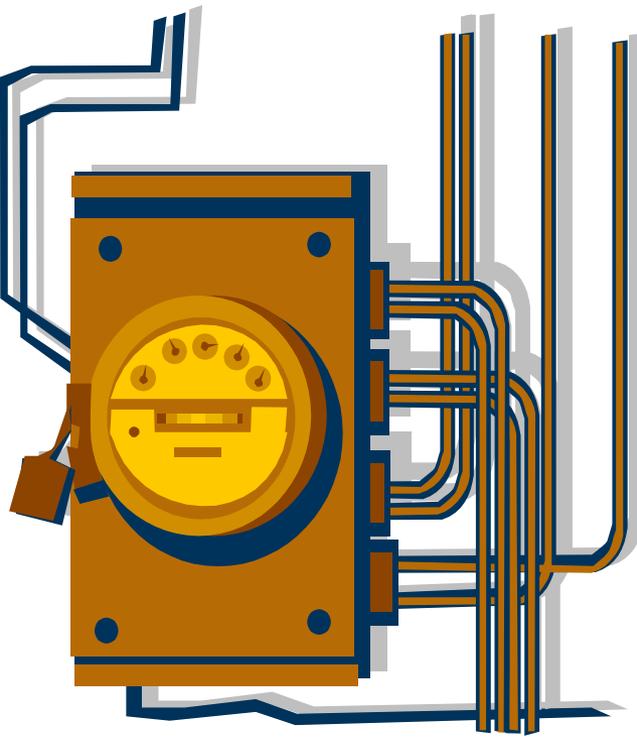




# GSA's Advanced Metering Program



*Application of Metering  
Strategies to Meet Agency  
Goals*

*FMSP Energy Division  
Karen Curran*

*GovEnergy 2010  
Dallas, TX*



# Advanced Metering – GSA Program

- Program started following GAO Audit (2005) on use of Demand Response Programs
- 1<sup>st</sup> Round of Metering began 2006
- Inside Firewall IT policy (officially issued Feb 2009)
- Regions install meters in the field that can communicate to GSA's network
- National Office - Energy Division has Schneider Electric IONEEM platform
  - Allows for data analysis and trending
  - Data from field brought into the front end server – interconnection effort
  - Regions can access front end server and EEM capabilities

# GSA Advanced Metering Plan

- **Development of Agency Plan**

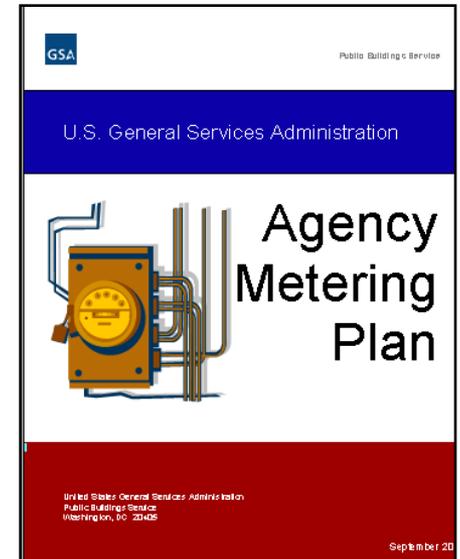
- What are the objectives?
  - Meet mandates
  - How are we going to use Metered Data?
- Current and Future Metering Needs

- **Agency original plan submitted to DOE in 2006**

- Prioritized based on total electricity usage & cost (typically site with most DR opportunities)

- **Current Priorities**

- Covered Facilities (EISA07) – Top Energy Users (198 bldgs)
- Sites receiving ARRA Funding
- Bldgs where Financing Energy Project
- Bldgs with onsite generation (PV, Cogen, Wind turbines)
- New Construction



# Use of Metering Data (Building Perspective)

## Energy billing & procurement

- Verifying utility bills
- Tenant energy use (sub metering)
- Identifying best rates
- Participating in demand response programs

## Optimize performance

- Diagnose equipment & systems operations
- Benchmark utility use
- ID potential projects
- ID power quality problems

