

Manufacturers Energy Forum

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Smart Energy Strategies for Manufacturers

PRESENTED BY:

Paul Spiegel, P.E., LEED AP President Practical Energy Solutions

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A seven year old energy consulting company focused on energy assessments, strategic planning, and conservation & efficiency programs to assist in meeting short and long term energy goals

- Energy audits/assessments/benchmarking
- Energy modeling/building energy simulations
- Financial and technical evaluation of capital projects
- IECC Code Compliance Plan Review
- Building operational review and conservation strategies
- Energy and utility strategic planning
- Incentive and grant project support & implementation
- LEED certifications
- Baseline development, measurement and verification of savings from energy upgrades and initiatives



Practical Energy Client List

Municipal Clients:

City of Philadelphia Chester County Borough of West Chester Philadelphia Gas Works (PGW) Media Borough Delaware County Tredyffrin Township City of Coatesville PIDC

Institutional Clients:

West Chester Area School District Garnet Valley School District Westtown School Downingtown Area School District The Hill School Overbrook School for the Blind Arthur Ashe Youth Tennis Center Upper Merion Area School District The Reinvestment Fund

Commercial/Industrial Clients:

Elliott Lewis PJM Interconnection <u>United Technologies Corp.</u> Vertex, Inc. <u>Sikorsky Helicopter</u> Liberty Property Trust Bentley Systems ING Insurance <u>Accu-Weld Window & Door</u> <u>Cardone Industries</u>

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Getting the most out of this program





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Focus on Energy



Why Save Energy in Your Facilities?

- Energy is a significant operating expense
 Impacts unit costs of products produced
- Environmental:
 - Climate
 - Health impacts
 - Supply chain requirement
- Benchmarking and Disclosure laws
- Receive rebates and tax deductions
- Conserve finite resources
- Opportunity!







Topics to be covered today

- Benchmarking Understanding where you are today
- Developing an Energy Plan Prioritizing first steps
- Calculating ROI Calculating project payback periods
- On-site renewable energy Is your site viable? Does it make sense?
- Backup generation Reducing or eliminating downtime due to grid interruptions, load shedding
- Procurement Leveraging your demand to buy energy, including clean energy, at a discount
- Natural Gas Can/should your company convert to natural gas?
- **Financing** Available resources and incentives to facilitate your projects



Reducing Energy Costs

Procurement of electricity and gas

- What is pricing based on?
 - × Amount used per month or year
 - Energy use profile (when during the day, week and year it is used)
 - For electricity, check the rates quoted against your current rate to verify savings, or hire someone to do it for you
- Real time pricing, or peak & off-peak pricing plans will they benefit you?
- Choices: reverse auction, sales consultant, direct solicitation
- Is clean energy cost-effective?







Reducing Energy Costs

• Reduce cost through tax apportionment

- Manufacturers are not required to pay state sales tax on components of their products, and energy used in the process is considered a component
- Process v. non-process loads
 - Submetering or calculated loads
 - Get the tax exemption for all process loads
- This information can be used as a baseline in tracking improvements as well





- Benchmarking manufacturing energy use is difficult
 Process loads make up a significant portion of the usage
- Benchmark against your own energy use (past 2 or 3 years)
 - Variables that you may need to adjust for:
 - Units produced
 - ➤ Hours of operation
 - × Number of employees



Case Study –LEED-EB Certification for a Manufacturing Facility

- Facility: 61,173-sf building housing administration/ offices (38%), final finishing, painting and assembly areas (60%), and a server room (2%)
- The LEED-EB energy prerequisite requires buildings to perform at a level of energy intensity that is at least 19% better than similar buildings
- Typical benchmarking methods:
 - Energy Star Portfolio Manager
 - Against your own historic data
 This was a new facility



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• Manufacturing Case Study (cont.)

• Proposed benchmarking methods:

- Benchmarking the source EUI against that of relevant sister facilities in the company (corrected for climate and other variables)
- Benchmarking the building's source EUI against the aggregated DOE/Energy Information Administration's Industrial/Manufacturing Energy Consumption Survey (MECS) data set
- Benchmarking the building's source EUI against the aggregated 2007/2008 IFMA Operations and Maintenance Survey data for manufacturers (18 different industries represented)



Improving Your Energy Performance

- Operational
- Capital Upgrades
- Measurement & Verification
 - Quote from Jack Welsh, former CEO of G.E.:
 - You can't manage what you don't measure...
 - A better quote from Jack Welsh
 - We measure too much, and understand too little...





