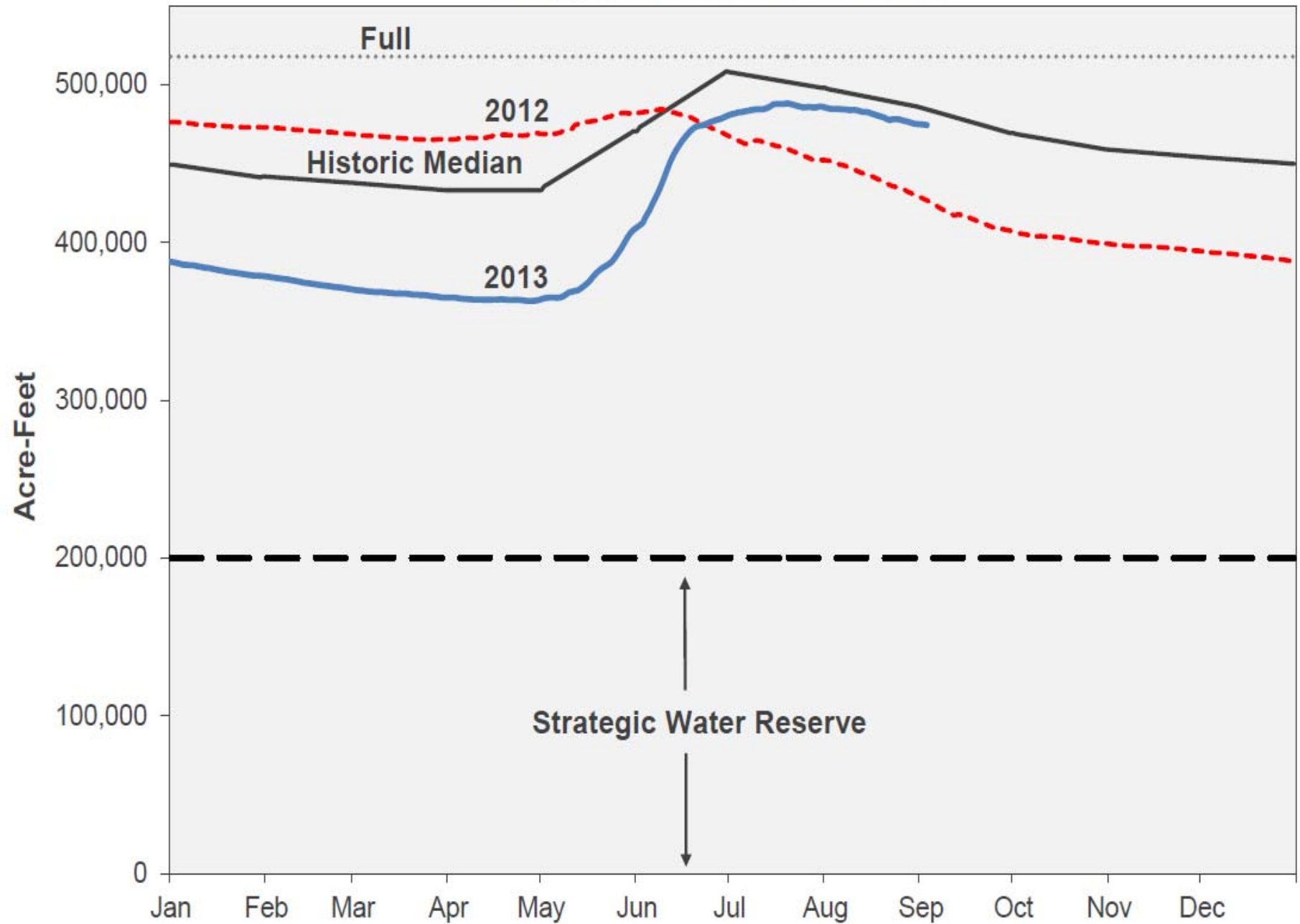
Denver Water – Drought Declaration

- **April 1 declared Stage II**
  - **2 days a week residential**
  - **Water budget program offered**
- **June 26 declared Stage I**
  - **3 days a week residential**
  - **Water budget program reduced to 10% reduction**

DENVER WATER

Water Budget Program

- Waive the 2/3 day a week restriction
- Consumption based
- Reduction based on 2010/2011 Usage
- No watering 10 am – 6 pm
- No water waste