Verify project performance

Promote energy awareness

# Use of Metering Data (Agency – Enterprise View)

## Energy Procurement

- Load Aggregation
- Load Factor
- Participating in demand response programs

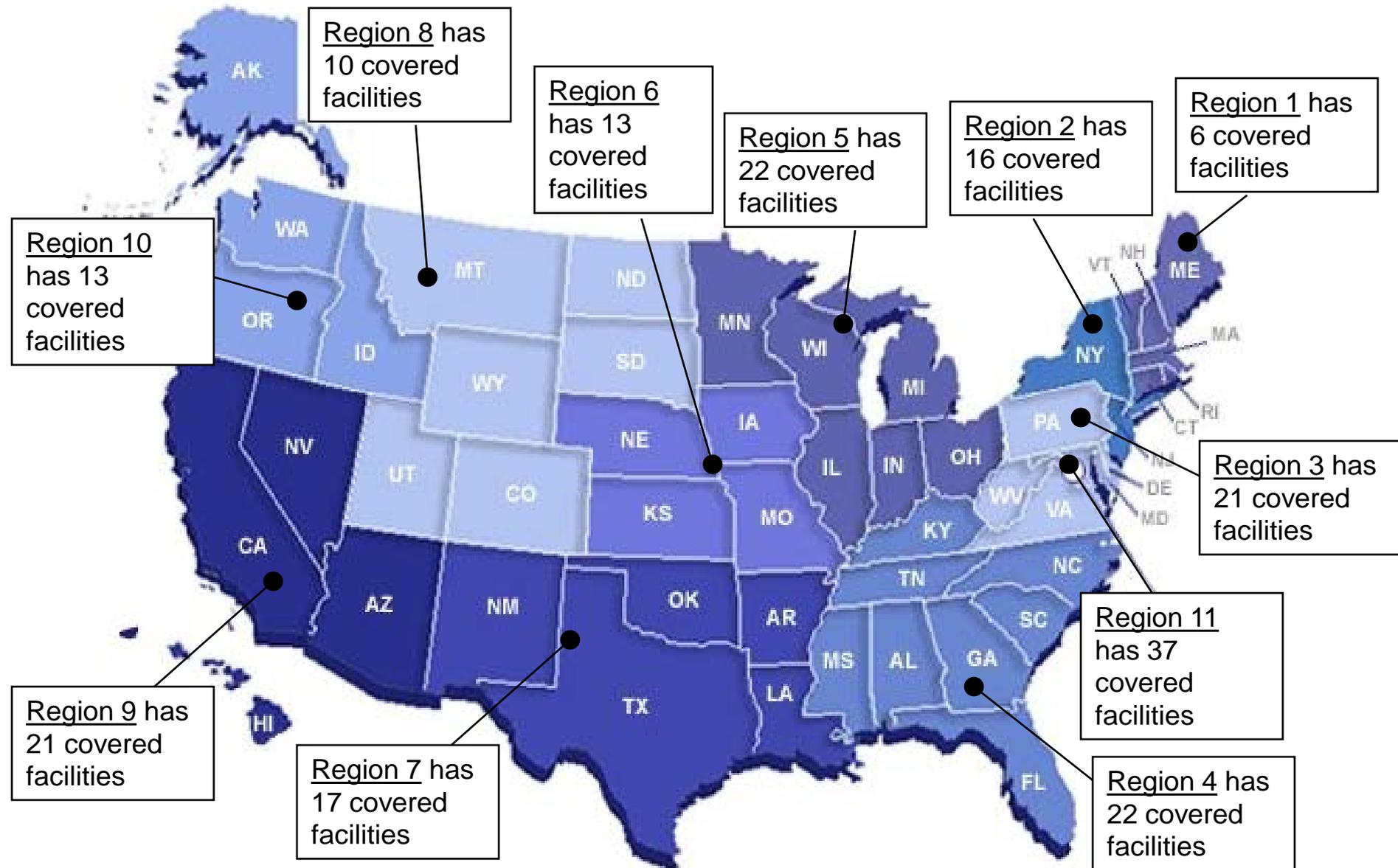
## Benchmarking

- Baseline comparisons
- Start-Up Comparisons
- Energy/Water intensity
- Trends across similar bldg types

Verification for  
Reporting Mandates

Promote energy  
awareness  
& Sharing Lessons  
Learned

# GSA Covered Facilities (EISA Sec. 432)



GSA's "covered facilities" under EISA 2007 are the 198 facilities that represent 75% of GSA's total energy usage.



# Advanced Metering – GSA Approach

- Where “Practicable” calculated on utility costs
- Initial Focus – Electric metering
  - 1<sup>st</sup> deadline, biggest benefit
  - Knowing detailed 15 min info proves to be valuable - ie.\$\$
  - Regions gain metering knowledge and work through IT / network issues
- WAGES (Water, Gas, Steam, other) being added as appropriate
  - “when” we use these energy types doesn’t have same economic impact
  - Gas pulse output from existing meter connect to digital input on electric adv meter – issue with some gas utilities unable/unwilling to provide
  - Water pulse output can be brought to analog input (when feasible – look at service entrance location)
  - Sometimes separate meters needed



