GSA Building Energy Strategy

Reduce Demand
Expand Supply
Energy Procurement
Leverage Advanced Technology
Improve Security

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Overview

• Federal buildings consume $6.5 billion in utilities each year. GSA plays a large role in this business through its energy procurements, alternative financing mechanism, regulatory intervention and performance benchmarking.
  – Internally, GSA currently spends $400 million for energy in buildings where it directly pays the bill.

• Through aggressive energy strategies, GSA is currently reporting a 23.54% reduction in consumption compared to 2003.
  – In terms of cost avoidance, this equates to a lower energy bill of $58 million.

• Additional savings to the utility spend result from securing lower prices due to competitions and mitigating rate increases sought by utilities before State Commissions.

• Continuing to reduce consumption 3% annually, meeting renewable targets and negotiating a volatile energy commodity market will be challenging.
At the very least, if we are to maintain past performance trends, GSA should strategically accelerate its momentum in three key areas:

• Strategic Sourcing
• Validating Performance
• Liberating data
Strategic Sourcing

- GSA energy contracts comprise $3.1 billion in government-wide expenditures.
- GSA aggregates loads, segments markets and strategically sources energy management services so that federal customers don’t have to staff redundant programs.
- Additionally, GSA utility contracts offer an option to the ESPC program. Since 1992 federal agencies recorded $1 billion in investments across 651 projects using our unique Utility Energy Service Contract authority.
- GSA monitors all 50 State Commissions for new utility tariff applications. When we see something significant, GSA or our agency partners intervene legally.
  - Looking forward, we expect continued volatility in energy commodity markets, smart grid regulatory initiatives, and climate change adaptation funding requests by Utility Commissions or State law.
  - Key to our success will be a proactive change in tactics focused on our clients prudently accepting more risk to take advantage of opportunities presented by time of use rates and smart grid initiatives.
GSA Areawide Public Utility Contracts

• Currently have 98 areawides available
• Covers approx. 110 operating companies nationwide
• Currently working with 10 companies to get new areawides in place
• Areaawide Contracts will be available on GSA website for download by June 1, 2014
Validating Performance

• GSA is unique among federal agencies in its ability to centrally monitor energy cost and consumption wherever it pays a bill.
  – The Energy Usage Analysis System (EUAS) tracks each utility bill Finance pays, inputs weather data by zip code, and normalizes for measured gross square footage.
    • The system then benchmarks performance at all levels of the portfolio.
• Additionally, GSA’s national advanced metering system tracks 91% of electricity consumption in real time across the owned inventory.
• Remote surveillance by GSA staff will ensure energy management capabilities inherent in advanced metering is performed by contractors as stipulated in the new O&M specification.
• While these systems have reached they practical investment limit in terms of portfolio coverage, expansion of this capability has limitless potential under a Green Button structure.
Liberating Data:

• Effective energy management requires assessing efficiency levels of major end use building loads.
• The export of this data for forensic analysis, corrective recommendations and verification of stipulated results is an essential strategy to achieving our goals in the face of resource limitations.
• By liberating our data in this manner, GSA gains access to virtual assessment tools which, by default, offer a business model which is cheaper, faster and requires less staff resources.
• Obstacles that must be overcome include resolving constraints to exporting live data across the GSA internet firewall, as well as allowing control signals into our Building Automation Systems from Smart Grid programs.
GSA Energy Efficiency Continuum
(synchronized with procurement/regulatory action)

ADVANCED METERING  
Rapid Building Assessments  
Green Button
• 450 buildings

• 91% of GSA’s total electricity consumption

• ~1900 sources (electricity, gas, water, steam)
Identify Problems in Individual Buildings

--GSA notified contractor, who discovered holidays were not programmed into the building automation system (BAS).
--Contractor corrected problem by Monday, Jan. 2.
Advanced Metering

Compare Buildings in Same Portfolio

Why do the buildings have such different baseloads?

Why the lag in shutdown time?

What is causing the start-up spike?

