



Energy Performance Assessment

November 2013





Welcome!

If you are unable to hear audio, please dial in to 1-877-423-6338 and enter 963215 as the participant passcode.



POWER SAVERS CAMPAIGN



The Organisation of Eastern Caribbean States Secretariat has launched *Power Savers*, an energy efficiency public education and awareness campaign

Non-domestic campaign elements include:

- Three webinars
- Web page located on the OECS website
- Three newsletters



WHY IS THE OECS RUNNING THE CAMPAIGN?




- In 2011, businesses and institutions in OECS member countries spent \$340 million on all fuels
- The median percentage of operating costs represented by energy costs was 10%
- Results showed a large potential for improvement of energy data management practices



BACKGROUND ON THE WEBINAR SERIES

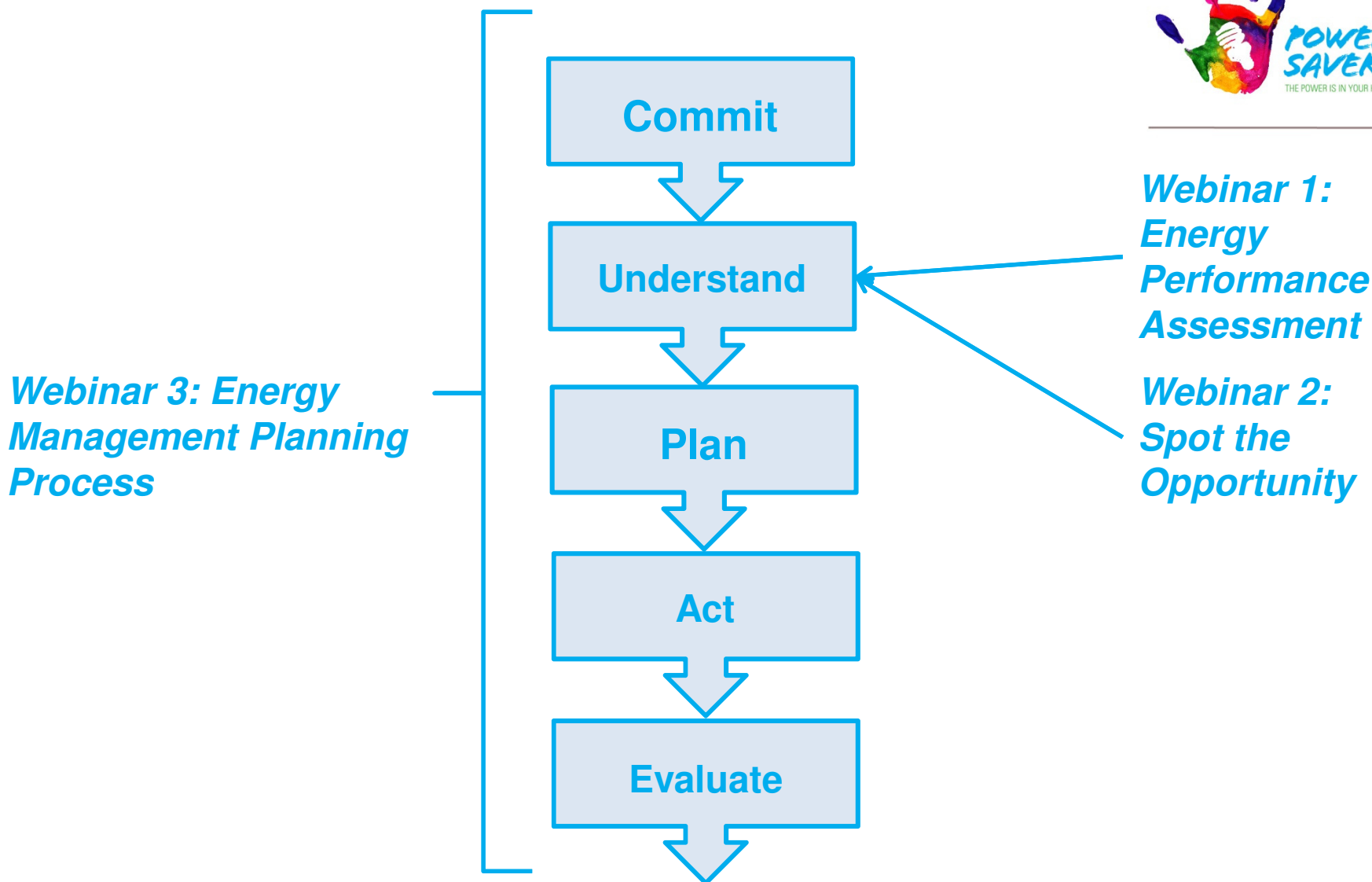


In response to the survey results, we will be hosting 3 webinars:

1. Energy Performance Assessment 
2. Spot the Opportunity (January 2014)
3. Energy Management Planning (February 2014)



HOW DO THE WEBINARS FIT TOGETHER?



LEARNING OBJECTIVES



Webinar 1: Energy Performance Assessment

- Understand the contribution of energy costs to operating costs
- Develop an end-use inventory for your facility
- Establish an energy baseline
- Compare your facility's energy performance to its past performance
- Report on your facility's progress



AGENDA FOR TODAY'S WEBINAR



- Key outcomes of an energy performance assessment
- How to read your utility bill
- Collecting your facility's energy data
- Developing an End-Use Inventory
- Establishing a tracking system to monitor progress