DENVER WATER

Program Implementation & Response
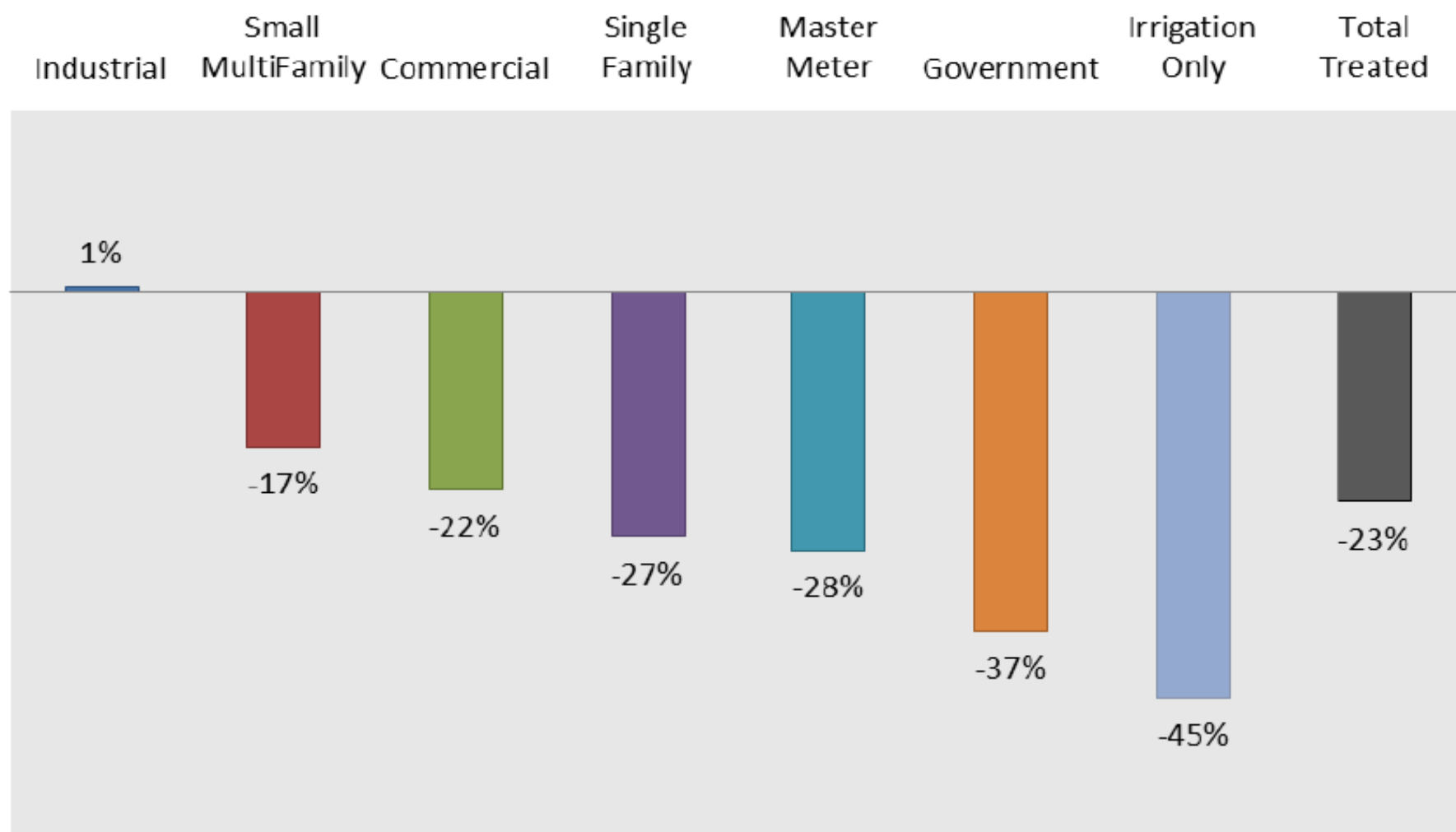
- http://www.9news.com/rss/story.aspx?storyid=342372

DENVER WATER

In the Field (Drought Patrol)

- **Tablets and Contacts**

DENVER WATER

Stage 2 Water Savings by Customer Class
(April - June 2013, Weather Adjusted)

Water Efficiency

- **Should not be based on past consumption**
- **Indoor**
- **Outdoor**
- **Individual Cases**

