NORTHEAST ENERGY EFFICIENCY PARTNERSHIPS

Advanced Rooftop Units (ARTU) Workshop Discussion Guide

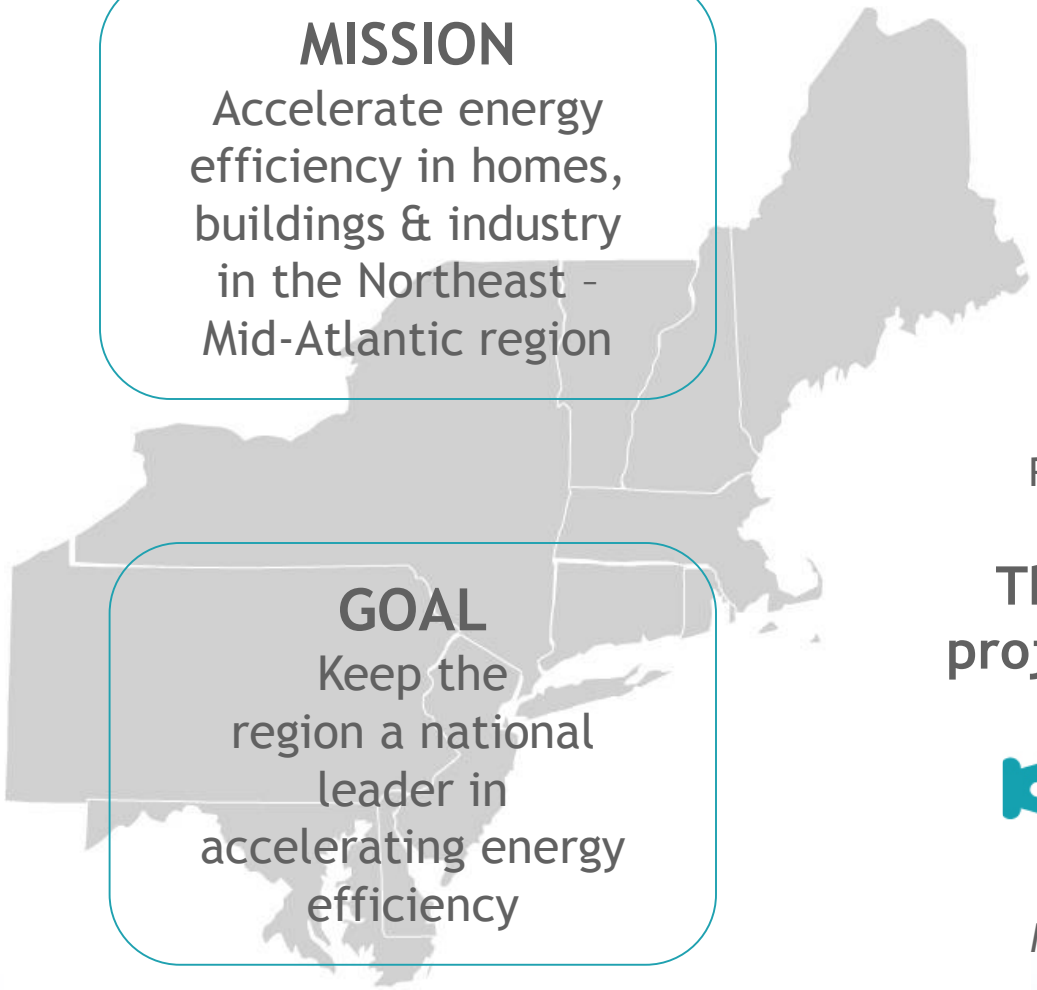
JUNE, 2015

Jon Linn, Senior Commercial & Industrial Advisor

Northeast Energy Efficiency Partnerships (NEEP)

NORTHEAST ENERGY EFFICIENCY PARTNERSHIPS

"Accelerating Energy Efficiency"



MISSION

Accelerate energy efficiency in homes, buildings & industry in the Northeast – Mid-Atlantic region

GOAL

Keep the region a national leader in accelerating energy efficiency

STRATEGIES

Reduce Building Energy Use

Speed High Efficiency Products

This project!

Make Efficiency Visible

Advance Knowledge - Best Practices

Regional energy efficiency collaborations since 1996

NEEP ARTU PROJECT

- To Advance Adoption of ARTU
- To Transform the Market—Equipment & Practices
  1. Gather Stakeholders
  2. Assess Market and Develop Strategies
  3. Market Strategy Document for 2016

PROJECT ACTIVITIES

Proposed Timeline and Working Group Participation

- Review Market Assessment and Review Market Assessment
  - Today: June 15
- Develop a *Recommended Regional Market Strategy Report*
  - June - July
- Review and distribute findings from Strategy Report
  - July - August

PURPOSE OF TODAY'S WORKSHOP

- **Purpose:**
  - Identify, discuss and develop issues & concepts to feed Draft Strategy Recommendation for 2016
- **Workshop Objectives:**
  - Identify issues/opportunities for partnerships
  - Identify key barriers, solutions and elements of success
  - Identifying action steps to build towards common goals
  - Build relationships among stakeholders

TODAY

Time	Program
10:00	Welcome and Introductions
10:10	NEEP ARTU Project
10:30	Innovative, Progressive and Effective Promotions Panel
12:00	Lunch
1:00	Barriers and Solutions
2:00	Break
2:10	Activities and Priorities
3:00	Wrap and Adjourn – Thank you!
3:15	Tour of Schneider Electric

HIGH LEVEL FINDINGS

In the Northeast Region:

- Aging fleet of RTUs
- Thousands of Units sold every year
- Lots of room to boost proportion of High Efficiency Units
- Huge Potential E savings and D reduction
- Lots of good, strong programs
- Lots of room for improvement and new ideas

CURRENT EVENTS

Moving Targets

- Stretch Code: MA and more
- DOE Standards Updating
- ENERGY STAR HVAC specification Update
- CEE Specifications Revision
- Twenty Twenty, Twenty Two, Four Ten

ANNUAL SHIPMENTS & SALES

Table 1. Annual Sales of Commercial Packaged HVAC Units (RTUs) in the Northeast Region

Total Sales (# of Units) and Growth of Packaged Commercial HVAC Equipment		
Size (Tons)	Total Sales (Entire Region)	Total Sales of Qualifying (Entire Region)
<5	26,066	5,531
≥ 5 to < 11	12,591	2,053
≥ 11 to < 20	4,659	862.15
≥ 20 to ≤ 30	8,653	1,882
Total	51,969	10,328

TOTAL AND EFFICIENT SALES

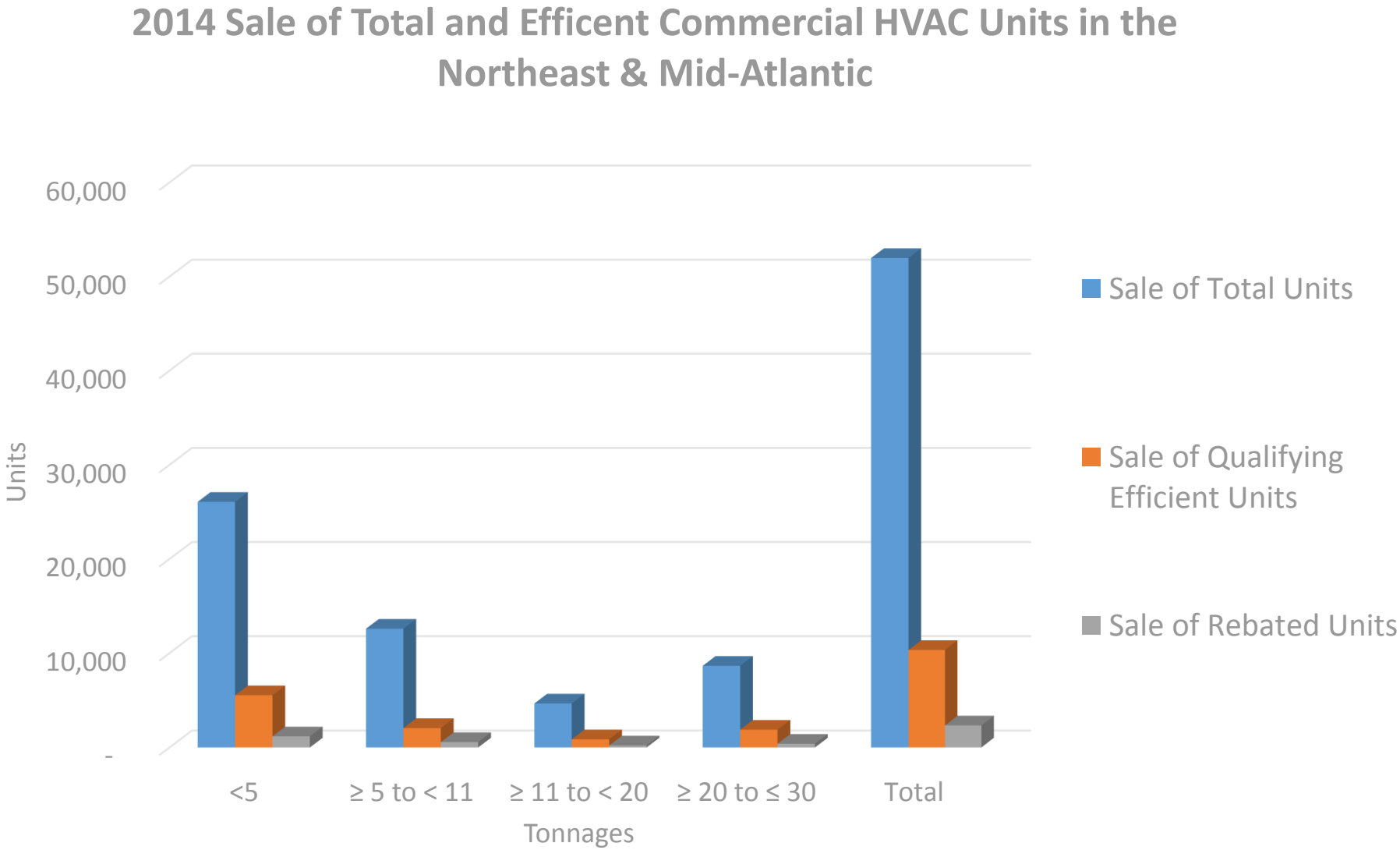


Table 3. 2014 Annual Sales of Commercial Packaged HVAC Units (RTUs) in the Northeast Region

ANNUAL SALES BY STATE

2014 Estimated Annual Sales of Commercial Packaged HVAC Units (RTUs) in the Northeast and Mid-Atlantic Region, by State						
State	Percent of Power Sales (In the region)	<5 ton	≥ 5 to < 11 ton	≥ 11 to < 20 ton	≥ 20 to ≤ 30 ton	Total
CT	5%	1,382	668	247	459	2,756
DC	3%	903	436	161	300	1,801
DE	2%	442	213	79	147	881
MA	7%	1,882	909	336	625	3,753
MD	12%	3,184	1,538	569	1,057	6,349
ME	2%	427	206	76	142	851
NH	2%	480	232	86	159	957
NJ	16%	4,063	1,963	726	1,349	8,100
NY	31%	8,113	3,919	1,450	2,693	16,175
PA	18%	4,585	2,215	819	1,522	9,141
RI	1%	390	188	70	129	777
VT	1%	214	104	38	71	427
						51,969

INSTALLED BASE

Table 2. Installed Base of Commercial Packaged HVAC Units (RTUs) in the Northeast Region

Total Number of Installed Packaged Commercial HVAC Units	
Size BTUH (Tons)	Total Installed Base (# Units)
<65K BTUH (<5.4 Tons)	408,711
65K ≤ BTUH <135K (5.4 ≤Tons <11.3)	197,427
135K ≤ BTUH <240K (11.3 ≤Tons <20)	73,047
240K ≤ BTUH <360K (20 ≤Tons <30)	135,687
Total	814,871

BUILDING OCCUPANCY & OWNERSHIP

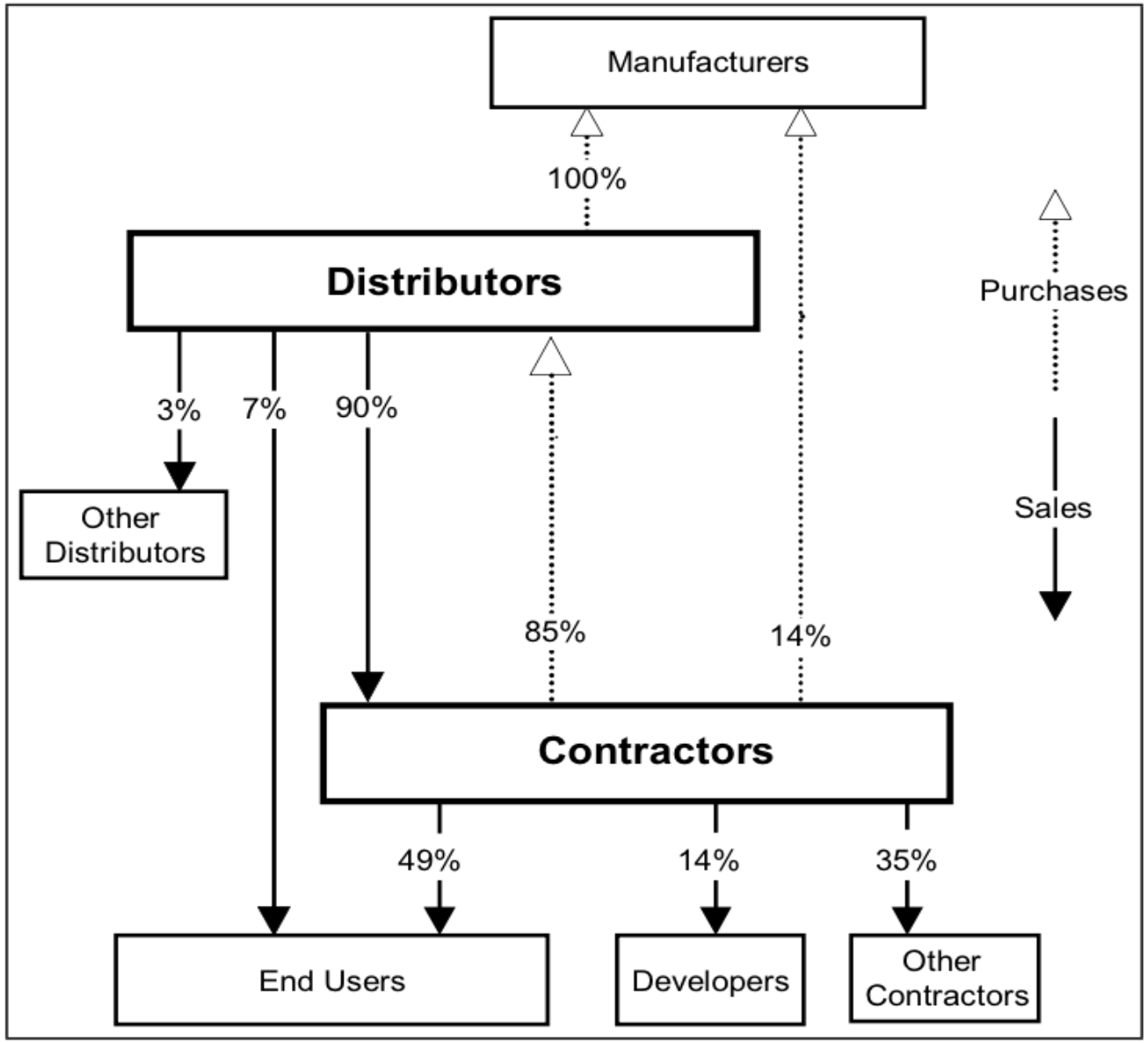
Table 5 Commercial Building Occupancy Characteristics in the Northeast Region