- Establishing an energy baseline
- Energy benchmarking
- Taking Action



KEY OUTCOMES OF AN ENERGY PERFORMANCE ASSESSMENT



Understand Costs

- What is your facility's current energy usage?
- How much does energy cost on a monthly/annual basis?

Understand When and Where

- What are your facility's major end uses?
- How often and for how long does your equipment operate?

Track and Compare

- How does current energy use compare to past use?
- How does your facility's energy use compare to that of its peers?



HOW TO READ YOUR UTILITY BILL



What is a kilowatt hour?

- A kilowatt hour (kWh) is a unit of energy
- Electrical energy consumption is calculated by multiplying the power draw of equipment by the number of hours of use

$$\text{Energy consumption}(kWh) = \text{Wattage} \times \text{Hours of use} \times \frac{1 \text{ kW}}{1000 \text{ W}}$$



HOW TO READ YOUR UTILITY BILL



Example: How much does it cost to run (10) 100 W incandescent light bulbs for 10 hours if electricity costs \$0.34/kWh?

$$\begin{aligned} \text{Cost (\$)} &= \frac{100 \text{ W}}{\text{bulb}} \times 10 \text{ bulbs} \times 10 \text{ h} \times \frac{1 \text{ kW}}{1000 \text{ W}} \times \frac{\$0.34}{\text{kWh}} \\ &= \$3.42 \end{aligned}$$



HOW TO READ YOUR UTILITY BILL

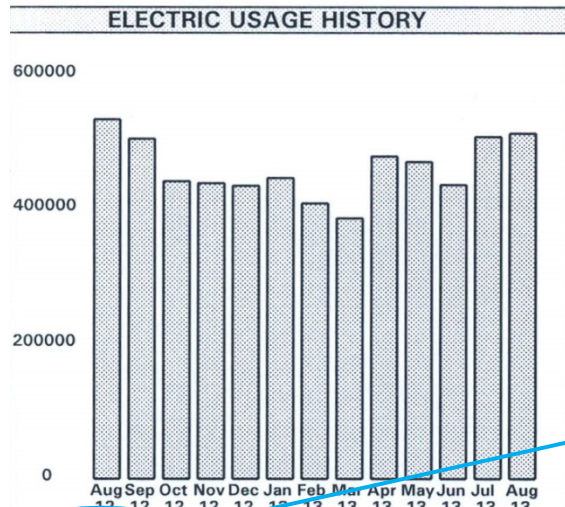


Example: Hotel electrical utility bill

Meter Number	Read Dates		Billing Days	Code	Meter Readings		Multiplier	Usage	Units
	Present	Previous			Present	Previous			
	04/08/2013	04/07/2013	31	ME	41339	39699	160	262400	kWh
	04/08/2013	04/07/2013	31	ME	39169	37716	160	232480	kWh

