Deciphering the Data:
Using Your Building's Story to Make Sustainability Gains

Moderator:
Brendan Hall
Public Sector Program Manager, EPA ENERGY STAR Commercial & Industrial Branch

Presenters:
Jeffrey Salay, PE, CEM, LEED AP
Senior Principal, GHT Limited

Zack Moore
SVP Customer Solutions & Co-Founder, SOL VISTA

SOL VISTA

GHT LIMITED
CONSULTING ENGINEERS

Session Objectives

1. Participants will understand how aggregated utility data for ENERGY STAR and benchmarking compliance can be transformed into actionable insights to make building improvements while increasing profitability.

2. Participants will be able to apply lessons learned from energy audits to create savings opportunities, increase asset values and bring buildings back on track from changes to their ENERGY STAR scores.

3. Participants will understand the value of portfolio-wide energy monitoring and how it can improve decision-making at the individual property level.

4. Participants will understand and be able to apply strategies to assure local compliance, maximize cost reduction and achieve an ENERGY STAR score of 75 or higher to target local government building leases.

Our Panel

Jeffrey Salay, GHT Limited Senior Principal & OES Studio Leader

- Oversees Operations & Energy Services studio
- 26+ years' experience in mechanical design and energy management strategies
- BS in Mechanical Engineers; LEED AP and Certified Energy Manager

Zack Moore, SOL VISTA SVP Customer Solutions & Co-Founder

- Oversees SOL VISTA's technical and engineering efforts
- Heads SOL VISTA's business development and customer management activities
- BS in Chemical Engineering; MBA in Technology Management

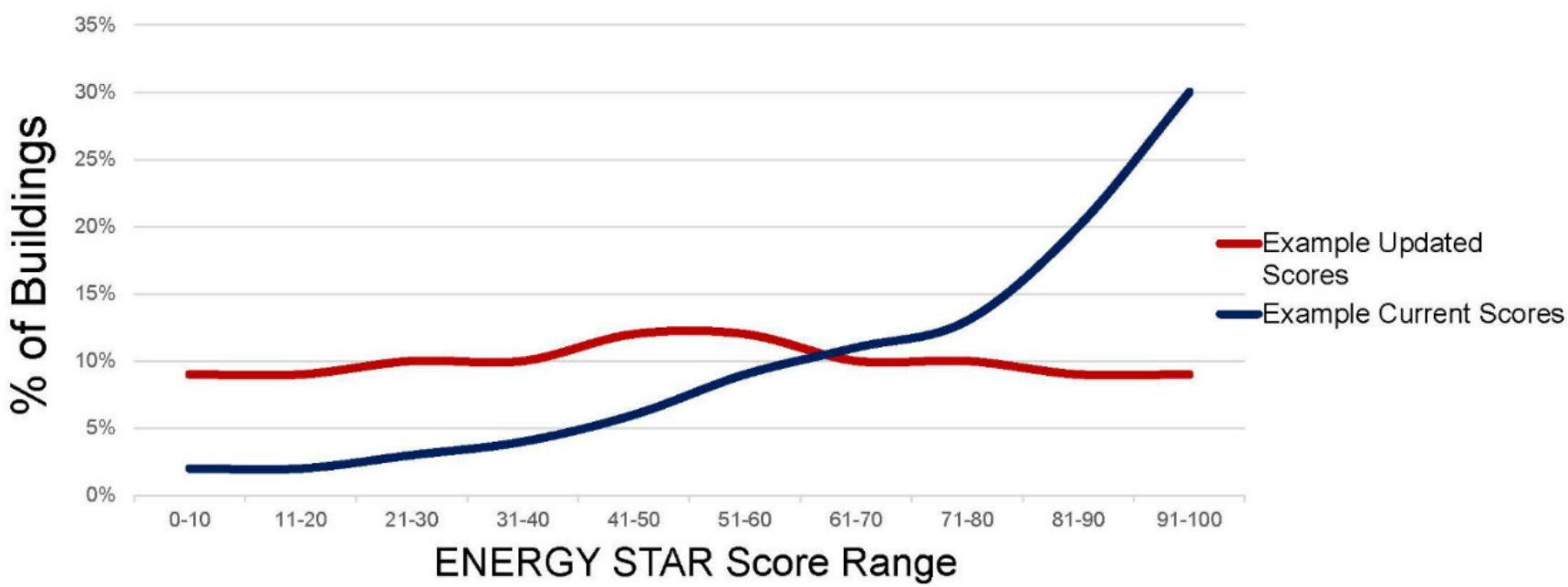
MODERATOR:

Brendan Hall, Environmental Protection Agency (EPA) Public Sector Program Manager, ENERGY STAR Commercial & Industrial Branch

- Serves as national lead to colleges & universities and co-lead to local governments
- Offers tools, resources & support to help organizations and buildings eliminate energy waste

ENERGY STAR Score Updates & Review Period

Why updates to 1-100 ENERGY STAR scores were needed: *rebalancing the distribution after market improvement*



What We Looked At & Why

Provide information about building performance based on the most up-to-date market data available

- 2012 Commercial Energy Consumption Survey was released by EIA (prior scores were based on 2003 survey)
- 2012 survey shows lower aggregate energy intensity as compared with 2003

Re-assess key drivers of energy use

- Have the relationships between operating characteristics and energy intensity changed in the last 10 years?
- Are there new variables in CBECS that we should be adjusting for going forward?

