



# Building Performance & Federal Green Challenge



Thomas Burke, P.E., LEED AP O+M, 12/13/17

# GSA's Activities & FGC

- GSA Portfolio & Regulatory Drivers, etc.
- GSA's Energy Use Analysis System (EUAS)
- Guiding Principles (GPs) & GSA's Program
- Energy Savings Performance Contracts (ESPC)
- Waste Diversion & Materials Recycling Facilities (MRF)

# GSA's Portfolio – National

**8,792 total assets** (2016)

- **374 million sq. ft.**

**1,621 owned assets**

- **183 million owned sq. ft.**

**7,171 leased assets**

- **191 million leased sq. ft.**



# GSA Portfolio – Region 2

**520 total assets** - 87 owned & 433 leased

- **26.4 million sq. ft.**
  - 16.8 million sq. ft. owned
  - 9.6 million sq. ft. leased



# Impact of Buildings

- Electricity 72%
- Total Energy 39%
- Carbon Dioxide 38%
- Raw Materials 40%
- Waste Output 30%
- Water 14%



# Why Do It ?

- Executive Orders and Laws
- Each Agency has its own mandated Strategic Sustainability Performance Plan (SSPP - EO 13693)
  - <http://www.whitehouse.gov/administration/eop/ceq/sustainability/plans>
- OMB Scorecards
- Triple Bottom Line, P3
  - People
  - Planet
  - Profit



# Regulatory Drivers

- **Executive Order 13693** 2015
- Executive Order 13514 2009
- Executive Order 13423 2007
- Energy Independence Security Act (EISA) 2007
  - Codifies sections of E.O. 13423



# Regulatory Drivers

- **Guiding Principles (GPs) for Federal Leadership in High Performance and Sustainable Buildings** **2006**
  - Was part of EO 13514, was 15% by 2015
  - Now part of E.O. 13693, with GSA's goal of 25% by 2025
  - GPs updated in 2016





# Energy, Water, GHG & Net Zero Buildings

- Energy - 2.5% ↓ annually by 2025 based on 2015 baseline
- Water - 36% ↓ by 2025 based on 2007 baseline
- Green House Gases (GHG) - 40% ↓ by 2025 based on 2008 baseline (Scope 1 & 2)
- Renewable Energy – 30% ↑ by 2025
- Net Zero – New construction design starts in 2020 to achieve net zero by 2030 (net zero water/waste where feasible)





**Scope 1&2 GHG Emission Reduction Target**

For Scope 1&2 GHG Reduction Target of 73.0% by 2025:  
62.8% reduction in 2016 and on track



Score: GREEN



**Scope 3 GHG Emission Reduction Target**

For Scope 3 GHG Reduction Target of 83.0% by 2025:  
66.1% reduction in 2016 and on track



Score: GREEN



**Reduction in Energy Intensity**

Reduction in energy intensity in goal-subject facilities compared with 2015:  
5.0% and on track



Score: GREEN



**Use of Renewable Electricity**

Use of renewable electricity as a percent of facility electricity use:  
47.9% from renewable sources and on track for 30% by 2025



Score: GREEN



**Use of Clean Energy**

Use of clean energy as a percent of facility energy use:  
24.1% of federal building electric energy and thermal energy is clean energy and on track



Score: GREEN



**Reduction in Potable Water Intensity**

Reduction in potable water intensity compared with 2007:  
26.3% and on track for 36% in 2025



Score: GREEN



**Green Buildings**

Sustainable green buildings:  
35.0% GSF of inventory sustainable



Score: GREEN



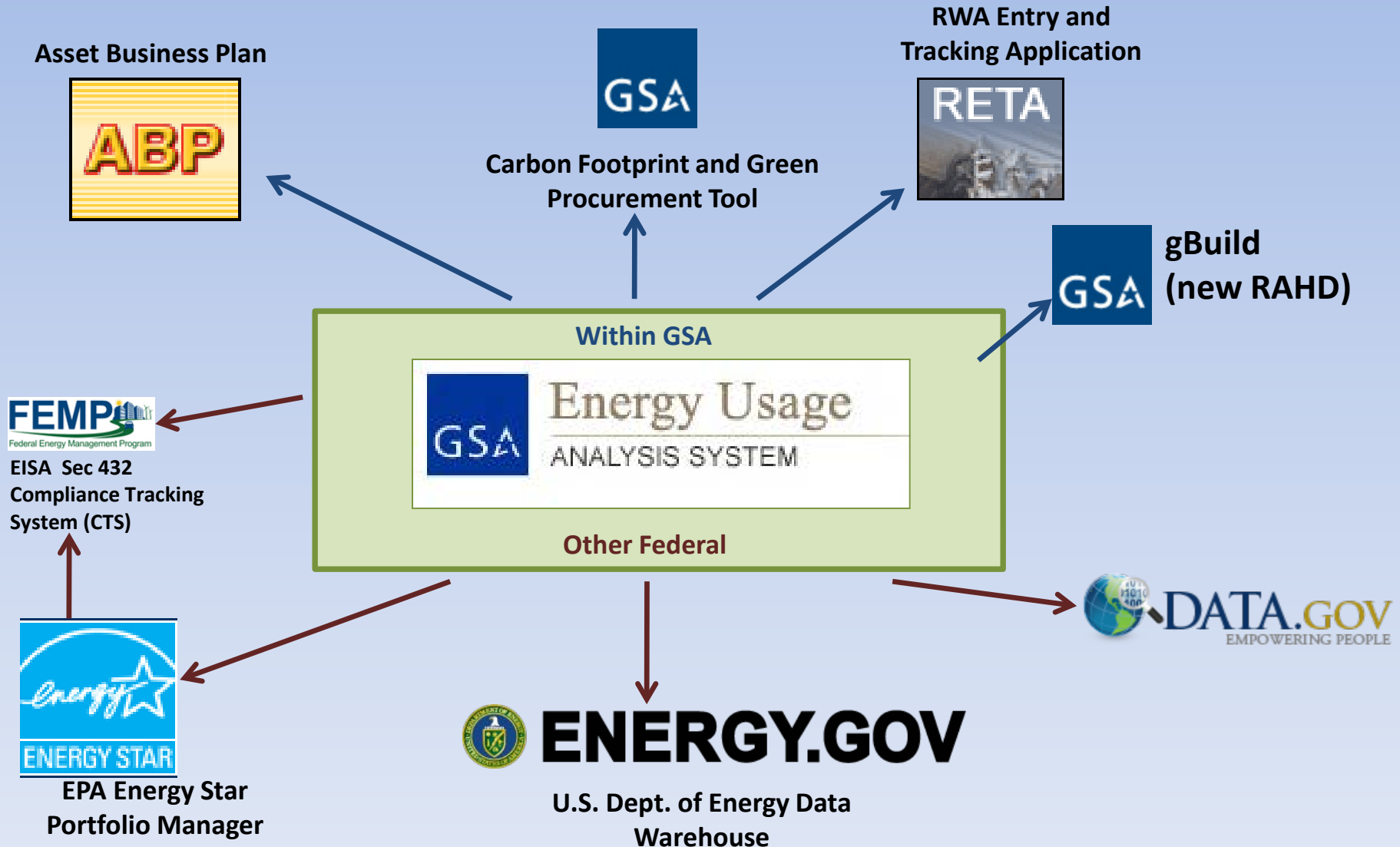
# GSA's Energy Use Analysis System (EUAS)

- EUAS **tracks energy and water consumption** and cost for all GSA operated buildings (owned and leased) where GSA pays utilities.
- **Over 5100 Invoices processed monthly**
- EUAS used by GSA energy managers to **track progress** toward meeting GPs, energy & water goals (EO 13693):
  - Energy - 2.5% annually thru FY25, below 2015 baseline
  - Water - 2% annually thru FY25, 36% below 2007 baseline
- EUAS helps forecasting, monitoring energy budgets as well as for spotting anomalies.
- Not meant to be Building Mgr's daily energy mgmt tool to see how his bldg is operating.

