Launching Into Space: Advanced M&V For Our Region

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Connecticut Department of Energy and Environmental Protection

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

Standardized, Sustainable and Transparent EM&V – Integrating New Approaches in Connecticut

Michele Melley

NEEP Public Meeting: Stellar EM&V

Providence, Rhode Island

May 21, 2019

Connecticut Department of Energy and Environmental Protection

Standardized, Sustainable and Transparent EM&V- Integrating New Approaches in Connecticut

Funding:

DOE Funding: Office of Energy Efficiency Renewable Energy.
Cost Match: Project Partners

Project Goals:

This project will test the use of advanced data analytics and collection tools (M&V 2.0) through a statewide pilot and compare these findings with traditional M&V practices.
The project team will transfer those results and experiences to other states along with additional EM&V 2.0 research and experiences from across the country.

Impact:

- Develop M&V 2.0 software tool standards and protocols
- Broad scale adoption and use of M&V 2.0 tools in CT based on pilot results
- State and regional education on automated versus traditional approaches to EM&V

Partners:

- NH, NY, RI, VT, NEEP, LBNL
- Eversource Connecticut (utility)
- United Illuminating (utility)

Stakeholders:

- State energy offices, regulators, utilities, program administrators, evaluators, system planners, facility managers

CT Advanced M&V Pilot: Status

Commercial Pilot-Completed

- Targeted 2-3 Dozen Commercial Buildings
- AMI Data
- RCx, Energy Opportunities, SBEA
- Compared Advanced M&V to "Traditional –savings estimates, time and cost.

CT Advanced M&V Pilot: Status

Commercial Pilot- **Completed**

Resources/Deliverables-

- Utilities Traditional Savings Memo
- LBNL'S Implementation Resource Guide
- Pilot Results Memo-Coming Soon
- State Partner Workshops
- Outreach Plan
- Research Briefs/Guidance

CT Advanced M&V Pilot: Status

Progress

Transfer M&V Tool to Industry

- **Utilities-Considering Use of Tool in Implementation Phase**

  Project Criteria: expected savings > 5%, retrofit baseline, no DG

- **LBNL-Trained CT Utility Staff**

CT Advanced M&V Residential Pilot: Status

Residential Pilot-Planning Phase

Scope:

- Targeting ~ 2,000-3,000 CT “HES” homes
- Monthly Consumption Data- (not AMI)
- Compare the advanced M&V to “Traditional”
  -savings estimates, time and costs
- NEEP will track the process of using these tools and share results with states.

NEXT STEPS

- **Residential Tool Selected-Finalize Contract**
- **CT Utilities Provide HES Data –input Advanced M&V tool.**
- **Finalize Pilot Design**

THANK YOU

- Michele Melley
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M&V 2.0: Connecticut C&I Pilot

Stellar EM&V Annual Public Meeting

21 May 2019

Research Team

Jessica Granderson, Eliot Crowe, Samir Touzani, Sam Fernandes

Lawrence Berkeley National Laboratory

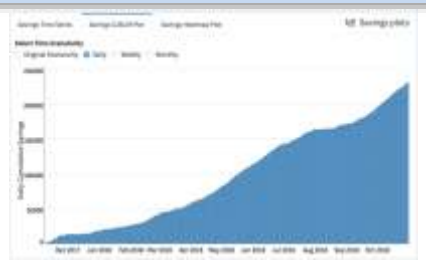
Advanced M&V Savings Estimate Process

3-step project review sequence:

- Expected savings > 5%
- CUSUM chart profile relatively straight
- Compare advanced M&V savings estimate to traditional M&V savings estimate