	Percentage of Commercial Buildings in the region
Owner Occupied	55%
Lease-Tenant Occupied	33%
Other or Unoccupied	12%

Table 6 Responsibility for Energy bills and Equipment decisions

	Responsible for Energy O&M Decisions	Decision Maker for Energy Equipment Purchase
Owner	85%	85%
Tenant	13%	12%
Other	2%	3%

SUPPLY CHANNELS



SAVINGS POTENTIAL- NEW SALES

Table 5. Estimated Savings Potential—Baseline to Tier 2 Annual Sales of RTUs in the Northeast Region

Size Range Tons	Total Sales (# of Units) 2014	Demand reduction (kW) per Unit	Total demand reduction; 100% Annual Sales (MW)	Energy Savings (kWh/yr) per Unit	Total energy savings; 100% Annual Sales (GWh/yr)
<5	26,066	0.33	8.53	249.05	6.49
≥ 5 to < 11	12,591	0.73	9.16	553.45	6.97
≥ 11 to < 20	4,659	1.67	7.76	1,268.33	5.91
≥ 20 to ≤ 30	8,653	2.31	19.99	1,758.18	15.21
Total	51,969	-	**45.44**	-	**34.58**

SAVINGS POTENTIAL- EARLY REPLACEMENT

- Replacing just 5% of installed base (~40,000 units) represents a greater savings opportunity
  - Energy- 56 MW in early replacement scenario versus 45 MW in new equipment scenario
  - Peak Demand- 43 GWh/yr in early replacement scenario versus 35 GWh/yr in new equipment scenario
- Efficiencies of existing units degrade each year

MARKET BARRIERS

- Financial Barriers
  - Access to capital
  - Hidden costs
    - Engineering
    - Architectural
- Business Cultural Barriers
  - Split Incentive: Owner—Occupant
  - Business priorities vs. cost savings
  - Fear of unknown
  - Aversion to construction disruption
  - Availability of qualifying equipment
  - Payback beyond perceived business longevity

NEEP ARTU PROJECT

Regional Strategy

1. Do better at what we do well
2. New Solutions Outside of Today's Mold

Today's Tactics

- Steer Customers' Selection to Efficient Options

What about Tomorrow?

- Examples?

NEEP ARTU PROJECT

Tomorrow's Tactics?

Example

- Today we facilitate selection by customer
  - Intervene to reduce cost
  - Make ARTUs more available
- How about for Tomorrow we:
  1. Recognize the customer just needs cool dry air. Doesn't really care to own equipment
  2. So. Engage someone else who gains from owning the iron box on the roof?

Thank you!

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Have a great day!

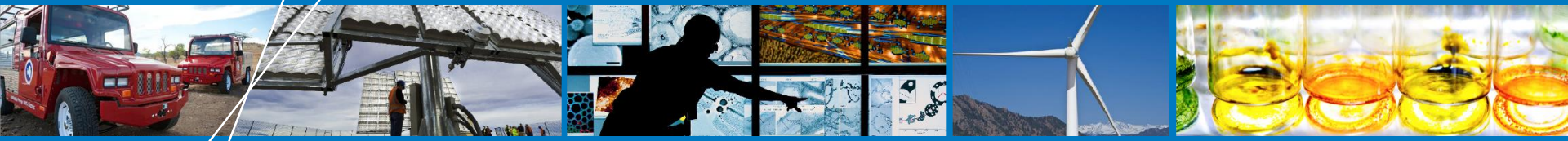
MARKET OPPORTUNITIES

- Region has high value for reducing peak demand through the Forward Capacity Market
  - 2015 Auction Clearing prices- $9.55 per kilowatt-month (kW-month)
- Advanced RTUs enable kW reductions via efficiency
- Connected RTUs enable kW reductions via Controls/Demand Response

Can these value streams be harnessed?

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

High-efficiency Rooftop Unit Technologies



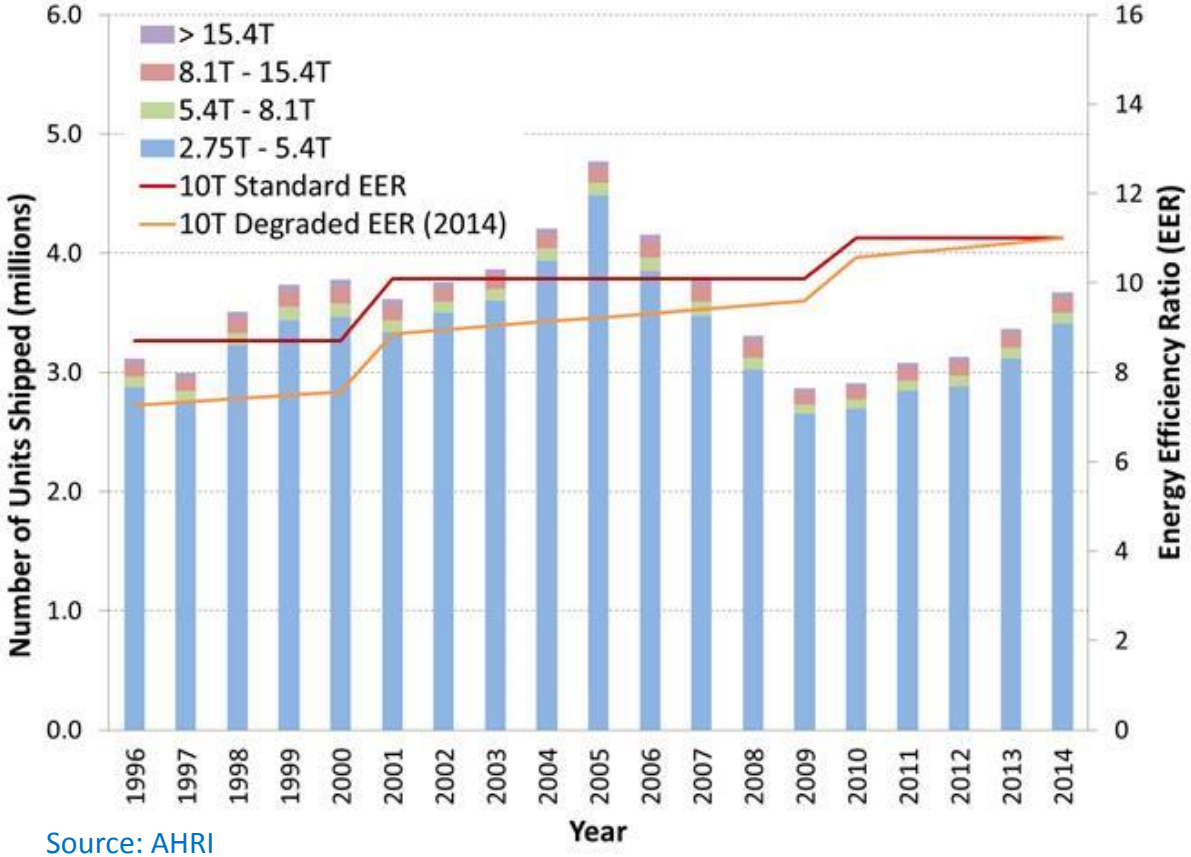
NEEP Workshop: Raise the Rooftop on HVAC Efficiency

June 15, 2015

Michael Deru

Why RTU's Are Important?

- RTUs cool over 60% of U.S. commercial building floor area
- Consume 4.3 Quads annually
- Large stock of 8 to 16 year old RTUs



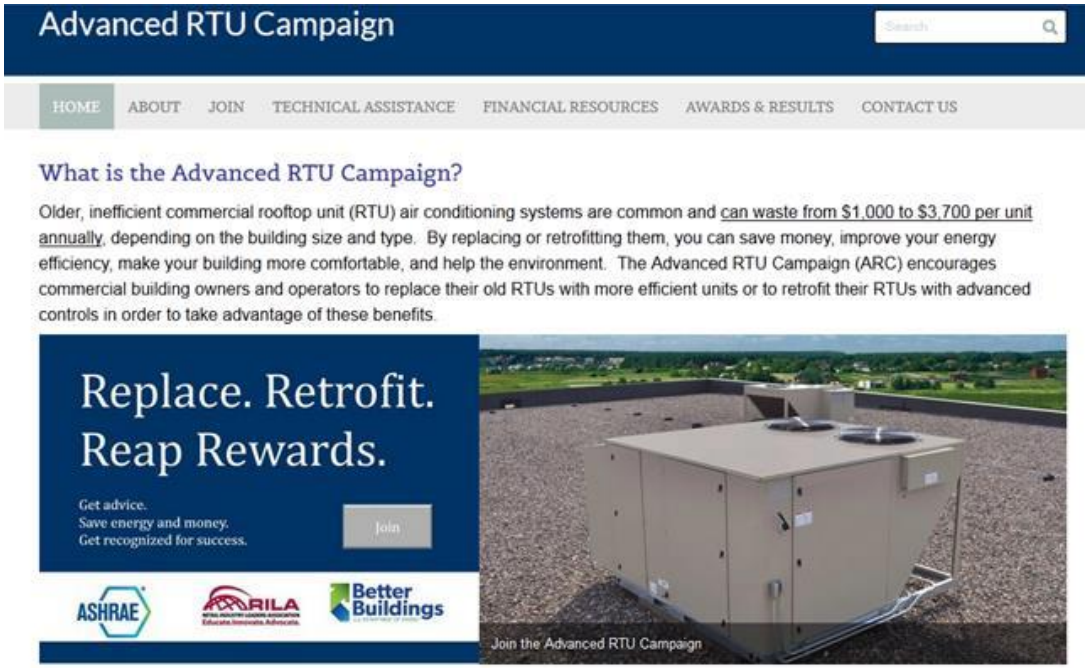
Source: AHRI

Credit: Michael Deru

DOE Advanced RTU Campaign

- **DOE/Industry partnership**
- **Promote high-efficiency RTU solutions:**
  - High-efficiency RTUs (CEE Tier 2 and above)
  - Advanced RTU control retrofits
  - Quality Installation and Quality Maintenance
- **Results (so far)**
  - 193 partners
  - 40,000 RTUs
  - 4 trillion BTUs
  - $37 million in annual savings

www.advancedrtu.org



ASHRAE

RILA
RETAIL INDUSTRY LEADERS ASSOCIATION
Educate.Collaborate.Advocate.

FEMP
Federal Energy Management Program

Better Buildings
U.S. DEPARTMENT OF ENERGY

Advanced RTU Campaign Resources

RTU Evaluation Process

Gather Information

- ❑ **Initial RTU Inventory:** RTU Inventory Spreadsheet
- ❑ **Preliminary Screening:** Decision Tree
- ❑ **Detailed Inventory:** RTU Inventory Spreadsheet
- ❑ **Visual-Based Field Evaluation:** RTU Field Evaluation Checklist

Analyze

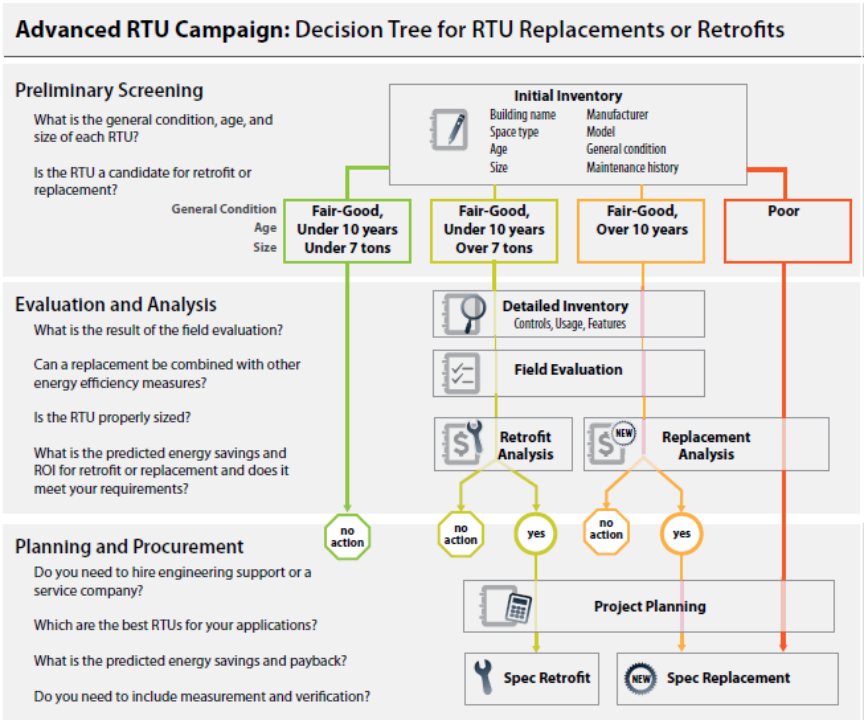
- ❑ **Analysis:** RTU Incentives Database, RTU Comparison Calculator, 179D DOE Calculator, RTU Sizing Guidance, and ARC Case Studies

Plan

- ❑ **Project Planning:** ARC Supporting Partners

Take Action

- ❑ **Procurement:** Procurement Specifications
- ❑ **Measurement and Verification (M&V):** M&V Guidance



Solutions

Increasing savings, complexity & cost

1. Multi-speed Supply Fans

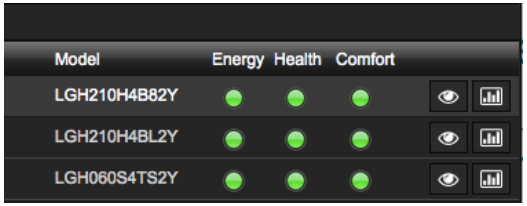
- VFDs
- ECMs
- High Efficiency Centrifugal Fans

Source: Yaskawa

Source: ebm-papst

2. Advanced control and connectivity

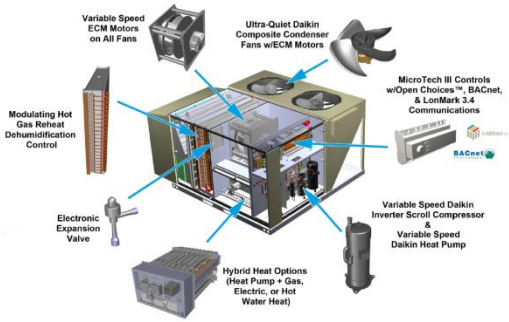
- Demand Control Ventilation (DCV)
- Predictive Economizing
- Web-based Control & Monitoring