# EUAS Reporting Features

- **Choice of Reporting Units**
  - ✓ Actual energy units
  - ✓ Btu's or Mmbtu's
  - ✓ Btu's/GSF
  - ✓ Cost/Unit
  - ✓ Actual Water Units
- **Flexible Reporting Periods**
  - ✓ Full fiscal year
  - ✓ Year-to-date
  - ✓ Floating twelve months
  - ✓ Range of dates
- **Organizational Options**
  - ✓ Building
  - ✓ Field Office (Service Center)
  - ✓ District (Eastern or Western)
  - ✓ Region (also State for some)
  - ✓ Nation
- **Building Categories**
  - ✓ Goal or non-goal government owned (A, B)
  - ✓ Goal or non-goal leased (C, D)
  - ✓ Goal Energy Intensive (I)
  - ✓ Reimbursable (E)
  - ✓ Optional Designations ( EISA Cov Fac, Metered, LPOE, etc)

# EUAS Shares Data with Energy Star & Other Applications



# Reports

- Actual Data Energy / Actual Data Water – most used
- Sorted Bldg – Best format for exporting
- % Variance – Very Useful for Energy Mgmt

- ▶ Actual Data - Energy
- ▶ Actual Data - Water
- ▶ Comparison Report
- ▶ Water Status
- ▶ Energy Status
- ▶ Vendor Accounts
- ▶ Facility History
- ▶ Building History
- ▶ Building Address
- ▶ Sorted Building
- ▶ % Variance
- ▶ Comparison Graph
- ▶ Energy Performance (with weather data)
- ▶ Un-Formatted Data Report
- ▶ Ad-Hoc

- ▶ Building Performance Benchmarking Report
- ▶ Energy Star Rating Report
- ▶ Comparison Report - Degree Days

## Legislative Mandates:

Energy Baseline: 2003, now 2015

Water Baseline: 2007

Click here for legend information

← BACK | PRINT | EXPORT | **VIEW LEGENDS**

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Desired Printer Setting :Landscape

**Actual Data Report - Energy**

Region Summary for building categories : A

Optional Building Designation(s) :

Energy Usage is shown in Actual units - Show Totals and Sub Totals

Region : 11

Conversion Detail = Site Use

Date : 4/8/2014

Report for the period of Fiscal Year 2013

Time : 2:47:34 PM

	Electricity (KWH)	RenElec (KWH)	Demand (KW)	Steam (Thou. lbs)	Gas (Cubic Ft)	RenGas (Cubic Ft)	Oil (Gallon)	Coal (Ton)	Chill Wtr (Ton Hr)	Other: (mmBT
<b>Building: AX0011RE - A</b>										
Total Usage	0	122,395,036	0	0	0	0	0	0	0	0
Cost	\$0	\$53,854	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Building: AX1100PJ - A</b>										
Total Usage	0	0	0	0	0	0	0	0	0	0
Cost	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Building: DC0000AB - A</b>										
Total Usage	19,862,142	1,489,661	0	24,849	0	0	0	0	0	0
Cost	\$2,109,566	\$2,234	\$0	\$966,584	\$0	\$0	\$0	\$0	\$0	\$0
<b>Building: DC0000NA - A</b>										
Total Usage	19,244,948	1,443,371	0	0	14,733,378	0	0	0	0	0
Cost	\$1,942,118	\$2,165	\$0	\$0	\$162,760	\$0	\$0	\$0	\$0	\$0
<b>Building: DC0007ZZ - A</b>										
Total Usage	13,289,171	996,688	0	12,311	0	0	0	0	0	0
Cost	\$1,443,721	\$1,495	\$0	\$478,869	\$0	\$0	\$0	\$0	\$0	\$0

\* RenElec, RenGas are information items only; RenElec, RenGas usage and cost are also included in electricity and gas usage

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Desired Printer Setting : Landscape

# % Variance Report

## Percentage Variance Report

Region Summary for building categories : A

Reporting Unit : BTU/GSF, Utility Types : All Energy

Goal Tracked For Water : All

Region : 11

the period of Floating 12 Months, January 2014 and Entire Fiscal Year 2013

Buildings in Region : 11

Variance : + or - 005

Building	Building Name	2014 Information			2013 Information			% Variance
		Category	GSF	BTU's/GSF	Category	GSF	BTU's/GSF	
DC0014PB	E B PRETTYMAN COURTH	A	627,739	45,210	A	627,739	42,897	5.39%
DC0573PB	WILLIAM BRYANT ANNEX	A	443,681	59,807	A	443,681	56,369	6.10%
MD0232ZZ	SOUTHERN MD COURTHSE	A	297,330	82,232	A	297,330	74,158	10.89%
DC0031ZZ	ROB - NCR	A	942,977	70,537	A	942,977	65,273	8.06%
DC0501BC	SIDNEY YATES	A	208,783	34,026	A	208,783	29,477	15.43%
MD0778AG	CENSUS BUREAU OFFICE	A	2,573,353	61,257	A	2,573,353	64,926	-5.65%
DC0078ZZ	CIVIL SERVICE BLDG	A	53,581	91,305	A	53,581	84,487	8.07%

Sensitive But Unclassified, Intended for GSA Internal Use Only.