BILLING SUMMARY	
Previous Balance as of : 04-07-13	\$308,716.87
Payments & Adjustments 09-08-13	(\$308,716.87)
Balance Forward as of : 04-08-13	\$0.00
Current Charges as of : 04-08-13	\$172,364.99
Total Amount Due	\$172,364.99

PREVIOUS BALANCE	308,716.87
PAYMENT 09/08/2013	-163,709.45
PAYMENT 12/07/2013	-145,007.42
BALANCE FORWARD	0.00



	Rate	Usage	Charges
BLOCK 1 ENERGY	0.240000	60	14.40
BLOCK 2 ENERGY	0.225000	24940	5,611.50
BLOCK 3 ENERGY	0.190000	75000	14,250.00
BLOCK 4 ENERGY	0.167500	394880	66,142.40
FUEL SURCHARGE	0.174475	494880	86,344.19
FIXED CHARGE			2.50
CURRENT CHARGES			\$172,364.99
TOTAL AMOUNT DUE			\$172,364.99

Bill Type	Account Type	Bill Date	Due Date	Current Charges	Total Amount Due
ESTIMATE	COMMERCIAL/	04/Aug/2013	03/Sep/2013	\$172,364.99	\$172,364.99

MESSAGES:

Billing period

Meter readings

Meter multiplier

Fuel Surcharge

Energy consumption (kWh)

Block rate structure

Bill Type



HOW TO READ YOUR UTILITY BILL



- How do you calculate kWh?

Usage (kWh)

$$= (\textit{Present meter reading} \\ - \textit{Previous meter reading}) \times \textit{Meter multiplier}$$

$$\textit{Usage recorded by meter 1} = (41339 - 39699) \times 160 \\ = 262,400 \textit{ kWh}$$

$$\textit{Usage recorded by meter 2 (kWh)} = (39169 - 37716) \times 160 \\ = 232,480 \textit{ kWh}$$



HOW TO READ YOUR UTILITY BILL



Block rate structure:

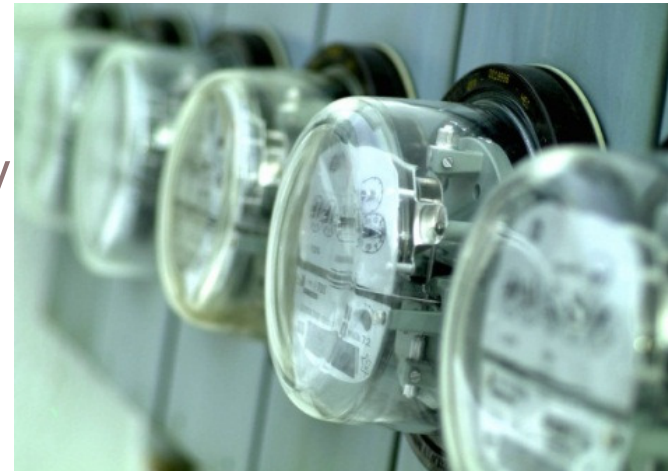
- Block 1: 0-60 kWh charged at \$0.24/kWh
- Block 2: 61-25,000 kWh charged at \$0.225/kWh
- Block 3: 25,000-100,000 kWh charged at \$0.19/kWh
- Block 4: Over 100,000 kWh charged at \$0.1675/kWh
- Fuel surcharge applied to total consumption
- Marginal rate