DENVER WATER

Water Efficiency

- **Indoor**
  - **Read Date**
  - **Number of School Days (Jan-Mar)**
  - **DPS average gallons/student/day = ~9**
  - **Pools**
  - **Cooling Towers**

DENVER WATER

Water Efficiency

- **Outdoor**
    - **Read Date**
    - **Number of School Days (May-October)**
    - **Subtract Indoor use from total use**
    - **Gallons/sqft**
        - **Turf, Xeriscape, Athletic, Weather Factor**

Individual School Reports

- **Leak detection**
- **Targeting inefficiencies**
- **Controller programing**
- **Facility manager performance**

Rebates & Incentive Programs (DW)

- **Toilets (Tank type $75, Flushometer Bowl/Valve $125)**
- **HE Urinals $100**
- **Cooling Tower ($500 conductivity controller, $50 flow meter, incentive program)**
- **Commercial Warewashing ($300)**
- **Weather Sense weather-based smart controllers (up to 25%)**
- **Rotary Nozzles $2 per nozzle**
- **Irrigation Efficiency Program**

DENVER WATER

Model School: Green Valley Elem

- **Indoor: 6.30 gsd**
  - 25% lower than average elementary

- **Outdoor**
  - 2010: 20.83 gft²
  - 2011: 17.02 gft²
  - 2012: 18.85 gft²

- **Significantly low than community**

DENVER WATER

Opportunity for improvement: South HS

- **Indoor: 7.63 gsd**
  - **lower than average**

- **Outdoor g/ft²**

	2010	2011	2012
Goal	18.55	17.81	21.86
Actual	116.75	122.03	139.50
% Over	529%	585%	538%

DENVER WATER

Lincoln HS

- **Indoor: 7.54 gsd**
  - **lower than average high school**

- **Outdoor g/ft²**

	2010	2011	2012
Goal	18.55	17.81	21.86
Actual	20.35	23.11	23.12
% Over	9.69	29.70	5.77

DENVER WATER

John F Kennedy HS

- **Indoor**
  - **2010-11: 9.92 gsd**
  - **2012-13: 85.66 gsd**
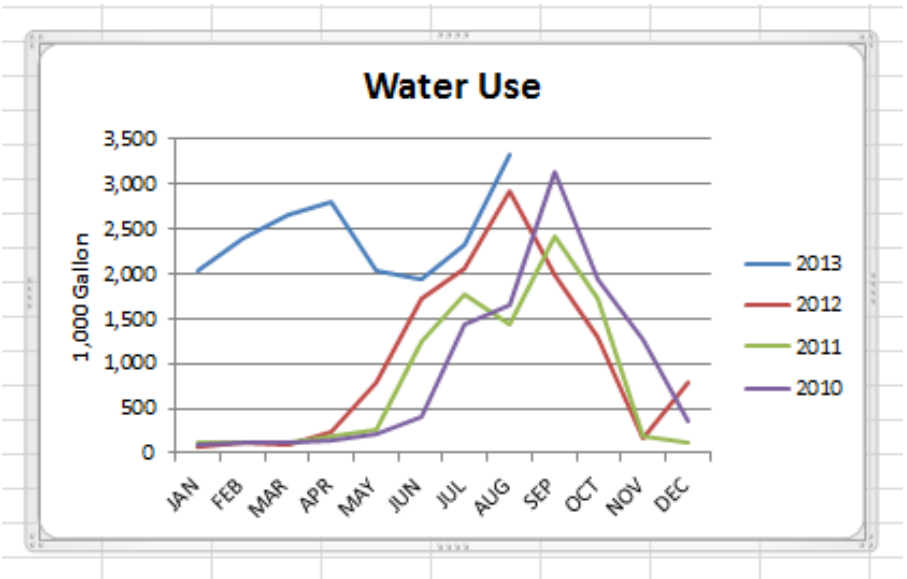
- **Release: July 17, 2013**
- **Activity**
  - 1,500 – 2,000 unique users per day
- **Performance**
  - Server difficulties during first few days
    - "Timeout" errors, etc.
    - *Thanks for your patience!*
    - We know you were excited to use the new system
  - We modified our server configurations and have been running smoother ever since
  - We are still working through some bugs

Known Issues & Common Challenges

- Browser Compatibility
  - Not compatible with Internet Explorer 8
  - Supported browsers:
    - Internet Explorer 9 +
    - Firefox 16 +
    - Chrome 10 + *(still resolving a few minor bugs/display issues)*