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Organization Level: Nation | Regions: All | States: All | Reporting Period: Floating 12 Month | Fiscal Month: Jan | Fiscal Year: 2014 | Building Subset: All Buildings

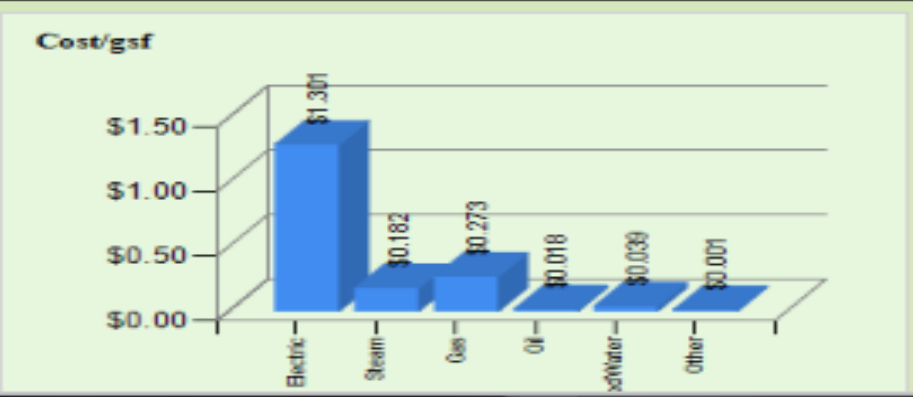
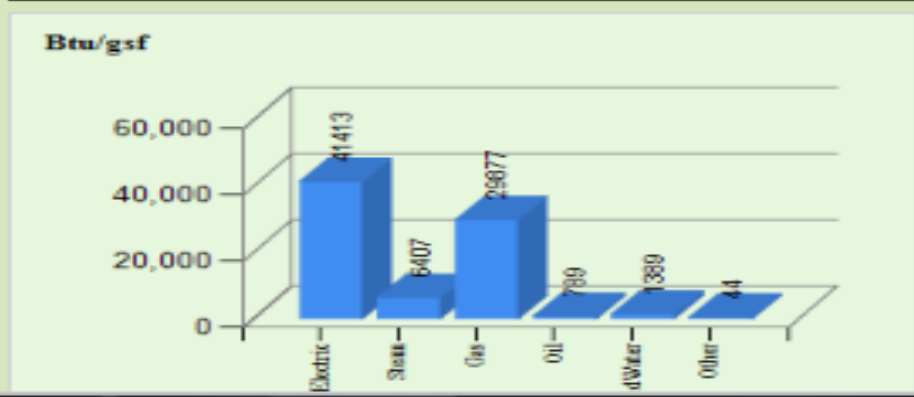
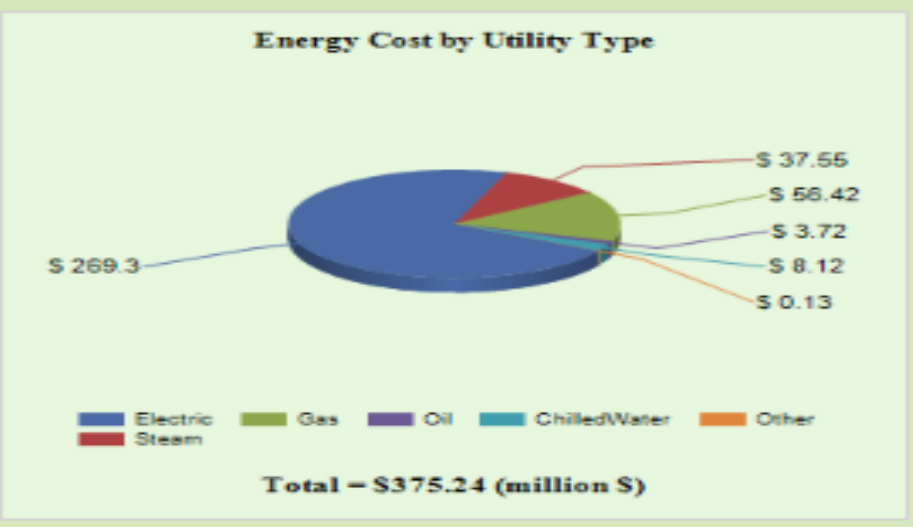
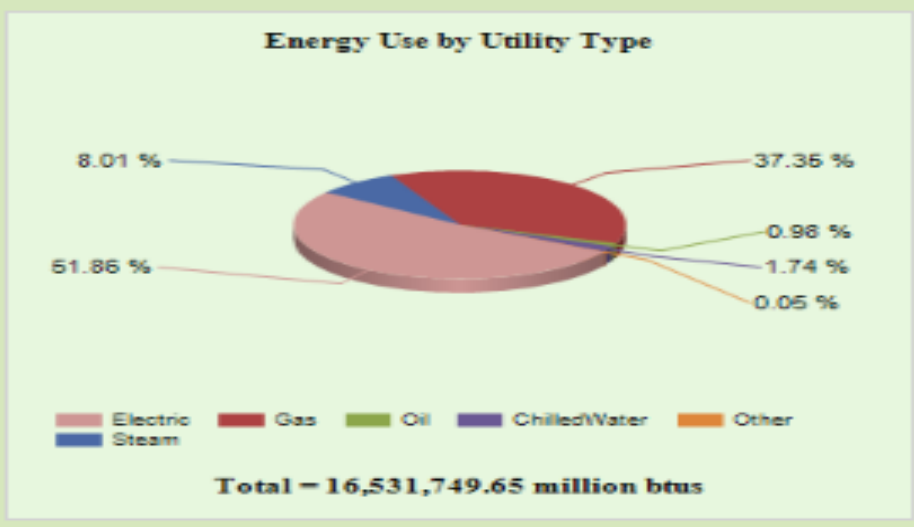
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OVERVIEW - STATISTICS

Organization Level	Region	State	Reporting Period	Fiscal Month	Fiscal Year	Building Subset
Nation	All	All	Floating 12 Months	Jan	2014	All Buildings



