



NORTHEAST ENERGY EFFICIENCY PARTNERSHIPS

Forum 2013 Highlights, and Looking to 2014 and beyond...

Julie Michals and Elizabeth Titus, NEEP

Monica Kachru, Northeast Utilities

Tom Belair - Public Service New Hampshire

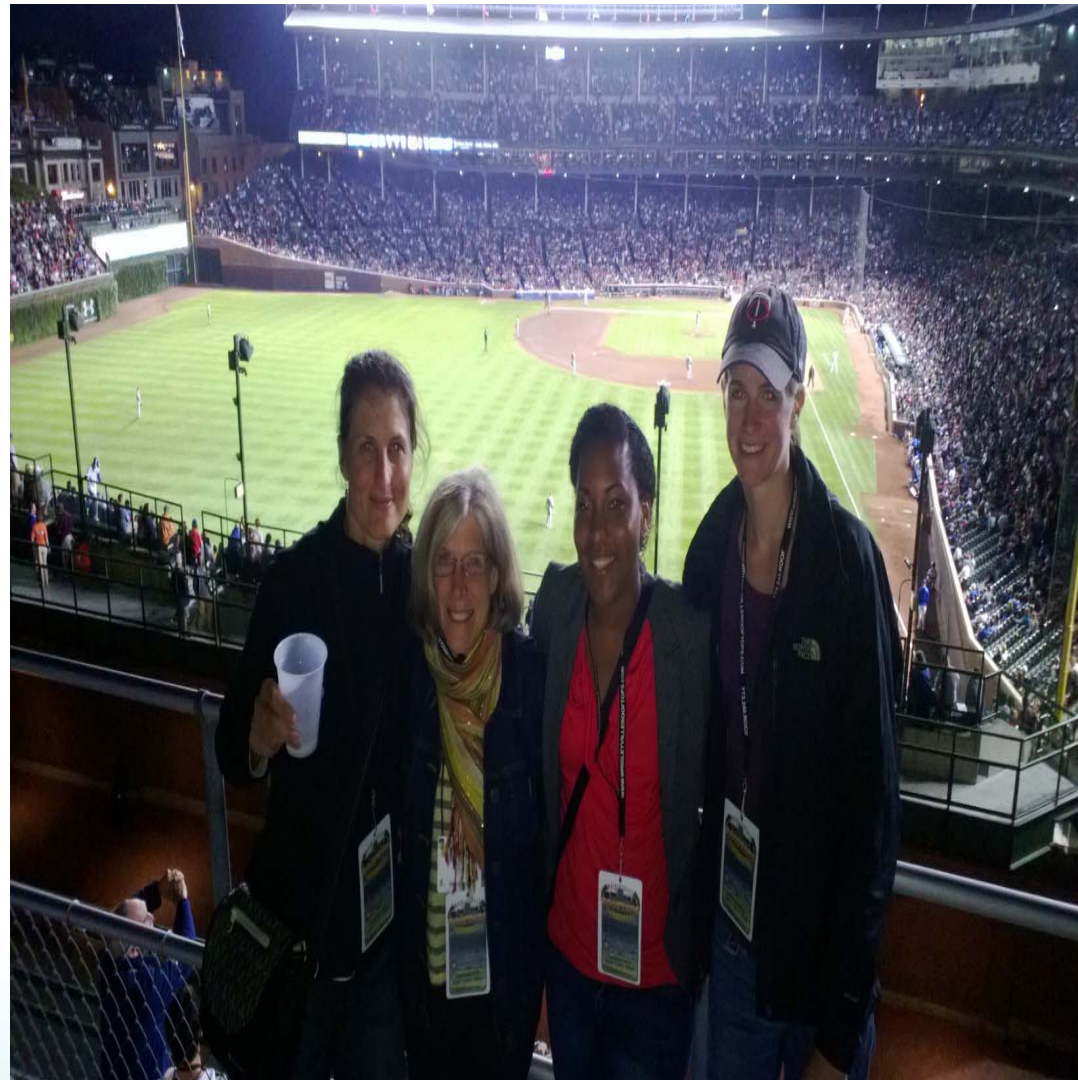
Pierre Van de Merwe - Vermont Energy Investment Corp.

First, some quick introductions:

EM&V Forum Team:



- Julie Michals - Director,
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- Elizabeth Titus - Senior
R&E Manager:
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PROJECT COMMITTEE CO-CHAIRS (2013)

Many thanks for your leadership!