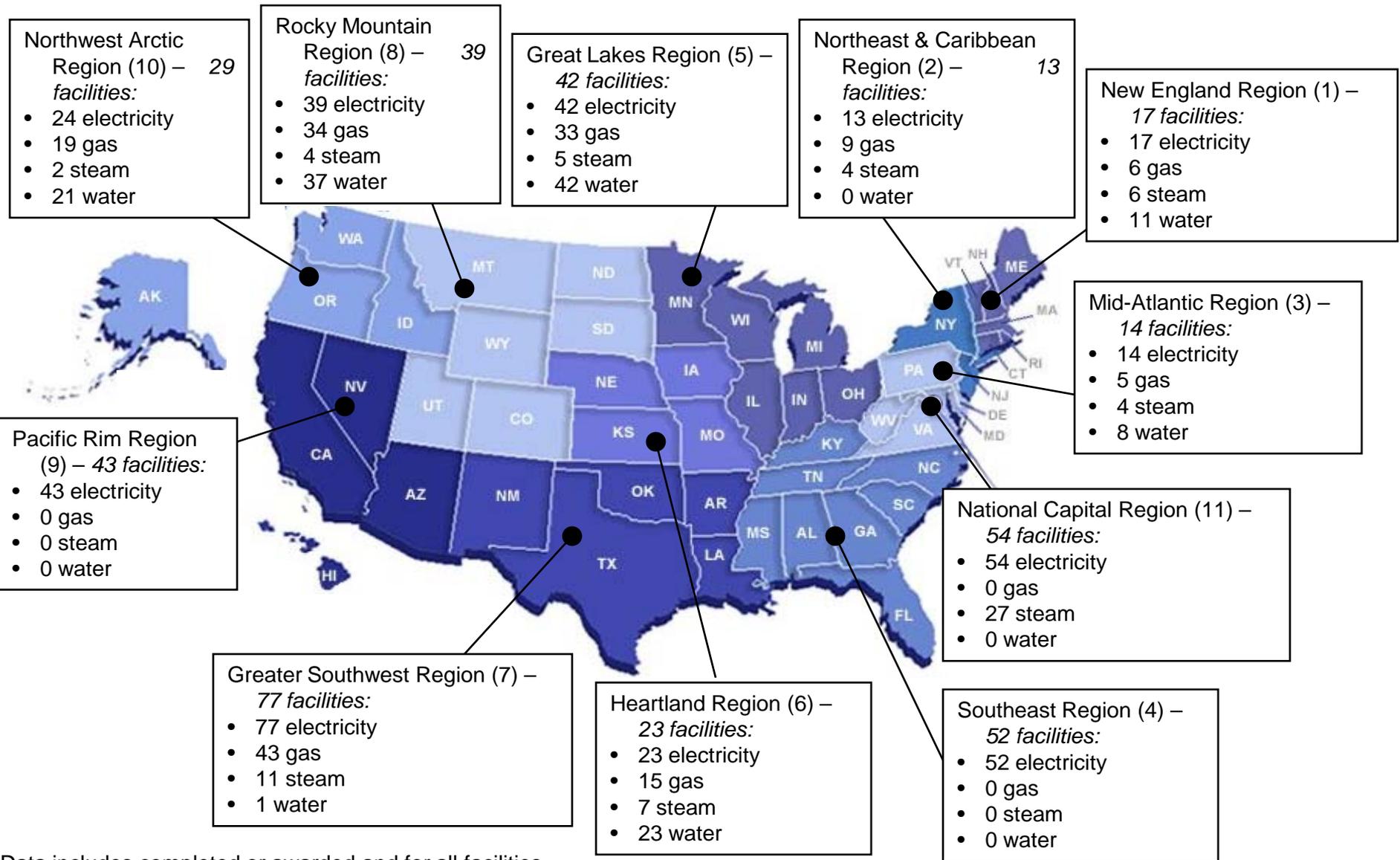
# GSA Advanced Metering Status

- Sites with Adv Meters completed or awarded
  - Total - 403 facilities; with 174 being Covered facilities
- Approximately 54+ more funded with awards by end of August
- Many sites have added gas /steam / water/ purchase chilled water as well as some equipment points
- 114 Bldgs available for trending on EEM now, with approx 90 with task orders underway, more with proposals in progress
- 78 Bldgs - analysis capabilities in Reg 7 system

# GSA Advanced Metering Status by Region



**Overall status:** 173 completed, 230 awarded and 54 more funded!



Data includes completed or awarded and for all facilities, covered & non-covered (as of July 2010).



# Technologies Used

- Advanced Electric Meters
  - Full range of capabilities
  - Simple Data loggers
- Wireless devices; provided meet set GSA CIO requirements for security; specific pre-approval required
- Analog/ Digital pulse outputs connected to other device
- Ultrasonic Meters ( rare...)
- Electromagnetic Meters



# IT Component / Progress

- IT System issued firewall policy for AMS (Advanced Metering Systems) and BAS (Bldg Automation Systems)
  - Big decision – required lots of coordination
- Impact / Role (PBS Systems Integration Team – Team Lead):
  - Unique Email set up....@gsa.gov
  - IP addresses needed
  - Network connectivity issues / Location of the GSA network in bldg
  - Managing all servers (vulnerability scans/ hardware specifications meet needs/ software inventory)
  - Work with vendors to implement software updates if needed
  - Requirement to scan all devices on GSA network
- Energy Division – worked closely with CIO to establish process for above
  - Facilitate discussions with appropriate folks / follow up on issues
  - More communication / awareness in the field of how process works
  - Participating on “Green IT Team” – focused on developing document for regions to use to help throughout process with complying with IT polices and security requirements



# Minimum Requirements

- Advanced Electric Meters
  - IP Addressable, meeting standard communication protocols
- Data collection
  - Measure and record 15 min interval data
- What is being measured (minimum vs. recommended)
  - Power consumption over time (bare minimum)
  - Phase voltages, phase currents, power factor, kVAR (recommended in most cases)
  - Gallons over time for water