Why do the buildings have such different baseloads?
Remote Building Analytics Platform

First Fuel Dashboard

**DC0459AF Ronald Reagan Building - [04/01/11 - 03/31/12]**

<table>
<thead>
<tr>
<th>Building Name:</th>
<th>DC0459AF Ronald Reagan Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Address:</td>
<td>1300 Penn Ave NW, Washington, District Of Columbia, 20004, United States</td>
</tr>
<tr>
<td>Building Size (SqFt):</td>
<td>3,100,000 GSF</td>
</tr>
<tr>
<td>Primary Activity:</td>
<td>Office</td>
</tr>
<tr>
<td>Heating Type:</td>
<td>District Steam</td>
</tr>
<tr>
<td>Cooling Type:</td>
<td>Electricity</td>
</tr>
<tr>
<td>Average Occupancy (%)</td>
<td>100</td>
</tr>
<tr>
<td>Year Constructed:</td>
<td>1998</td>
</tr>
<tr>
<td>Last Renovated:</td>
<td>N/A</td>
</tr>
<tr>
<td>Electricity Cost:</td>
<td>$7,709,431 at average cost/kWh of 12 cents</td>
</tr>
<tr>
<td>District Steam Cost:</td>
<td>$1,834,212 at average cost/MLb of 39.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy Consumption</th>
<th>Total</th>
<th>Per SqFt</th>
<th>Per SqFt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>64,245,256 kWh</td>
<td>20.72 kWh</td>
<td>70.71 kBTU</td>
</tr>
<tr>
<td>District Steam</td>
<td>47,031 MLbs</td>
<td>0.02 MLbs</td>
<td>18.11 kBTU</td>
</tr>
<tr>
<td>Total</td>
<td>275,359,915 kBTU</td>
<td>88.83 kBTU</td>
<td>88.83 kBTU</td>
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<tr>
<td>Peak Demand (Electric)</td>
<td>12,399 kW</td>
<td>4.00 W</td>
<td>13.66 BTU/hr</td>
</tr>
</tbody>
</table>

Open in new window
First Fuel Analysis

Ronald Reagan Detail Summary

Data Center

<table>
<thead>
<tr>
<th>Energy</th>
<th>Savings</th>
<th>Carbon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>5,754,406 kWh (9%)</td>
<td>$890,529</td>
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<tr>
<td>District Steam</td>
<td>1,742 MMBtu (4%)</td>
<td>$67,938</td>
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<tr>
<td>Total</td>
<td>21,713,981 kBTU</td>
<td>$758,467</td>
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</tbody>
</table>

Annual Electric End Use per SqFt:

- Cooling: 3.32kWh
- Lighting: 4.13kWh
- Plug Load: 6.94kWh
- Electric Heating: 0.64kWh
- Pumps: 0.64kWh
- Ventilation: 3.75kWh
- Miscellaneous: 6.94kWh

Top Recommendations:

- Operational:
  - Review existing control sequences for all Ventilation equipment.
  - Evaluate existing chilled water production equipment and pumping system components for replacement and upgraded control strategies.

- Savings:
  - 1,163,817 kWh
  - 10,173 Therms
  - $172,882
  - 929 tonnes

- Retrofit:
  - 2,059,904 kWh
  - $247,091
  - 929 tonnes
  - Cost: $2,955,100 to $4,541,930
  - ROI: 12 Years to 20 Years
Audit identifies consumption spikes, which investigation shows to be “rogue” garage fans.

FirstFuel coaches building manager on how to modify controls.

Result: 6.9 GWh decrease in consumption
Energy savings: $825,000/year

* Energy reduction/savings reflect total across multiple measures
GSA Energy Efficiency Continuum

Advanced Metering  First Fuel  Green Button
“The Administration will leverage the ‘Green Button’ standard – which aggregates energy data in a secure, easy to use format – within federal facilities to increase their ability to manage energy consumption, reduce greenhouse gas emissions, and meet sustainability goals.”

The President’s Climate Action Plan, June 25, 2013
GSA Pilot Overview

• Test Green Button Data Standard as provided by participating utility companies

• Coordinate with Utility (PEPCO) Green Button Connect My Data deployments to receive whole facility Interval Data

• Authorize 3rd party to receive Green Button Connect My Data streams from Utility and in-facility meters for 5 target Buildings in DC

• Coordinate with EPA to provide Green Button Connect My Data delivery into ESTAR Portfolio Manager

• Coordinate with DOE to provide Green Button Connect My Data delivery into Building Performance Database
Green Button Initiative

- Enables electronic consumer access to energy data and supports development of ecosystem (apps)

- Available to 42+ million customers now and 59+ million in the future based on utility commitments

- Result of collaboration among White House, DOE, NIST, state regulators, utilities, vendors, SGIP, and North American Energy Standards Board
Topologies: GSA Pilot

Utility Infrastructure - PEPCO

GSA Buildings

Building Automation and Metering - Schneider EEM

GSA Energy Managers

First Fuel

Portfolio Manager

Building Performance Database

REMOTE BUILDING ANALYTICS

FIRSTSCREEN

FIRSTAUDIT

FIRSTPORTFOLIO

FIRSTBENCHMARK

FIRSTMONITOR
Topologies: Smart Grid
Topologies: Customer Domain
Topologies: Smart Grid - Commercial