Source: Transformative Wave

3. High Efficiency Cooling

- IEER > 18.0
- Improved temperature and humidity control



Source: Daikin

Defining RTU Efficiency

Efficiency Standards

- **AHRI 210/240 for RTU < 65,000 Btu/h – EER and SEER**
- **AHRI 340/360 for RTUs ≥ 65,000 Btu/h – EER and IEER**

Efficiency Metrics

- **Energy Efficiency Ratio (EER) –** performance at one point, usually at full load
- **Seasonal Energy Efficiency Ratio (SEER) –** More appropriate for residential applications
- **Integrated Energy Efficiency Ratio (IEER) –** weighted average of EERs

$$IEER = 0.02 \cdot EER_{100\%} + 0.617 \cdot EER_{75\%} + 0.238 \cdot EER_{50\%} + 0.125 \cdot EER_{25\%}$$

Historical RTU Efficiencies

Example: 10-ton RTU

90.1-1999	90.1-2001	90.1-2004	90.1-2010		CEE Tier 2		RTU Challenge	Best Available
EER	EER	EER	EER	IEER	EER	IEER	IEER	IEER
8.7	10.1	10.1	11	11.2	12	13.8	18	>20

Credit: Michael Deru

Credit: Ian Doebber

Historical RTU Efficiencies

Example: 10-ton RTU

90.1-1999	90.1-2001	90.1-2004	90.1-2010		CEE Tier 2		RTU Challenge	Best Available
EER	EER	EER	EER	IEER	EER	IEER	IEER	IEER
8.7	10.1	10.1	11	11.2	12	13.8	18	>20
7.3	8.7	9.0	10.5	← degraded performance in 2015				

Credit: Michael Deru

Credit: Ian Doebber

High Efficiency RTUs

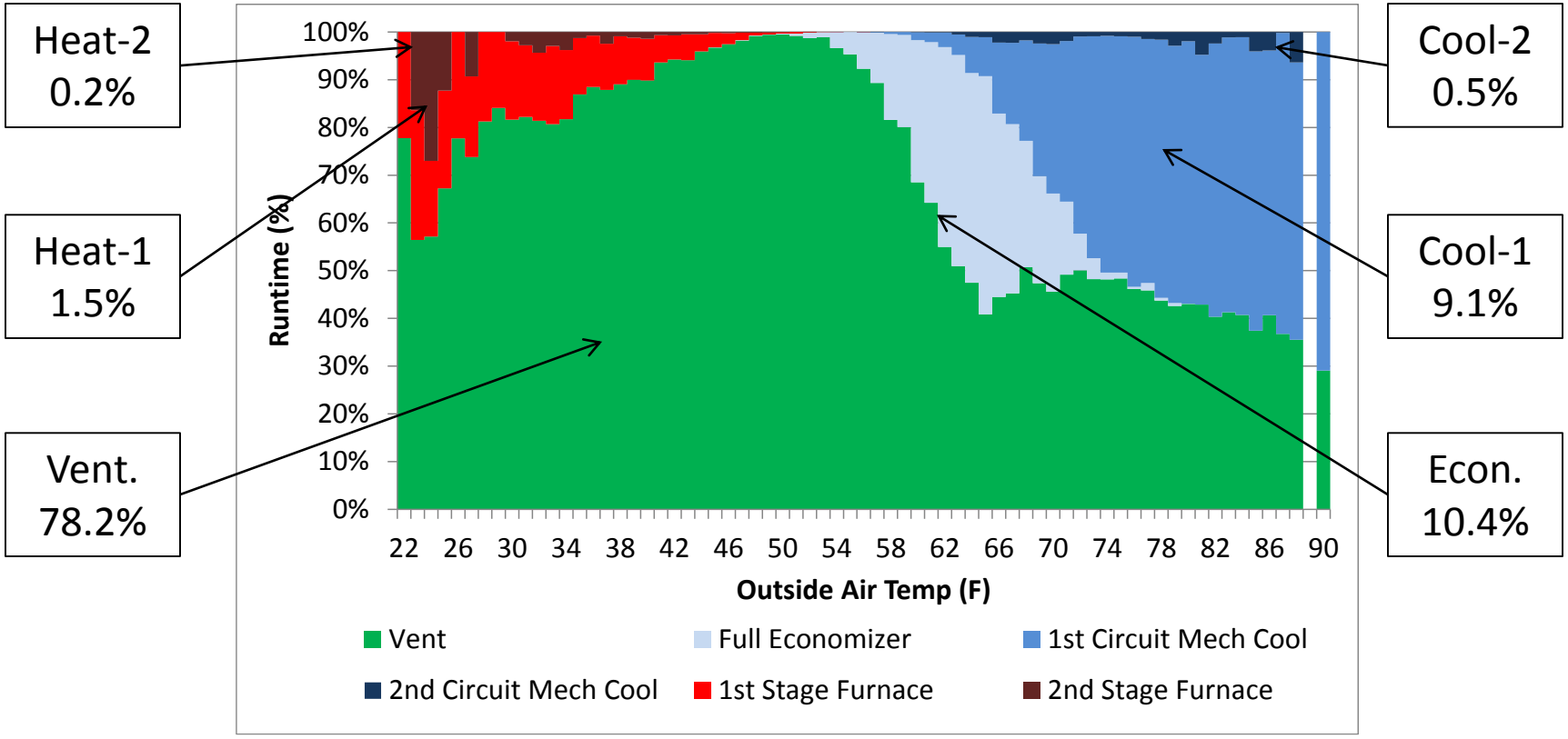
- **Two RTU models achieved the DOE's RTU Challenge (now five manufacturers)**
- **Part load efficiency ratings of IEER > 18.0**
  - Variable-speed supply fans
  - Variable-speed compressors or additional cooling stages
  - ECMs for condenser fans
  - Embedded automated fault detection and diagnostics
  - Low leakage OA dampers
- **NREL's Hawaii field demonstration of a Daikin Rebel showed 35-40% savings to a 90.1-2010 baseline**

Source: Daikin

Source: Carrier

RTU Operation

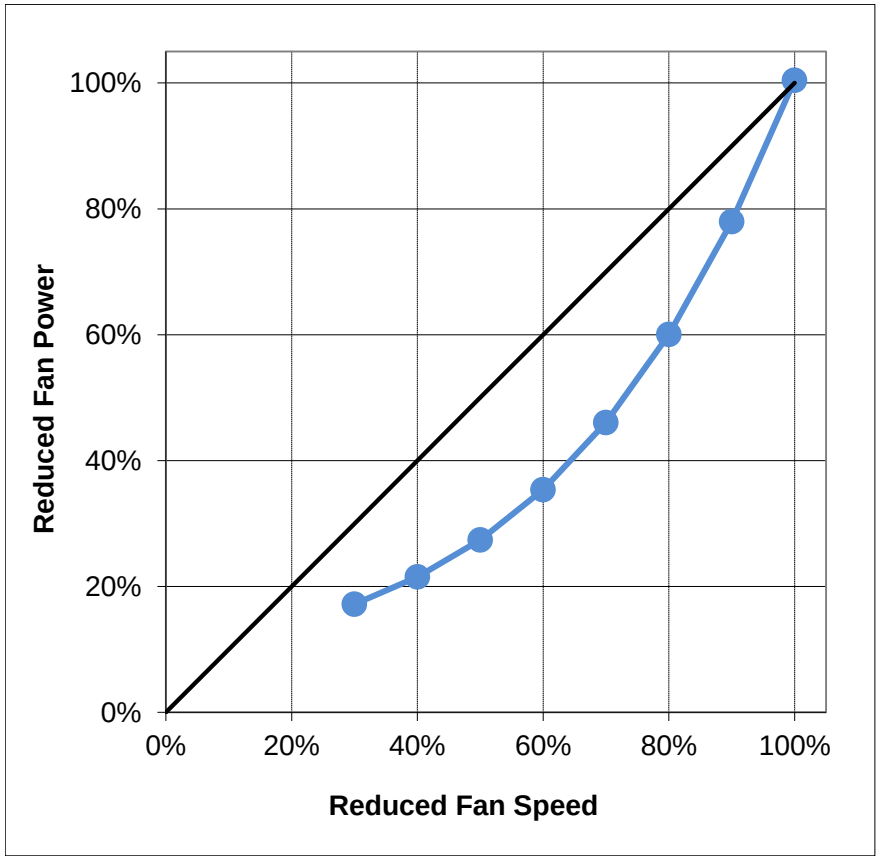
Aggregated operational modes across five 10-ton RTUs serving a dry-goods retailer near Seattle for 1 year (monitored data)



Source: Transformative Wave

Multi-Speed Supply Fans

- **Fan laws result in greater energy savings**



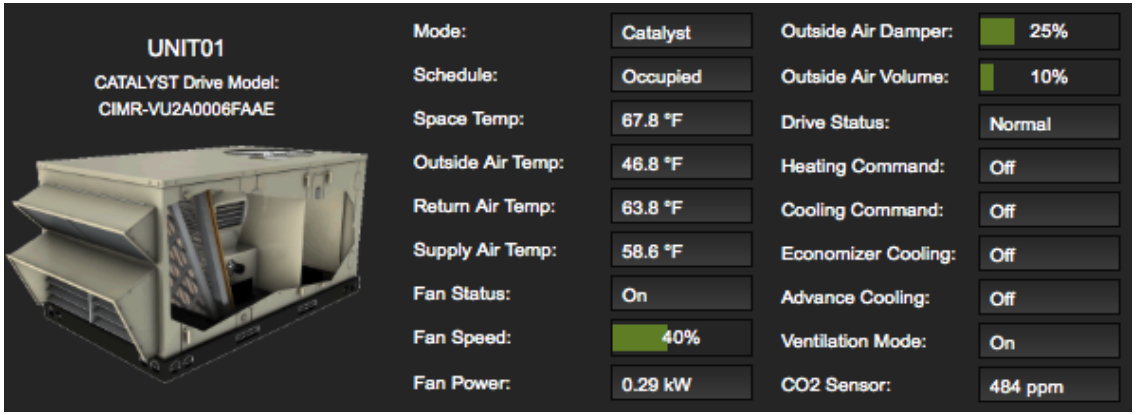
Source: NREL

Multi-speed supply fan power for 5 10—ton RTUs serving dry-goods retailer near Seattle

	Reduced Speed	Reduced Power	Fan Power for 5 RTUs
Econ.	100%	100%	7.5 kW
Heat-2	100%	100%	7.5 kW
Cool-2	90%	78%	5.8 kW
Heat-1	90%	78%	5.8 kW
Cool-1	70%	46%	3.4 kW
Vent	40%	22%	1.6 kW

Advanced control and connectivity

- **Improper control and maintenance issues are common for RTUs. Examples are:**
  - OA damper fixed open or closed => no economizing, no DCV
  - Compressor failure due to short cycling
- **Connectivity provides remote control and monitoring for automated fault detection and diagnostics**
- **Automated fault detection and diagnostics (AFDD) enables decision makers to be proactive rather than reactive**



Source: Transformative Wave

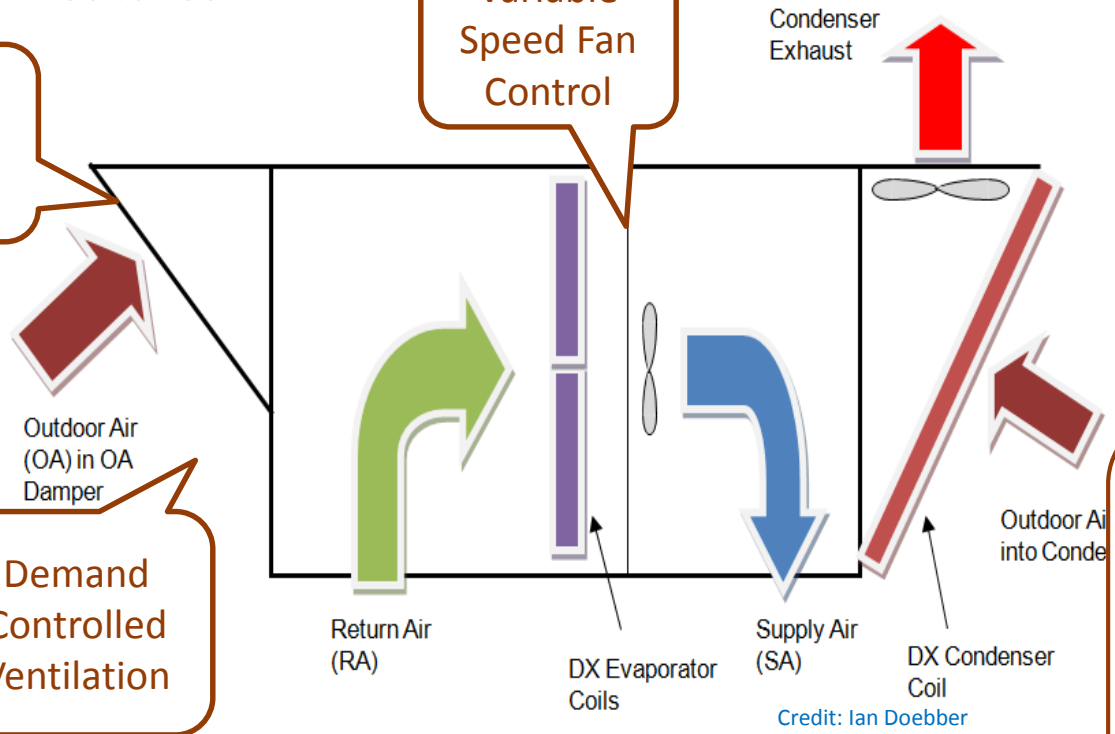
What are RTU Retrofit Controls?