COLLECTING ENERGY DATA



- Understand how, when and where is energy used?
- Collect data at the facility level using utility bills
- Do an electrical end-use inventory
- Collect facility and operational data like floor area, operating hours, energy use/unit output, guest nights



COLLECTING ENERGY DATA



Example:

Facility level data for small business

Meter Reading Date	Meter Reading	Energy Consumption (kWh)
12/21/2011	3040	
1/20/2012	3205	39,500
2/17/2012	3380	42,000
3/21/2012	3563	44,000
4/19/2012	3719	37,560
5/19/2012	3899	43,000
6/23/2012	4103	49,000
7/25/2012	4315	51,000
8/22/2012	4533	52,350
9/20/2012	4728	46,750
10/21/2012	4912	44,000
11/17/2012	5068	37,560
12/20/2012	5214	35,000



DEVELOPING AN END-USE INVENTORY



Example: Electrical End-Use Inventory

- (40) T12 fluorescent lamps x 156 W x 4,380 h = 24,178 kWh
- (12) 400 W metal halide fixtures x 460 W x 4,380 h = 27,331 kWh
- (1) motor x 25 hp x 0.746 kW/hp x 0.8 load factor / 85% efficiency x 1,200 h
= 21,064 kWh
- (6) 3.5 ton AC units x 12 / 7.5 EER x 3,650 h = 40,880 kWh

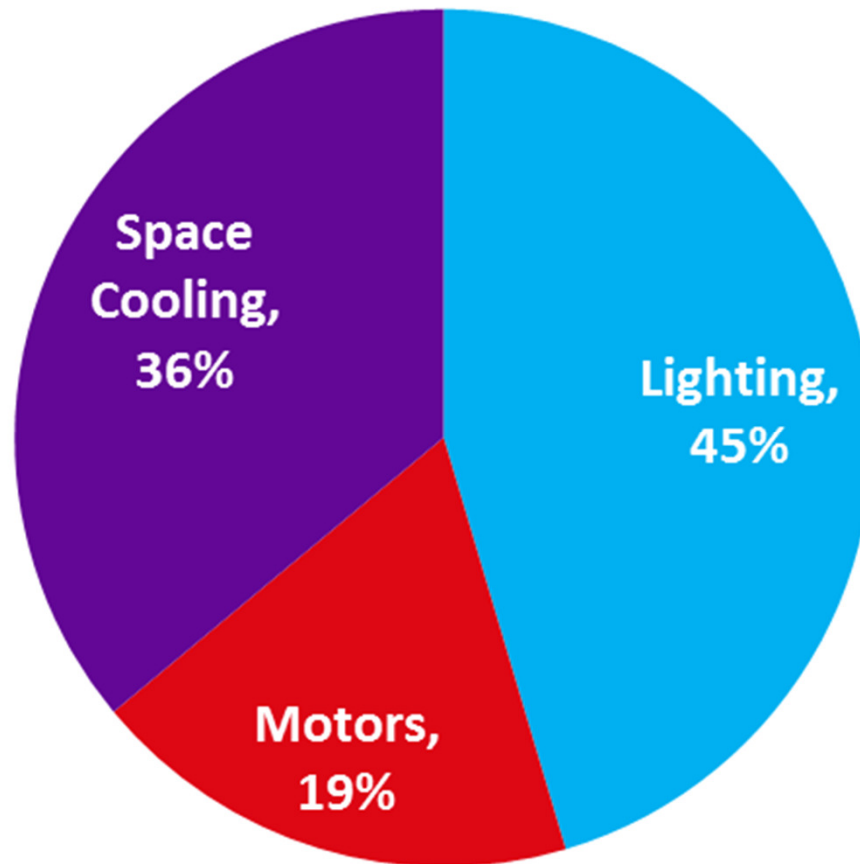
Load	Quantity	Unit kW	Total kW	Hours per Year	Annual kWh	% of Total	End-Use
400 W metal halide fixture	12	0.46	5.52	4,380	24,178	21%	Lighting
Fluorescent 4-lamp T12 fixtures	40	0.16	6.24	4,380	27,331	24%	Lighting
25HP motor	1	17.55	17.55	1,200	21,064	19%	Motors
7 ton Air Conditioner (EER = 7.5)	1	11.20	11.20	3,650	40,880	36%	Space Cooling