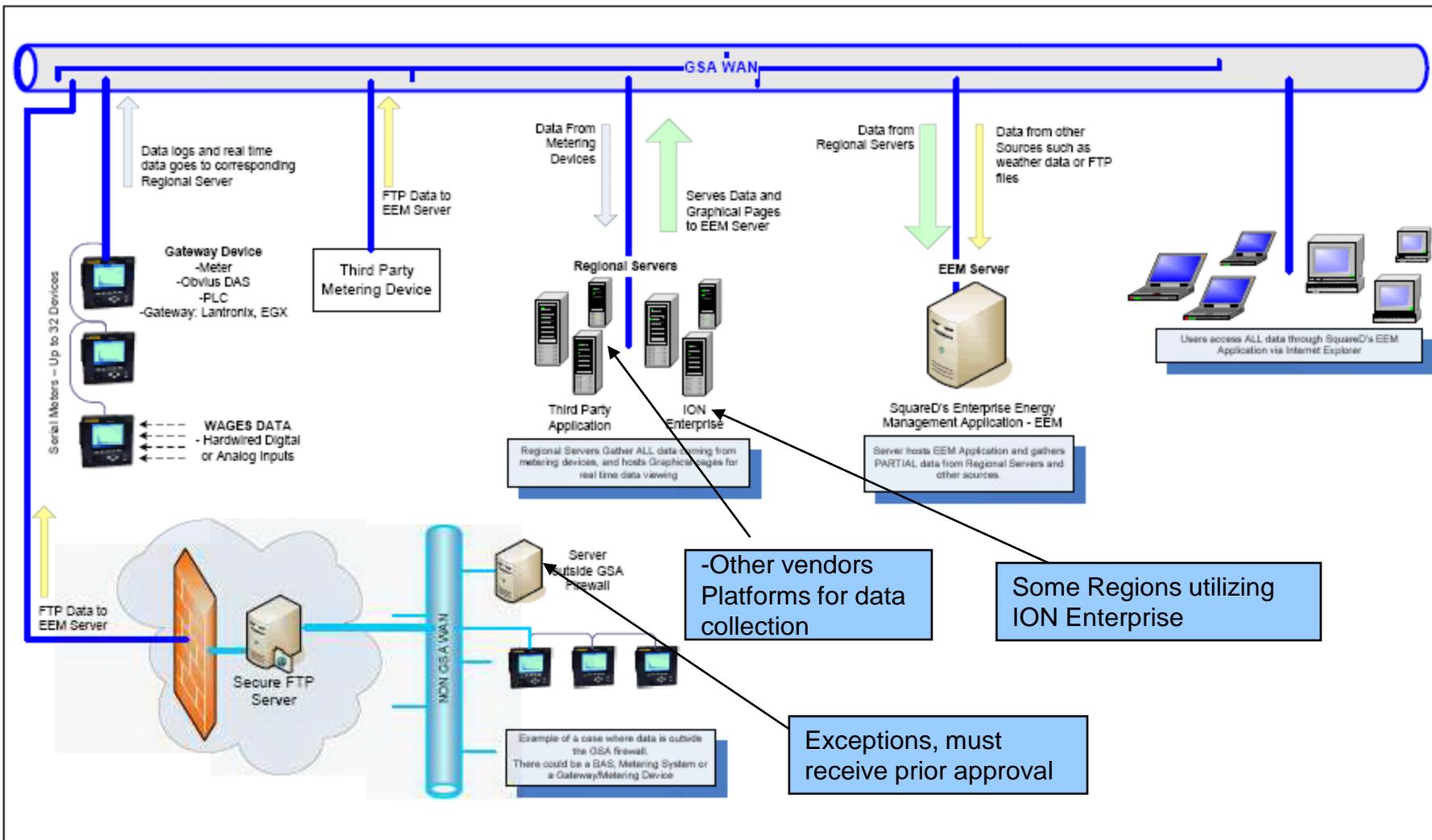


# Preferred Additional Features

- Electric Devices
  - Bi-directional monitoring (additional costs)
  - Can accommodate other inputs
  - On board data storage (memory)
- What ELSE is being metered
  - Equipment parameters ( temperatures, run hours)
  - Lighting Sub-panels

# Contracting Approach

- Some metering accomplished via larger project at site – metering contractor was sub to GC
- Typical Government Contracting process
- GSA Schedules
  - Schedule 03 FAC – Facilities Maintenance and Management Category 871-204 – Metering Services
  - Schedule 56 – Buildings and Buildings Materials, Industrial Services & Supplies



-Other vendors Platforms for data collection

Some Regions utilizing ION Enterprise

Exceptions, must receive prior approval

E									
D									
C									
B									
A									
REV	DESCRIPTION	DATE	BY	 SQUARE D Schneider Electric POWER MANAGEMENT OPERATION 296 TECH PARK DR, SUITE 100 LAWRENCE, TN 37088 (615) 287-3600		FIELD OFFICE / ENGINEER / APPLICATION ENGINEER Humberto R Zavarce DRAWN BY HRZ	FILENAME GSA NATIONAL NETWORK.VSD DRAWING STATUS FOR EXAMPLE ONLY CREATION DATE 10/1/00	TITLE GSA National Metering Network DESCRIPTION GSA National Metering Network FACTORY ORDER NO. PAGE 1 OF 1	



Careful what you wish for....  
Isn't having funding for metering a good thing?  
**HELP!!**





# Agency Metering Program – Administration -GSA's FMSP Energy Division

- Weekly meeting with Schneider Electric
  - Coordinate workload (existing and pipeline) / HSPD 12 clearances and network
  - Front End Issues
  - Application Support
- Monthly (sometime more frequent) with Regions
  - Regional Champion/ Contacts
  - Latest Front End Enhancements
  - Training
  - Best Practices
  - Issues ( usually relate to IT and network )
- Work closely with offices within GSA with stakes in metering (O&M, Smart Bldgs, Sustainability)
- Energy Division Metering Insite page (Internal site)
  - Repository for pertinent documents and policies



# GSA Nationwide Analysis System

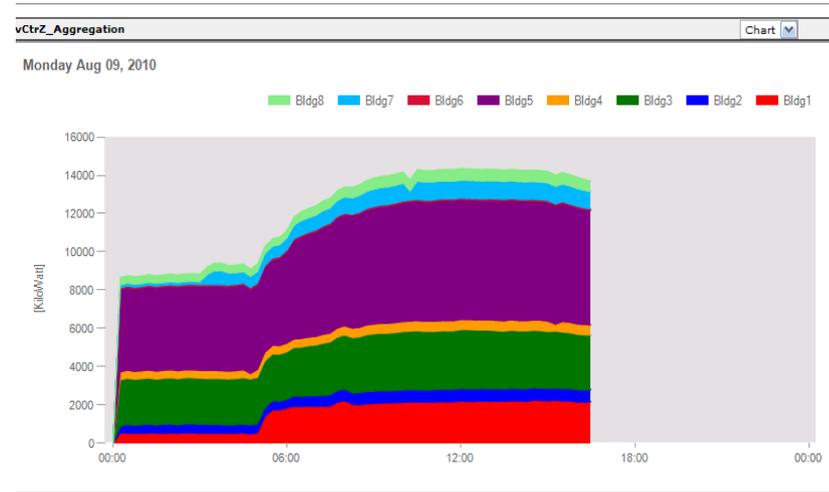
## ION EEM

- **Managed out of National office**
- **Energy Division has premium support agreement – any GSA person can use**
  - 1-888 # with pin, we get updates about issues and resolutions
  - Periodic training for users (typically when new sites get tied in)
  - Monthly report on health of system
  - Electronic copies of training materials can be shared – step by step of creating trends
- **ION EEM Front End- Behind GSA Firewall**
  - Created regional user accounts/groups
  - Create Service Ctr Accts
  - Once bldgs online, create more user accounts, as needed by the region



# Additional EEM Features

- Trends
- Customizable Reports
- Alarms – notification for user identified parameters including email notification
- Billing – Rate Wizard Module
  - Allows run real bill based on inputted rate structure for parameters we choose, one meter (sub-meter), different date range.
- Weather Feed (coming soon to GSA system)
- Additional Modules – In Progress
  - Power Quality/ Modeling





# EEM Administration (Continued)

## Challenges

- Educating property mgrs about system.
- Getting them to use the data
- Maintaining the network of users

## Communication Lost Notification

- Automatic email sent when change of communication status for device on Enterprise server

## EEM Training

- Hands on computer room ION EEM training
- How-to guide for copying existing trends
- Coming soon - video training, to be available on EEM site; Users to access directly, customized to GSA's system