Common Features

Integrated Economizer Control

Variable Speed Fan Control

Demand Controlled Ventilation



Credit: Ian Doebber

Other Potential Features

- FDD and Remote Monitoring
- Variable Speed Condenser Fan Control
- Compressor control

Best Applications for Control Retrofits

- **Existing RTUs**
  - constant speed supply fan operation
  - greater than 7.5 tons (evaporator fan ≥ 2 hp)
  - at least 5 years of remaining life
- **Existing buildings**
  - more than 50 hours per week of operation
  - high electricity rates (≥ 0.10 $/kWh blended rate)
  - located in a climate with significant swing seasons (more time in first stage cooling or ventilation only)

Other RTU Technologies

- **Energy Recovery Ventilator (ERV)**
  - Reduces heating and cooling loads – most effective in heating climates
  - Must have exhaust or relief air at RTU
  - Increase in fan energy – by pass when not appropriate for heat recovery
- **Condensing gas furnace**
  - Increase burner efficiency to > 90%
  - Best for large RTUs that have high runtime

Thank You

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VEIC/
Efficiency Vermont

NEEP *"Raise the Roof" on HVAC Efficiency*

6/15/2015
Schneider Electric
Andover, MA

Vermont Energy Investment Corporation

About VEIC

- Over 25 years of reducing economic and environmental costs of energy
- Comprehensive focus and results
- Energy efficiency, renewable energy, and transportation
- National and international consulting and implementation
- Program design, planning and evaluation; policy, advocacy and research
- Clients: government agencies, regulators, utilities, foundations, and advocates

Efficiency Vermont

EFFICIENCY$MART

DC SUSTAINABLE ENERGY UTILITY

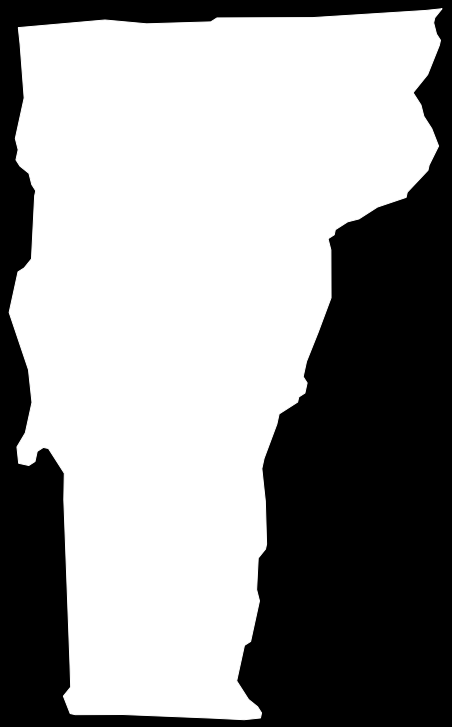
veic.org

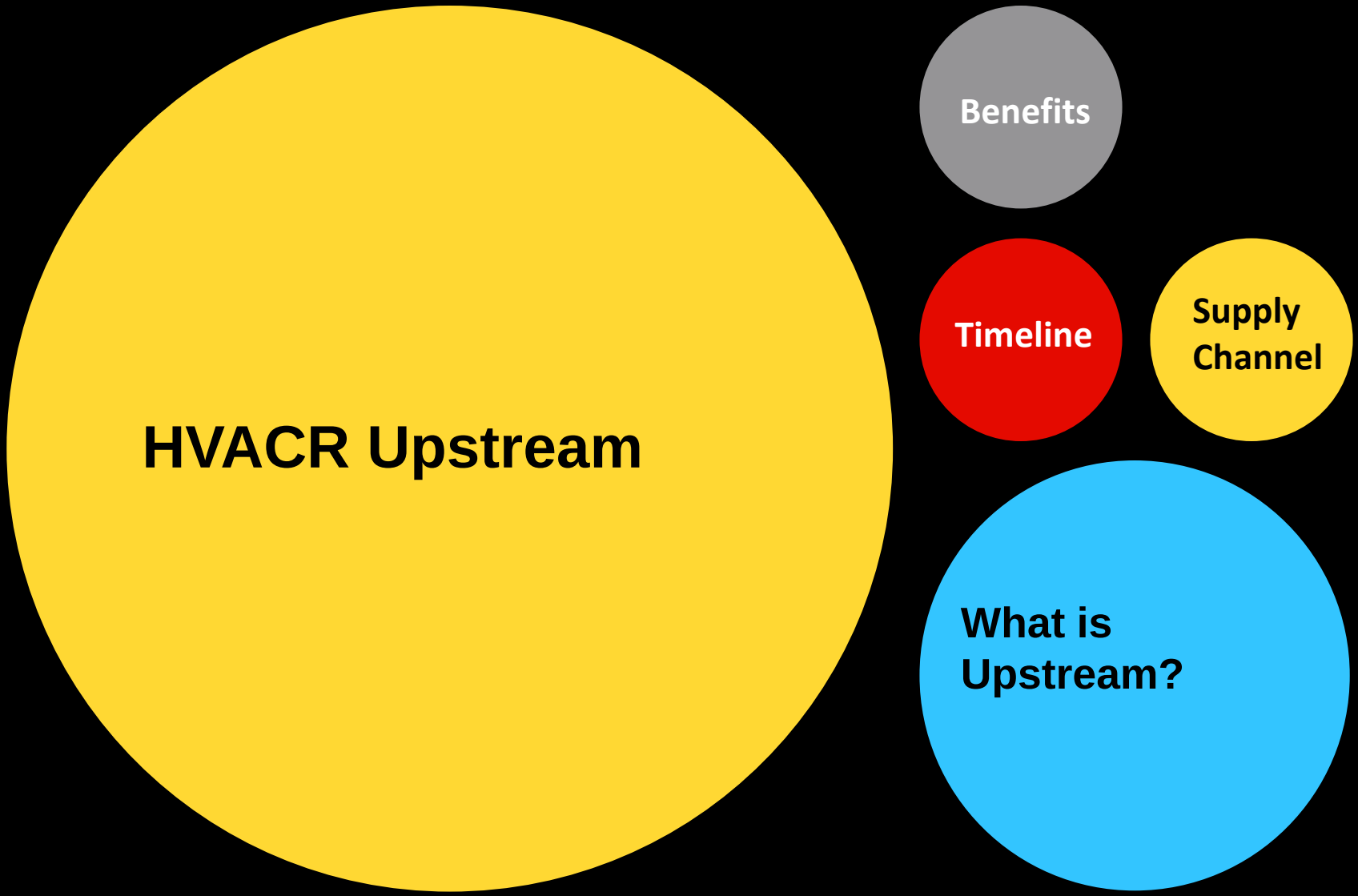
Vermont

Vermont Energy Investment Corporation

State Demographics

- Population (2011): 626,431
- Seven cities larger than 10,000 residents
- Burlington: largest city at 42,500 residents (2010)
- Chittenden: largest county by population at 156,545 residents (2010)





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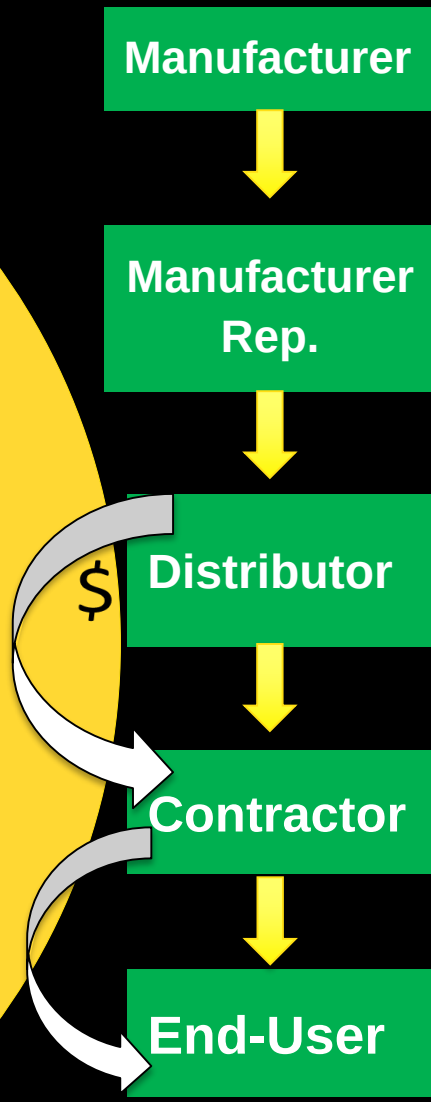
What is an *Upstream* program?

Rebate paid to distributor at wholesale level;
Buy-down* of efficient equipment at distributor's *point of sale

Distributor sells efficient equipment to Contractor or *End-User w/ an*
Instant Rebate* - *new, lower price

Pass-thru of rebate to end-user



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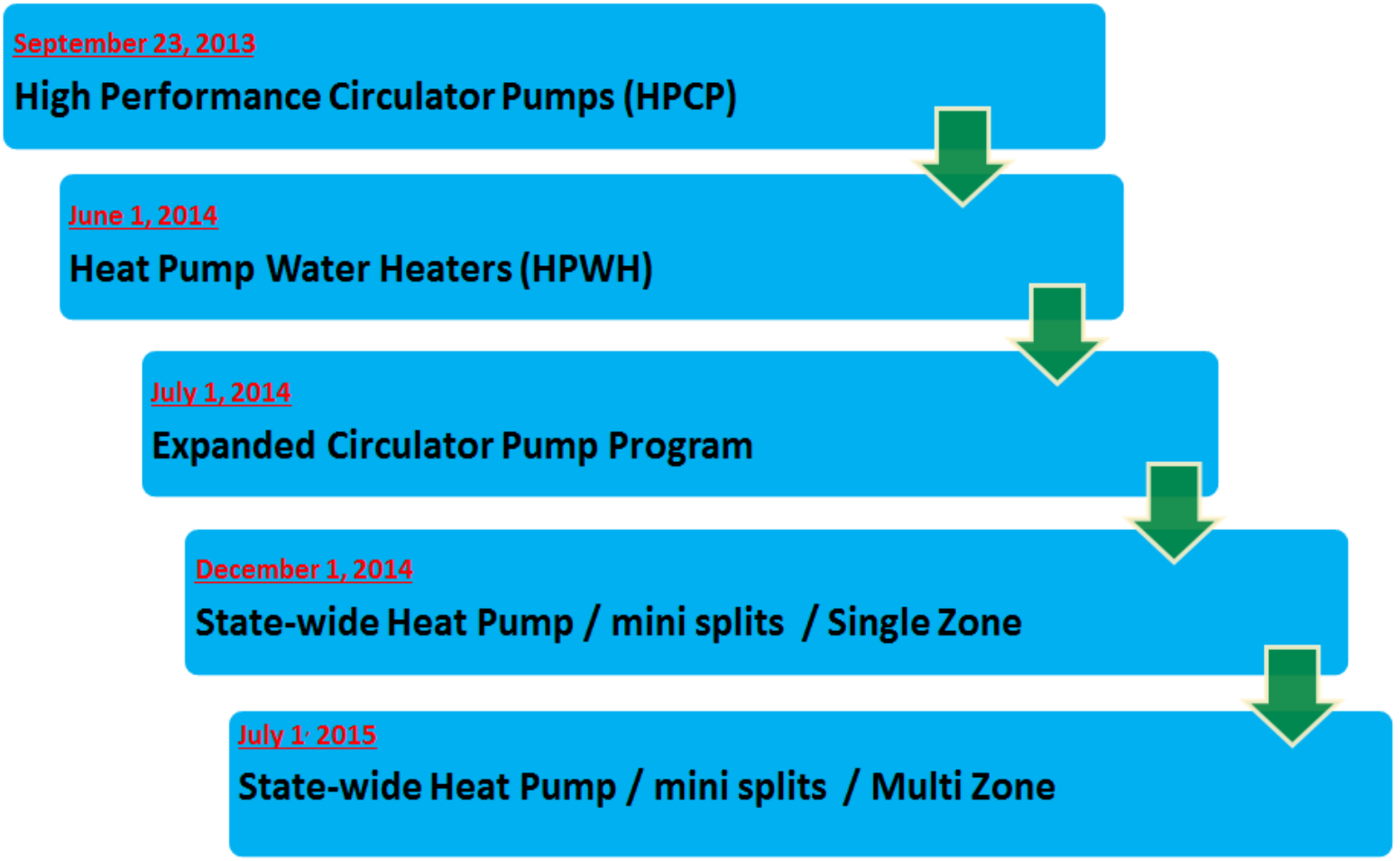
Benefits of Upstream

1. Promotes increased availability, sales & installation of efficient equipment
2. Influences distributor stocking practices
3. Diminishes financial barriers to contractors & end-users
4. Facilitates Market Transformation

Upstream Sales Submission Process

1. Distributor sells qualifying Equipment
   - Minimum customer contribution
     - Prevents market pricing deterioration!!
   - Distributor obtains minimum project information from purchaser at point of sale
2. Distributor submits sales to Efficiency Vermont *(EVT)* on monthly basis
3. After sales verification, EVT sends rebate check to Distributor
4. Metering and random post-installation inspection

Efficiency Vermont's HVACR Upstream Timeline



Participating Efficiency Vermont Upstream / **Instant Rebate** HVACR **Distributors;** *14 Distributors covering 44 Locations !!!!!*

F.W. WEBB COMPANY

10 Locations

Barre
Bennington
Brattleboro
Rutland
Springfield
St Albans
St Johnsbury
Williston
Keene (NH)
Lebanon (NH)

THE GRANITE GROUP
SOLID AS OUR NAME

7 Locations

Barre
Burlington (2)
Newport
Rutland
Keene (NH)
Lebanon (NH)

Blodgett SUPPLY

5 Locations

Montpelier
Newport
Rutland
White River
Williston

Sid Harvey's

2 Locations

Rutland
Williston

UNITED REFRIGERATION INC.

Rutland

R.E. MICHEL COMPANY, LLC

2 Locations

Williston
Glens Falls, NY

Appalachian Supply, Inc.

2 Locations

St Johnsbury
Littleton, NH

RJ MURRAY
SINCE 1933
H.V.A.C. WHOLESALE DISTRIBUTORS

Williston

BellSimons COMPANIES
HVAC · REFRIGERATION · PLUMBING

3 Locations

South Burlington
Pittsfield (MA)
Springfield (MA)

CENTRAL SUPPLY

2 Locations

Lebanon (NH)
Woodsville (NH)

HOMANS ASSOCIATES

2 Locations

Williston
Albany, NY

Hulbert Supply

2 Locations

Brandon
Burlington

VP Supply Corp

2 Locations

Albany (NY)
Plattsburgh (NY)

PSG PREMIER SUPPLY GROUP

3 Locations

Brattleboro
Greenfield (MA)
Lebanon (NH)

Current Upstream Participating Manufacturers

The new degree of comfort.™

HVACR
Upstream Approach

Vermont Energy Investment Corporation

Best Practice Guide for Working w/ Supply Channel

- ❑ Required VEIC/EVT *101 /201 Training*
- ❑ *Sales, Marketing, Training, and Technology* RFI for manufacturers, manufacturer reps & distributors
- ❑ Point of sale marketing materials
- ❑ Cooperative marketing plan and materials
- ❑ Qualified Product List *(QPL)*
- ❑ Participation agreement with standard terms and conditions
- ❑ Communication plan for internal and external stakeholders
- ❑ Data tracking form
- ❑ Incentive schedule
- ❑ Evaluation plan and reporting
- ❑ Plan for future program changes or sunsetting measures

VEIC/Efficiency Vermont

101 / 201 Training

Vermont Energy Investment Corporation

Sample Agenda: VEIC / Efficiency VT *101 / 201* Mtg

Time / End-time		Topic	Presenter
10:30a		**START MEETING**	**GROUP**
10	(10:40a)	Introductions / Review Agenda	GROUP
20	(11a)	Company ABC, LLC Overview	Company ABC TEAM
20	(11:20a)	Vermont Energy Investment Corporation/Efficiency Vermont Overview	Howard/Jake/Meghan
20	(11:40a)	HVACR Programs	Jake
20	(12)	HVACR Upstream Programs	Howard
10	(12:10p)	ASHP Overview & Timeline to Launch	Howard/Jake
20	(12:30p)	Eligibility, Performance Request, Data Collection	Jake
45	**(1:15p)**	**LUNCH**	**GROUP**
30	(1:45p)	SMTT: Training & Sales/Marketing RFI/ *Efficiency Excellence Network*	Howard/Jake/Meghan
10	(1:55p)	HVACR Sales & Marketing	Howard
15	(2:10p)	Questions	GROUP
20	**(2:30p)**	Action Items & Next Steps	GROUP