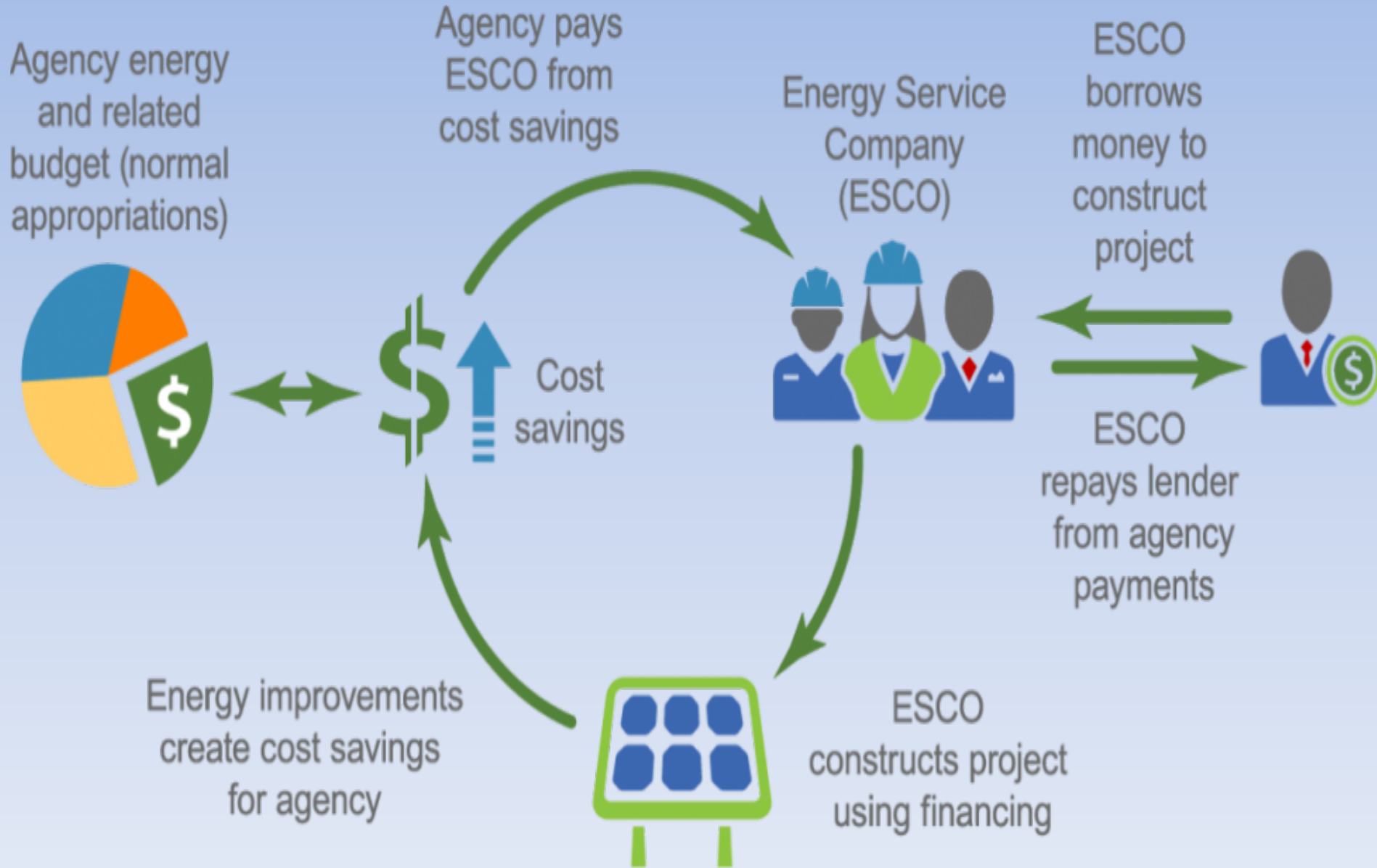
# Energy Savings Performance Contracts (ESPC)

- Energy savings performance contracts (ESPCs) allow federal agencies to procure energy savings and facility improvements, An ESPC is a partnership between an agency and an energy service company (ESCO). ESPC allow agencies to do energy projects with **minimal up-front capital costs and no special appropriations from Congress**
  - Access to private-sector expertise in energy efficiency, renewable energy, water conservation, and reduced emissions
  - Built-in incentives for ESCOs to provide high-quality equipment, timely services, and thorough project commissioning

# Energy Savings Performance Contracts (ESPC)

- ESCO conducts a comprehensive energy audit Investment Grade Audit ( IGA) for the Federal facility and identifies improvements to save energy. Energy Saving Measure (ECMs)
- ESCO designs and constructs the project, and arranges the necessary financing
- ESCO guarantees that the improvements will generate energy cost savings sufficient to pay for the project over the term of the contract

# ESPC Cycle of Cost Saving & Payments



# Who are The ESCOs ?

## 2017 DOE IDIQ ESPC Energy Service Companies (ESCO)

- [ABM Government Services, LLC](#)
- [AECOM Technical Services, Inc.](#)
- [Ameresco, Inc.](#)
- [The Brewer- Garrett Company](#)
- [CEG Solutions](#)
- [Consolidated Edison Solutions, Inc. \(CES\)](#)
- [Constellation NewEnergy, Inc.](#)
- [EDF Renewable Energy](#)
- [Energy Systems Group, LLC](#)
- [Honeywell International, Inc.](#)
- [Leidos Engineering](#)
- [Lockheed Martin Corp.](#)
- [NORESCO, LLC](#)
- [OpTerra Energy Services](#)
- [Schneider Electric](#)
- [Siemens Government Technologies, Inc.](#)
- [SmartWatt Energy](#)
- [Southland Energy](#)
- [Trane U.S., Inc.](#)
- [WGL Energy Systems, Inc.](#)

# ESPC Key Characteristic & Benefits

- The legislated purpose is to achieve energy savings and ancillary benefits.
- Savings guarantees are mandatory.
- **Measurement and verification is mandatory.**
- **Contract term cannot exceed 25 years.**
- Infrastructure improvements that pay for themselves over time.
- **Ability to purchase long-payback equipment by bundling with short-payback ECMs.**
- Guaranteed cost savings and equipment performance.

# ESPC Investment Grade Audit (IGA)

APRIL 15, 2016



GSA Region 2

## Final Investment Grade Audit/ Final Proposal

Original Solicitation #GS-02P-12-PV-C-0002

Under Department of Energy Contract DE-AM36-09GO29044

Greater Manhattan Service Center

201 Varick Street  
Federal Building VA

Ronald H. Brown  
U.S. Mission to the  
U.N. Building BN

Lower Manhattan Service Center

Alexander Hamilton  
U.S. Custom House HA

Daniel P. Moynihan  
U.S. Courthouse MO

Ted Weiss  
Federal Building WE

Charles L. Brieant, Jr.  
Federal Building &  
U.S. Courthouse BR

Brooklyn Service Center

Emanuel Celler  
U.S. Courthouse CE

Theodore Roosevelt  
U.S. Courthouse &  
Federal Building RO

Conrad B. Duberstein  
U.S. Bankruptcy  
Courthouse DU

Javits Service Center

Jacob K. Javits  
Federal Building JA

## Volume I Technical Proposal

Submitted to:

General Services Administration  
Public Buildings Service, Region 2  
26 Federal Plaza  
New York, NY 10278

Submitted by:

Trane U.S., Inc.  
Federal Contracting Solutions Group  
4833 White Bear Parkway  
St. Paul, MN 55110  
(651) 407-3800



**TRANE**

# ESPC Measurement and Verification (M&V)

- Measurement and Verification (M&V) done by GSA's 3<sup>d</sup> party contractor and by ESCO

## **M&V Guidelines: Measurement and Verification for Performance-Based Contracts Version 4.0**

Prepared for the U.S. Department of Energy  
Federal Energy Management Program

November 2015



# ESPC & GSA Region2

- **Total of 18 Buildings for @ \$137 M**
  - New York City ESPC – 10 Buildings @ \$113 M
  - Caribbean ESPC – 3 Buildings @ \$9 M
  - National Deep Retro Fit I, ESPC – 3 Buildings @ \$8 M
  - National Deep Retro Fit II, ESPC – 2 Buildings @ \$7 M
- **When completed regional energy reduction of @ 30%, water reduction @25%**