Same purposes behind scores and certification

Property Types

Property types updated in August 2018:

K-12 Schools, Offices, Retail, Supermarkets, Hotels, Warehouses, Houses of Worship

Property types not impacted

Multi-family, Data Centers, Hospitals, Senior Care

Additional Details

Other changes made August 2018:

Property types with August 2018 updates:

- Changes to property use details required for 1-100 ENERGY STAR scores and certification
- Offices, K-12 Schools, and Warehouses now eligible for scores and certification if 1,000 ft2 or larger – previous minimum was 5,000 ft2

All property types:

- New national source factor for electricity: from 3.1 to 2.8
- Additional factor updates
- New option to estimate out energy use of data centers located in other buildings

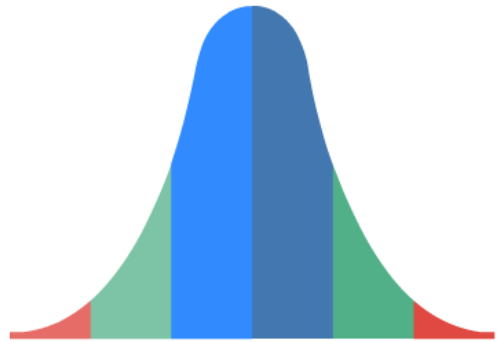
Changes applied to all historical scores and source metrics in Portfolio Manager

Previous ENERGY STAR certifications are not affected

How Did We Get Here?

ENERGY STAR Program

Prior versions of CBECS



New CBECS Data

Then vs. Now

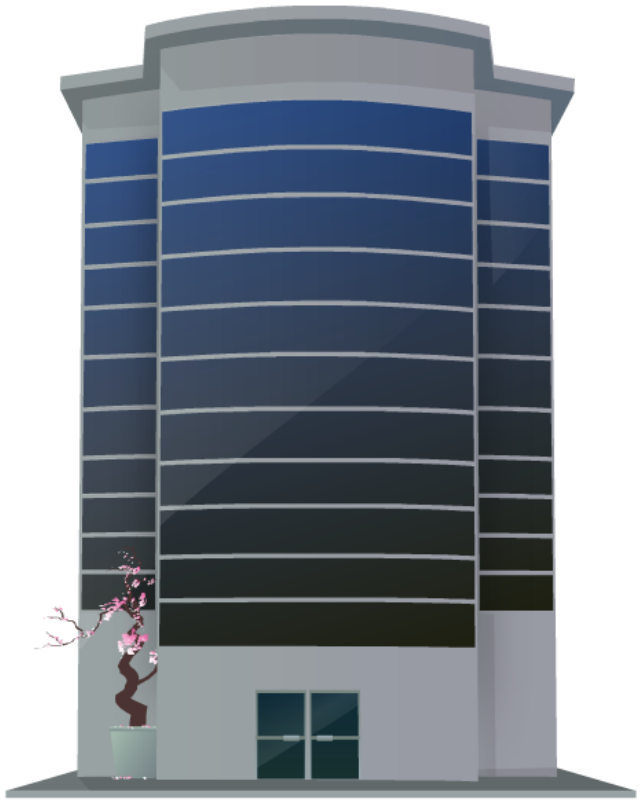
2017 - Your Building

ENERGY STAR Score: 78

2019 - Your Building

ENERGY STAR Score: **66**

So what can we do?



A Sample Project

10-story commercial office building in Bethesda

ENERGY STAR Score: 67

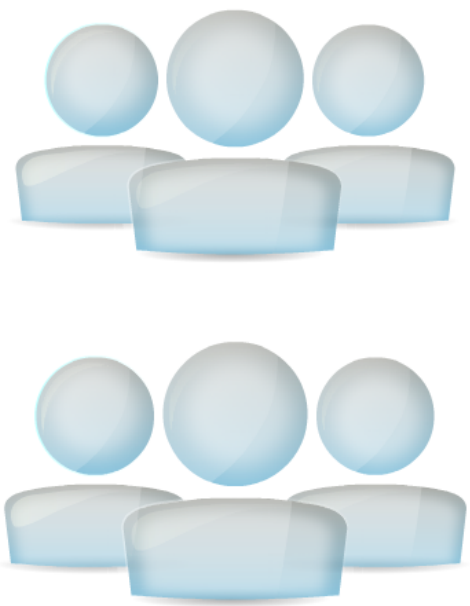
- not eligible for GSA leases
- difficulty attracting new tenants
- loss of tax rebates & incentives