Tom Belair - Public Service New Hampshire

Victoria Engel-Fowles - NYSERDA

Lisa Glover - Unitil

Crissy Godfrey - Maryland Public Service Commission

Monica Kachru - Northeast Utilities

Barry Murphy - Vermont Dept of Public Service

Jeremy Newberger - National Grid

David Pirtle - PEPCO/PHI

Pierre van der Merwe - DC Sustainable Energy Utility

2013-14 Forum Projects

(2014 proposed agenda & budget up for adoption by Steering Committee in January 2014)



2013 Projects	2014 Projects
Protocol Development Projects	
Regional EE Database (REED)	Regional EE Database (REED) cont. potentially expanded
EM&V Methods (input to national protocol efforts)	EM&V Methods cont. (state practices; national efforts)
Net Savings Methods Guidance	<i>Net Savings Methods Guidance in 2014 (2013 cont.)</i>
C/E Testing Research and Guidance	<i>C/E Testing Guidance in 2014 (2013 cont.)</i>
Mid-Atlantic TRM Update V3	Mid-Atlantic TRM Update V4
Emerging Technologies	Ductless Minisplit Heat Pump Meta Study
	Geotargeting - Review of Programs, EM&V Practices
	ISO New England - Support on EM&V in FCM for PAs
Research & Evaluation Projects	
Loadshape Study (2012 VFD project nearly complete; 2013 project starting)	Loadshape Data Catalog (inventory of studies)
Remaining Useful Life / Measure Life Study	Measure Life Research Part 2
Incremental Cost Research	Incremental Cost Research cont (new measures)
	Lighting Interactive Effects (TBD)

Forum Strategic Planning - Key Project Areas 2014-16



Audience	Forum Goal
PUCs, Air Regulators, SEOs, ISO/RTOs, PAs	1. Increase Transparency and Use of Common EM&V Methods in Forum States
	2. Develop & Support Common EE Reporting in Forum States
PAs, PUCs, ISOs	3. Leverage EM&V Funds through Joint Research to Develop Savings Assumptions
All Stakeholders	4. Increase Access to and Understanding of EM&V for Key Policymakers and Stakeholders

See project examples in Annual Public Meeting materials

PROGRESS TOWARDS LONG-TERM GOAL OF: CONSISTENT, TRANSPARENT, ACCESSIBLE COMPARABLE ENERGY EFFICIENCY DATA



Regional EM&V Forum Develops Guidance (methods) and Consistent Data (Inputs)



Forum Steering Committee Adopts Protocols/Guidance & Data as Recommended Best Practice



States Adopt & Implement Forum Products to Measure, Evaluate & Report Savings

underway

EM&V Forum Collects, Makes State Savings Data Public & Accessible via Regional Database (REED)



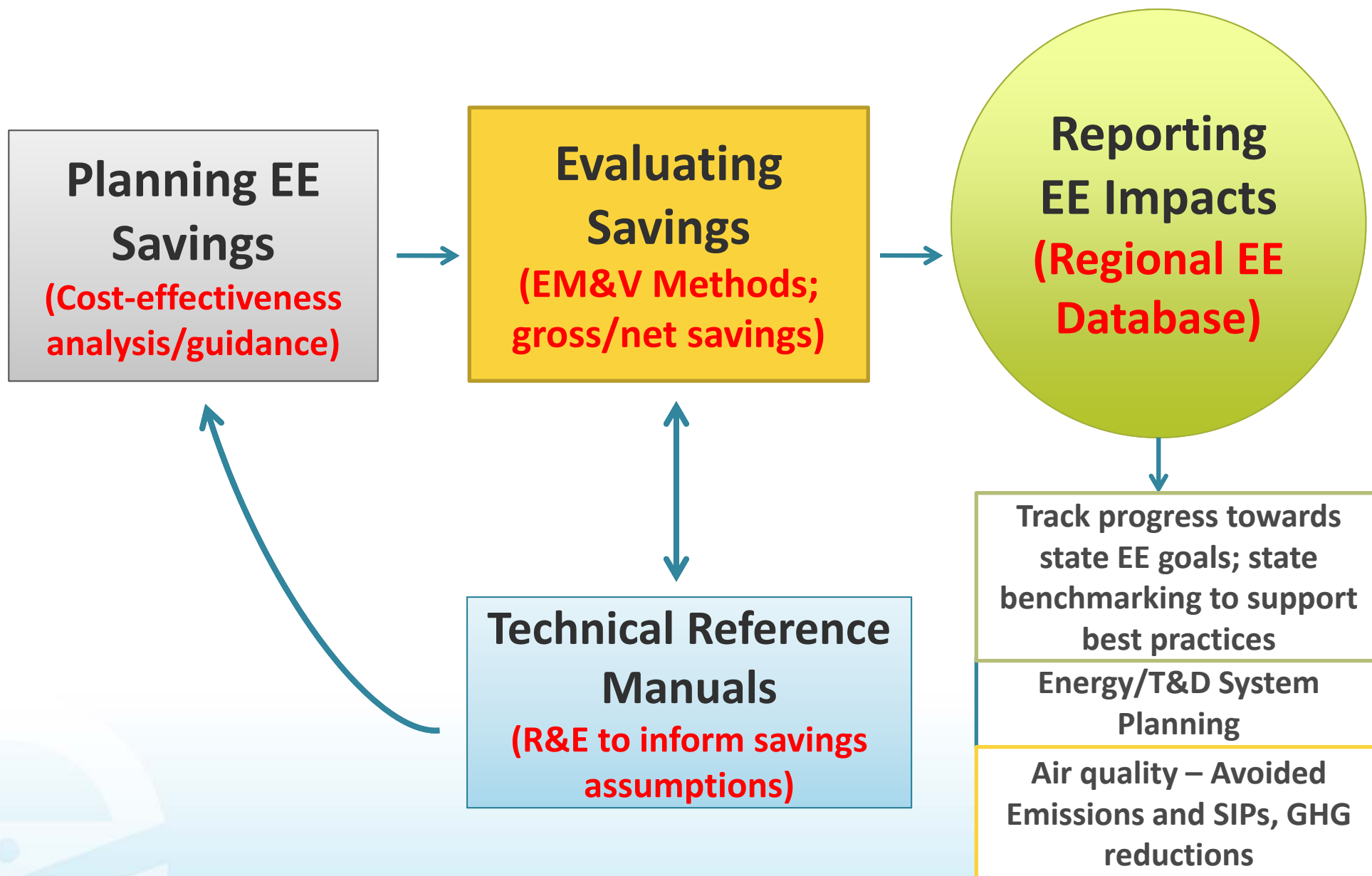
ISO/RTOs and National & Federal Efforts Reference/Incorporate EM&V Forum Products into national guidance documents

