

**Retrofit Suppliers Workshop:
Making the Effective Pitch**

**December 4, 2013
8:30am – 12:00pm**



DVIRC Overview

- DVIRC is a Non-Profit, Economic Development Organization focused on the manufacturing sector of Southeastern PA
- In business since 1988
- DVIRC is 1 of 7 PA Industrial Resource Centers (IRC) funded by the PA Department of Community and Economic Development (DCED)
- DVIRC is 1 of 59 Manufacturing Extension Partnership (NIST/MEP)
- 30 employee organization
- Over \$100 million of value added impact for our clients in our first two quarters of this year

DVIRC and the EEB Hub

- DVIRC is 1 of 25 EEB Hub member organizations
- Our role is to assist in:
 - Building Re-tuning training and education
 - Assisting with the market adoption of Advanced Energy Retrofits (AERs)
 - Integrated Solutions Showcases

Value Stream Mapping Event Overview

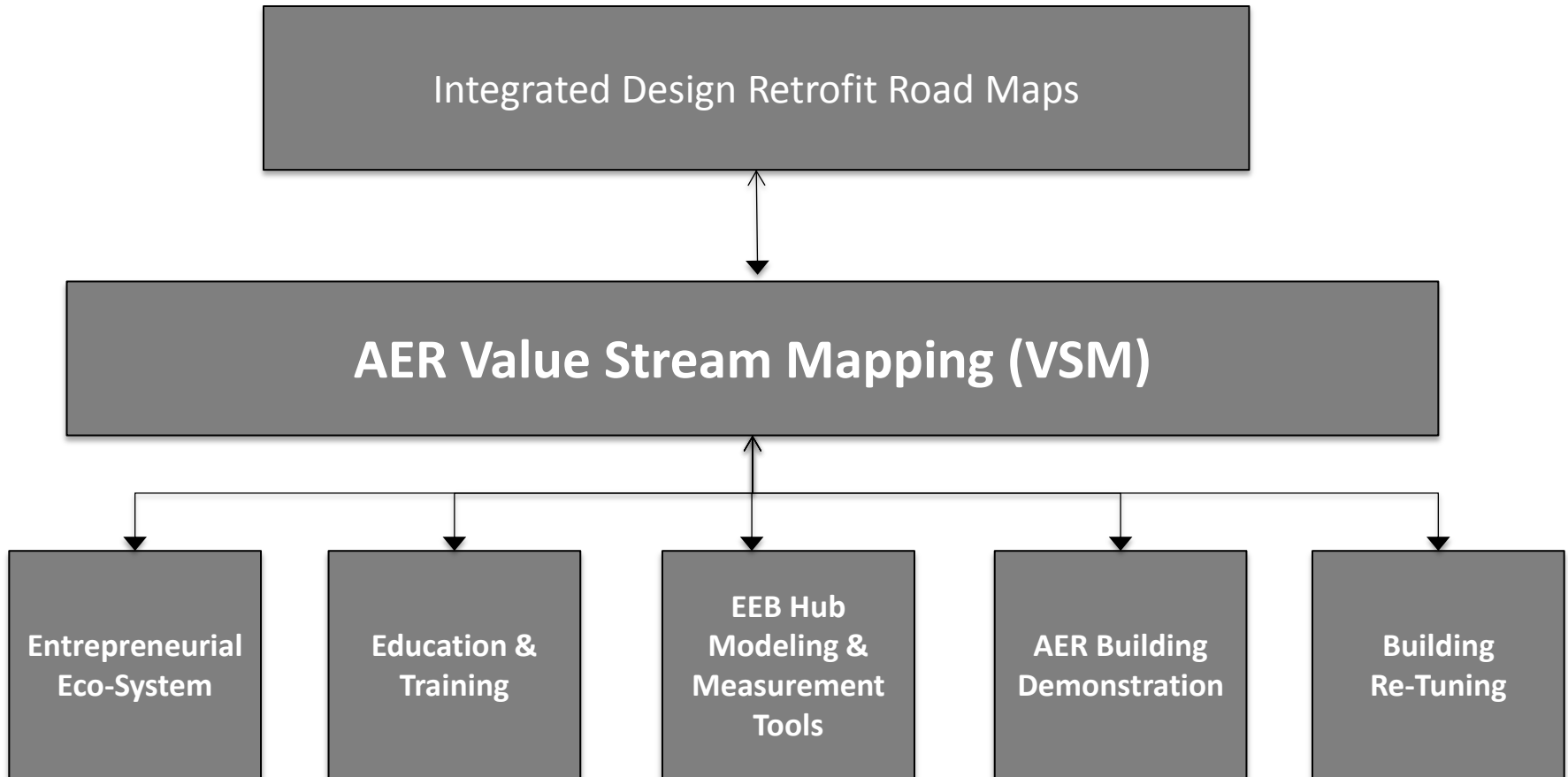
EEB HUB OBJECTIVE

- Identify strategies that will accelerate market adoption of energy efficient retrofits of commercial buildings in the Greater Philadelphia region.