Sales, Marketing, Training & Technology *(SMTT)*

RFI

- **Manufacturers**
- **Manufacturer reps**
- **Distributors**

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SMTT RFI

- **Sales:** develop Sales Strategies
- **Marketing:** joint Marketing programs, leverage core competencies
- **Training:** develop education/training approach w/ Strategic Partners
- **Technology:** Impact to Supply Channel; inventory displacement due to new eligibility, innovation, etc; negotiate w/ Manufacturers for NO Penalties to Distributor Partners

SMTT Examples

Joint Sales & Marketing Efforts

- 1st Understand with Upstream……..
  - The Challenge: Communicating the end-use benefits of an upstream program to contractors & customers
  - The Solution: Visual materials
    - Efficiency Vermont Marketing worked with HVACR Manufacturers, Manufacturer Reps & Distributors

Taco SMTT Plan: Shelf Header & Poster

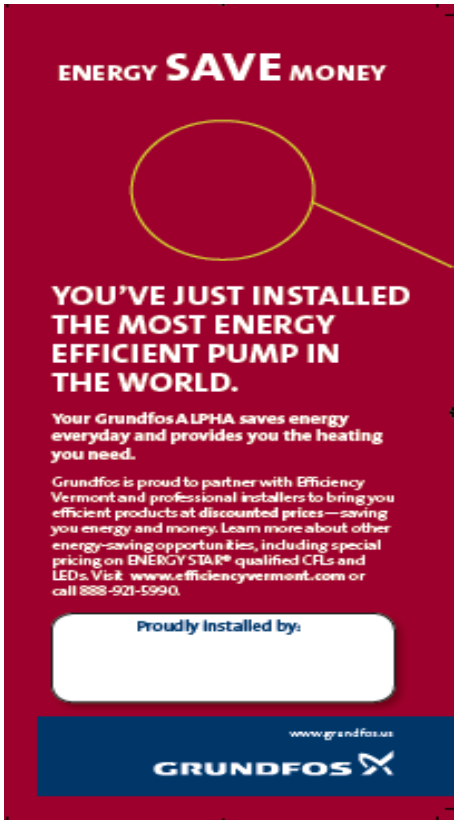
Training & Education – Trade / Application Cont…

- Manufacturer Factory Trainings
  1. Distributor #1– Scheduled 8/21st & 22nd
  2. Distributor #2– Scheduled 8/27th & 28th
  3. Distributor #3– *TBD*
  4. Distributor #4– *TBD*

Joint Marketing Efforts

Box sticker – Efficiency Vermont recognition on the distributor's shelf

HPCP Joint Marketing Efforts



Mediums of Communication and Education

Type/Target Audience	Efficiency Vermont Employees	Wholesale Executive & Management Teams	Wholesale Salespeople – Inside & Outside	Trade Installers & Service Contractors	End Users/ Property Owners	Other
Local trade events	X		x	x		
Distributor events	X		x	x		
Printed literature	x	x	x	x	x	
Print advertising						
Email marketing	X		x	x		
POS marketing			x	x		
Distributor publications			x	x		
Other:	x	x	x	x		

SMTT Strategic Plans

6. Participating Distributors

a) For each of the below Distributors and Locations, please mark a **(x)** where appropriate and also summarize the Sales and Marketing Activities in the last column

Distributor	Branch	Your respective HPWH Products are the Primary HPWH Manufacturer	Your respective HPWH Products are the Secondary HPWH Manufacturer	Other	Project Related	Sales and Marketing Activities
BellSimons	South Burlington					
	Pittsfield, MA					
	Springfield, MA					
Blodgett Supply	Montpelier					
	Newport					
	White River Jct.					
	Williston					
Central Supply	Lebanon, NH					
	Woodsville, NH					
FW Webb	Barre	X				Webinar for managers Personal visits Counter Training Plumber Training HVAC Training Counter display with net price shown
	Bennington	X				
	Brattleboro	X				
	Rutland	X				
	Springfield	X				
	St. Albans	X				
	St. Johnsbury	X				
	Williston	X				
	Keene, NH	X				
	Lebanon, NH	X				

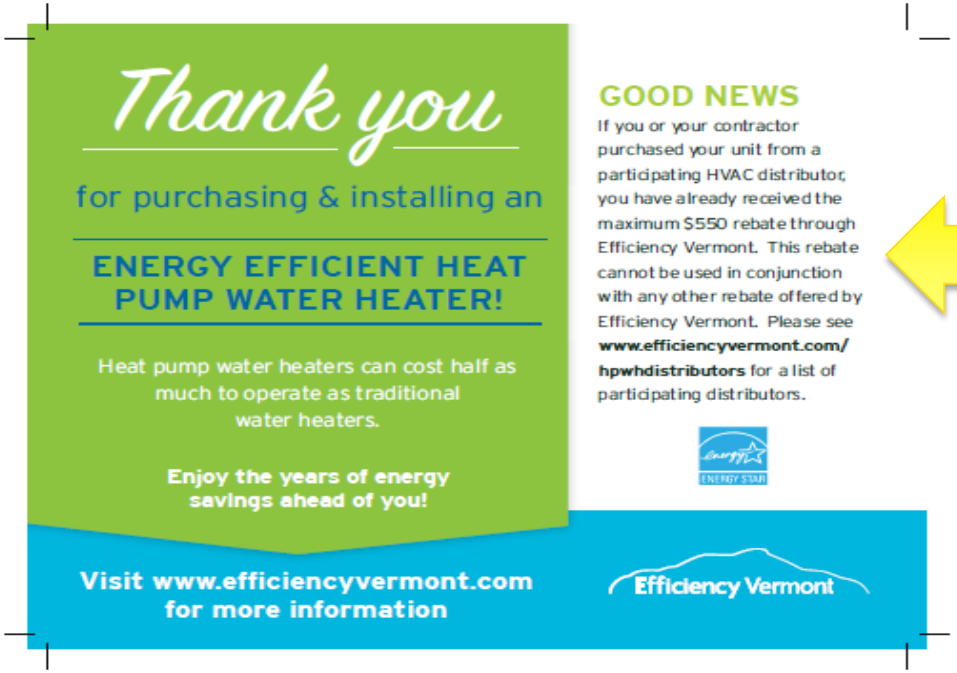
SMTT Supply Channel Feedback

- ***"You have the most comprehensive program I have seen for impacting the marketplace and we are proud to be asked to be a partner."*** **- Distributor #1, *VP-Residential Sales***

- ***"We, as manufacturers, look to you for guidance in what equipment to develop and bring to market. Efficiency Vermont is really a national leader on this."* – Manufacturer #1, Regional Sales Manager, Ductless Split Systems**

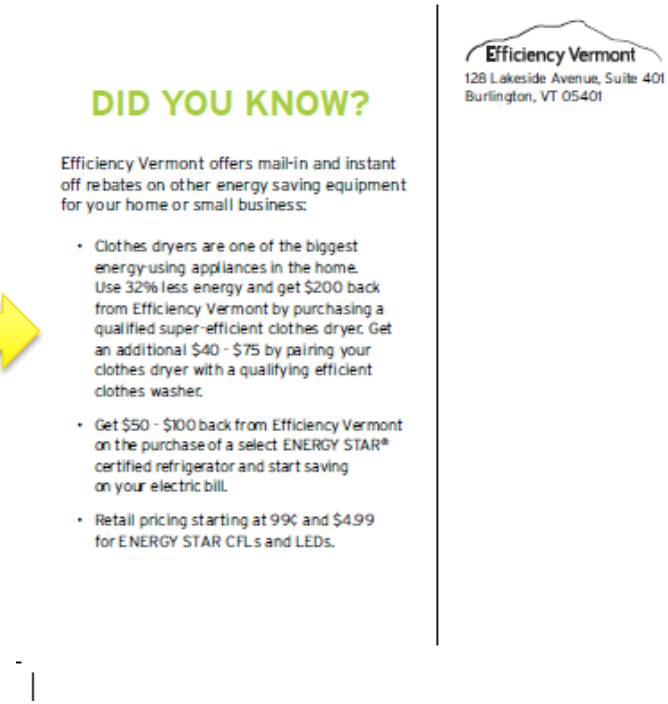
- ***"VEIC team, I want to thank you all for a great meeting and looking forward to working with each of you. I am reviewing the preso and getting together the information you need. Thank you again for your time and information shared and working to get what you need by this week." Kind regards, Manufacturer #3, Division Sales Manager***

Vermont
Energy Investment
Corporation



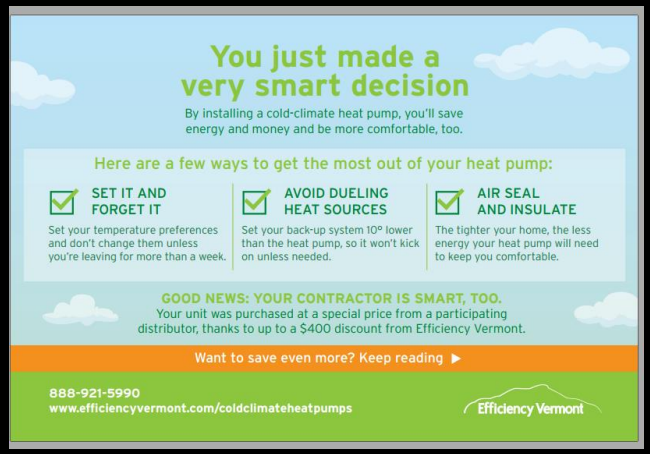
Thank you!
Cross-Marketing
Postcard Mailer Campaign

Clothes Dryers
ENERGY STAR Refrigerators
$.99 & $4.99 ENERGY STAR CFLs/LEDs

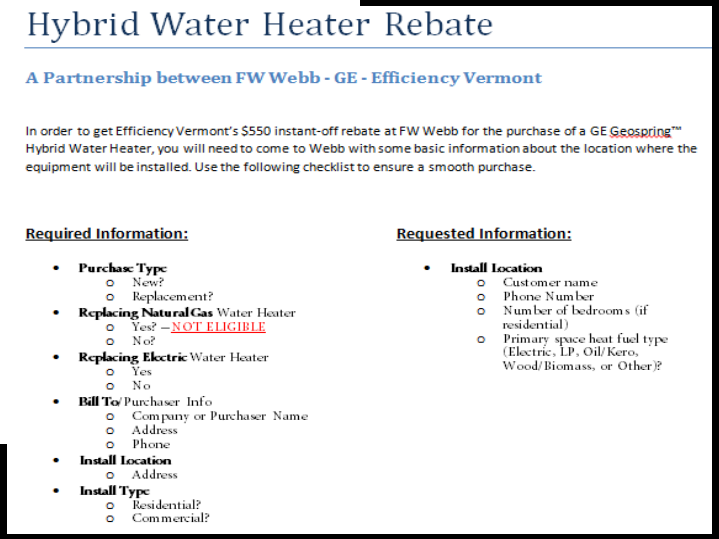



High-Efficiency HVACR Products for the price of conventional
Funded by Efficiency Vermont
Find a full list of qualifying HVACR products and discounts at:
www.efficiencyvermont.com/upstream
Or call 888-921-5990 for more information.
Discounts effective 7/1/2015 through 12/31/2015
Efficiency Vermont
Efficiency Vermont
Everybody wins
Now you can provide the energy-efficient HVACR products your customers are looking for—at deep discounts.
End-use customers will enjoy greater comfort and lower bills, contractors and distributors will increase sales and customer satisfaction, and all of Vermont benefits through lower energy demand and related costs.
How does it work?
Efficiency Vermont subsidizes the cost of qualifying efficient products by paying rebates directly to distributors, who pass the savings on to installers, who then pass these savings on to end-users.
Contractors purchase qualifying products, provide end-user information, and receive in-store discount.
Call 888-921-5990 for more information.
Efficiency Vermont
COLD-CLIMATE HEAT PUMPS
UP TO A $400 DISCOUNT
Cold-climate heat pumps heat and cool homes at a fraction of the cost of conventional heating and cooling. By moving heat rather than generating it, heat pumps typically consume much less energy than traditional electric, propane, or oil heating systems. Depending on the system they offset, heat pumps can save between $5,000 and $25,000 over the lifetime of the unit.
Visit www.efficiencyvermont.com/cchppartners for full product list, participating distributors, and more information.
HEAT PUMP WATER HEATERS
$400 DISCOUNT*
Heat pump water heaters can cost less than half as much to operate compared to traditional electric resistance water heaters, and save as much as $4,900 over the lifetime of the unit. In addition to providing domestic hot water, heat pump water heaters also dehumidify the space around them.
Visit www.efficiencyvermont.com/hpwhpartners for full product list, participating distributors, and more information.
Not available for natural gas conversions. As of January 1, 2016, Efficiency Vermont will no longer provide a discount for Heat Pump Water Heaters that are 55 gallons or larger.
HIGH-PERFORMANCE CIRCULATOR PUMPS
DISCOUNTS VARY BY PRODUCT
Circulator pumps use advanced controls and brushless motor technology to optimize pump operation, resulting in lower energy use—up to 85%—compared to conventional circulator pumps.
Visit www.efficiencyvermont.com/pumps for full product list, participating distributors, specific discounts, and more.


Thank you
for purchasing & installing an
ENERGY EFFICIENT HEAT PUMP WATER HEATER!
Enjoy the years of energy savings ahead of you!
GOOD NEWS
If you or your contractor purchased your unit from a participating HVAC distributor, you have already received the maximum $400 rebate through Efficiency Vermont. This rebate cannot be used in conjunction with any other rebate offered by Efficiency Vermont. Please see www.efficiencyvermont.com/hpwhdistributors for a list of participating distributors.
Visit www.efficiencyvermont.com for more information
Efficiency Vermont


You just made a very smart decision
By installing a cold-climate heat pump, you'll save energy and money and be more comfortable, too.
Here are a few ways to get the most out of your heat pump:
SET IT AND FORGET IT
Set your temperature preferences and don't change them unless you're leaving for more than a week.
AVOID DUELING HEAT SOURCES
Set your back-up system 10° lower than the heat pump, so it won't kick on unless needed.
AIR SEAL AND INSULATE
The tighter your home, the less energy your heat pump will need to keep you comfortable.
GOOD NEWS: YOUR CONTRACTOR IS SMART, TOO.
Your unit was purchased at a special price from a participating distributor, thanks to up to a $400 discount from Efficiency Vermont.
Want to save even more? Keep reading ▶
888-921-5990
www.efficiencyvermont.com/coldclimateheatpumps
Efficiency Vermont


More smart ways to save, brought to you by Efficiency Vermont:
HEAT PUMP WATER HEATERS
$400 OFF REGULAR PRICE
HIGH PERFORMANCE CIRCULATOR PUMPS
DISCOUNTS VARY BY MODEL
CLOTHES DRYERS
UP TO $400 CASH BACK
REFRIGERATORS
UP TO $75 CASH BACK
Find information about these deals and more by visiting www.efficiencyvermont.com or call 888-921-5990.
Efficiency Vermont
128 Lakeside Avenue, Suite 401
Burlington, VT 05401


Hybrid Water Heater Rebate
A Partnership between FW Webb - GE - Efficiency Vermont
In order to get Efficiency Vermont's $550 instant-off rebate at FW Webb for the purchase of a GE Geospring™ Hybrid Water Heater, you will need to come to Webb with some basic information about the location where the equipment will be installed. Use the following checklist to ensure a smooth purchase.
Required Information:
Purchase Type
New?
Replacement?
Replacing Natural Gas Water Heater
Yes? – NOT ELIGIBLE
No?
Replacing Electric Water Heater
Yes
No
Bill To/Purchaser Info
Company or Purchaser Name
Address
Phone
Install Location
Address
Install Type
Residential?
Commercial?
Requested Information:
Install Location
Customer name
Phone Number
Number of bedrooms (if residential)
Primary space heat fuel type (Electric, LP, Oil/Kero, Wood/Biomass, or Other)?