DEVELOPING AN END-USE INVENTORY



Example: End-use breakdown for electrical load inventory



ESTABLISHING A TRACKING SYSTEM



Enter the collected data into a tracking system, which could be in the form of:

- In house tool such as a spreadsheet or database
- ENERGY STAR's [Portfolio Manager](#) (commercial facilities)
- ENERGY STAR's [Energy Performance Indicators](#) (industrial facilities)



ESTABLISHING AN ENERGY BASELINE



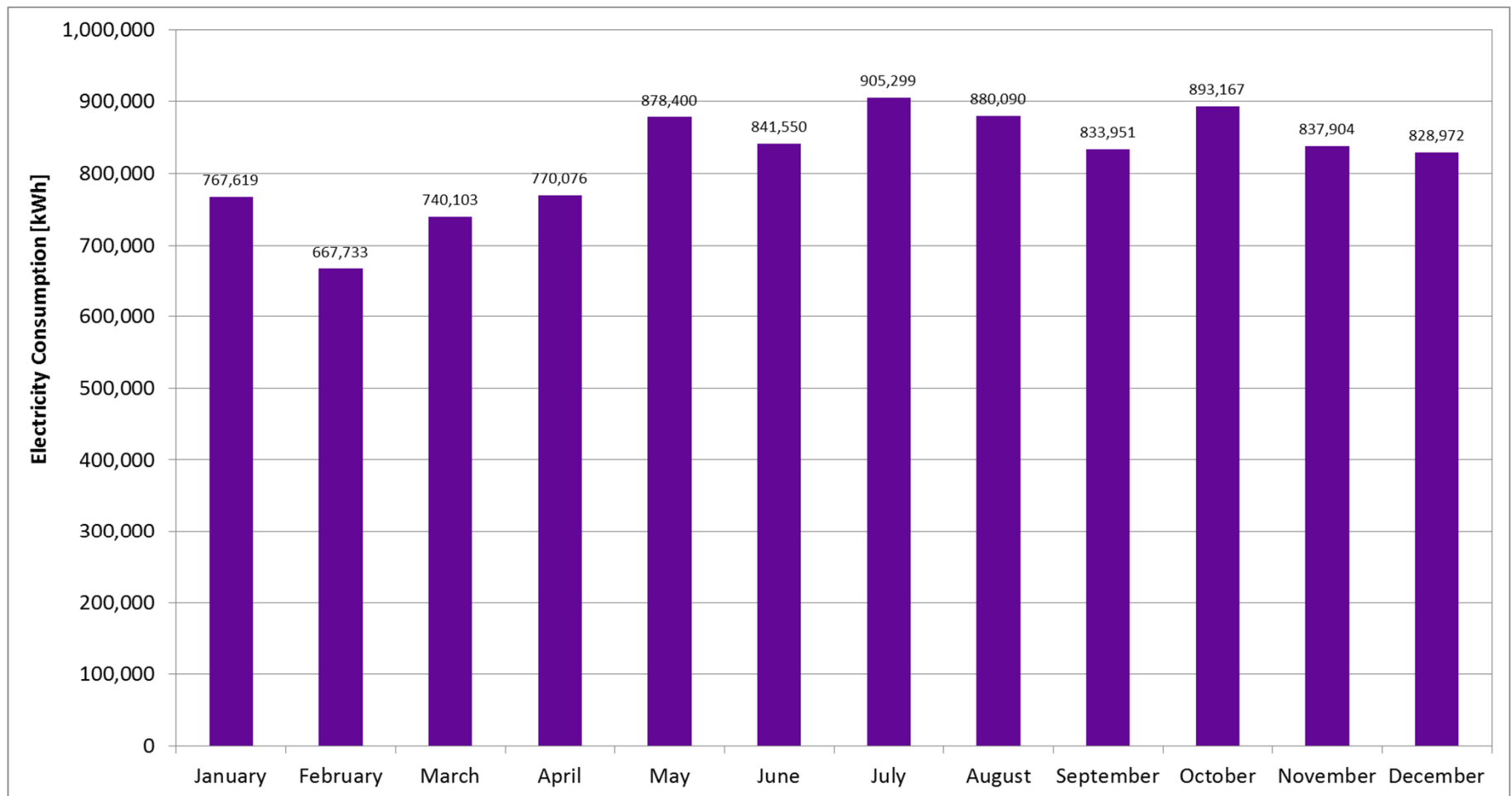
- An energy baseline serves as a reference point for evaluating future energy saving efforts
- A baseline period:
 - Daily
 - Monthly
 - Annually
- Can be used for predictive purposes (i.e. budgeting)