PROCESS MAPPED

- The process map included all the steps from private building owner interest in AER to completion of the retrofit.

Collaboration of Value Stream Mapping within the EEB Hub



Challenges to the Team

*12 cross-functional individuals from the commercial building industry to examine the **Advanced Energy Retrofit (AER) Process from a Building Owner Perspective:***

- What is the value proposition of an AER for Owners?
- Why are Owners not pro-actively pursuing retrofitting now?
- Why, when a Building Owner needs to replace at least 1 system, does he/she not look to pursue Integrated Design and an Advanced Energy Retrofit (Partial or Substantial)?

Action Items Identified by Team –

The end of the Value Stream Mapping (VSM) event left us with 6 follow up action items to investigate further.

- 1. Develop Market understanding** of the characteristics of private building owners such as number of buildings owned, size of buildings, and ownership structure
- 2. Educate building owners and operators** about a proven path/process to undergo an AER retrofit
- 3. Financial – Create one-page summary of possible sources of financial support** for building owners to complete AERs (including utilities)

Action Items Identified by Team –

The end of the Value Stream Mapping (VSM) event left us with 6 follow up action items to investigate further.

4. Banking/Financial – **Educate financial community** on benefits of AER and value enhancement for building; develop lending packages that are easy and quick.
5. Suppliers to AERs - a) Improve integration of AER suppliers to providing services to owners, b) Educate suppliers on credibility issues, c) Educate suppliers on how to speak the language of building owners (NOI/cash flow/ value equation)
6. Schedule Building Owners to **visit existing buildings** that have successfully completed AERs (owner-to-owner)

WHICH WILL BE THE FIRST STEPS NECESSARY TO:

7. **Create market pull for AERs** from Building Owners



Fostering Supplier Integration and Defining Best Practices for Small to Mid-Sized Commercial Buildings

DVIRC and the EEB Hub moved forward planning a workshop where Small to Mid-Sized Commercial Building Contractors and Installers (in the fields of HVAC Controls and Maintenance, Lighting, Roofing and Windows) will be organized into two teams.

The teams were asked to work together and define an integrated sales “pitch” to a Building Owner, to entice that Building Owner to agree to undergo an Advanced Energy Retrofit (AER) for a (sample) building.

Workshop Goals

The EEB Hub seeks to gain a real time perspective from Building Owners on the effectiveness of the Suppliers' proposals and areas for improvement.

The Building Owners will provide candid feedback for the suppliers to make their “pitches” more compelling and focused.

We look for workshop participants & attendees to gain valuable takeaways that will aid them in building or refining SMSCB Supplier value equations in the market, to convey simply and fluently the benefits of AERs that Building Owners can connect with.



Process

Compile 2 Teams of Small to Mid-Sized Commercial Building Suppliers:

Building A – (Building Owner)

Lighting: Ray Sizer, National Energy Solutions

Building Automation: Renee Fiorelli, Peterson Services

Retro-Commissioning/Test & Balance: Peterson Services

Building B – Wayne Zukin Zukin Realty (Building Owner)

Lighting: Evan Levy & Chris Maxwell, Greentech Energy Solutions

Roof: Steve Consalvo, Liberty Roofing

Windows: John Siegel, Quanta Panel

Introductory Meetings between Suppliers on both Supplier Teams

Introductory Meetings between individual Supplier Teams & their respective Building Owner

Proposal Meeting between Supplier Teams & Building Owner

Today's Agenda

8:45am – 9:25am – *Background, Workshop Participant Introductions & Workshop Overview (Barry Miller, DVIRC) & Building Re-tuning Program Overview (Rob Crossett DVIRC)*

9:25am – 9:55am - *Team A - AER "Pitch"*

9:55am – 10:15am - *Building Owner Feedback and Report Out to Team A (Homer Robinson, Building Owner) - **Followed by Audience Q&A***

10:30am – 11:00am – *Team B - AER "Pitch"*

11:00am – 11:20am *Building Owner Feedback and Report Out to Team B (Wayne Zukin, Building Owner) – **Followed by Audience Q&A***

11:20am – 11:40am – **AUDIENCE Q&A to Supplier Teams**

11:40am – 11:50am – *Summation and Next Steps Towards Building an Integrated Solution for Suppliers*

What is Building Re-tuning?