Understand energy usage

- utility bills
- average peak loads
- water & sewage history

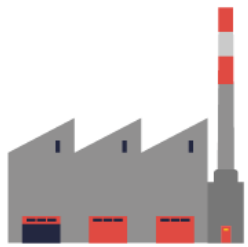
Analyze schedule trends

- building operations schedules
- average peak usage
- opportunities



Configure for occupancy counts

- confirm actuals
- occupancy surveys

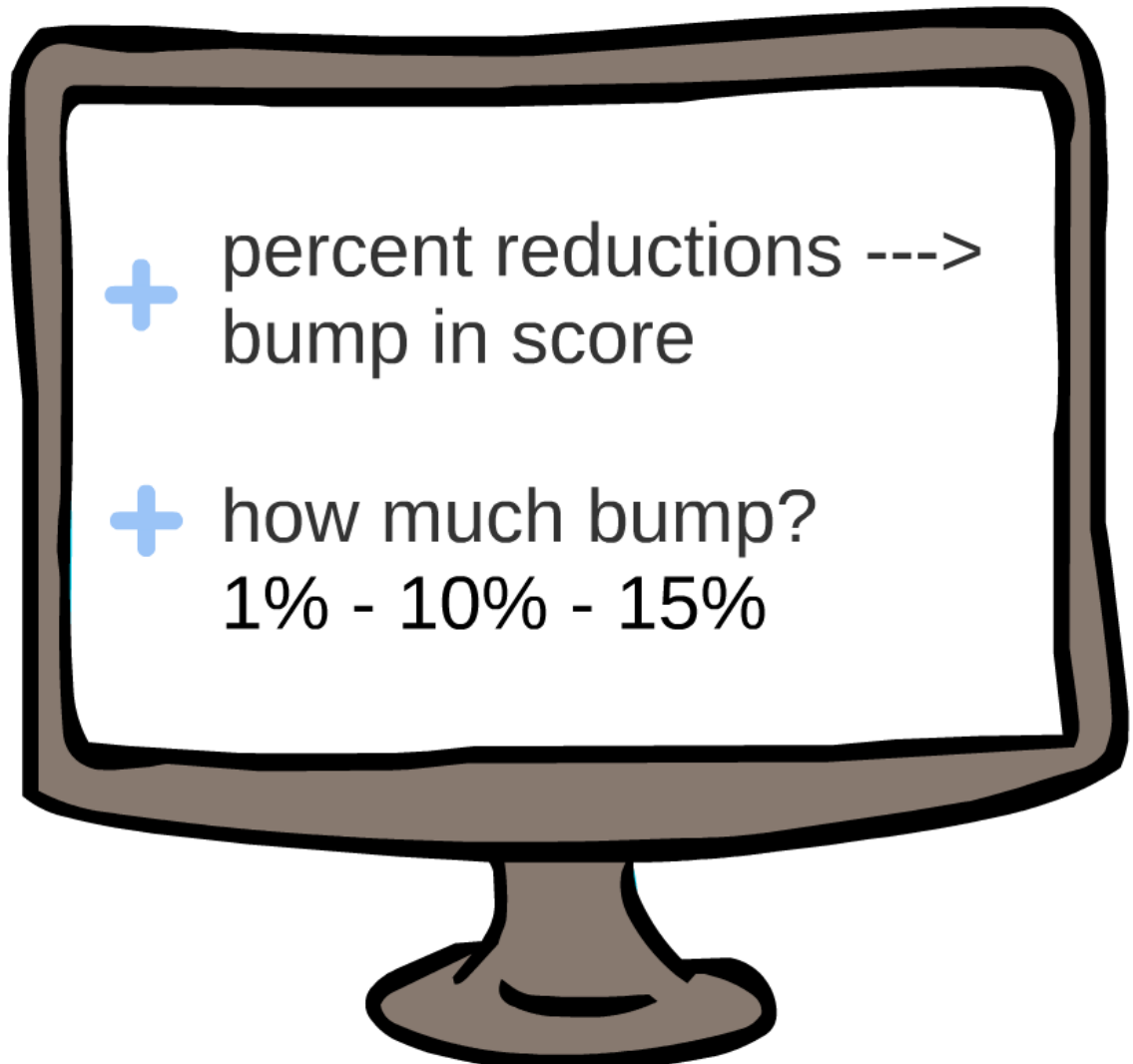


Account for building amenities

- garage, data center, fitness center

LET'S TALK...