ISO 50001



• Steps in the process

- Establish baseline
- Set realistic/practical performance targets based on an audit or assessment
- Develop prioritized list and implement EnPIs
- Track/measure your progress
- A 3rd party certifying agency is required to review all of the information developed, interview staff members, and sign off and submit final documentation
- Certification is good for 3 years
- Ties in great with supply chain sustainability measures required by many Fortune 500 companies

Er	Sample Large Upgrade Project – Lighting (\$50,000) & HVAC (Dua \$20	al Measure, 00,000)	tical ergy ions
	Project Cost	\$	250,000.00	
	PECO Rebate	\$	25,000.00	
	Net Project Cost/Loan Amount	\$	225,000.00	
	Annual Lighting Energy Savings (2 year payback)	\$	25,000.00	
	HVAC Energy Savings (10 year payback)	\$	20,000.00	
	TOTAL Annual Savings	\$	45,000.00	
	Monthly Energy Savings	\$	3,750.00	
	Monthly Loan Payment (10 year, 3.5%)	\$	2,224.90	
	Monthly Net Profit/Revenue	\$	1,525.10	
	Annual Net Profit/Revenue	\$	18,301.20	
	10 Year Net Profit	\$	183,012.00	

How much would you borrow at 5% to get a 20% ROI?

Address your Fear & Take Action!

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- If you are concerned about making a mistake, hire an independent consultant
- Look at financial benefits of taking action
 - Procurement
 - Tax apportionment
 - Capital upgrades
 - Certification
 - Incentive programs rebates, loans, tax deductions
- Track your performance, and compare it to a well developed baseline
- Earn recognition for your efforts



Additional questions?

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Mark Fischer PWI Engineering

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MANUFACTURERS ENERGY FORUM

Buildings Systems Planning, Design & Management



Presentation to SEI and the Manufacturing Alliance of Chester and Delaware Counties By PWI Engineering - November 07, 2013

Today's Topics









- Developing a Strategic Energy Plan
- Calculating Project ROI
- Backup Generation or CHP
- Combining Both Sides of the Meter
- Marcellus Shale Revolution Got Gas?



Developing a Strategic Energy Plan



Strategic Energy Plan Process





Energy and utility costs are not fixed costs – they are manageable expenses.





Managing these expenses requires foresight, ingenuity, analysis and planning.



Strategic Energy Plan Process





- Understanding and Projecting Energy/Utility Operating Costs
- Identifying Energy Source and Cost Forecasts
- Developing "Multi-Source" Solutions to Avoid Dependence
- Economically Analyzing Alternative Solutions
- Developing a Cost Monitoring and Measuring Program
- Developing an Energy/Utility Purchasing Program

(continued)





Strategic Energy Plan Process



Strategic energy planning is a "supply side function" which also includes:

- Creating Decision Making Tools To Navigate Changing Pricing
- Creating a Flexible, Multi-Year Program for Implementation
- Developing a Continuous Improvement Program that Scrutinizes Emerging Technologies





 Strategic energy plans should provide a map along with the decision-making factors to navigate the volatile energy marketplace for the next decade or more.



Calculating Project ROI



Calculating ROI









Before the discussion on Return on Investment, a few questions must be answered.

- Have the "Low Cost, No Cost" and "Capital Expenditures" energy conservation measures (ECM's) been identified and separated?
- For Cap Ex ECM's, how will they be financed?
- Does Ownership or Senior Management have a maximum defined payback time period?
- Has a Life-Cycle Cost Analysis been performed?



Calculating ROI











Once the Cap Ex project has been isolated, a simple ECM Return on Investment calculation is as follows;

- Identify the existing equipment's annual hours of use,
- Determine the wattage of the equipment and multiply by the # of hours to get annual kWh.
- Multiply the "all-in" utility electric cost per kWh by annual kWh to get total spend for existing equipment.
- Perform the same calculation for the new equipment.
- Subtract the new annual cost from the existing cost to determine annual savings from this ECM.