- My Portfolio Graphs
  - Will not show for portfolios with more than 1,000 properties
  - We are working on a longer term solution

- Portfolio Excel Download
  - Will not show for portfolios with more than 5,000 properties
  - We are working on a longer term solution

Known Issues & Common Challenges

- Sharing permissions have changed
  - There are more customizable options now
  - There is not a 1:1 mapping between the old and the new systems
  - We erred on the side of caution –
    - People cannot do anything they could not do before
    - People may not be able to do everything they could do before
  - Because of the degree of customization only the building owner can share the property
    - *You cannot share a property that was shared with you*

Known Issues & Common Challenges

- 1st Level mapping of permission levels:

Old System Permissions	New System Permissions
Facility Editor	Full Access
Facility/Profile Editor	Full Access
Read Only	Read Only
Profile Editor	Read Only

- Additional Modifications for Facility Editor and Facility/Profile Editor

Specification in Old System	New System Permissions
Cannot Set Baseline	Custom Access – Full Access to Everything, *except* Read Only to "Goals"
Cannot Delete	Custom Access – Full Access to Everything, *except* Read Only to " Property"

Known Issues & Common Challenges

- Meter Edit Requirements
  - Before:
    - Could save a meter with gaps/overlaps
  - Now:
    - *Cannot* save a meter with gaps/overlaps
  - What to do:
    - If you view your meter and hit "save" you will be required to fix gaps and overlaps before moving on – there are error messages to prompt you to these fixes

- View PDF Applications
  - After applying for ENERGY STAR certification some properties are not able to download their application PDF from the Recognition Tab

Known Issues & Common Challenges

- Facilities outside the US and Canada
  - Some are not able to access data
  - This is due to a missing field in our database related to assumptions for the average percent electricity and average fuel costs (typically based on State or Province)

- Sustainable Buildings Checklist
  - Some data was not properly migrated from our old system to our new system
  - We're working to restore everything from our complete backup

EPA

Known Issues & Common Challenges

- Calculation Errors
  - Target Finder Calculator & Design Tab of Portfolio Manager
    - The column for median performance level is calculated incorrectly if you do not enter estimated data
    - Applies to all property types
    - Work around (until we correct the defect)
      - Enter an estimated energy use, or
      - Set your Target to 50 to see median performance information
  - Medical Offices and Dormitories only
    - Calculations associated with the national median and the target are incorrect
    - Applies to existing buildings and design projects

→ ***Fixes for both of these are being tested as we speak. We hope to correct the error tomorrow evening.***

Changes in the ENERGY STAR Score

- New Weather Data
  - More than tripled the number of weather stations that we reference
  - On average the weather stations are closer to each individual building
  - In some cases (e.g. microclimates in California) the Heating Degree Days and/or Cooling Degree Days are more than 50% different at the new (closer) station

- New Parking Garage Assumptions
  - Update to procedures to account for ventilation in fully enclosed garages
  - Lower scores with large enclosed garages that are open 24/7

- Canada
  - Scores are only available for Offices and K-12 Schools

Office Hours

- What we will answer today:
  - Questions that apply to the general features and calculations of Portfolio Manager, and therefore apply to everyone.

- What we can't answer today:
  - Specific questions about your properties (such as why/how your metrics have changed or why the tool shows certain values for selected years). These questions require an analyst to review your account. **Submit these questions through www.energystar.gov/BuildingsHelp**.

Extra Help

- Ask a Question
  - www.energystar.gov/buildingshelp

- Take a Training
  - www.energystar.gov/buildings/training
  - Step-by-step documents (PDF)
  - Links to live and recorded webinars

- Sign up for Webinars
  - http://esbuildings.webex.com

- Review Technical Documents
  - http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/understand-metrics

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Thank you for Attending!

Questions?

If you have any questions on Portfolio Manager or the ENERGY STAR program, contact us at:
www.energystar.gov/BuildingsHelp

What is a property?
What about a campus? a building?