# ESPC & GSA Region2

**Solar PV Panels**

**Condensing Boilers**

**Chiller Plant Improvements**

**New EMCS/BAS Controls**

**Pneumatic to Digital Data  
Controls (DDC)**

**Replace Compressors**

**New Interior & Exterior Lights**

**Upgrade/Replace Cooling Tower**

**Replace/Refurbish Air Handling  
Units (AHU)**

**Windows Caulking & Sealing**

**Double Pane Interior Windows**

**Repair/Replace Steam Traps**

**New Variable Frequency Drive  
(VFDs)**

**CO-GEN Plant Improvements**

**Transformer Upgrades**

**Water & Plumbing Fixtures**

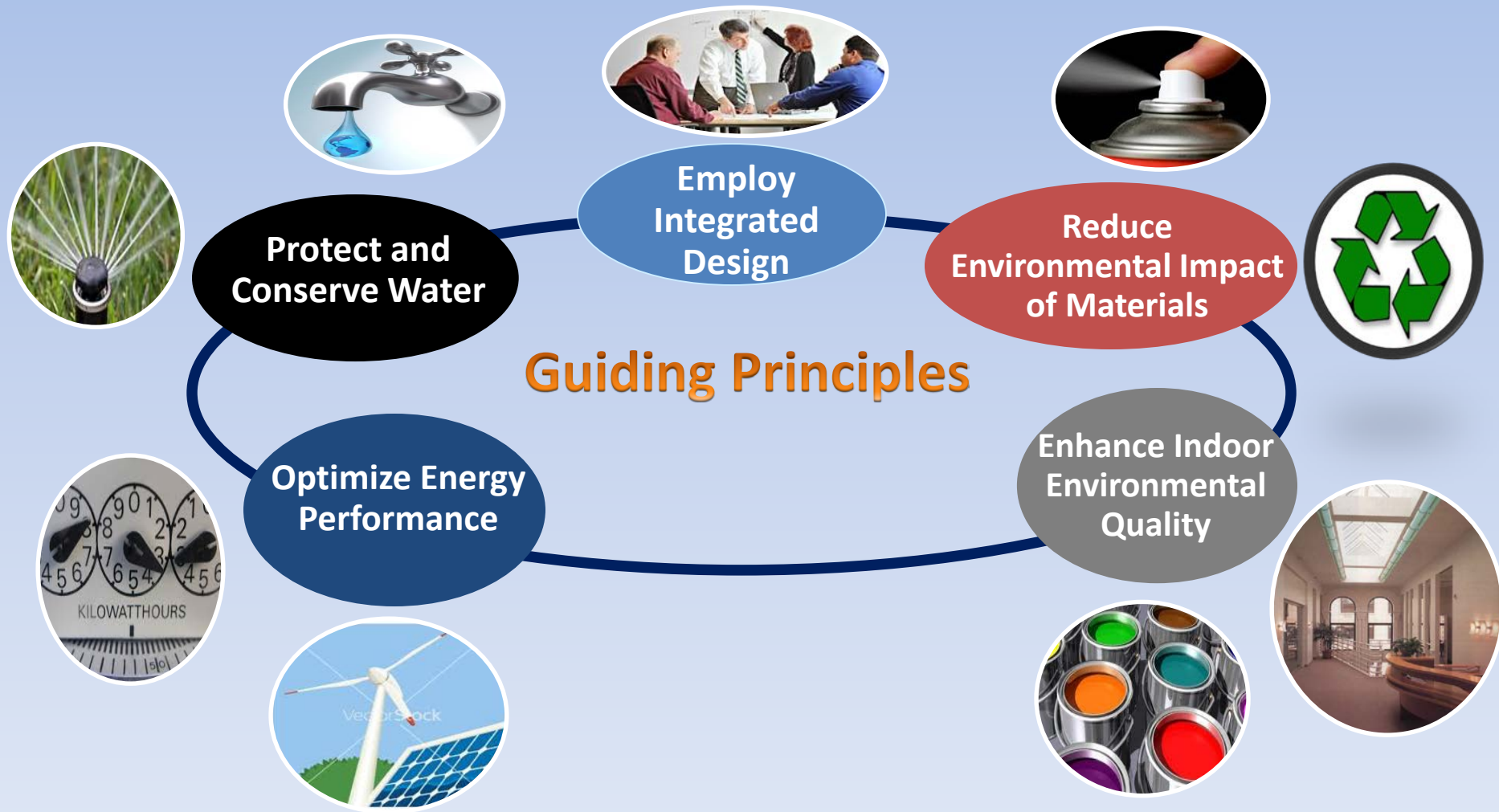
**Demand Control Ventilation  
(DCV)**

# ESPC & GSA Region2

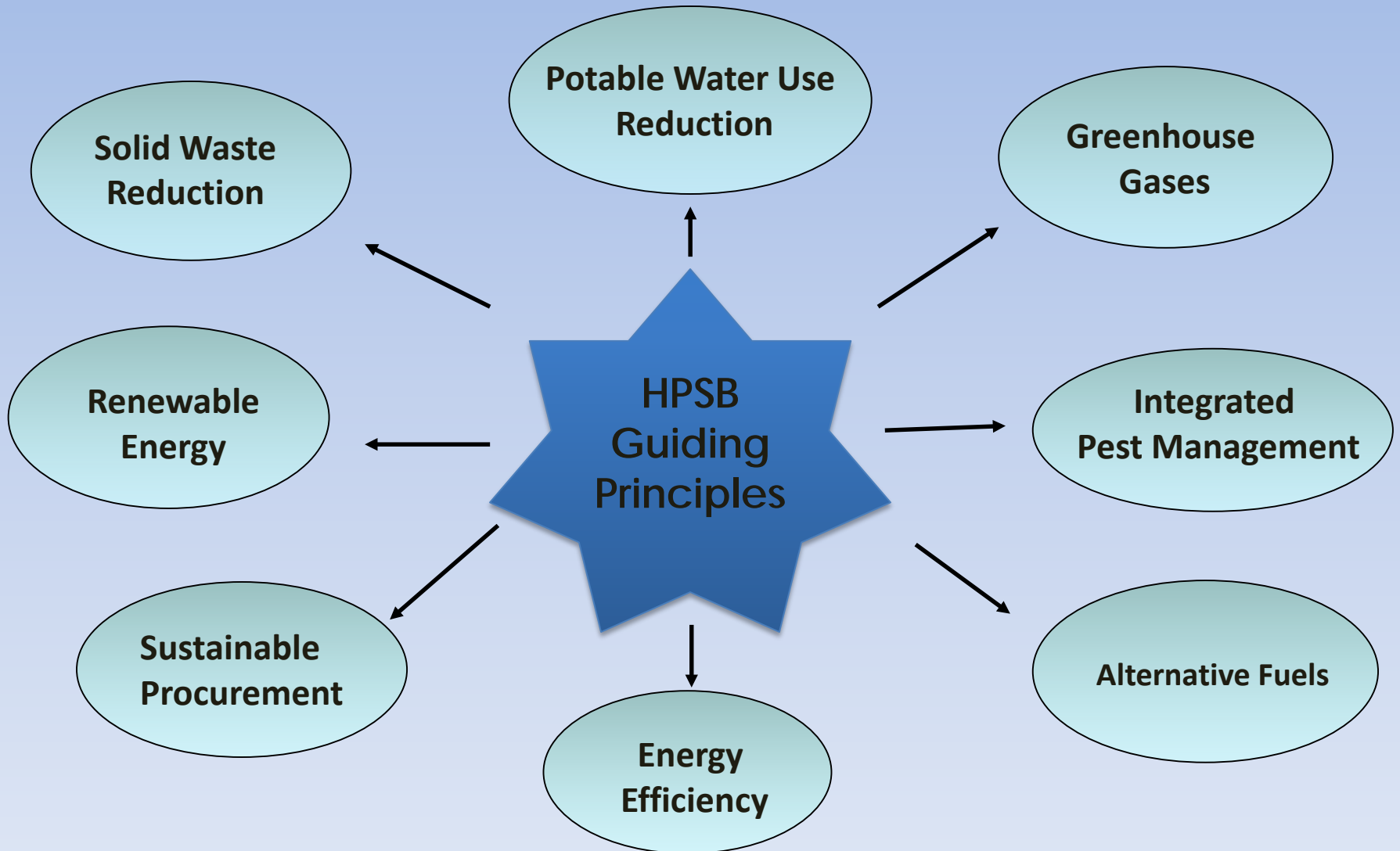
ECM No	Energy Conservation Measure	Breant	Brown	Dubenstein	Hamilton	Javits	Moynihan	Roosevelt/Celler	Varick	Weiss
1.2.2	Install Condensing Boilers	X								
2.1.1	Chiller Plant Improve. Elec & Abs-2-Elec (RO/CE)						X	X		
2.1.2	Chiller Plant Improvements - Abs-2-Elec	X								
2.1.3	Chiller Plant Improvements - Turb-2-Elec									X
2.3.1	Improve Variable Secondary Chilled Water Loop (Controls ECM only)			X						
3.2.2	EMCS Control Strategies 1 - Temp Reset; Opt S/S; Wireless (JA & WE); Replace EMCS (HA); Pneu to DDC (BR)	X	X	X	X	X	X	X	X	X
3.2.3	EMCS Control Strategies 2 - Chiller Opt; VAV Boxes-100 (VA)	X		X	X	X	X	X	X	X
3.2.4	EMCS Control Strategies 3 - Duct SP; GSA Link (BR,HA,MO,WE); Mtrg (except DU, JA, RO/CE)	X	X	X	X	X	X	X	X	X
3.9.1	Replace Air Compressor	X								
4.4.1	AHU Replacement/Refurbishment				X	X			X	
4.5.1	Upgrade/Replace Cooling Tower							X		
5.1.1	Interior Lighting - Office Areas				X			X	X	X
5.1.2	Interior Lighting - Common Areas (Hallways, Elevator Lobbies, etc.)		X		X			X	X	X
5.1.3	Interior Lighting - Ground Floor Lobby Areas									X
5.1.6	Interior Lighting - Cell Blocks							X		
6.1.1	Install Double Pane Interior Windows					X				
6.2.1	Window Caulking & Sealing								X	
7.2.1	Steam Condensate Cooler				X	X				X
7.4.1	Steam Traps - Repair/replace - includes MP/HP Trap monitoring; meter piping (VA)				X	X			X	X
8.2.1	VFDs on Cooling Tower Fans		X							X
8.4.1	Variable CHW/HW Flow		X				X	X	X	X
10.1.1	CO-GEN Plant Improvements - Improve Operation								X	