Rob Crossett – December 4th, 2013



Building Re-tuning at a Glance

Building Re-tuning: A systematic process to identify and correct building operational problems that lead to energy waste – ENERGY SAVINGS 5-20% ANNUALLY

Includes small, low-cost repairs, such as replacing faulty sensors

Re-tuning is a no- to low-cost systematic process to identify and correct building operational problems that lead to energy waste

Large Buildings: Re-tuning can be done by using building automation systems (BAS) to identify and correct problems, such as inefficient scheduling and temperature set points.

Small Buildings: Re-tuning can also be done by implementing a process to find solutions to operational problems in buildings without BAS.

Common low-cost/ no-cost re-tuning measures include:

- *Tightening up equipment schedules*
- *Correcting economizer problems*
- *Implementing automatic reset and/or scheduled adjustments for discharge temperature and static pressure set points*
- *Adjusting zone terminal box set points*
- *Adjusting chiller plant and heating plant operations (including chilled water/hot water set point reset, chilled water/hot water loop differential pressure reset, and condenser water reset)*

Intended Audiences for Re-tuning



Building Owners



Building Managers



**Building Operators/
Engineers**



- This training session is an in depth technical course and is ideally suited for individuals directly responsible for on-going and hands-on operation of a building or portfolio of properties
- The outcome of this offering will put these individuals in a better position to critically examine and utilize these new skills throughout your portfolio
- Given the “deep-dive” that this program offers, and the limited number of seats, this training is only offered to those individuals who have direct hands-on knowledge and responsibility for building operations and/or Building Automation Systems
- It is expected that information will be shared both before and after the training, so that results can be monitored and tracked

Steps Needed to Re-tune, Including Gathering Data

- Step 1: Provide high-level building data* and 1 year of monthly energy usage information
- Step 2: Track 6 months of energy usage after implementing re-tuning
- Step 3: Contribute qualitative input on organizational/culture change challenges/successes to monthly follow-on conference calls

* Additionally, the example building volunteered for each re-tuning training must work with PNNL to obtain 3 weeks of BAS interval data down to the zone-level



Large Building vs. Small Building Re-Tuning

Large Building (>100K sq. ft.)

- Systematic process to identify and correct operational problems that lead to energy waste (same as small building re-tuning)
- Re-tuning process relies heavily on detailed monitoring data from a BAS
- Major focus areas include:
 - Occupancy scheduling
 - Discharge-air temperature and pressure control
 - Air-handling unit (AHU)
 - Zone conditioning
 - Meter profiles
 - Central plant

Small Building (<100K sq. ft.)

- Systematic process to identify and correct operational problems that lead to energy waste (same as large building re-tuning)
- Re-tuning process does not rely on detailed monitoring data from a BAS.
- Buildings mostly have packaged units for heating and air and are controlled by zone thermostats, many recommendations are prescriptive.
- Some topics covered are often covered in training associated with energy auditing and retro-commissioning for small/medium-sized commercial buildings

Small Building Re-tuning

- Small building re-tuning focuses on small commercial buildings (<100,000 sf) that typically do not have BASs
- This training helps building operations staff to learn how to operate buildings more efficiently and reduce operating cost
- The knowledge and skills learned through the training will be highly valued by organizations and companies seeking to improve the performance of their buildings.

Four Primary Steps of Small Commercial Building Re-Tuning

1. Initial Data Collection Phase – Collection of information about the building
2. Investigation Phase – Building walk-down to identify and characterize the building operations
3. Implementation Phase – Application of prescriptive re-tuning measures
4. Documentation Phase – Reporting of measures implemented and calculation of energy savings



Large Building Re-tuning

- Large building re-tuning focuses on large commercial buildings (>100,000 sf) that have BASs
- Training includes learning by doing:
 - Work within a virtual, 3D commercial building
 - Collect and analyze building prints and trend data
 - Perform a virtual building walk down
 - Interact with building occupants
 - Work through a variety of interactive scenarios designed to target specific re-tuning issues throughout the building

Six Primary Steps of Large Commercial Building Re-Tuning

1. Collecting Initial Building Information – Basic building information
2. Pre-Re-tuning Phase – Trend data collection and analysis
3. Building Walk Down – Getting to know the building
4. Re-tuning – Identifying and correcting operations problems
5. Savings Analysis – Determining and reporting the impacts