Optimization strategies



SOL VISTA Intro:

- building energy & water experts
- in-house Skywalk analytics platform & on-site projects

goals: **reduce utility waste and cost**
improve building performance

Roots in Montgomery County:

- SOL VISTA:

year founded - 2010

MoCo/MD innovation & energy awards

customers across US & Caribbean

Doubletree Bethesda (hotel)

Parkview Spring Street (office bldg)

building performance

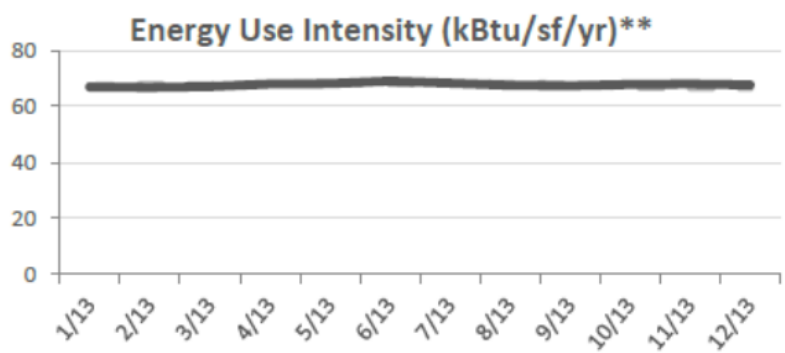
- four key steps

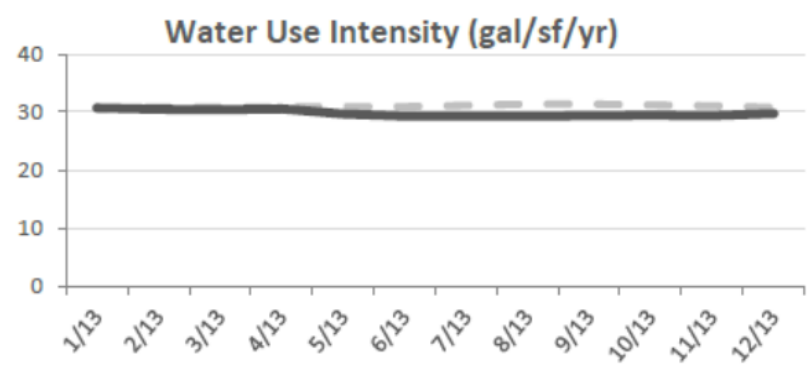
1. data analysis
2. demand-side efforts
3. supply-side efforts
4. ongoing monitoring

1. data analysis

- utility bill analysis
- peer benchmarking
- energy use anomalies
- operations and equipment data

Performance Summary		Previous Yr	Current Yr	Variance	Dec-2012	Dec-2013	Variance
ENERGY STAR Rating*		70	70	-1.3%	71	69	-2.8%
Energy Use	MBtu	22,679	23,055	1.7%	2,002	2,064	3.1%
Energy Use Intensity (EUI)**	kBtu/sf	66.6	67.8	1.8%	5.89	6.07	3.1%
Water Use Intensity (WUI)	gal/sf	30.7	29.7	-3.4%	2.3	2.6	13.3%
GHG Emissions	MtCO2e	1,655	1,676	1.3%	141	145	2.5%





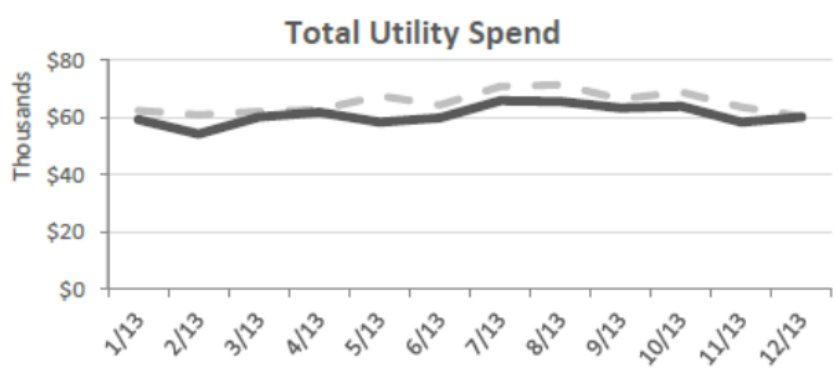
* ENERGY STAR rating for Previous and Current Years are the annual ave.