Upstream Website

Participating Distributors

QPLs

Vermont Energy Investment Corporation

Upstream Web Page

- efficiencyvermont.com/HVACR upstream
- Steps for program participation *(for contractors)*
- Eligible Products List
- Participating Distributors List
- FAQs

HPWH Web Page

QPL by Manufacturer
(& SIZE)

User-friendly w/ Sorts & only ENERGY STAR Manufactures in the HPWH Upstream Program

Logos & Hyperlinks

Heat Pump Water Heater
Qualifying Products (Sorted by Manufacturer)*
Effective 7/2/2014; Updated 4/14/2015

Efficiency Vermont

* *Eligible for Efficiency Vermont's $550 Instant Off Invoice Rebate. Rebate offer only available to electric utility customers in Vermont who do not currently have a natural gas water heater & customer information required at point of purchase.*

www.americanwaterheater.com | www.aosmith.com | www.ge.com | www.rheem.com | www.statewaterheaters.com

Manufacturer	Model Number	Model Name	Energy Factor	First Hour Rating	Size (in Gallons)	Distributor(s)	Product Incentive
American www.americanwaterheater.com	HPE10260H045DV 102	Hybrid Electric	2.33	68	60	Central Supply	$550
	HPE10280H045DV 102		2.33	84	80		$550
	HPSE10280H045DV		2.72	91	80		$550
	HPSE10266H045DV		2.74	81	66		$550
	HPSE10250H045DV 100		2.75	67	50		$550
AO Smith www.aosmith.com	PHPT 60 102	Voltex®	2.33	68	60	Hulbert Supply	$550
	PHPT 80 102		2.33	84	80		$550
	SHPT 80		2.72	91	80		$550
	SHPT 66		2.74	81	66		$550
	SHPT 50 100		2.75	67	50		$550
GE www.ge.com	GEH50DEED	GeoSpring™	2.4	65	50	F.W. Webb RE Michel	$550
	GEH50DEEJSR		2.9	67	50		$550
	GEH50DFEJSC		3.1	67	50		$550
	GEH80DFEJSR		2.9	92	80		$550
	GEH80DEEJSC		3.1	92	80		$550
Rheem www.rheem.com	H85ORH	Professional Prestige™	2.45	57	50	Blodgett Supply Premier Supply Group Sid Harvey's	$550
State www.statewaterheaters.com	EPX 60 DHPT 102	Premier®	2.33	68	60	The Granite Group VP Supply Corporation	$550
	EPX 80 DHPT 102		2.33	84	80		$550
	SPX 50 DHPT 100		2.75	67	50		$550
	SPX 66 DHPT		2.74	81	66		$550
	SPX 80 DHPT		2.72	91	80		$550
Steibel Eltron www.stiebel-eltron-use.com	Accelera 300/WHP300	Accelera® 300	2.73	76	79.5	*Check with the Listed Participating HPWH Distributors for Inventory*	$550

For more information, visit: www.efficiencyvermont.com/hpwhpartners

Participating Distributors:

Blodgett Supply www.blodgettsupply.com | Central Supply www.plumberssupplyco.com | F.W. Webb Company www.fwwebb.com | The Granite Group www.thegranitegroup.com | Hulbert Supply www.hulbertsupply.com

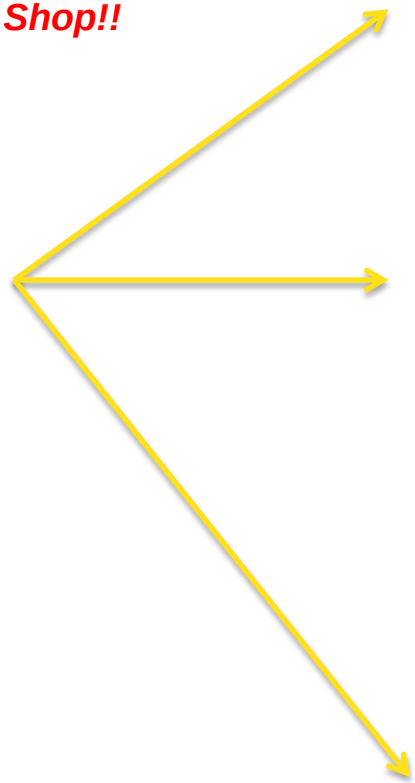
PSG www.premiersupplygroup.com | R.E. Michel Company, LLC www.remichel.com | Sid Harvey's www.sidharvey.com | VP Supply Corp www.vpsupply.com

HPWH Web Page

Participating Distributor List

User-friendly
1-Stop Shop!!

Logos & Hyperlinks



Heat Pump Water Heater

Participating Distributors

Effective 7/2/2014; Updated 4/15/2015

Distributor Name	Phone	City	State	HPWH Manufacturer
Blodgett Supply www.blodgettsupply.com	802-229-5105	Montpelier	VT	Rheem www.rheem.com
	802-334-0151	Newport	VT	
	802-775-3342	Rutland	VT	
	802-295-3143	White River Junction	VT	
	802-864-9831	Williston	VT	
Central Supply www.plumberssupplyco.com	603-448-5116	Lebanon	NH	American www.americanwaterheater.com
	603-747-2328	Woodsville	NH	
F.W. Webb Company www.fwwebb.com	802-479-3373	Barre	VT	GE www.ge.com
	802-447-2312	Bennington	VT	
	802-257-4316	Brattleboro	VT	
	802-775-1922	Rutland	VT	
	802-885-8127	Springfield	VT	
	802-527-0531	St Albans	VT	
	802-748-8101	St Johnsbury	VT	
	802-863-1167	Williston	VT	
	603-357-1877	Keene	NH	
	603-448-1980	Lebanon	NH	
The Granite Group www.thegranitegroup.com	802-476-6239	Barre	VT	State www.statewaterheaters.com
	802-658-2747	Burlington	VT	
	802-773-1209	Rutland	VT	
	802-383-4510	South Burlington	VT	
	603-357-0350	Keene	NH	
	603-442-6480	Lebanon	NH	
Hulbert Supply www.hulbertsupply.com	802-862-6426	Burlington	VT	AO Smith www.aosmith.com
	802-862-6427	Brandon	VT	
Premier Supply Group www.premiersupplygroup.com	802-257-9230	Brattleboro	VT	Rheem www.rheem.com
	603-443-9768	Lebanon	NH	
	413-588-5391	Greenfield	MA	
RE Michel www.remichel.com	802-862-3661	Williston	VT	GE www.ge.com
	518-583-4865	Glens Falls	NY	
Sid Harvey's www.sidharvey.com	802-775-8855	Rutland	VT	Rheem www.rheem.com
	802-658-0534	Williston	VT	
VP Supply Corp www.vpsupply.com	518-459-6000	Albany	NY	State www.statewaterheaters.com
	518-563-4916	Plattsburgh	NY	

Participating Manufacturers:

www.americanwaterheater.com

www.aosmith.com

www.ge.com

www.rheem.com

www.statewaterheaters.com

Upstream Data Collection

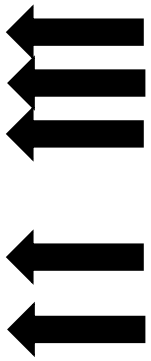
Streamline data collection

User Friendly data submission process

Vermont Energy Investment Corporation

Provide minimum project information to HVACR Participating Distributor at time of Circulator Pump INSTANT REBATE purchase

1. Distributor name & sales month
2. Distributor Branch Location (if applicable)
3. Invoice date
4. Invoice number
5. Purchase Order # or Job Name (if applicable)
6. Manufacturer model number
7. Product Description
8. Serial Number (if applicable)
9. Quantity
10. Invoice Price
11. Product Incentive Amount (optional)
12. Bill To Information
    a. Company Name
    b. Address
    c. Phone
13. Install Location Information
    a. Contact Name (requested)
    b. Installation Address **(required)**
    c. Installation Phone (requested)
14. Installation type [select one]
    a. Commercial
    b. Small Residential (1-4 family)
    c. Large Residential (5+ family)



Supply Channel Approach

STRATEGY

Understanding the Market Levers to drive Market Transformation

1. SMTT Plans
2. Value Proposition
3. Incentive Levels
4. Administration / Management Fees

Understand Distributors' Profit Model

- Gross Margins & Net Income; EE Products potential to increase GM % & GM $'s
  - Min Contribution Requirement *(prevent pricing deterioration)*
  - **Asset Management** & how Utilities can add value!
    - **Inventory**: Increase Inventory Turns w/ Sales *(incentives)*, Marketing, Training, Technology *(no penalty for new products or programs displacing inventory)*

    +

    - **Accounts Receivable:** turnaround reimbursement faster than Distributors average Days Receivables

    —

    Accounts Payable: Work w/ Manufacturers to increase days payables

    =

- **RONA: Return on Net Assets!!!!**

Distributor Value Proposition

- A **strategic partnership**…

	Standard Pump ($)	HPCP ($)	Variance ($)
Standard Wholesale Cost	52	120.25	68.25
Standard Sell Price to Trade	65	165	100
EVT / Others Incentive to Wholesale *(est)*	-	$100	
Sell Price to Trade	65	65	-
Gross Margin $ per HPCP	13	44.75	31.75
Gross Margin $ @ 20,000 HPCP / yr	260,000	895,000	**$635,000**

HVACR Upstream Incentives & Admin / Mngt Fees

Efficiency Vermont Program	Current Incentive	Current Admin / Mngt Fee	Comments

Cold Climate Heat Pumps (CCHP)	$300 Single-zone	$50	• Low incentive/incremental due to DPS
			• Aggressive Admin/Mngt Fee
			  • Complex Sale
			  • Inventory Investment

Heat Pump Water Heaters (HPWH)	$550	$100	• Aggressive incentive & Admin/Mngt Fee • Sales under duress (95%) • Small window of opportunity
Circulator Pumps (HPCP)	$80 (PA <1.25 Amps) $500 (PB 1.25 Amps < 5) $1000 (PC 5 < Amps)	$1 $1 $1	• Aggressive incentive • High $MWh resulted in low admin/mngt fees • Increasing fees & lower incentive levels effective 7/1

Supply Channel MAPPING: Cold Climate Heat Pump Strategic Alliances

Distributor Name	City	State	Primary ccHP Manufacturer	Primary ccHP Manufacturer Rep
Blodgett Supply	Montpelier	VT	Fujitsu	SRGI
	Newport	VT		
	White River Junction	VT		
	CORPORATE-Williston	VT		
	Rutland	VT		
Bell Simon	South Burlington	VT	Mitsubishi	Mitsubishi (factory direct sales force)
	CORPORATE-Palmer	MA		
	Pittsfield	MA		
	Springfield	MA		
Central Supply	Lebanon	NH	Fujitsu	SRGI
	Lebanon			
	Woodsville	NH		
FW Webb	Barre	VT	Daikin	N/A
	Bennington	VT		
	Brattleboro	VT		
	Rutland	VT		
	Rutland	VT		
	Springfield	VT		
	St Albans	VT		
	St Johnsbury	VT		
	Williston	VT		
	CORPORATE-Bedford	MA		
	Keene	NH		
	Lebanon	NH		
The Granite Group	Barre	VT	Mitsubishi	Mitsubishi (direct - confirmed)
	Burlington	VT		
	Rutland	VT		
	South Burlington	VT		
	Keene	NH		
	CORPORATE=Concord	NH		
	Lebanon	NH		
Homans Assoc.	Wilmington	MA	Mitsubishi	
Hulbert Supply	Burlington	VT	LG	United Components in NY
	Brandon	VT		
Johnstone Supply	Kenilworth	NJ	Fujitsu & Daikin	Direct - no rep
Premier Supply	Lebanon	NH	Fujitsu	Sweeney Rogers Geraghty
	Brattleboro	VT		
Grainger	(Does not service VT)		n/a	n/a
RE Michael	Williston	VT	Fujitsu	Sweeney Rogers Geraghty
RJ Murry	Williston	VT	Carrier	
Sid Harvey	Burlington	VT	Fujitsu	Sweeney Rogers Geraghty
	Burlington			
	Rutland	VT		
United Refrigeration	Rutland	VT	Daikin	
VP Supply	Albany	NY	Panasonic	