Vornado Realty Trust: Building Re-tuning Case Study

- Vornado Realty Trust is one of the nation's largest owners and managers of commercial real estate
- Over 20 million square feet of Vornado's 100 million square foot portfolio has earned the Energy Star label
- In October 2012, Vornado trained building operators to re-tune one of its buildings in Arlington, VA
- Re-tuning provided the facilities management team with the ability to identify and understand building scheduling opportunities that drove significant, low-cost energy savings



Address: 2100 Crystal Drive, Arlington VA
Owner: Vornado Realty Trust
Size: 250,000 square feet

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Vornado Realty Trust Re-tunes its Building to Save Energy Through "Optimizing" Building Operations

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In October 2012, Vornado trained building operators to re-tune one of its buildings in Arlington, VA. Re-tuning provided the facilities management team with the ability to identify and understand building scheduling opportunities that drove significant, low-cost energy savings.

In 3 months since the training the company has saved an average of 2% on its heating bill and 3% in electricity bill due to the following 5 measures that were identified:

1. Lowering the boiler hot water supply temperature set point
2. Lowering the boiler hot water supply temperature set point
3. Changing the set points on the discharge temperature and GPM of water supply temperatures
4. Lowering condenser water temperature supply
5. Using return sensors to the condenser to set out 150° below its high setpoint

There are several training resources available to building owners and operators interested in learning more about re-tuning:

- [Energy Star Building Performance Checklist](#)
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What is Re-tuning?
 Building re-tuning is an approach for optimizing building systems (BMS) to save energy by identifying and correcting operational problems, such as inefficient scheduling, low operation set points, and peak pressure set points. Re-tuning minimizes energy consumption and improves occupant comfort. This process can reduce building energy use between 2% to 5%.

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PNV has developed several training resources available to [www.pnv.com/buildingre-tuning](#)

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*All data collected in VA was taken on a warm day during the Spring and Fall months.

BUILDING TECHNOLOGIES PROGRAM

Re-tuning Training Session Offer to Save Energy

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Step 1: Analyze Data from BMS and Identify Energy Saving Opportunities

BMS data from BMS can be used to identify building operators and operators who are responsible for energy consumption and who are responsible for energy savings. The data can be used to identify energy saving opportunities and to develop a plan to address them.

Step 2: Develop an Energy Savings Plan or Savings Opportunity

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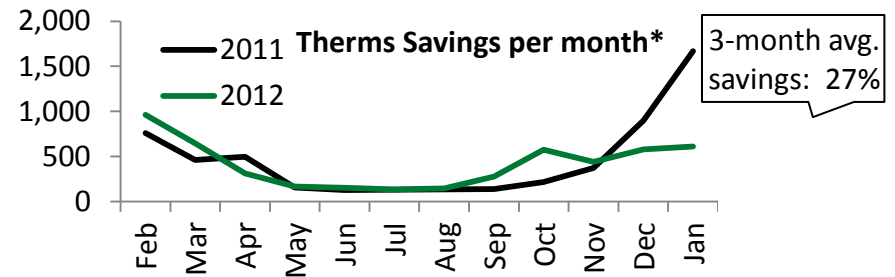
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Vornado Saved a three-month average of 27% on Heating Bills

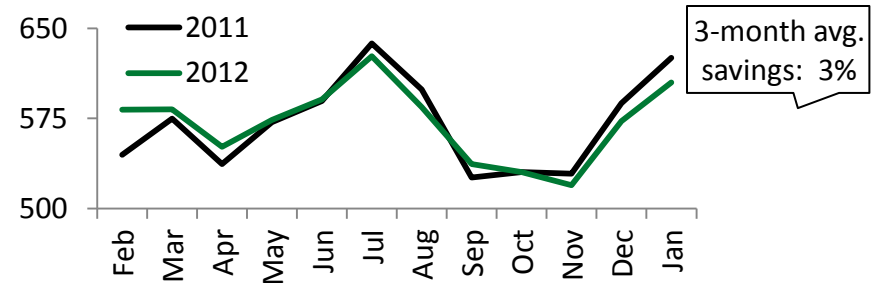
In the 3 months since the training the company has saved an average of 27% on its heating bill and 3% on its electricity bill due to the following 5 measures that were identified:

- Lowering the boiler hot water supply temperature set point
- Lowering the static pressure on the main duct and branches
- Changing the set points on fan discharge temperature and chilled water supply temperature
- Lowering condenser water temperature supply
- Using motion sensors for the conference rooms to set VAV boxes to night mode

Vornado Energy Re-Tuning Data



kWh Savings per month**



*Both Therm and kWh usage were normalized by degree days

**Fan and cooling kWh savings are most significant during the Spring and Fall months

Thank You

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