ESTABLISHING AN ENERGY BASELINE



Example: 12-month baseline period



ESTABLISHING AN ENERGY BASELINE



Example: Metrics you can use to evaluate your facility's performance

- kBTU/ft² or kBTU/m²
- kWh/ft² or kWh/m²
- kWh/guest night
- L/100 km
- kWh/L of rum produced
- \$/ft² or \$/m²



ENERGY BENCHMARKING



- Energy benchmarking is:

the ongoing review of your facility's energy consumption to determine if its energy performance is getting better or worse in comparison to yourself, other facilities in your portfolio, and/or your peers

- Answers the question “how is my facility doing?”
- First step towards answering “what can be done to improve my facility's performance?”



ENERGY BENCHMARKING



Free online tool: ENERGY STAR Portfolio Manager

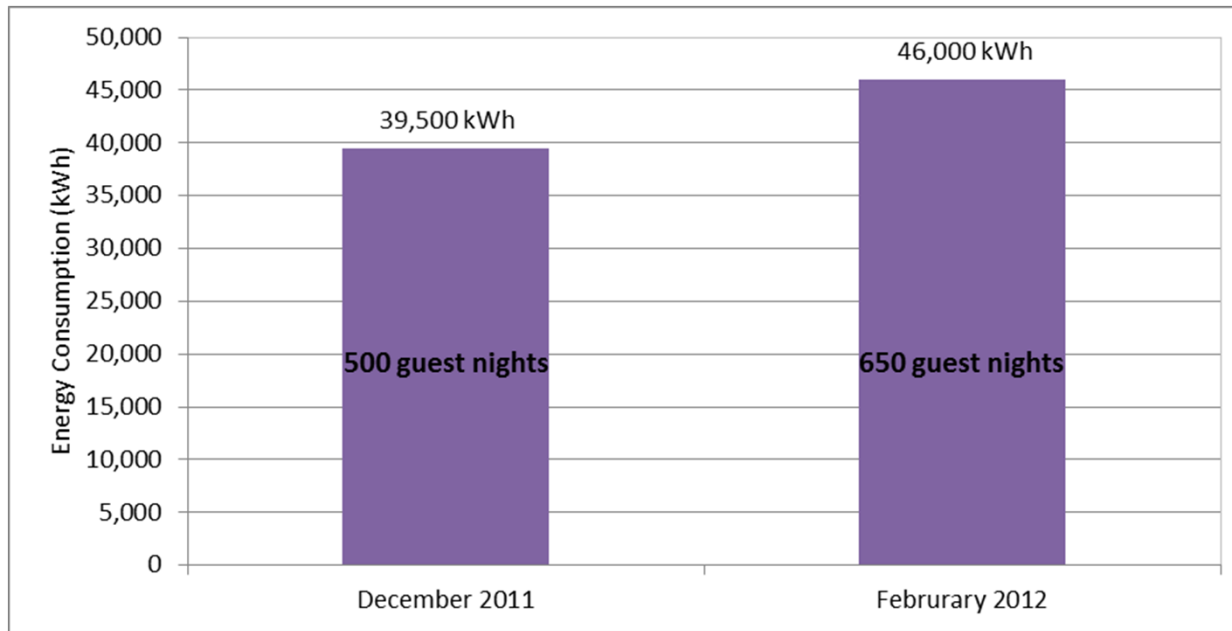
- A no-cost online resource that lets you benchmark, track and manage energy and water consumption and greenhouse gas emissions
- Either enter energy data manually or upload a spreadsheet
- Benchmark your facility
- Generate custom reports