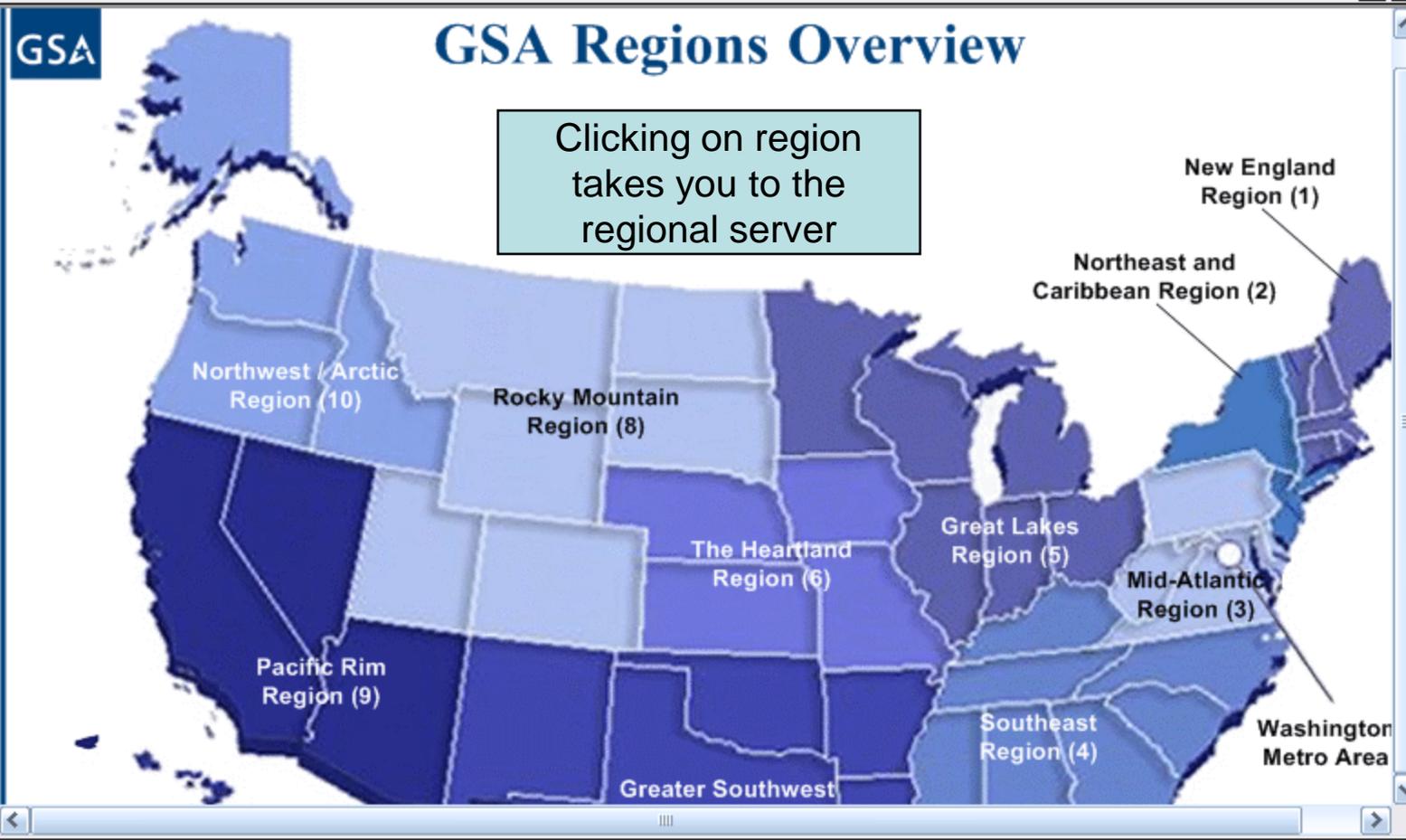
# Lessons Learned (some the hard way)

- There is NOT a one size fits all SOW for every site
- Involving IT Early
- Barrel Key Switches ( prevent someone from disconnecting meter)
- Shorting Blocks – allow for maintenance without outages
- WAGES Metering
  - Discussions early with utility about ability to use their pulse outputs
  - New Meter, shut downs may be required
- Communication – issues can be time consuming to troubleshoot
  - Helpful to have process for notification when communication is lost
- Processes and Lessons Learned in Guidebook
  - Slowest part of process – when establishing network presence if none exists (involve them early)

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- gion8
- \_UsageTrend
- OffHrs\_Wkend
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- day vs Yester
- is Wk vs Last
- Lag
- ly4th Week
- artUpComparis
- \_Websites
- g2

### Nation\_Regional Breakout

#### Nationwide\_Webreach



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- ly4th Week
- artUpComparis
- \_Websites
- g2

Nation\_Regional Breakout

Nationwide\_Webreach



# Region 11 (NCR)

- Back
- Nation Map
- Help

- DC Services
- Potomac Service Center
- HOTD
- Triangle Service Center
- Metro Service Center

Nation\_Regional Breakout

Nationwide\_Webreach



- Back
- Nation Map
- Help

# Region 11 - DC Services

**DC0114ZZ**  
US TaxCourt



kw  
Amps

Metering

**DC0083/4ZZ**  
FOB 10A and 10B



kw  
Amps

Metering

**DC0014ZZ**  
Prettyman Courthouse



kw  
Amps

Metering

**DC0033ZZ**  
Mary Switzer Bldg



kw  
Amps

Metering

**DC0010ZZ**  
Dept of Education (FOB6)



kw  
Amps

Metering

**DC0004ZZ**  
Cotton Annex



kw  
Amps

Metering

**DC0034ZZ**  
Cohen Building



kw  
Amps

Metering

**DC0501BC**  
Sidney Yates



kw  
Amps

Metering

- Nationwide
- Karen Main
- Dem Trends
- Reg1\_IONEnterpr
- Reg1\_WalthamPV
- Region8
- CO\_UsageTrend
- Ex-OffHrs\_Wkend
- Aggregation
- Today vs Yester
- This Wk vs Last
- PFLag
- July4th Week
- StartUpComparis
- PV\_Websites
- Reg2