underway

SCOPE OF FORUM PROJECTS IN CONTEXT OF THE EM&V CYCLE



Forum **projects** address key areas...





2013 Project Highlights

REGIONAL EE DATABASE (REED)



Launched in February 2013, REED currently includes program year 2011 data for most Forum jurisdictions:

- Annual & Lifetime Energy Savings
- Peak Demand Savings
- Avoided Air Emissions
- Program Expenditures
- Job Creation Impacts
- Cost of Saved Energy
- Program Funding Sources
- Supporting Information



Program year 2012 data collection underway, available in January 2014 on REED website: www.neep-reed.org.

HOW EE STAKEHOLDERS CAN USE REED DATA



Compare program impacts to help enhance cost-effectiveness



Aggregate results to inform regional and national impacts / policies



Support system & transmission planning, forecasting



Incorporate EE data into state air quality & GHG plans

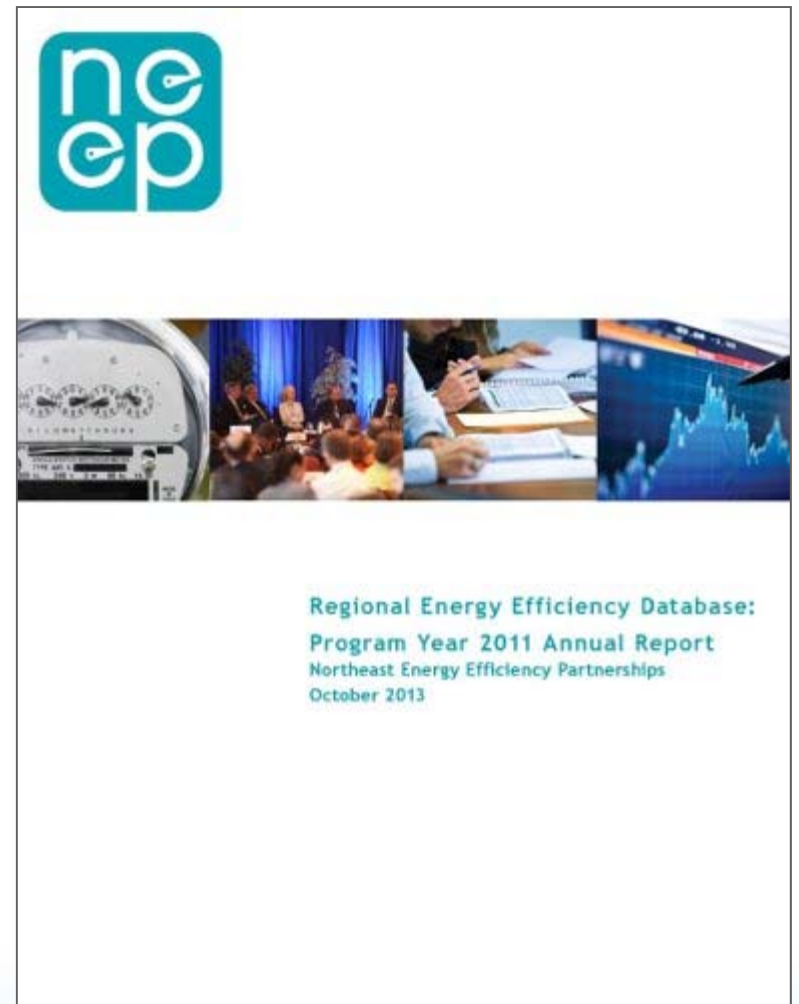


PROGRAM YEAR 2011 ANNUAL REPORT



REED [Program Year 2011 Annual Report](#) issued this fall.