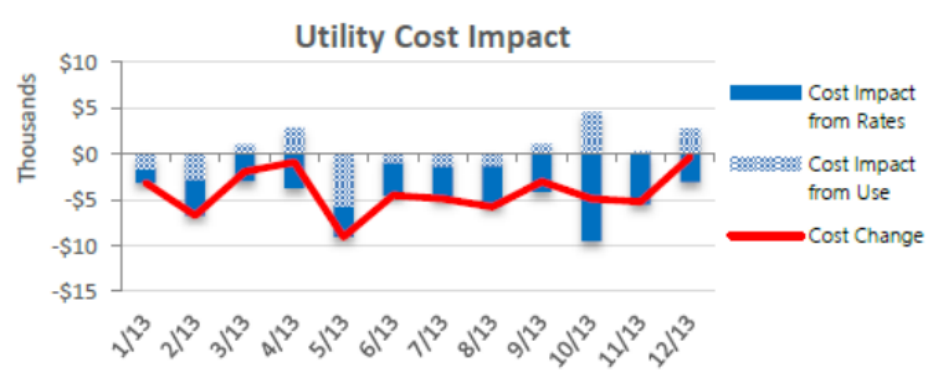
** EUI weather normalized for Previous and Current Years.

1. data analysis

- identify largest and easiest recoverable dollars first
- maximize cost and time efficiencies

Utility Cost Summary	Previous Yr	Current Yr	Variance	Dec-2012	Dec-2013	Variance
Total Utility Spend	$780,540	$730,011	-6.5%	$60,323	$60,015	-0.5%
Cost per Occupied Room	$6.43	$5.98	-7.0%	$6.40	$6.05	-5.3%
Cost Impact from Use		-$2,800			$2,747	
Cost Impact from Rates		-$47,729			-$3,054	



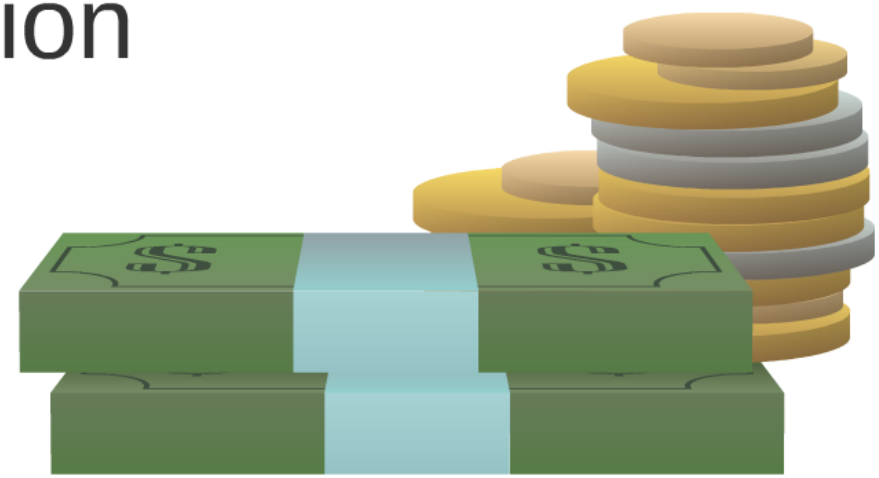


POLL QUESTION

Are you using a data analytics platform that compares your property to peer buildings, and normalizes for weather, occupancy, and other factors?

2. demand-side efforts

- assessment
- retrocommissioning
- project implementation
- incentives



2. demand-side: assessment

- ASHRAE level I or II
  - central plant/BAS
- financial considerations
  - assessment payback
  - no/low cost operational fixes
  - capital intensive opportunities
- additional focus
  - known issues and projects
  - renewable energy
  - incentives

EEO #	Description	Costs	Annual Savings	Simple Payback (yr)	IRR	NPV
1	Low-flow Aerators	$5,359	$6,780	0.8	138.5%	$51,514
2	Rooftop Pipe Insulation	$1,961	$764	2.6	56.3%	$4,623
Total		**$7,320**	**$7,544**	**1.0**	**117.3%**	**$51,514**

EEO #	Description	Costs	Annual Savings	Simple Payback (yr)	IRR	NPV
3	Chiller Upgrade	$317,717	$60,527	5.2	30.8%	$225,215
4	Laundry Water and Heat Recovery	$273,195	$58,612	4.7	34.4%	$248,065
5	Retrocommissioning (RCx)	$76,879	$17,000	4.5	35.4%	$74,001
6	Low-Flow Showerheads	$24,300	$26,161	0.9	121.5%	$195,622
7	Guestroom Thermostats	$177,977	$24,605	7.2	21.9%	$49,097
8	LED Lighting Retrofit	$77,823	$21,089	3.7	42.2%	$107,060
9	Kitchen Range Hood Controls	$41,925	$12,883	3.3	46.8%	$70,285
10	Booster Pump VFDs	$15,984	$2,697	5.9	27.3%	$8,446
Total		**$1,005,800**	**$223,573**	**4.5**	**35.6%**	**$977,792**

2. demand-side: retro-commissioning

- building-wide “tune-up” of equipment and controls
- many new buildings are not efficiently commissioned
- meters/sensors fall out of calibration
- new control technologies available
- low capex, good savings
- occupant discomfort

POLL QUESTION

Have you completed an ASHRAE audit or retrocommissioning at your property?