### Nation\_Regional Breakout

#### Nationwide\_Webreach



- Back
- Nation Map
- Help

Utility 1  
kW : 247.5

Utility 2  
kW : 168.0

Chilled Water  
Tons : 804.9

Chilled Water Flow  
GPM : 2,206.6

Steam  
LB : 17,006,700

Building Size  
SqFt : 735,296

Energy Types

COMMUNICATIONS



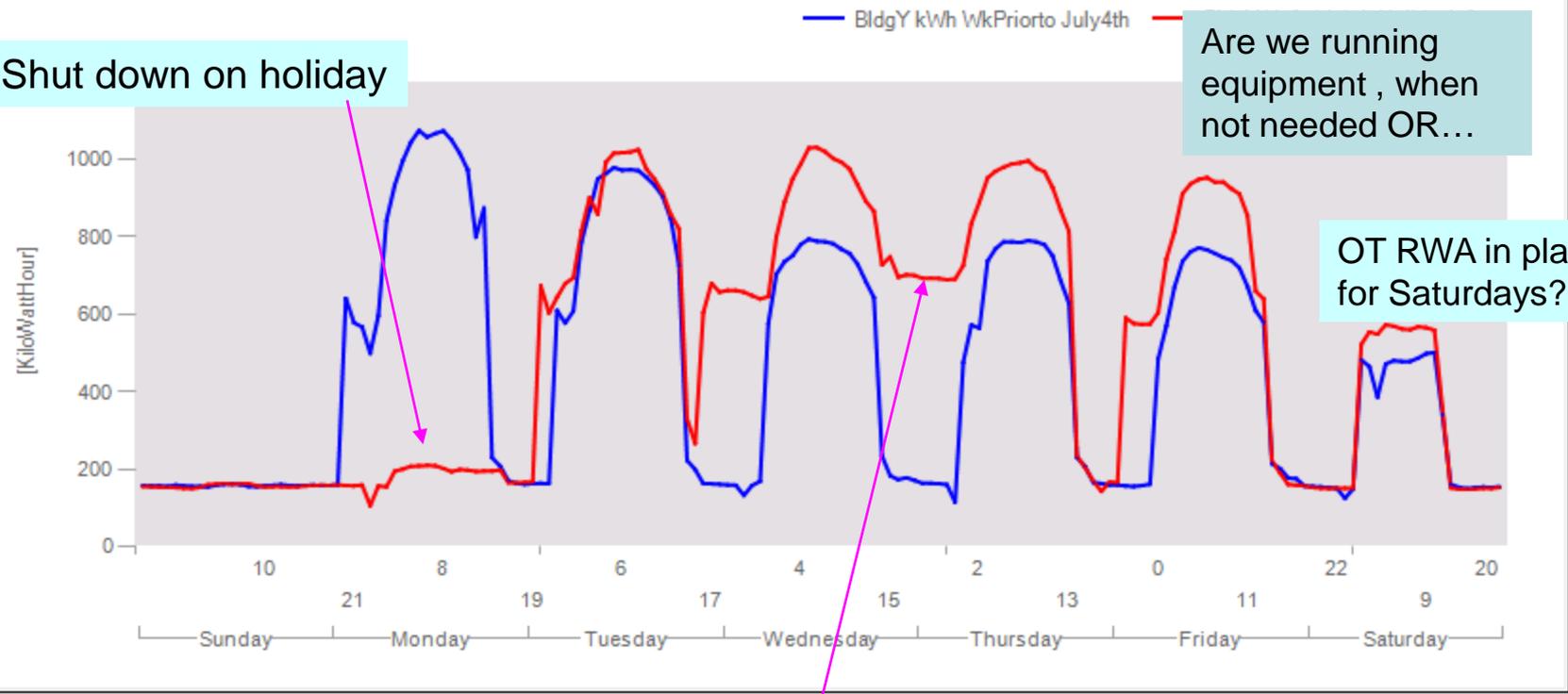
BldgY\_4thJulyvsWkBefore

Jun 27 2010 to Jul 11 2010

Shut down on holiday

Are we running equipment, when not needed OR...

OT RWA in place for Saturdays?

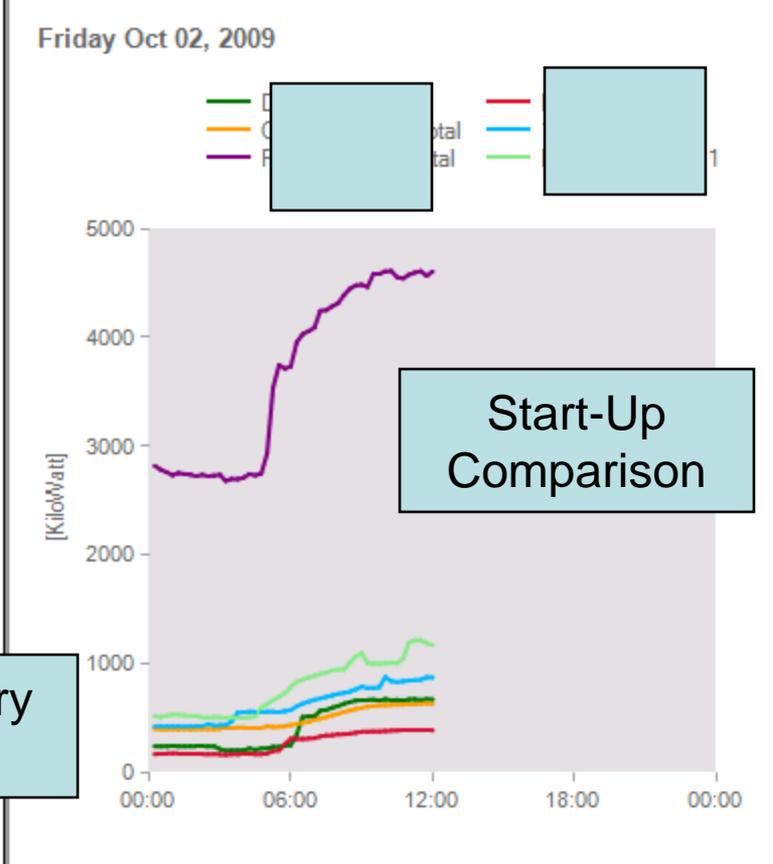


What happened here???