- Provides high-level impacts of 2011 EE programs at the state and regional level.
- Highlights similarities and differences in results across programs by type, sector and state.
- Program Year 2012 Annual Report forthcoming Q2 2014.



FORUM EM&V METHODS PROJECTS

Protocols and States Practices



1) Forum informs national EM&V protocol efforts:

1. US DOE Uniform Methods Project (UMP) - protocols for gross and net savings impact evaluation
2. US DOE/EPA SEE Action EM&V Efforts - interest in national EE reporting, advanced metering and EM&V
3. American National Standards Institute (ANSI) EE Standards Coordination Collaborative - roadmap of EE EM&V standards/protocols, identifies gaps and recommends how to fill gaps

2) Standardized Reporting of State EM&V Practices:

Forum developing a standardized form for PAs (or their evaluators) to identify EM&V methods used to determine energy and demand savings

NATIONAL EM&V PROTOCOLS

US DOE UMP - Impact Evaluation (Gross Savings)



Phase 1 Measure specific protocols:

- Refrigerator recycling
- Commercial Lighting
- Commercial lighting controls
- Residential lighting - **being updated**
- Residential furnaces and boilers
- Commercial unitary and split system air conditioning equipment
- Whole-building retrofit

Phase 1 Cross Cutting Protocols

- Sample design
- Survey design
- Metering
- Calculation of peak impacts
- Other evaluation topics (including rebound and persistence of savings)

Phase 2 Measure specific protocols **underway (public review open to Dec 20):**

- Non-residential new construction
- Retro-commissioning
- Chillers

Phase 2 measure protocols to be developed (fall 2013/winter 2014):

- Adjustable-speed drive motors
- Air compressors
- Behavior
- Data centers
- HVAC controls

Phase 1 complete at:

http://www1.eere.energy.gov/office_eere/de_ump_protocols.html

NATIONAL EM&V PROTOCOLS cont.

ANSI EE Standardization Coordinating Council



EM&V Chapter: Issue Areas, Gap Analysis, Recommendations

Program Measurement and Verification Methodological Approaches

TRMs; Baselines; Statistical Methodologies; Whole Building Metered Analysis; Methodologies Used for Large, Complex Retrofits; Useful (Measure Life) Lives and Survival Analysis

Non-Program Evaluation Methodological Approaches

Top-Down and Bottom-Up Methodological Approaches; Value of Evaluation, Risk and Finance

Reporting and Tracking Systems

Tracking Systems; EE Reporting; Standardized and Portable Data Collection

Emerging Issue Areas

Role of Conformity Assessment/Accreditation; Behavior-Based Programs (BB); Evaluating Emerging EE Technologies; Incorporation of Advanced Metering and Data

SCHEDULE: Public review expected in Q1 2014

STANDARDIZED EM&V METHODS REPORTING

Forum State Practices



- Forum developed *Regional EM&V Methods Guidelines* (2010) for states to use/reference - but focus now is less on common protocols, and more on creating transparency in state EM&V practices using a standardized template for comparability
- Draft document in development for project subcommittee review and discussion, with full scope development in early 2014
- Forum EM&V methods project will coordinate with national EM&V methods efforts, as appropriate

LOADSHAPE RESEARCH



Rationale for the research:

- ❑ Compile data for evaluation analysis to serve many functions (TRC, C/E inputs, Capacity markets, etc.)

Primary research:

- ❑ Variable Speed Drives (VSD) on HVAC by Cadmus and DMI: **report early 2014**
- ❑ Commercial Refrigeration: **report in late 2014**

LOADSHAPE RESEARCH



Loadshapes - AESC vs FCM vs 8760

1. AESC (TRC): Avoided Energy Supply Cost Study - 4 periods

			<u>Peak</u>	<u>Off-Peak</u>
✓	Summer	Jun-Sep	7AM-11 PM	11PM-7AM
✓	Winter	Oct-May	7AM-11PM	11PM-7AM

2. ISO-NE Forward Capacity Market On Peak Hours

- ✓ Summer Jun-Aug, Mon-Fri non-holiday, 1-4 PM
- ✓ Winter Dec-Jan, Mon-Fri non-holiday, 5-7 PM

Shortage or Deficiency Hours

- ✓ When regional reserve margin falls below a certain threshold

VARIABLE SPEED DRIVE (VSD) LOADSHAPE



Method

- Meter drives on 5 types of HVAC equipment (water pumps and fans)
- >400 meters, 166 projects, 12 programs, 8 states
- Calibrate baseline load shape with data from Massachusetts study
- Analysis of data nearly complete