2. demand-side: project implementation

- central plant upgrades
  - variable-capacity chillers
  - high-efficiency boilers
  - water pre-heating
  - condensate Hx
  - free cooling

2. demand-side: project implementation

- controls
  - building automation systems
  - variable frequency drives
  - co/co2 sensors
  - occupancy-based thermostats
  - demand-based hood controls

2. demand-side: project implementation

- lighting
  - LED lamp replacement
  - LED parking fixture placement
  - T8 LED replacement kits
  - occupancy sensors
  - no piggy-backed savings

2. demand-side: project implementation

- water
  - pool/spa, cooling tower, toilet leaks
  - faucets, showerheads, toilets
  - kitchen sinks and sprayers
  - laundry rinse water recovery
  - satellite based irrigation controls
  - sub-meters: cooling towers, irrigation credits

2. demand-side: project implementation

- onsite generation:
  - solar PV
  - solar hot water
  - gen sets
  - microturbines
  - reduce use first!
- onsite storage:
  - battery banks *(see white paper)*

2. demand-side: incentives

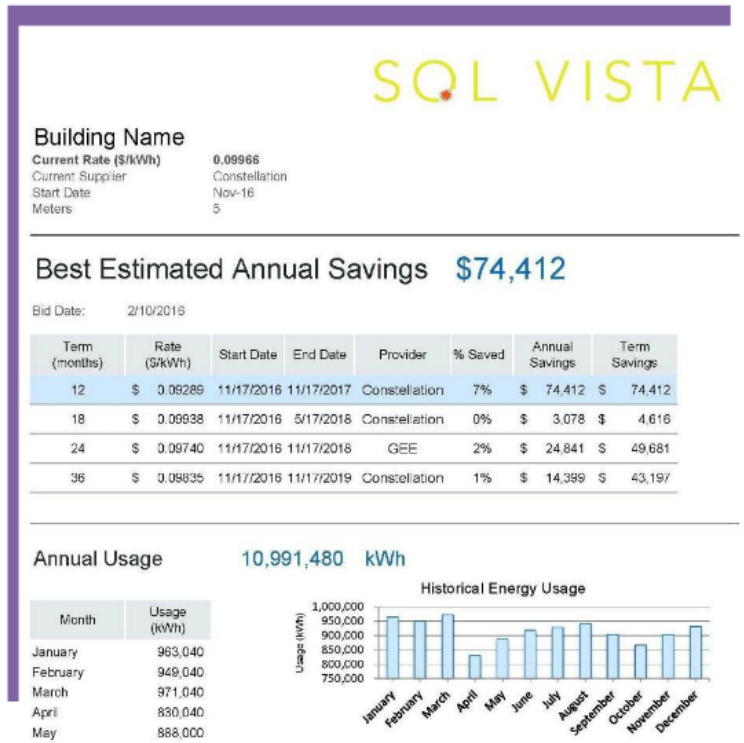
- incentive groups:
  - utility companies
  - regional programs
  - tax deductions/rebates (if applicable)
  - get creative, go custom
- incentive requirements:
  - project sequencing
  - baseline/M&V

3. supply-side efforts

energy procurement

3. supply-side - energy procurement

- electricity and gas:
  - start bidding 180-days out
  - fixed or variable contract
  - term length
  - compare to historic pricing
  - current market conditions
  - easy way to save money!



SQL VISTA

Building Name

Current Rate ($/kWh)	**0.09966**
Current Supplier	Constellation
Start Date	Nov-16
Meters	5

Best Estimated Annual Savings $74,412

Bid Date: 2/10/2016

Term (months)	Rate ($/kWh)	Start Date	End Date	Provider	% Saved	Annual Savings	Term Savings
12	$ 0.09289	11/17/2016	11/17/2017	Constellation	7%	$ 74,412	$ 74,412
18	$ 0.09938	11/17/2016	5/17/2018	Constellation	0%	$ 3,078	$ 4,616
24	$ 0.09740	11/17/2016	11/17/2018	GEE	2%	$ 24,841	$ 49,681
36	$ 0.09835	11/17/2016	11/17/2019	Constellation	1%	$ 14,399	$ 43,197

Annual Usage 10,991,480 kWh

Month	Usage (kWh)
January	963,040
February	949,040
March	971,040
April	830,040
May	888,000

Historical Energy Usage

POLL QUESTION

Are you taking advantage of deregulated markets to secure lower electricity and gas pricing?