- **Whatever you say it is!!**
- A property can be:
  - Part of a building
  - Single building
  - Campus or collection of buildings
- This is the second question you answer when you start benchmarking
- Whatever you came to benchmark is your property

Your Property's Buildings

How many physical buildings do you consider part of your property?
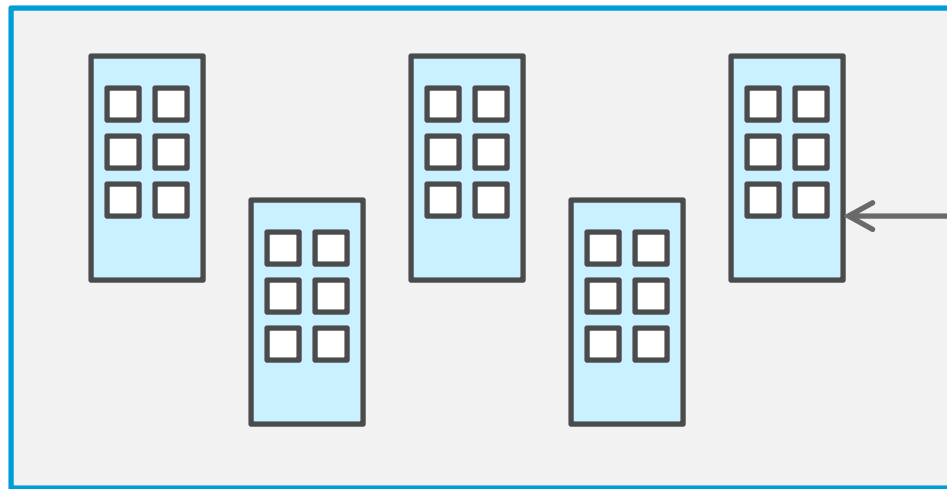
○ **None**: My property is part of a building
○ **One**: My property is a single building
○ **More than One**: My property includes multiple buildings

How many?

What is a property?
What about a campus? a building?

Individual building
Child Property
Single-building Property

Campus
Parent Property
Multi-building Property

ENERGY STAR

EPA

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What is a use?

- A use is an activity that occurs at your property
  - e.g. Office, Library, College/University
- Uses were called **spaces** before July 2013
  - Change in name was intentional
  - Focus is on overall building use/building activity
  - You should not break down individual spaces
    - No reason to enter atrium, restrooms, conference rooms and cubicles as separate "spaces" because they are all part of one use → Office
    - Not even necessary to break out small retail or restaurant on the first floor of an office

→ *You should always enter as few uses as possible*
→ *When in doubt – don't create another use!*

Do my individual buildings add up to my campus?

- First…another way of asking this question:
  - Do my child properties add up to my parent property?
- Answer: **No!**
  - You may not benchmark every single building on your campus
    - Maybe some buildings are not sub-metered so you cannot track them
  - The "use" of an individual building may not correspond
    - Parent Property → Defined with single use, "College/University"
    - Children Properties → Defined with different uses: Office, Library, Laboratory, Dormitory, etc…
  - No use details (floor area, workers, hours) are summed across different child properties
- What you should do:
  - You must manage the use information of your parent property and child properties separately (floor area and use details)
  - You *can add meters* from your children properties to the parent property total energy use

$\bigcirc$EPA

Tracking Occupancy in Offices and Medical Offices

- Information about occupancy is tracked in two ways
  - **Whole Property Value** – one value for the property, edited where you edit property name
    - Should reflect total percentage of the building that is occupied (i.e. in use)
  - **Specific Use Details** – Vacant space is represented by a separate use with:
    - Zero Workers
    - Zero Hours
    - Zero Personal Computers

- You must maintain data in both places
  - Do not automatically affect each other
  - We're evaluating ways to combine this information in the future

- ENERGY STAR Certification Requirements
  - 50% Occupancy at the whole property level
  - Specific use details reflect vacant space if there is more than 10% vacant (less than 90% occupied)

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Tracking Occupancy in Other Use Types

- Hotels
  - Whole Property Detail – Enter your overall occupancy level
  - Specific Use Details – No edits required for unoccupied areas
  - ENERGY STAR Certification - Must have average occupancy of 55% or greater
- K-12 Schools
  - Whole Property Detail – Enter your overall occupancy level
  - Specific Use Details – No edits required for unoccupied areas
  - ENERGY STAR Certification - Must be open for at least 8 months
- Everyone else (Retail, Warehouse)
  - Whole Property Detail – Enter your overall occupancy level
  - Specific Use Details – No Edits are required for unoccupied areas

→ *Because vacancy is less common within these types there are no specific metric adjustments at this time*

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