Preliminary Results/Recommendations

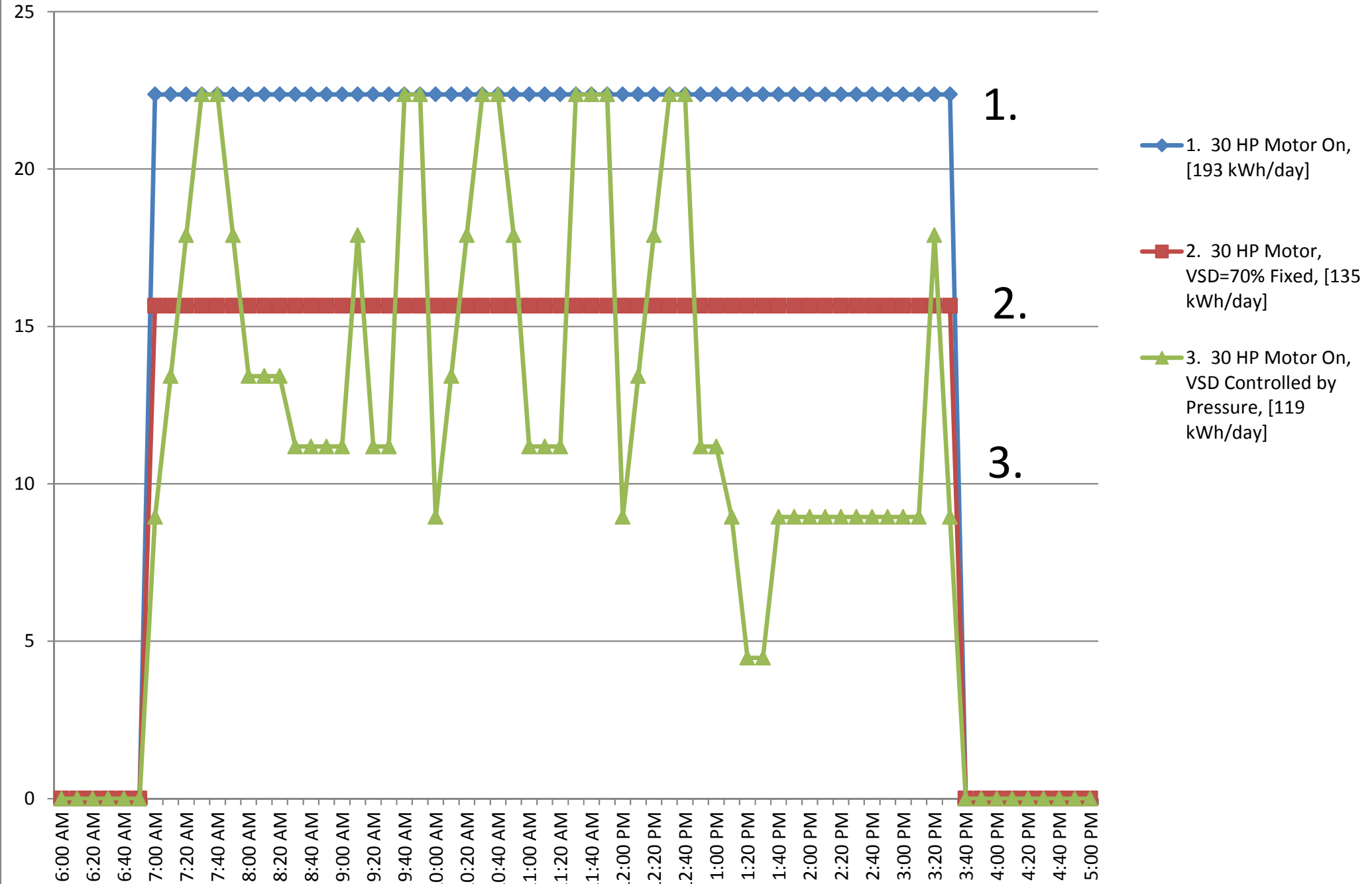
- ✓ *1/3 operate at constant reduced power*
- ✓ *1/3 vary (and correlate to outside air temp+)*
- ✓ *1/3 vary (and don't correlate to outside air temp)*

- ✓ *Post and pre retrofit important!*
- ✓ *Ensure the VSD is programmed to "vary"??*
- ✓ *Include "application" in tracking system ->*