4. ongoing monitoring

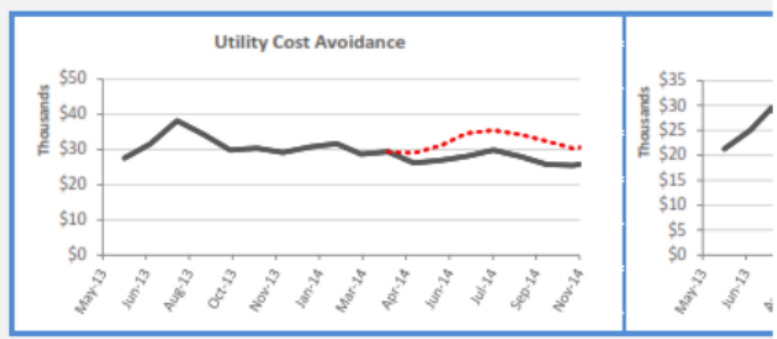
- project impact verification
- ongoing issue alerts
- reporting and budgeting
- regulatory compliance

4. ongoing monitoring - project impact verification

- data:
  - utility bill analysis
  - submetering
  - BAS and equipment logs
- variables:
  - occupancy
  - weather
  - fluctuating utility rates
  - operational impacts to savings

Utility Cost Avoidance

Utility	Apr-2014	May-2014	Ju
Electric	$ 2,389	$ 2,841	$
Electric Demand	$ 490	$ 598	$
Natural Gas		$ 938	$
Steam			
Chilled Water			
Other Fuel			
Water			
Total	$ 2,878	$ 4,377	$



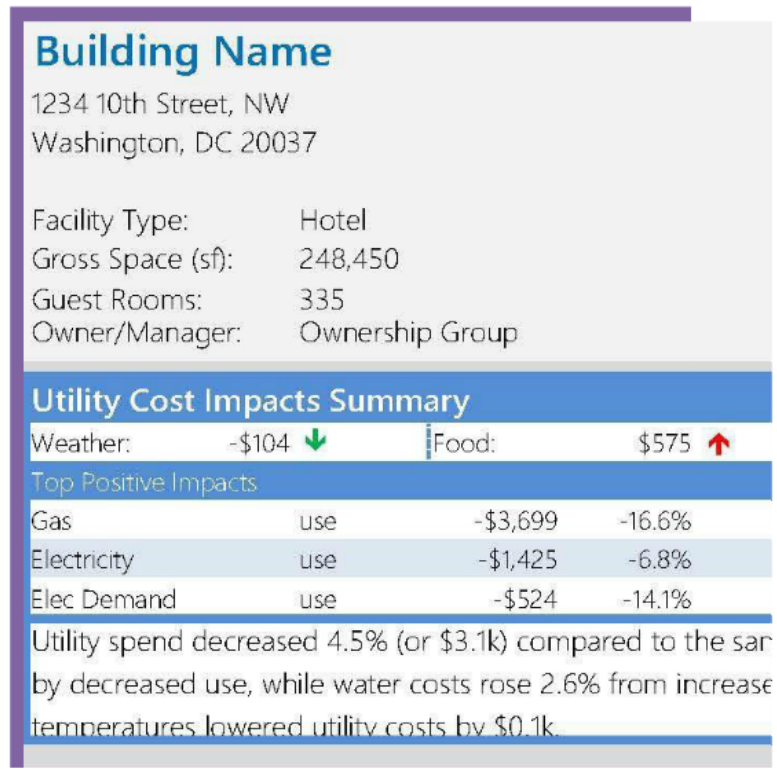
4. ongoing monitoring - issue alerts

- supply side:
  - utility bill errors
  - supplier bill errors
  - bad meters
- demand side:
  - equipment failures
  - operational changes
  - normalize for weather, occupancy, other variables

Utility	Use Alert Stats*
Electricity	OK
Demand	OK
Natural Gas	Review
Water	OK
District Steam	n/a
Chilled Water	n/a
Other Fuels	n/a

4. ongoing monitoring - reporting & budgeting

- monthly:
  - YOY/MOM performance
- groups:
  - location, building type
- annual:
  - budget season!
  - normalize for weather, occupancy, other variables
  - monthly impact from rate changes and efficiency projects



Building Name

1234 10th Street, NW
Washington, DC 20037

Facility Type:	Hotel
Gross Space (sf):	248,450
Guest Rooms:	335
Owner/Manager:	Ownership Group