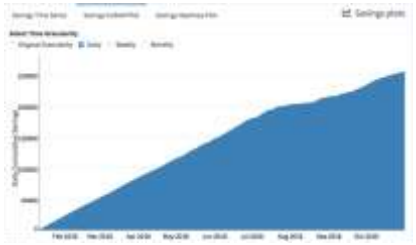
Findings kWh and Fractional Savings

Category 1



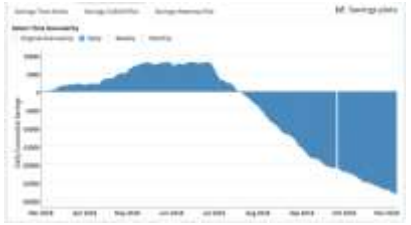
Trad.	Adv.
234,032	231,361
12%	11.9%

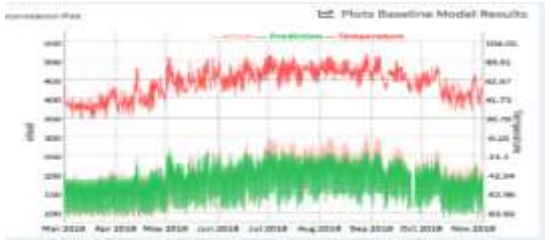
Category 2



Trad.	Adv.
588,840	254,604
26%	13.8%

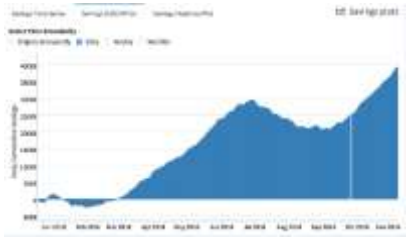
Category 3

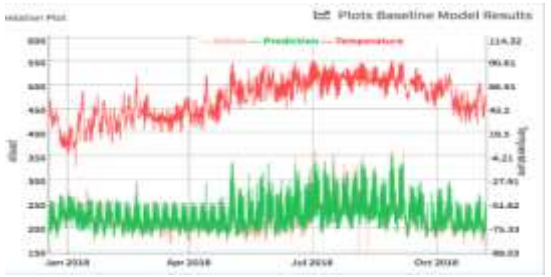




Trad.	Adv.
59,738	-16,555
4.4%	-1.6%

Category 4

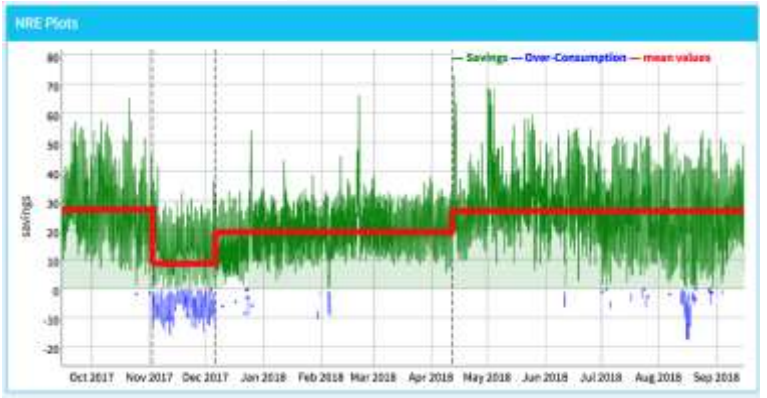




Trad.	Adv.
49,013	39,377
2.3%	2.2%

Key Takeaways

- Early feedback + visibility into savings as they accrue.
- Identify underperforming projects
- Non-routine events could be detected in a timely manner



- Advanced M&V not proposed as a direct replacement for comprehensive EM&V
- Pilots in other regions reveal similar trends

For more information: https://buildings.lbl.gov/emis/assessment-automated-mv-methods

ecrowe@lbl.gov , sgfernandes@lbl.gov

THANK YOU!

More details on our tool:

https://github.com/LBNL-ETA/RMV2.0

PERFORMANCE SYSTEMS DEVELOPMENT

We Speak Building

M&V Lessons Learned –

Duke Energy "Smart Energy Now" Behavioral Energy Savings Program

Chris Balbach, PE, CMVP, CEM, BESA

NEEP Stellar EM&V

Annual Public Meeting

May 21, 2019

Northeast Energy Efficiency Partnerships

PERFORMANCE SYSTEMS DEVELOPMENT

High Level Overview

~ 65 participating buildings

- 11 million+ conditioned square foot
- Savings compared to “2010” baseline period
- Savings target (%) set at community level

Variety of Building Types

- Offices / Financial Services
- Hotels / Retail
  - Mixed Use Buildings
- Municipally Owned Buildings
  - Jail / Courthouse

All Buildings represented by EPA Portfolio Manager

"Smart Energy Now" Program

GOAL:

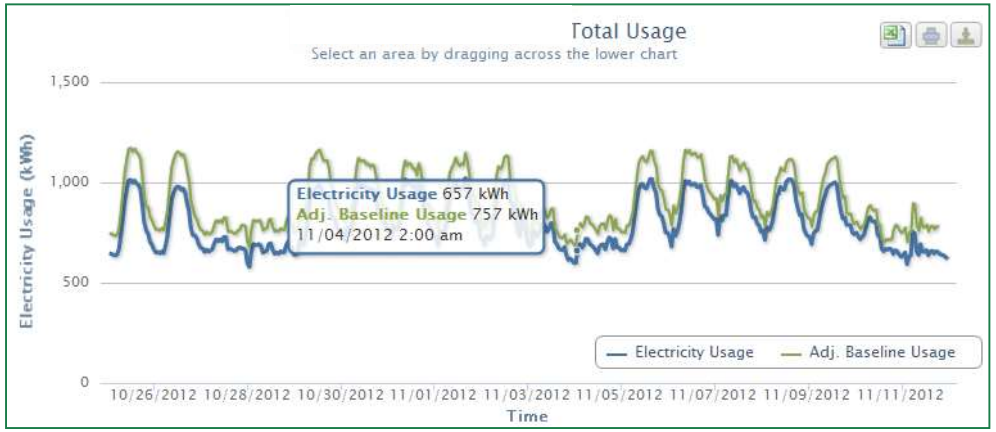
- Leverage large quantities of data

BARRIERS / ISSUES:

- Need to create *meaning* from the flood of *measured* data
- Real time (max 15 minute delay) feedback required
- Maintain Privacy

PSD SOLUTION:

- Real time **Whole Community** "efficiency meter" with a **community wide view of performance**
- Real time **Whole Building** "efficiency meter" for Building mngrs



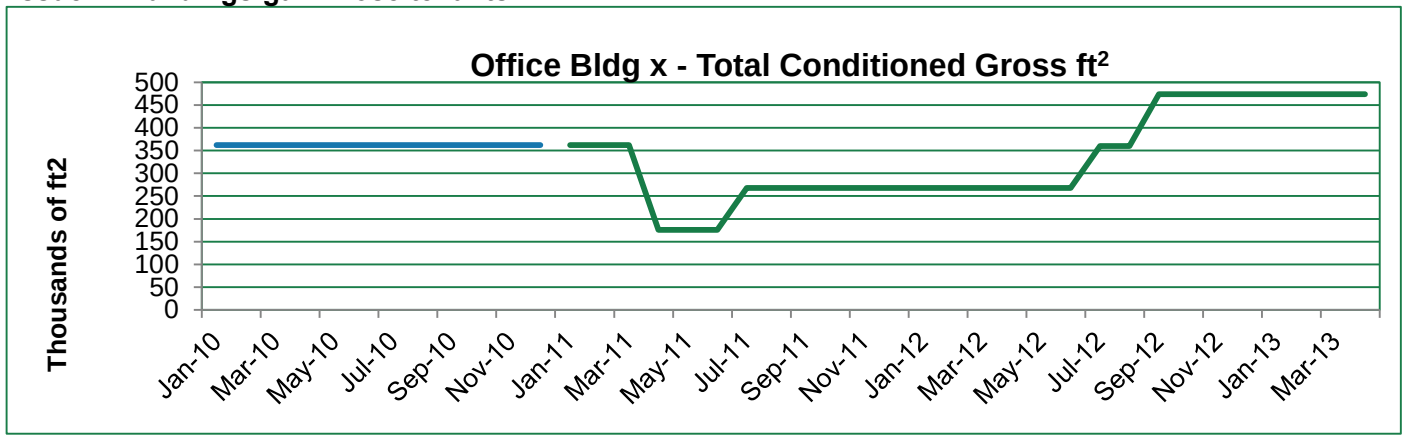
INNOVATIONS REQUIRED:

- Provide guidance to building owners & occupants to operate efficiently **and neither reward nor penalize economic growth**
- Use t**ransparent** M&V approach to developing savings adjustments (eventual third party EM&V review)