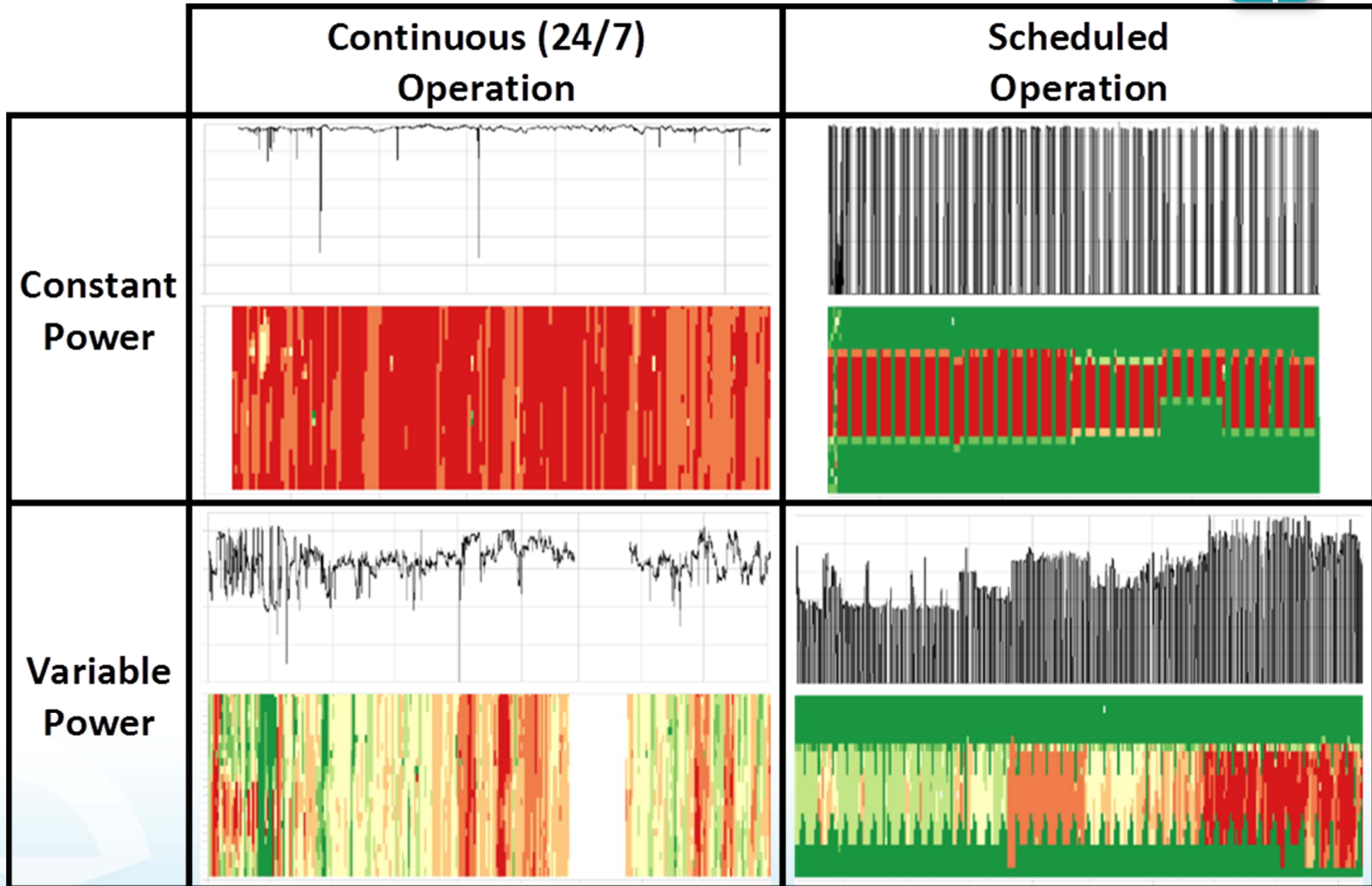
FAN OR PUMP APPLICATION CODE	
Code	Application
SFA	Supply fan on supply air handler
SFP	Supply fan on VAV packaged HVAC unit
RFA	Return fan on return air handler
RFP	Return fan on VAV packaged HVAC unit
BEF	Building exhaustfan
PEF	Process exhaustfan

Variable Speed Drive Application

30 HP Motor: 1. Always On, 2. VSD=70%, 3. VSD controlled by pressure



VARIATION IN VSD LOADSHAPES



COMMERCIAL REFRIGERATION LOADSHAPE



Rationale

- ❑ Targeting Cooler measures that have not been extensively studied
- ❑ Priority measures
 - ❑ Electrically Commutated Motors (ECM)
 - ❑ Evaporator fan controls
 - ❑ Anti-sweat Door Heater humidity or time Controls

Approach

- ❑ Short-term metering

Results in late 2014



ECM Motor, (77-28 = 49W savings)



ECM Motor, before blade is installed.