TARGET: Big 4 CCHP Manufacturers

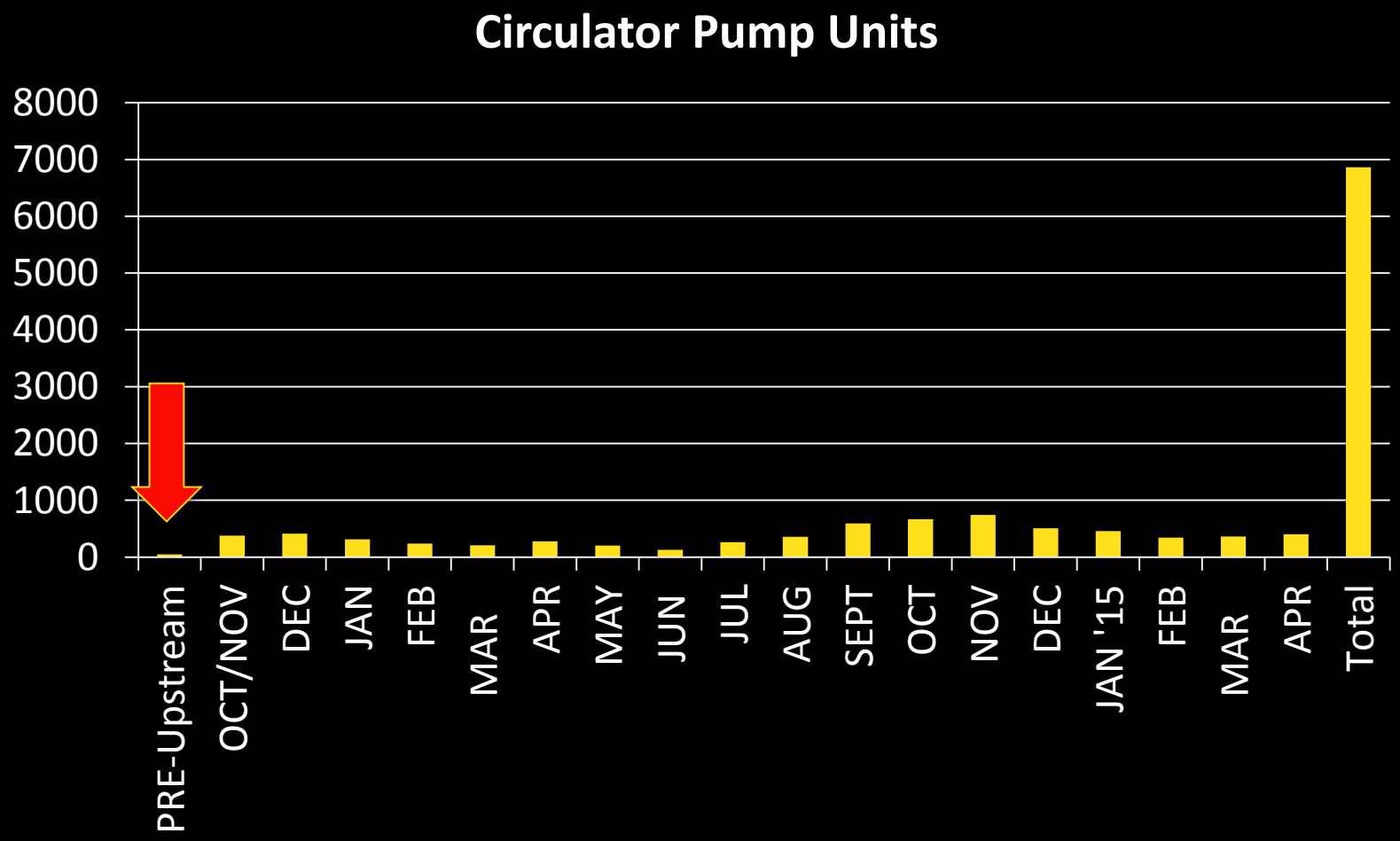
- 5 Firms represent 60% of the **TOTAL Distributor locations** in VT
- **+90% Market share** of the **14 Distributors/44** Locations that service VT

Distributor	Locations	HPWH Manufacturers	Comments
Distributor #1	xx	Manufacturer #1	Ongoing Discussions • Initial Meeting 9/24 • @ VEIC/EVT 10/17 • Follow-up 11/17-21 w/ Manufacturer & Distributor • Other Meetings
Distributor #2	xx	Manufacturer #1	• Initial Meeting 9/24 • Regional & Branch Manager
Distributor #3	xx	Manufacturer #2	Ongoing discussions • Stakeholder meeting 10/22-Manufactuer/Rep • Next 11/17-24 Manufacturer, Rep, Distributor
Distributor #4	xx	Manufacturer #3	• Initial Meeting – 7/29-Manufactuer • 10/14-Meeting-Manufactuer, Distributor • 11/17-11/21 –Manufacturer, Distributor
Distributor #5	xx	Manufacturer #4	• Initial Meeting 10/15 Manufacturer/Distributor

Upstream Program Results

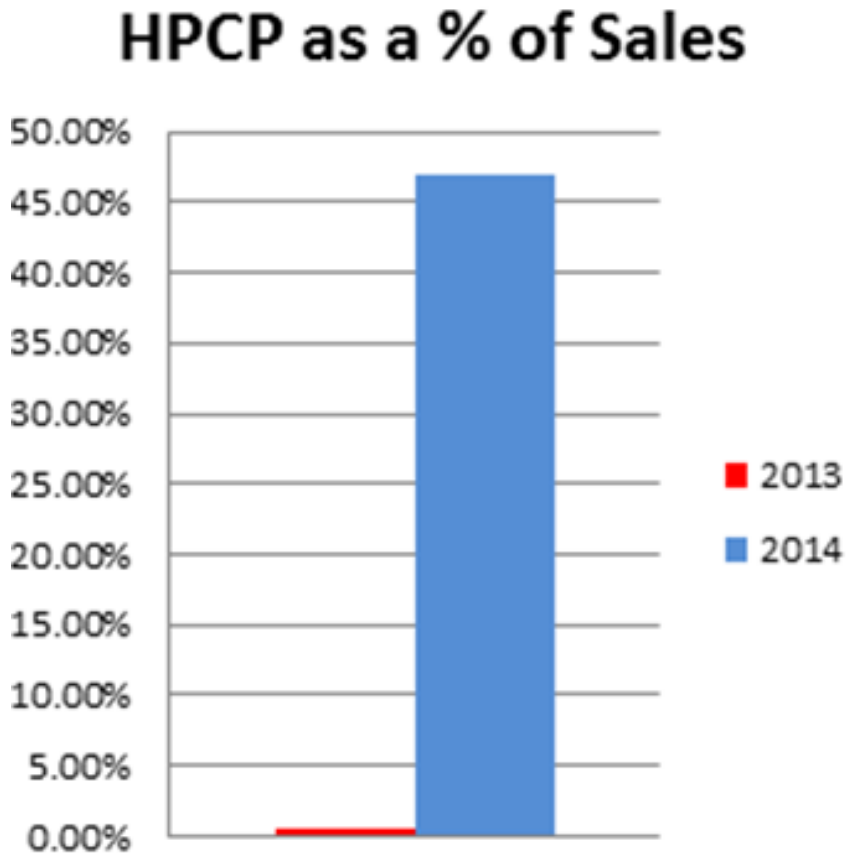
Vermont Energy Investment Corporation

Consolidated HPCP Participating Vermont Distributors' Results

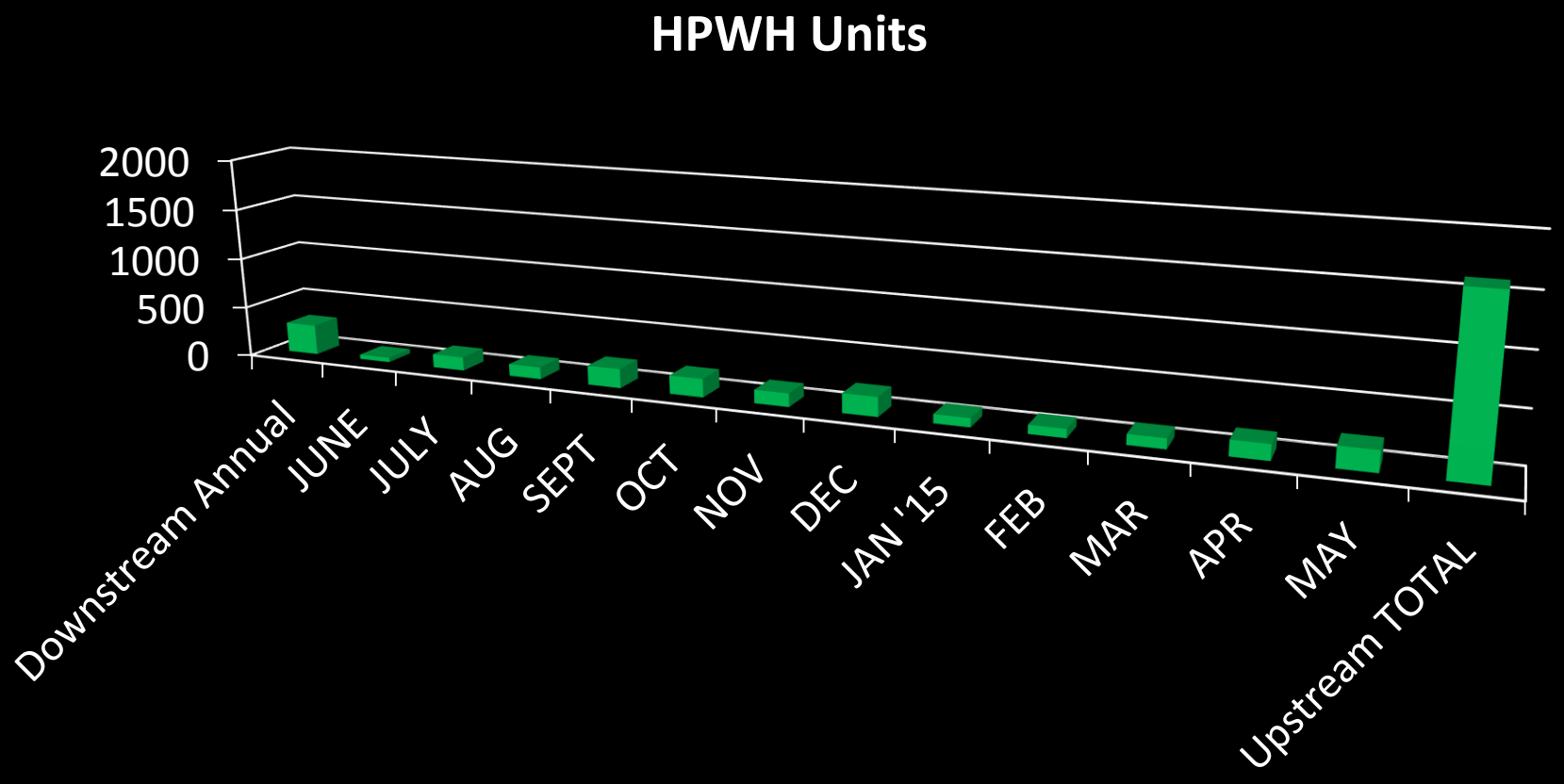


Every 2.5 Days = TOTAL ANNUAL AVERAGE before Upstream Program!!

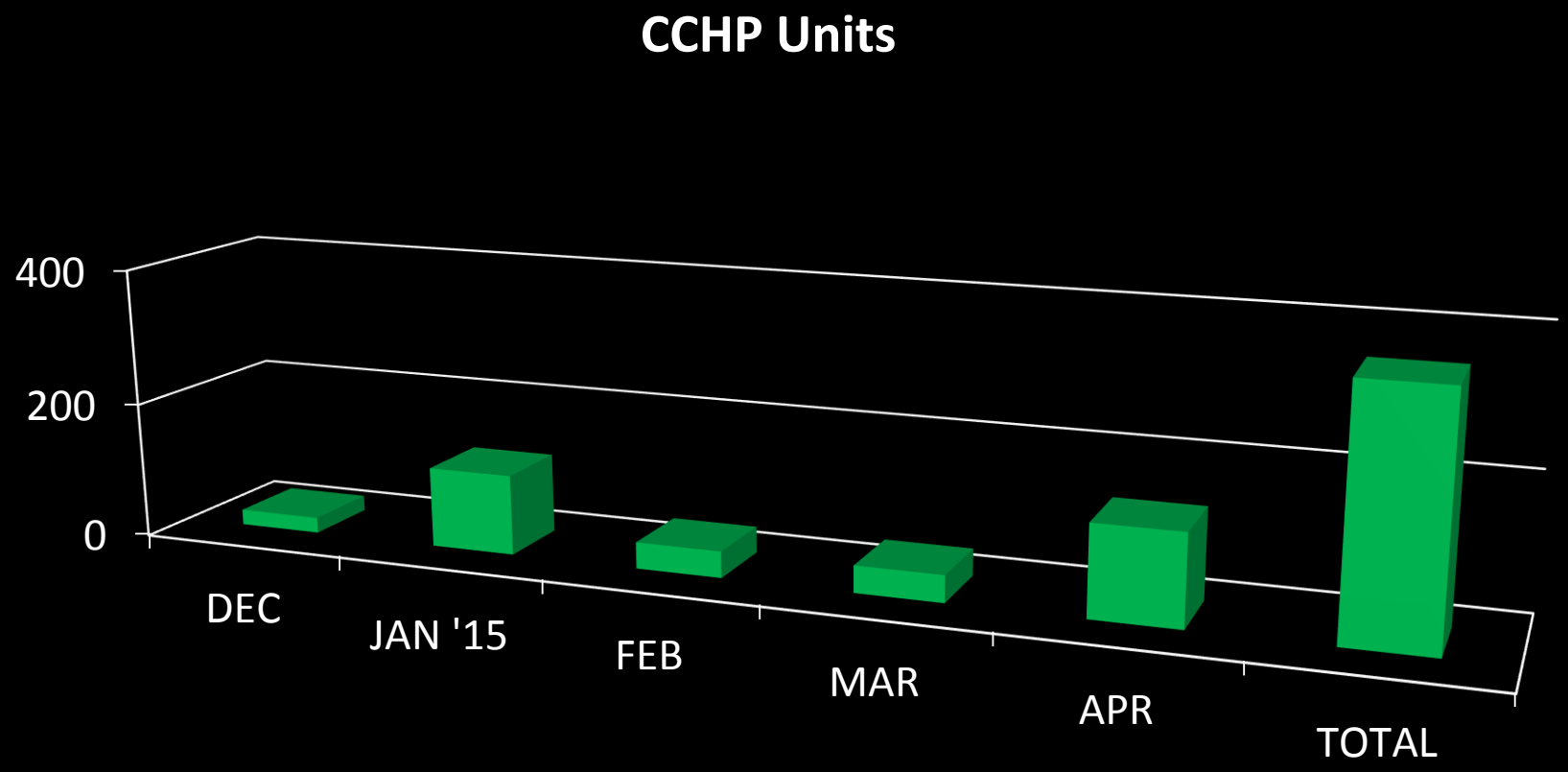
Distributor's *"Before & After"* Upstream



Consolidated HPWH Participating Vermont Distributors' Results



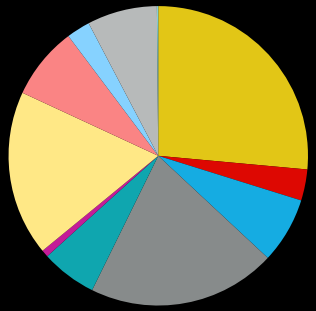
Consolidated CCHP Participating Vermont Distributors' Results



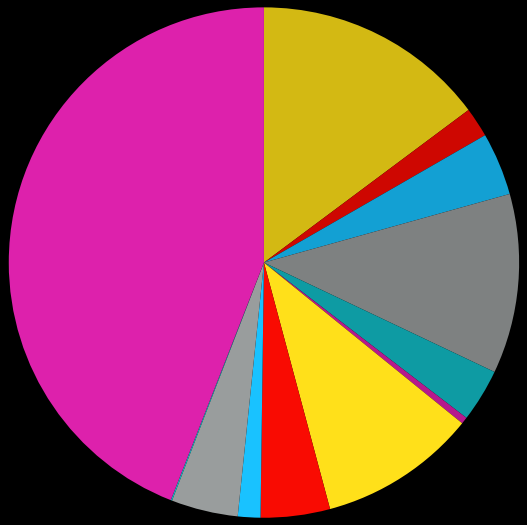
Distributor ABC Company - HPCP

Nov ‘13 – Sept ‘14

HPCP Sales by Branch Location



HPCP Program Market Share By Branch Location



Thank You!!!

Vermont Energy Investment Corporation

Innovations in Energy Efficiency Finance

Phil Burke,
Manager Of Underwriting - West
Alternative Energy Solutions
Energi, Inc.