10.1.2	CO-GEN Plant Improvements - Hot Water Heat Recovery								X	
10.1.3	CO-GEN Plant Improvements - Hot Water Absorbers								X	
12.2.1	Transformer Upgrades	X			X	X	X		X	X
13.1.1	Water / Plumbing Fixtures - Mod Existing			X	X	X	X	X		X
5.2.1	Exterior Lighting			X	X	X		X		X
7.4.3	Medium/High Pressure Steam PRV Digital Control Upgrade				X	X			X	X
4.14.1	Dynamic Air Filtration			X	X	X		X	X	X
3.2.7	Demand Controlled Ventilation			X	X			X	X	

# Guiding Principles

Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings



# Guiding Principles & Related Goals



# Sustainable Guiding Principles

- Employ Integrated Design Principles

- Integrated Design, incorporate into building operations and procedures
- Commissioning within 4 years, Cx

- Optimize Energy Performance

- Energy Star 75, 30% less than 2003 baseline, 20% reduction from 2015 baseline, 30% reduction better than ASHARE 90.1 & use Energy Efficient Products Site Renewable Energy
- Site Renewable Energy
- Install building level meters – electric, natural gas, steam, install advance meters as appropriate
- Benchmarking – preferably using Energy Star Portfolio Manger



# Sustainable Guiding Principles

- Protect and Conserve Water
  - Indoor Water, 20% potable water reduction compared to 2007 baseline
  - Outdoor Water, 50% (landscaping) potable water reduction compared to baseline, or no potable water for irrigation
  - Optimize Cooling Tower Water
  - Water efficient products (Water Sense products)



# Sustainable Guiding Principles

- Enhance Indoor Environmental Quality
  - Ventilation and Thermal Comfort, ASHRAE 62.1, or 10 cfm per person
  - Moisture Control (humidity)
  - Day Lighting, 2% into 50% of spaces or 50% of occupants control lighting, task lighting
  - Low Emitting Materials (paint, carpet etc.)
  - Protect Indoor Air Quality During Construction
  - Integrated Pest Management (IPM)
  - Tobacco Smoke Control





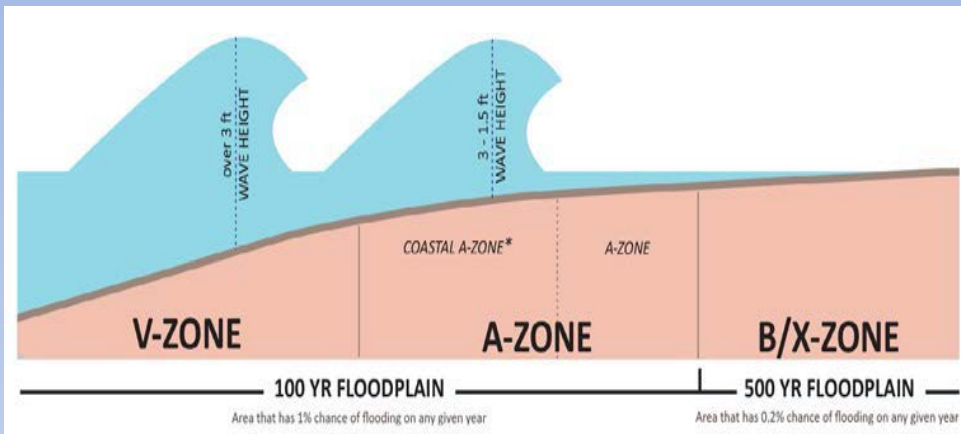
# Sustainable Guiding Principles

- Reduce Environmental Impacts of Materials
  - Environmentally Preferable Products (EPP)
  - Recycled Content
  - Bio-based Content (USDA)
  - Waste & Material Management
  - Ozone Depleting Materials, CFCs