EMERGING TECHNOLOGIES RESEARCH

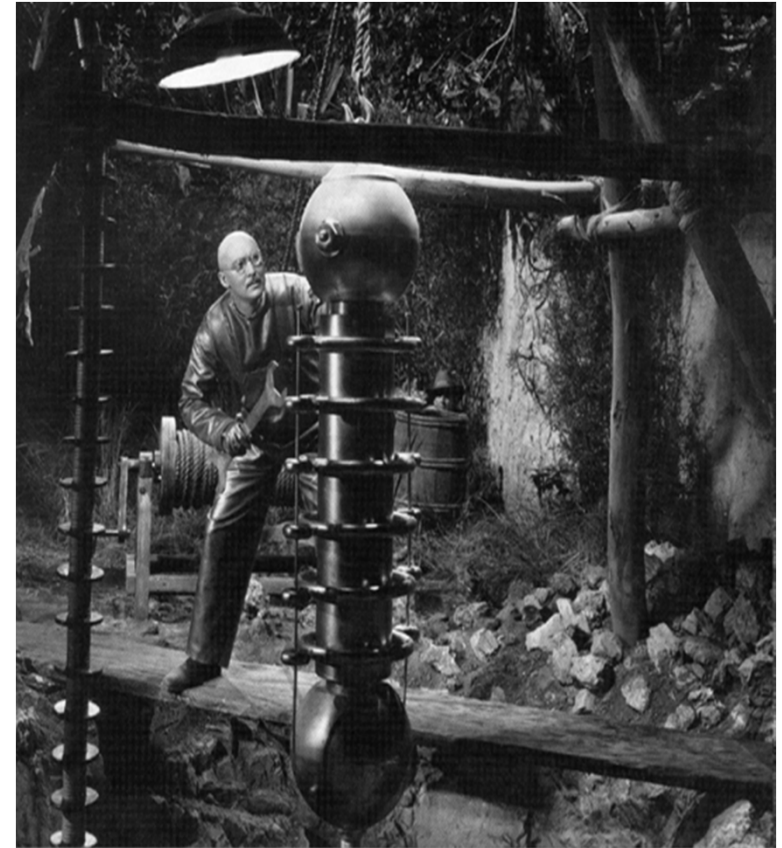


Rationale for the research :

- Fill knowledge gaps
 - Rapid advancement
 - Ripe for implementation
 - Not fully evaluated
- Leverage information
- Promote consistency

Primary research*:

1. Advanced Power Strips (APS): [report available](#)
2. Clothes Dryers: [report in Fall 2014](#)
3. Mini-split Ductless Heat Pumps (DHP): [report in early 2014](#)



*conducted by Energy & Resource Solutions, Inc.

RESIDENTIAL CLOTHES DRYER BASELINE RESEARCH



Purpose

- ❑ Support potential dryer programs
- ❑ Provide savings algorithms and M&V approaches

Background

- ❑ EPA spec for Efficient clothes dryers in development
- ❑ NE baseline has not been empirically studied
- ❑ Condensing dryers available now; Heat pump dryers expected in 2014



RESIDENTIAL CLOTHES DRYER BASELINE RESEARCH



Method

- ❑ Leverage research from Super Efficient Dryer Initiative
- ❑ Interview random sample of homeowners
- ❑ Meter power and exhaust air flow 3-6 months in the sample of households
- ❑ Compare results with NW study and DOE test procedure results