Agenda

- Who is Energi?
- ESI Overview
- Barriers to EE Adoption
- Traditional ESCO ESPC Financing
- ESA Model
- PACE & On-Bill Repayment
- Questions

Energi is a Massachusetts based Industrial Reinsurance Company that provides innovative risk management and insurance programs to segments of the energy industry. Energi offers a series of Warranty Insurance programs designed to support growth of the energy efficiency and renewable energy industries via risk mitigation.

Warranty Programs

- Energy Savings Warranty (ESW)
  - Insures Savings Related to Design & Installation of Energy Conservation Measures (ECM's)
- Solar Installation Performance Warranty (SIPW)
  - Insures Power Production related to Design & Installation of Solar System
- Output Performance Warranty (OPW)
  - Insures Power Production related to Manufacturing, Installation & Design of power producing system
- Manufacturers Product Warranty (MPW)
  - Insures cost to repair/replace defective energy related equipment

Energi's Role in Facilitating Financing

Broad range of contractors can provide investment grade guarantees

Enable new financing structures by insuring energy savings to support cash flows and repayment

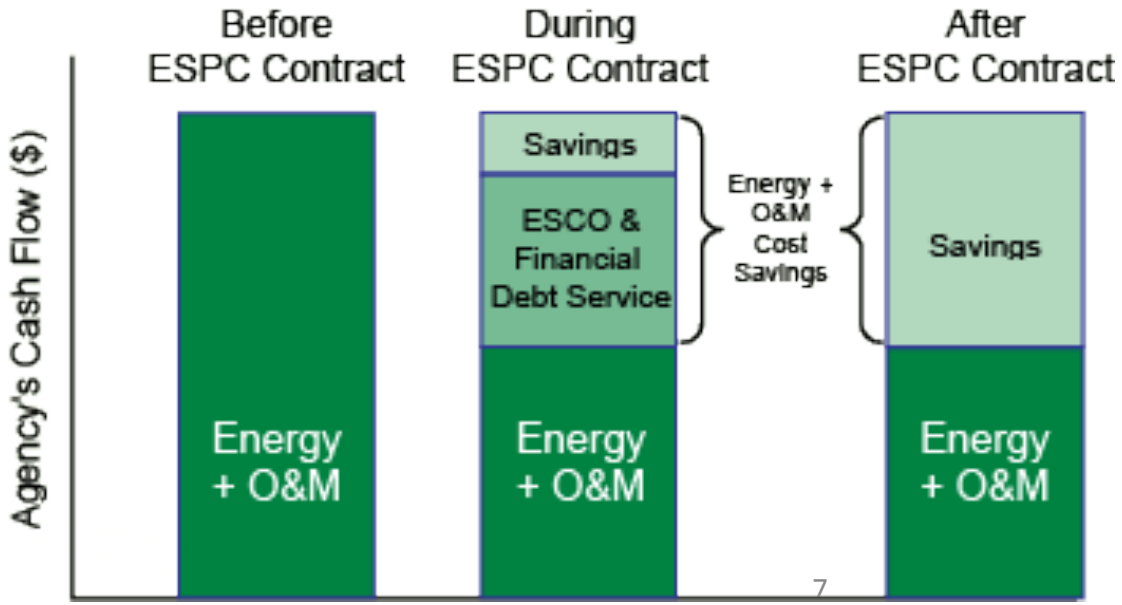
Financial Institutions have approved and/or are requiring ESW

Hurdles to EE Deployment

- Access to capital
- Balance Sheet Treatment
- Concern over project performance
- Short-term occupancy/lease

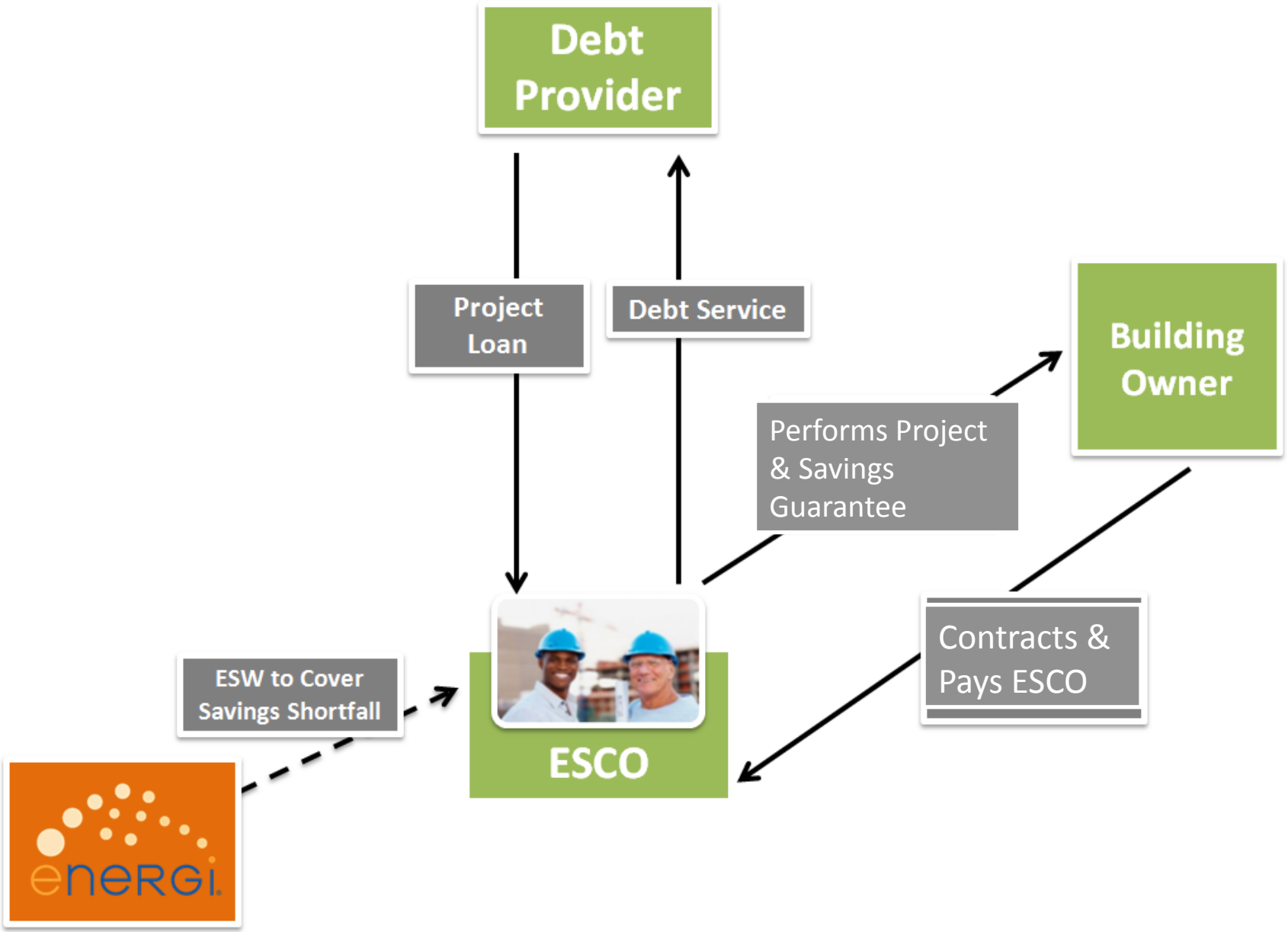
Traditional ESCO ESPC

- ESCO, or customer, arranges loan to pay for equipment
- Savings resulting from new equipment > repayment obligations
- Savings shortfall = ESCO repayment



Traditional ESCO ESPC Contd.

- “MUSH” facilities
- Large project size
- Long term leases or customer owned facilities
- Credit worthy contractor & customer


Debt Provider
Project Loan
Debt Service
Building Owner
Performs Project & Savings Guarantee
Contracts & Pays ESCO
ESW to Cover Savings Shortfall
ESCO
enerGi

Energy Service Agreements (ESA)

- Energy Services provider arranges financing & owns EE improvements
- Customer enters contract to "pay for achieved savings"
  - No up front capital cost for customer
  - Similar to Solar PPA
  - Shifts risk of underperformance to provider
  - Off balance sheet
- At end of term, option to transfer ownership to customer

ESA's contd.

- Suitable for commercial or aggregated residential projects
- Credit worthy off-taker
- Finance repayments based solely on Cash Flow from savings

METRUS ENERGY

Energi Provides Energy Savings Warranty for Metrus Energy Hawai'i Project

Posted on January 21, 2014

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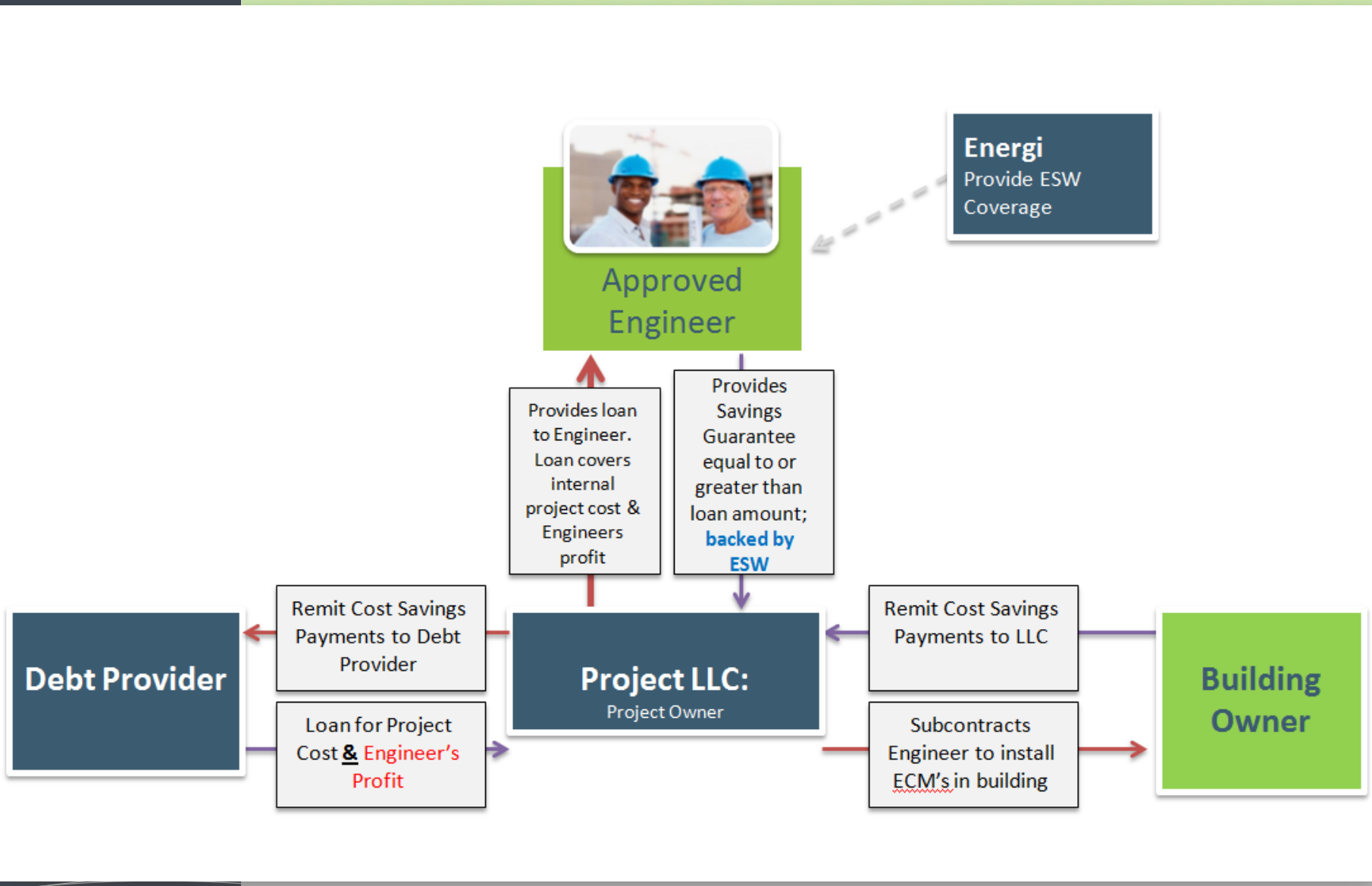
PEABODY, Mass.–(BUSINESS WIRE)–Energi, a leading provider of risk management and insurance progra


Energi
Provide ESW Coverage
Approved Engineer
Provides loan to Engineer. Loan covers internal project cost & Engineers profit
Provides Savings Guarantee equal to or greater than loan amount; backed by ESW
Debt Provider
Remit Cost Savings Payments to Debt Provider
Loan for Project Cost & Engineer's Profit
Project LLC:
Project Owner
Remit Cost Savings Payments to LLC
Subcontracts Engineer to install ECM's in building
Building Owner

Property Accessed Clean Energy (PACE)

- Allows commercial property owners to finance energy efficiency retrofits through property tax assessments
- Local government finances 100% of retrofit
- Savings from project > Property Tax Assessment
- PACE lien tied to property, allows for long term (20 years) financing
- Secure repayment – through property taxes

PACE Financing Opportunity Contd.

Existing PACE programs:

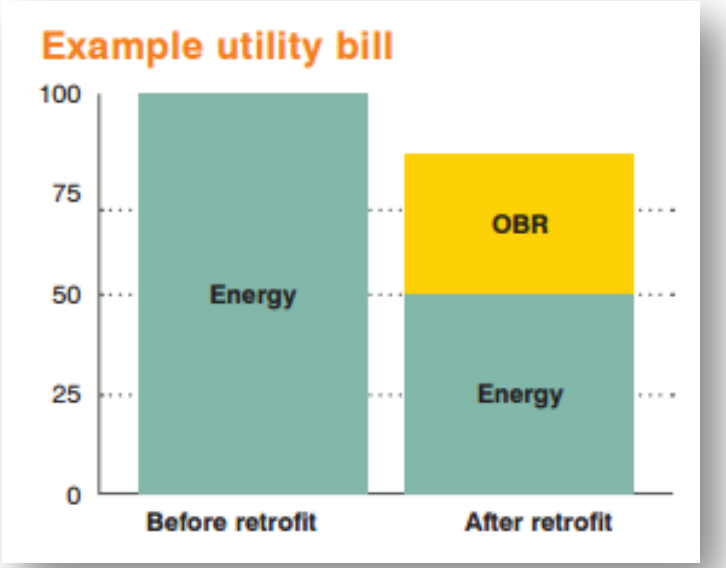
1. California
2. Connecticut
3. Florida
4. Michigan
5. Minnesota
6. Missouri
7. New York
8. Ohio
9. Texas
10. Wisconsin
11. District of Columbia

-www.pacenow.org

On Bill Repayment

- Administering utility or 3rd party covers retrofit cost
- Ratepayer then repays through charge on utility bill
  - Project savings > utility bill charge
- Non-repayment = shutoff of utility service
- "Tied to meter" – assessment stays with building

- Programs administered by:
  - Utility
  - Nonprofit
  - Government entity



-www.edf.org

Questions?

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