- ationwide
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- em Trends
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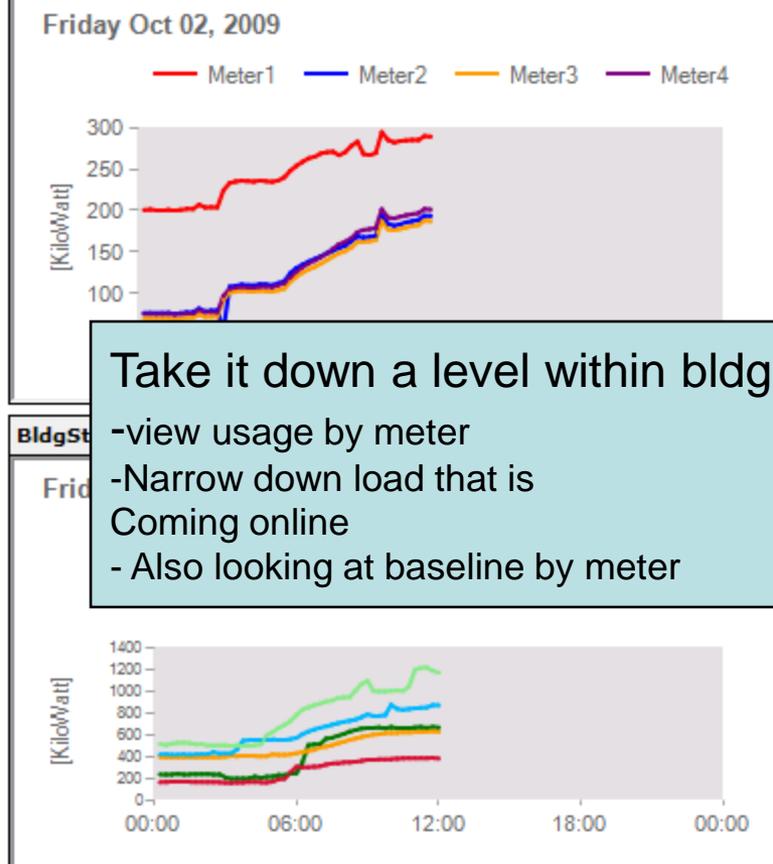
### NCR\_Bldgs Start Up Comparison

NCR\_BldgsStartUp\_Comparison Chart



Does startup vary by season?

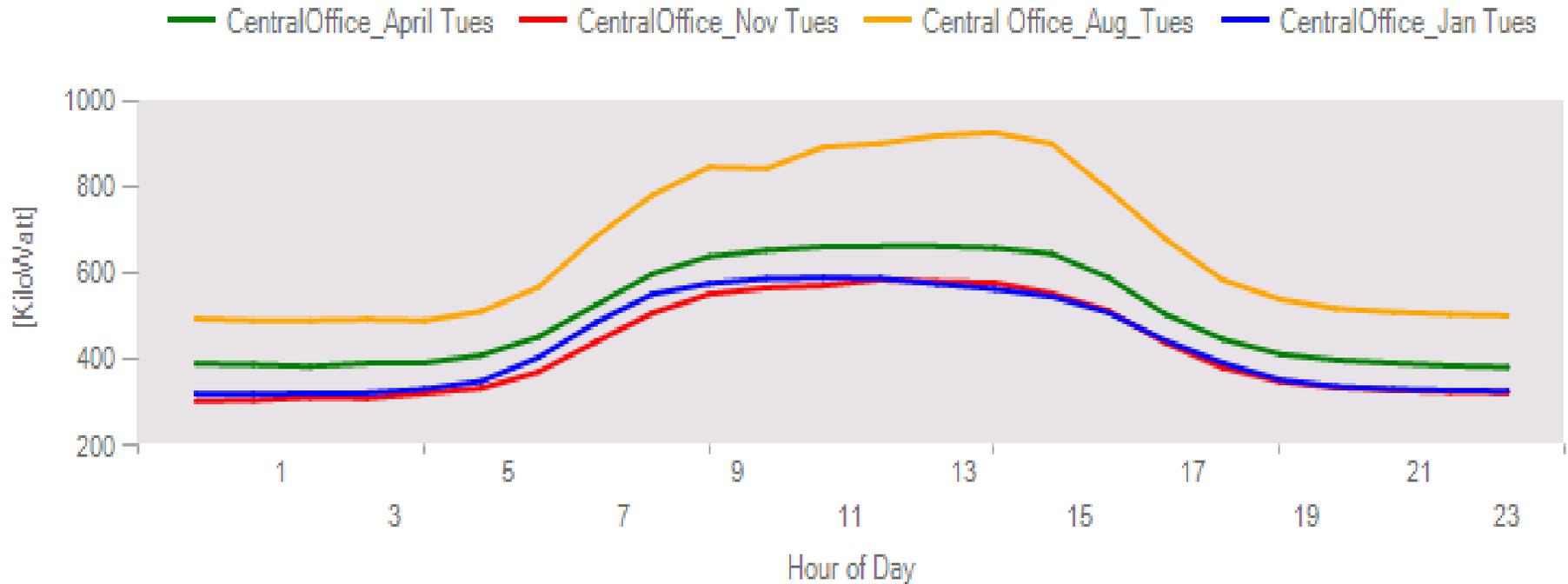
Today By Meter Chart





Start-up: not much variance by season  
Baseline load – big difference  
(looked at 1<sup>st</sup> Tues of each mth)