Report Expected Fall 2014

MINI-SPLIT DUCTLESS HEAT PUMP RESEARCH



Method

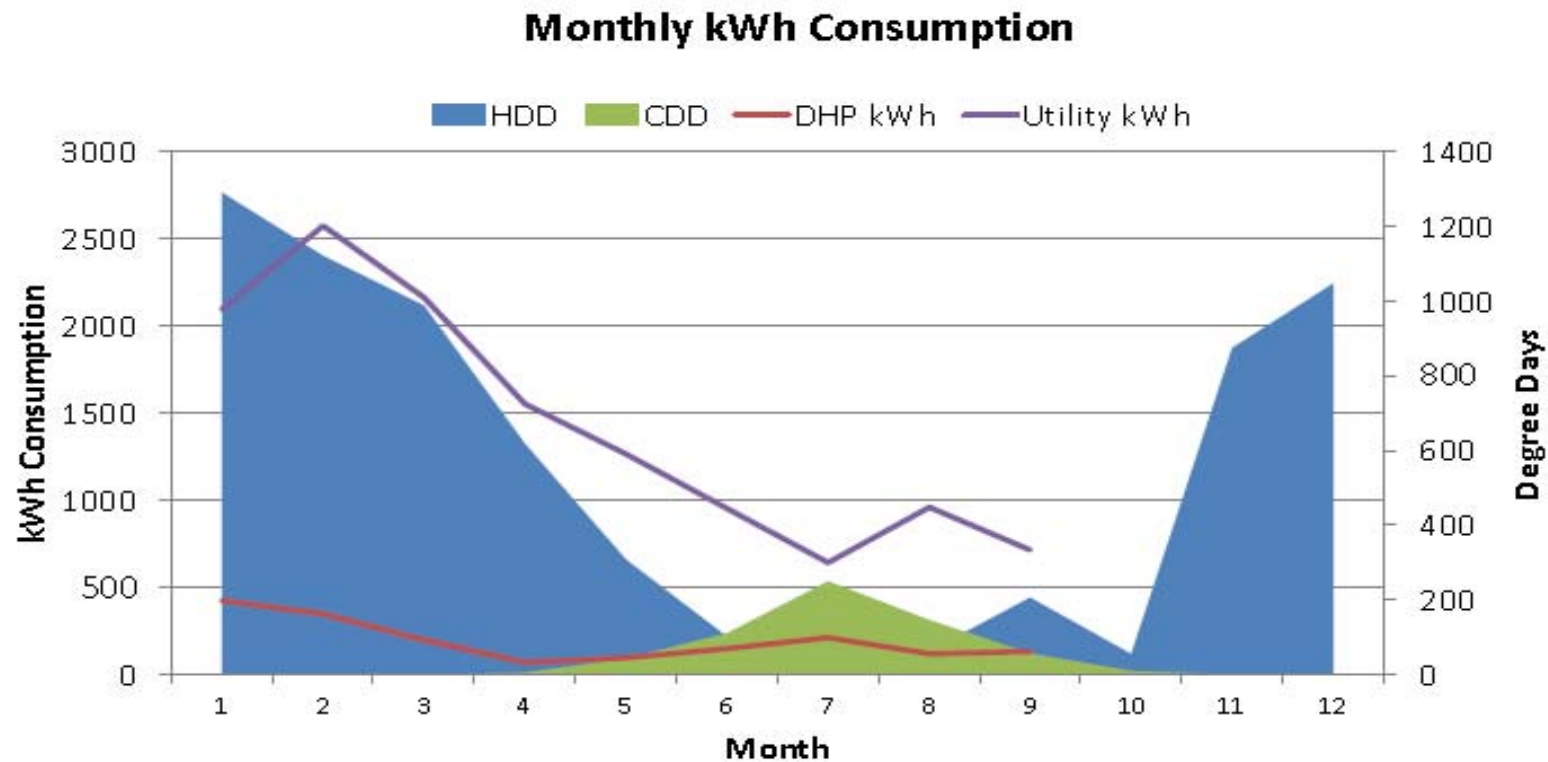
- Monitor 35 Installations: New Hampshire, New York
- Verify Cold Weather Performance
- Verify Homeowner Usage Patterns



Preliminary Findings - report early 2014

- Heating = predominant usage in New Hampshire; including shoulder seasons
- Heating and Cooling usage more level in New York
- Heating - Fuel oil displaced in NH; Natural Gas and Electric in New York
- Many installations replace 1 or more air conditioning units
- Cold climate units (New Hampshire) perform well in cold weather (17°F and lower)

SAMPLE MONTHLY KWH COMPARISON



Similar graphs for each site will be included in the final report

OTHER 2013 PROJECTS IN PROGRESS



* Including carryover from previous years

Mid-Atlantic TRM

- Annual Update ongoing: Final in June 2014;
- Possible format change (spreadsheet/database) in 2015

Residential Lighting Market Lift *

- Pilot ongoing (Vermont & Massachusetts)
- Results and post-EISA report: Summer 2014

Incremental Cost Study

- Characterize and develop cost curves for 5 measures
- Final report: Spring 2014

Remaining Useful Life (RUL)/Early Replacement Measures

- Phase 1: Compile program design information (current effort)
- Final report: Spring 2014



Upcoming 2014 Projects....

2014: GEOTARGETING



Scope

- ❑ Build on 2013 Regulatory Assistance Project White Paper
- ❑ Review relevant issues:
 - Current state practices (Vermont and Rhode Island)
 - Funding and operating mechanisms
 - Policy implications
 - Avoided costs and impacts
- ❑ EM&V guidance for energy efficiency and demand response programs delivered to the same customers



2014: EARLY REPLACEMENT MEASURE LIFE RESEARCH (PHASE 2)



Scope

- Focus on primary research on subset of priority measures including in-depth surveys of participants in retrofit/early replacement programs
- Analysis/estimation of measure life
- Recommendations about methods



2014: DUCTLESS HEAT PUMP META STUDY



Rationale:

- ❑ Information urgently needed to support rapidly evolving programs and policy
 - How to best incorporate into residential programs? How to measure the impact?
 - Analysis of current practices; guidance development

Approach

- ❑ Assemble and analyze existing information

2014: DUCTLESS HEAT PUMP META STUDY



Key Research Topics

- Characterize markets for ductless HPs
- Characterize field performance
- Deduce savings assumptions for new construction, electric heat retrofit and oil fuel displacement
- Provide guidance on EM&V
- Provide program design insights



QUESTIONS?