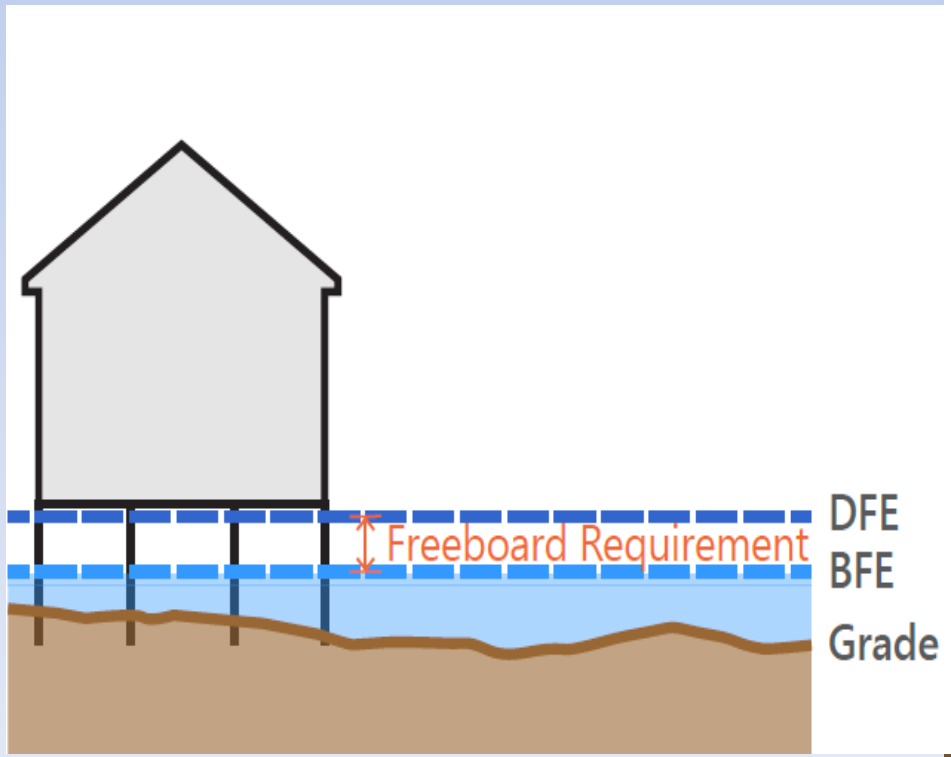


# Sustainable Guiding Principles

- Climate Change Risks
  - Climate Resilience and Adaptation Assessment
  - Mission Criticality
  - Facility Adaptation
- EO 13693 Action Plans
  - Climate Change Preparedness and Resiliency Work Group
  - (Mid Atlantic Federal Climate Partners)



\* New flood zone designation within the existing A-Zone where wave action is experienced. COASTAL-A ZONES are not mapped in current FIRMs but will be introduced in future revisions by FEMA.



# CEQ 2016 Guiding Principles for Sustainable Existing Buildings

## Required -8

<b>GP01</b>	<b>Integrated Assessment, Operation and Management</b>
<b>GP02</b>	<b>Commissioning</b>
<b>GP03</b>	<b>Energy Efficiency</b>
<b>GP07</b>	<b>Indoor Water Use</b>
<b>GP11</b>	<b>Ventilation and Thermal Comfort</b>
<b>GP15</b>	<b>Material Content and Performance</b>
<b>GP16</b>	<b>Waste Diversion</b>
<b>GP18</b>	<b>Climate Resilience</b>

## Optional – need 4

<b>GP04</b>	<b>Renewable Energy</b>
<b>GP05</b>	<b>Metering</b>
<b>GP06</b>	<b>Benchmarking</b>
<b>GP08</b>	<b>Outdoor Water Use</b>
<b>GP09</b>	<b>Alternative Water</b>
<b>GP10</b>	<b>Stormwater Management</b>
<b>GP12</b>	<b>Daylighting and Lighting Controls</b>
<b>GP13</b>	<b>Indoor Air Quality</b>
<b>GP14</b>	<b>Occupant Health and Wellness</b>
<b>GP17</b>	<b>Materials Management</b>

# GSA's Guiding Principles Program

- GSA's GP target of 25% by 2025 in line with the OMB/CEQ minimum target (EO 13693) for agencies that met the initial 15% target from EO 13514
- GSA's web based Sustainable Operations & Maintenance (SOM) Tool
- SOM tool used to track & document compliance with the GPs and LEED EBOM volume certification program
- SOM tool used for GSA's LEED volume certification program and to track WD.
- Revalidation of GP compliance every 4 years
- Agencies required to work towards 100% conformance with the GPs
- **GSA currently at @29% of GP eligible bldgs**

# Recycling & Waste Diversion

- EO 13514 & EO 13693: Divert at least 50% of non-hazardous solid waste and strive for net zero waste
- Minimize waste and pollutants



# Waste Diversion/Recycle

- Glass
- Cardboard
- Paper, Newspaper, Magazines
- Wood
- Plastics
- Aluminum Cans
- Fluorescent Bulbs
- Construction & Demolition Debris
- Electronics