EXAMPLE: TRACKING ENERGY PERFORMANCE



Lighting retrofit project takes place at a small hotel in January 2012



If December 2011 is the baseline period, how would you determine the savings from the lighting retrofit project that was implemented in January 2012?



EXAMPLE: TRACKING ENERGY PERFORMANCE



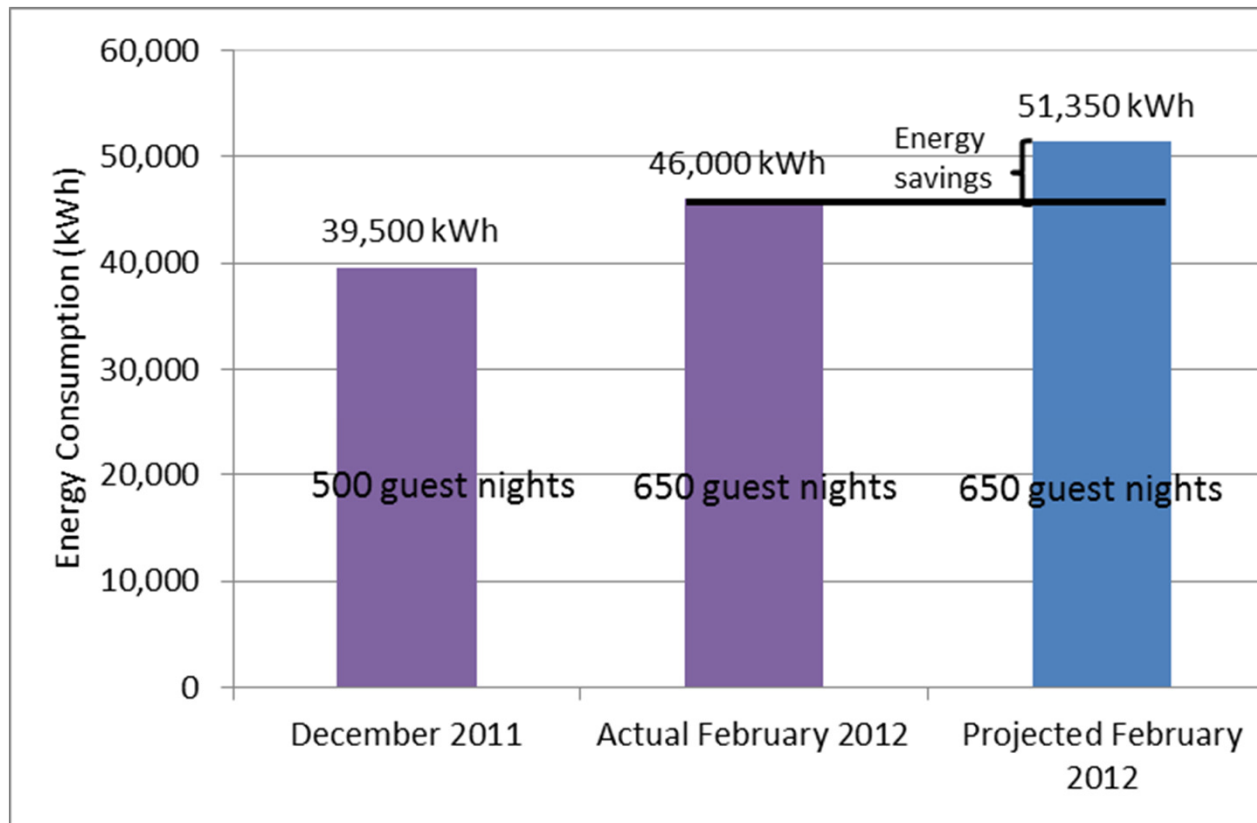
- We need to figure out what the energy consumption in February 2012 would have been had the lighting retrofit not taken place
- We also need to account for the difference in guest nights between December 2011 and February 2012
- *Projected Feb 2012 energy consumption =*