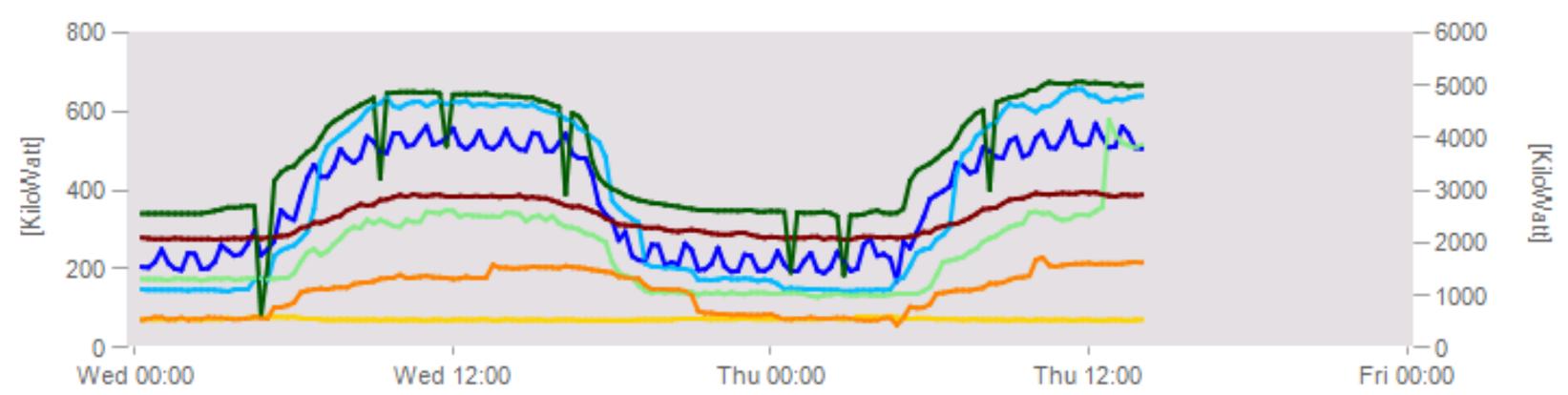
Aug 2009 to May 2010



ServCtrA\_SinceYesterday

Apr 28 2010 to Apr 30 2010

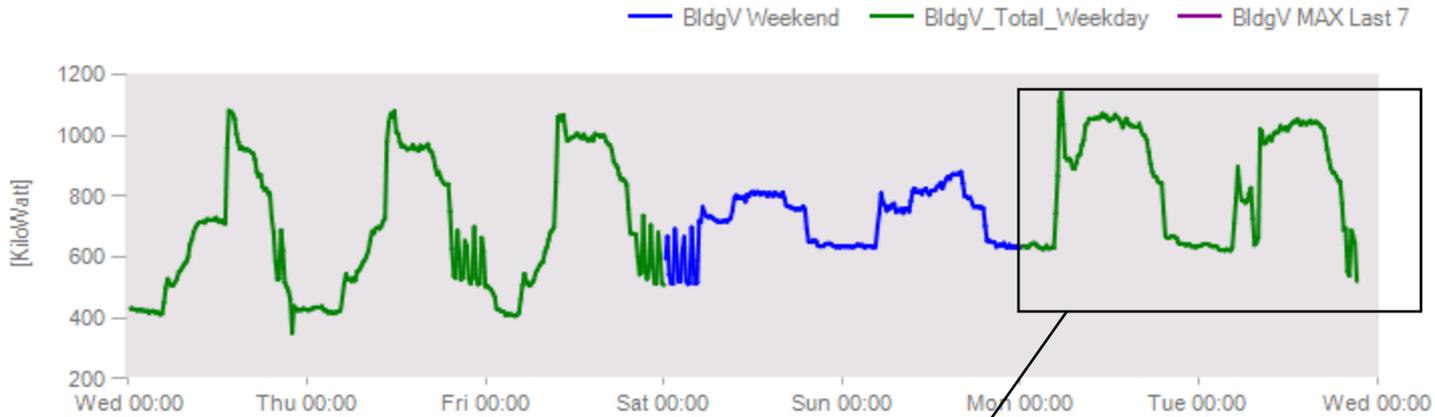
- Bldg A\_Leftaxis
- BldgC\_LftAxis
- BldgD\_LftAxis
- BldgE\_Rtaxis
- BldgF\_Rtaxis
- BldgG\_Rtaxis
- BldgB\_LftAxis



Typical trend on Service Center dashboard

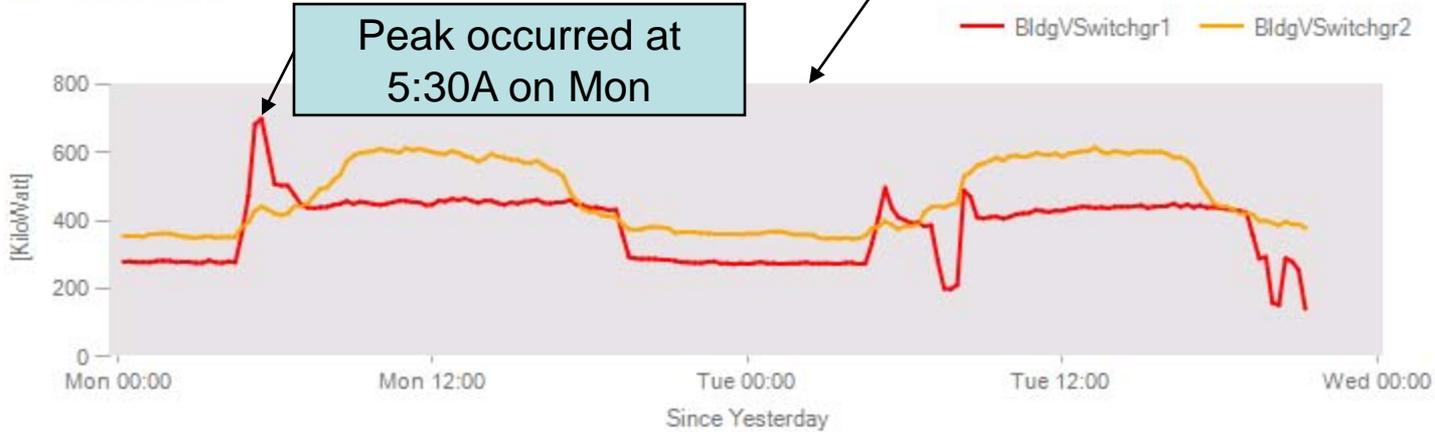


Apr 28 2010 to May 05 2010



-Zoom in on this timeframe  
-Breakout by meter

May 03 2010 to May 05 2010





# Follow Up Questions

**GSA FMSP Energy Division**

**Karen Curran**

**[Karen.curran@gsa.gov](mailto:Karen.curran@gsa.gov)**