Utility Cost Impacts Summary

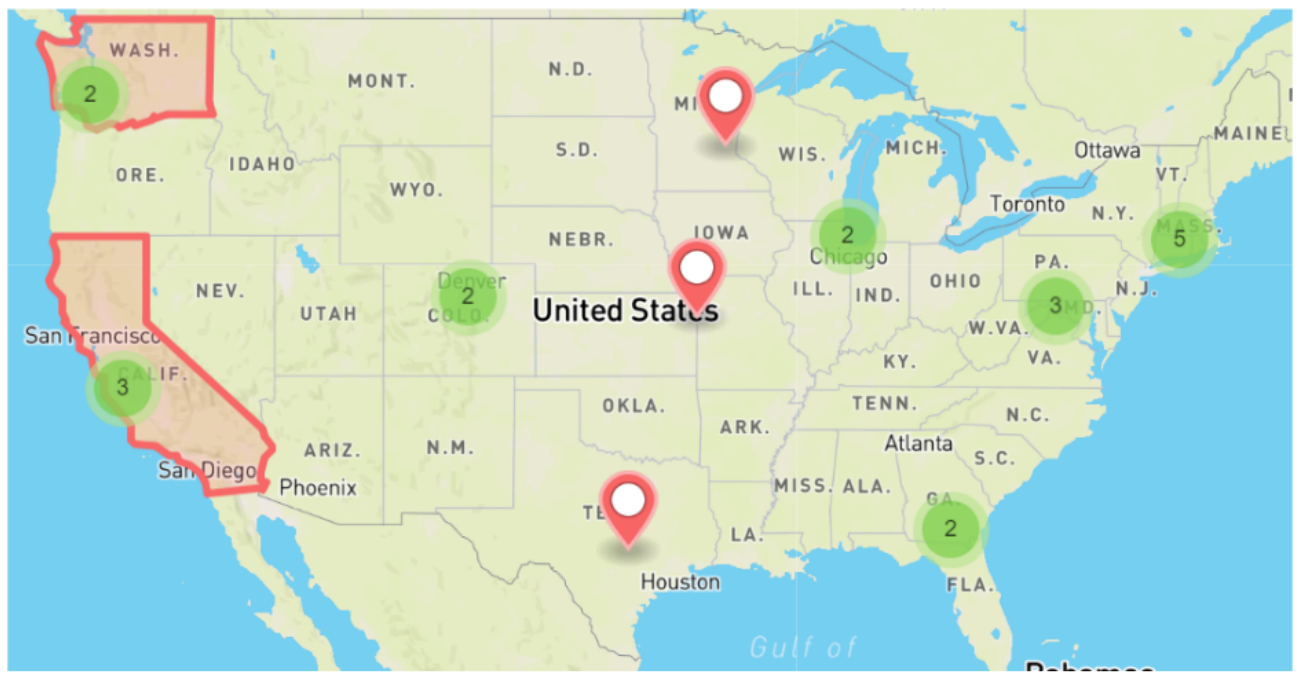
Weather:	-$104 ↓	Food:	$575 ↑

Top Positive Impacts			
Gas	use	-$3,699	-16.6%
Electricity	use	-$1,425	-6.8%
Elec Demand	use	-$524	-14.1%

Utility spend decreased 4.5% (or $3.1k) compared to the sar
by decreased use, while water costs rose 2.6% from increase
temperatures lowered utility costs by $0.1k.

4. ongoing monitoring - regulatory compliance

- annual benchmarking compliance:
  - cities, counties, districts, states across US
- penalties/fines:
  - $500-$2000/yr
  - $300/day
- growing rapidly!



Results - Parkview Spring Street

Savings Realized

Numbers verified by Skywalk:

- Electricity Use: ⬇ **34%**
- Water Use: ⬇ **20%**
- Electricity Costs: ⬇ **$146,000/yr**
- Water Costs: ⬇ **$12,000/yr**

Environmental Impact

Annual greenhouse gas emissions & water use reductions equivalent to:

1,189,706 miles driven by the average passenger vehicle

261,250 toilet flushes

ENERGY STAR score:
+38 points!

Results - DoubleTree Bethesda

Savings Realized

Numbers verified by Skywalk:

- Electricity Use: ↓ **8.1%**
- Natural Gas Use: ↓ **2.2%**
- Water & Sewer Use: ↓ **8.8%**
- Electricity Costs: ↓ **$33,000**
- Natural Gas Costs: ↓ **$11,000**
- Water & Sewer Costs: ↓ **$12,000**

Environmental Impact

DoubleTree Bethesda reduced greenhouse gas emissions & water use equivalent to:

434,887 miles/yr. driven by the average passenger vehicle

194,129 lbs of coal burned

352,483 toilet flushes

ENERGY STAR score:
+20 points!

POLL QUESTION

Have you already submitted your benchmarking compliance data?

Takeaways

- use data to focus efforts
- remain ROI driven
- find an implementation partner you can trust
- retrocommission if it makes sense
- engage local utilities early-on in review process
- don’t forget about energy procurement
- use data to verify success and find ongoing opportunities
- don’t let local benchmarking compliance sneak up on you!

Questions + Answers

Thank you!

Jeffrey Salay, Senior Principal
jsalay@ghtltd.com

Zack Moore, SVP
zmoore@solvista.com

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