$$\left(\frac{\text{Energy consumed}}{\# \text{ Guest nights}} \right)_{\text{Dec, 2011}} \times (\# \text{ Guest nights})_{\text{Feb, 2012}} =$$

$$\frac{39,500 \text{ kWh}}{500 \text{ guest nights}} \times 650 \text{ guest nights} = 51,350 \text{ kWh}$$



EXAMPLE: TRACKING ENERGY PERFORMANCE



$$\begin{aligned} \text{Energy savings} &= \text{Actual consumption} - \text{Projected consumption} \\ &= 5,350 \text{ kWh} \end{aligned}$$



TAKING ACTION



- Share results of the performance assessment with staff and management
- Benchmark against similar facilities
- Identify energy management opportunities
 - Capital projects
 - Low-cost operational improvements
- Evaluate organizational policies and practices



SANDALS GRANDE ST. LUCIA: BEST PRACTICES IN ENERGY AND WATER PERFORMANCE ASSESSMENT



- Early every morning, a Sandals technician reads all of the utility meters so that fuel, electricity and water use case be tracked
- Energy and water use data is shared with employees in the form of an Energy Wheel
- At the corporate level, Sandals uses an online tool called EarthCheck Assessed to track electricity, fuel and water use and costs, enabling the company to make year-to-year comparisons and to compare across facilities



RECAP: STEPS IN AN ENERGY PERFORMANCE ASSESSMENT



- Collect and track facility energy data
- Do an end-use inventory
- Develop an energy baseline
- Benchmark your energy performance
 - Internal comparisons
 - Comparison against similar facilities
- Identify areas of high-cost energy use at your facility
- Take action



NEXT WEBINAR : SPOT THE OPPORTUNITY



Topics will include:

- Benefits of energy efficiency actions
- A process for identifying savings opportunities
- Lighting opportunities
- Space cooling opportunities
- Developing a business case for energy efficiency projects



VISIT OUR WEBSITE



For more information on the OECS Power Savers campaign, visit

www.powersavers.org





THANK YOU FOR YOUR PARTICIPATION!

Please direct any additional questions you might
have to emily.kirke@icfi.com



REFERENCES



Dollars to \$ense Spot the Energy Savings Opportunities. Natural Resources Canada, April 2013, [Online]. Available: <http://www.energyintoaction.com/wp-content/uploads/2012/06/Dollars-to-ense-Spot.pdf> [Accessed September 2013].

ENERGY STAR Guidelines for Energy Management. US Environmental Protection Agency, US Department of Energy, 2013, [Online]. Available: <http://www.energystar.gov/buildings/tools-and-resources/energy-star-guidelines-energy-management>. [Accessed September 2013].

“What is building energy benchmarking?” Natural Resources Canada, January 16, 2013, [Online]. Available: <http://oee.nrcan.gc.ca/commercial/building/18410> [Accessed: September 2013].

R. Patterson, “Whitehorse Energy Management Plan_Final”, ICF Marbek for City of Whitehorse, Ottawa, ON, Dec. 2012.

“BVI Electricity Corporation Bill Format Breakdown” British Virgin Islands Electricity Corporation, 2011, [Online], Available: <http://bvielectricity.com/customer-services/billing/> [Accessed September 2013]