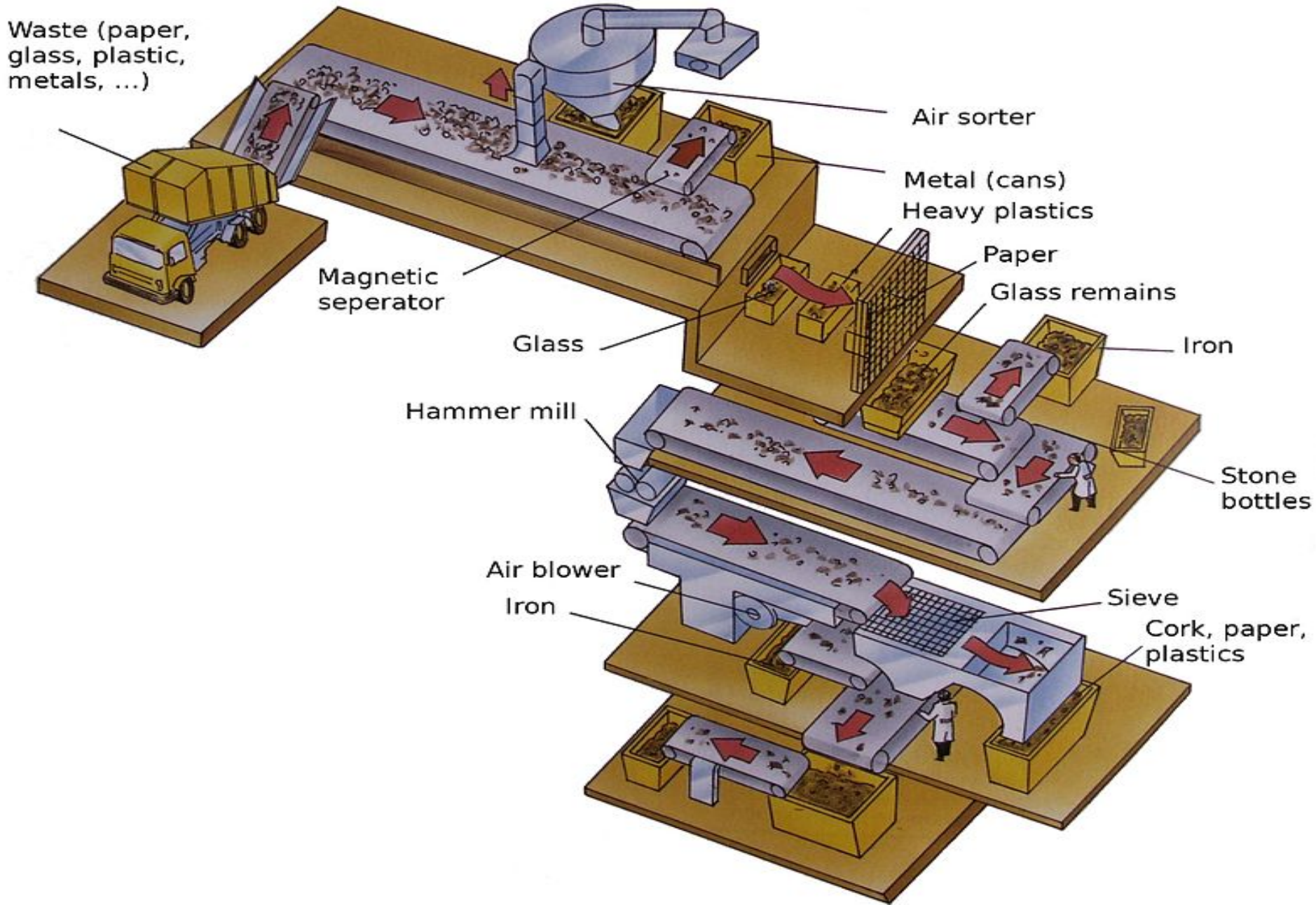


# Materials Recycling Facility (MRF )

- A materials recovery facility, materials reclamation facility, materials recycling facility or Multi re-use facility (MRF, pronounced "murf") is a specialized plant that receives, separates and prepares recyclable materials for marketing to end-user manufacturers



# MRF Diagram



# MRF Equipment





# **GSA Region 2 and MRFs**

- **Custodial Contracts changed to require use of Material Recycling Facility (MRF) with specified reporting**
- **Building's recycling and waste division reporting much higher when using a MRF, up to 75% - 80%**

# **GSA Region 2 & Federal Green Challenge**

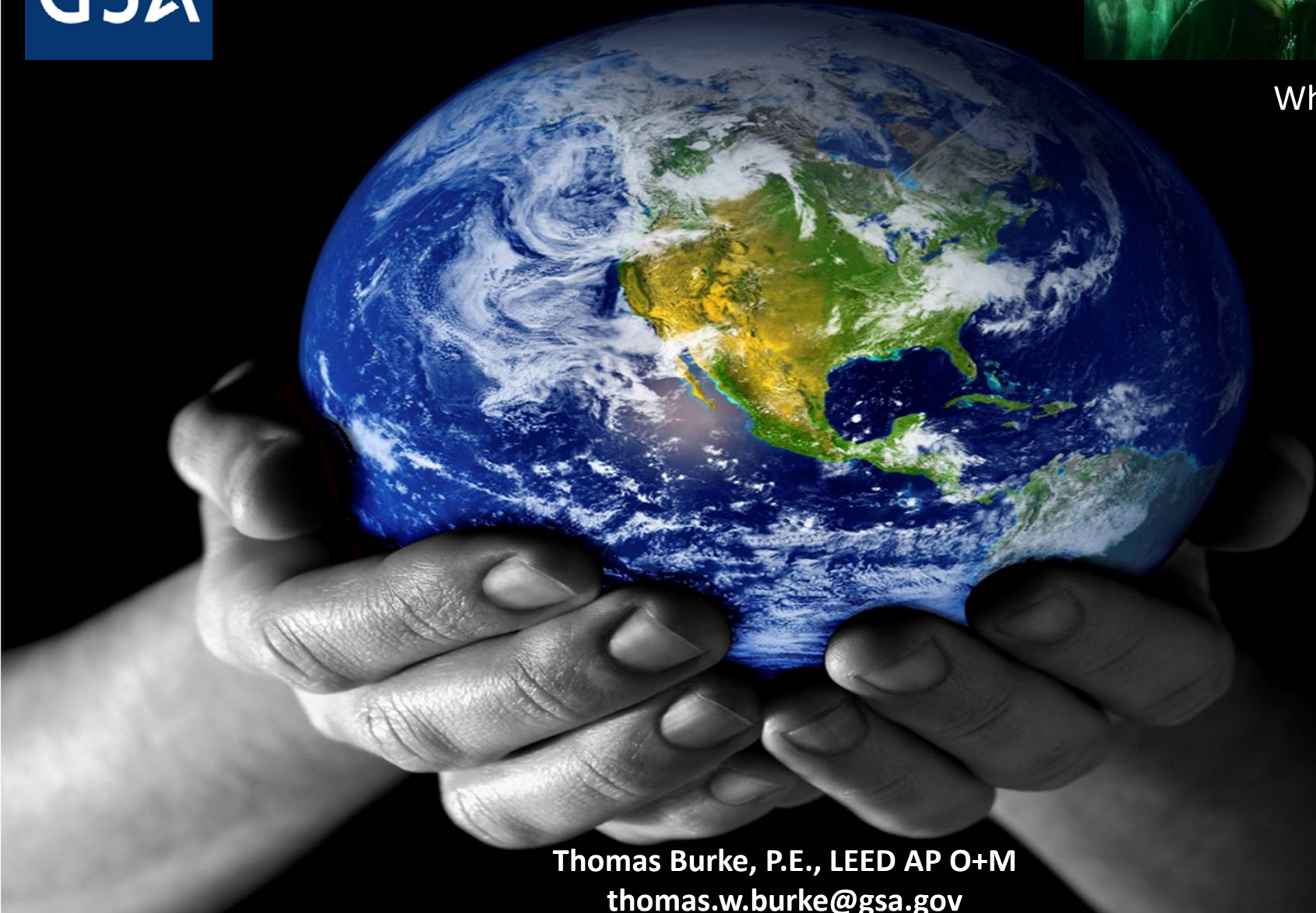
- **EUAS used to track energy and water for buildings and report for GP compliance**
- **ESPC used to increase energy efficiency and reduce water consumption & implement ECMs along with Agency's normal funding process for energy projects and building improvements**
- **Guiding Principles used to document and drive better building performance: Energy-Water-Waste-Cx (SOM tool)**
- **Waste Diversion tracked and reported in SOM tool used for GPs and E.O. requirements**



# Questions & Comments



What Say You



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