Calculating ROI











- Next, determine the average life of the existing and the new equipment. Then calculate the equivalent cost of the existing equipment over the life span of the new equipment (this is easier than it sounds).
- Factor in the labor differential between old and new.



- Cost of initial investment of new equipment Less energy savings over one year Less cost of replacement equipment (annualized) Less annual labor differential cost Total annual savings
- Multiply by expected years of new equipment.
- The result is the Return on Investment for that ECM.

Backup Generation or CHP

BUG or CHP









When extreme weather hit last year knocking out power for millions in this area, many companies scrambled to get some type of emergency back up generator (BUG).

Fear, panic and the resulting price gouging followed.

We have been fortunate that there has been no repeat of Hurricane Sandy but NOAA and NCDC have forecasted bigger storms will come our way as extreme weather continues to bringing colder colds, hotter hots and greater amounts of precipitation.

So what do you do?

A BUG for temporary power or a Combined Heat & Power (CHP) system to self-generate?

Back Up Generator (BUG)









Considerations:

- What do you want backed-up?
- Diesel or Natural Gas?
- Is there a budget or is it just "We need it now"?
- Will State EPA guidelines increase to Tier IV virtually eliminating diesel gen sets?

Benefits:

- Critical equipment will run during an outage.
- Through PJM's Demand Response program you can monetize the BUG with certain loads.



Combined Heat & Power (CHP) or Co-Gen SEP







Considerations:

- Do you have any thermal load?
- CHP is designed to run 24/7, is this a problem?

Benefits:

- Essential and non-essential equipment will run during an outage.
- Federal and State funding programs will decrease the cost (state grants, PA Act 129, ITC, etc.).
- You control when you want to self-generate and at what price of electricity.



Connecting Both Sides of the Meter

Both Sides of the Meter







Energy Demand and Supply management are NOT mutually-exclusive.

The best designed energy systems account for optimal

efficiency, procurement based on demand forecasts





Whatever the costs of engaging a good energy consultant, the benefits far outweigh any fees the consultant may charge.

and are flexible based on unforeseen events.

Don't be "Penny Wise and Pound Foolish"



Marcellus Shale Revolution Got Gas ?

Marcellus Shale Natural Gas











Inexpensive and abundant natural gas is here now.

- Winter prices are low and forecasted to stay low for a long while. In fact, the NYMEX December 2013 NG Contract is at its lowest since it began trading over 10 years ago.
- Are you looking at what equipment can be converted to natural gas? A simple ROI using conservative forward NG prices can make the decision very easy.
- The local energy management market in Chester and Delaware Counties has an abundance of qualified consultants, engineers and procurement experts – USE THEM for your benefit !!!





Walter D. Schroth Eagle Design Group

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EAGLE DESIGN GROUP L.L.C.

Production Facility



Schedule a time to tour our facility

CREATING & HIGHER STANDARD

- Chester County, PA facility
- Established in 1986
- 18,000 sqft
- Lean Manufacturing
- Copper & Fiber Labs
- Great Value
- American Quality
- Satisfaction Guaranteed









Project Summary

Assumptions & Costs for a New 69kW Solar Energy System

Project Investment Details			
Project Name	Eagle Design Group		
Solar Panel Model	Trina TSM-230w		
Number of Panels	300		
Inverter – Grid Interactive	PV Powered		
Number of Inverters	1		
System Size	69kw		
Kwh/year	77,421		
Cost per Watt \$/w	\$4.25		
Total Project Cost	\$293,250		
PA Sunshine Grant	\$37,000		
Federal ITC Grant	\$87,975		
Net Project Cost	\$168,275		
Est. Annual SREC Value (@ \$280, 5yr-Fixed)	\$21,580		
Est. Annual Value of Electricity (@ \$0.12)	\$9,249		
Est. Annual Operating Income (Yr.1)	\$30,470		





Monthly Electricity Use and Amount Supplied by Solar

Green Pointe. Energy has performed the necessary analysis on your current utility statements to identify and track your current consumption, load factor and power usage profile. By analyzing your bills this gave us insight into how you use your power as well as how the proposed Solar PV system will impact your usage profile.

In the above graphs we have calculated your monthly energy savings, the annual savings over the life of your system as well as the above graphs that we transposed your currently energy usage over the Solar PV system use. This analysis serves a performance indicator on how we can anticipate you





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