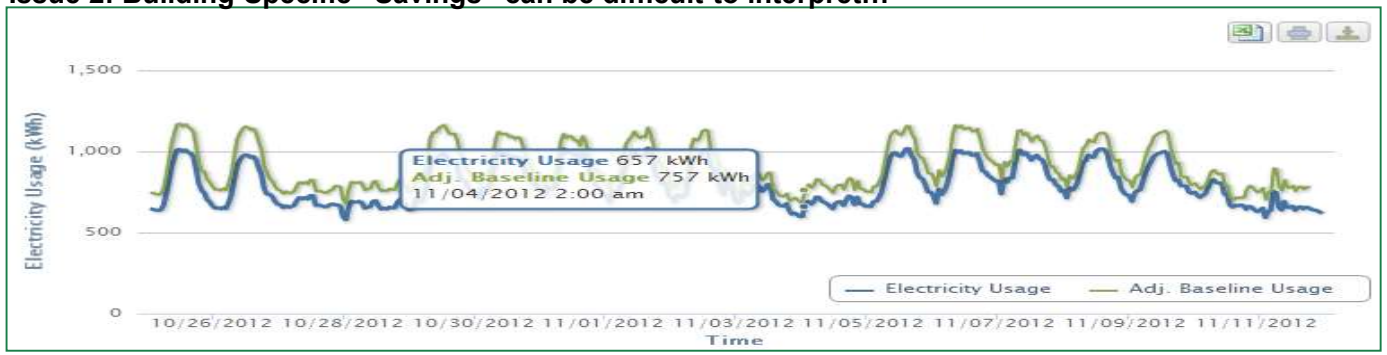
PERFORMANCE SYSTEMS DEVELOPMENT

Issues with Non Routine Event(s)

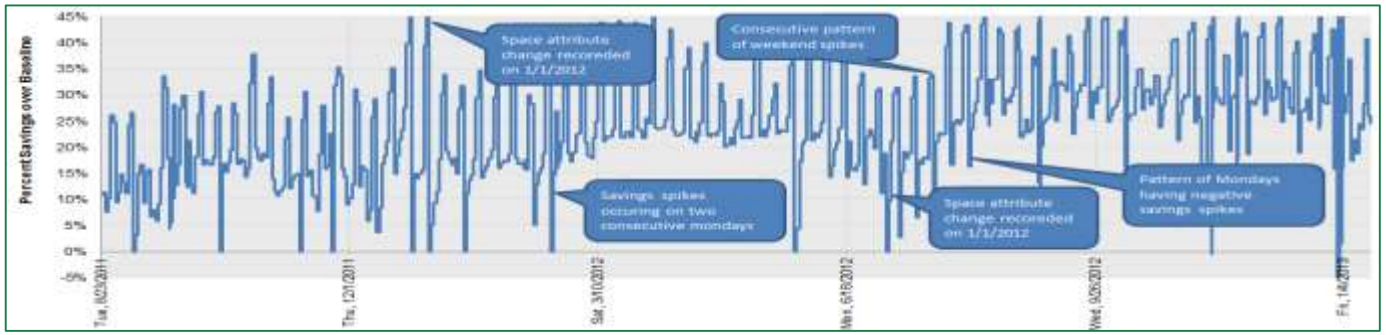
Issue 1: Buildings gain / lose tenants…



Issue 2: Building Specific "Savings" can be difficult to interpret…



Issue 3: Automated analysis of 'savings' data can reveals patterns - but not causes…



PERFORMANCE SYSTEMS DEVELOPMENT

Issues Discovered / Lessons Learned

- **Issues Discovered**
  - Customers lacked incentive to record/ update “Building Characteristics”.
  - Building Managers lacked a “Peer Comparison” to drive competition.
  - Economic Impact of recession was significant (2011+).
  - Duke Energy unable to leverage system data for program claimed savings (3rd party EM&V)
- **Lessons Learned**
  - Improve approach by ‘custom’ building generation of ‘EPA Scaling Factor’.
  - Onboard EM&V consultant with technology approach as soon as possible.

PERFORMANCE SYSTEMS DEVELOPMENT

Thank you for your time and attention!

Chris Balbach, PE, CEM, CMVP, BESA

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P4P AND ACTIONABLE INTELLIGENCE

NEEP 2019 ANNUAL MEETING, MAY 21

TERI LUTZ, MICHAELS ENERGY

MichaelsEnergy

Pay for Performance

- ✓ What is P4P?
- ✓ What are the objectives?
- ✓ How can it be achieved?
- ✓ What else should be considered?

Pay for Performance

What is it?

- ✓ P4P programs reward energy savings on an ongoing basis as the savings occur
- ✓ Savings - and payments - based on metered data

Sort of like this…
but smarter.

Pay for Performance

What are the objectives?

- ✓ Procure EE investment
- ✓ Shift from flat-rate rebate to market-based
- ✓ Increase EE savings and persistence over time
- ✓ Deliver locational and time savings to support/secure grid
- ✓ Stimulate innovation in program design

Pay for Performance

How can it be achieved?

- ✓ Smart metering infrastructure
- ✓ NMEC: Normalized Metered Energy Consumption
- ✓ Transparent open source tools, such as OpenEEMeter
- ✓ Empirically tested methods, such as CalTRACK

Considering Actionable Intelligence to…

Engage Customers

What are customers likely to do in the near and longer-term future?

Pay for Performance

What financial incentives drive the desired behavior?

Energy Forecasts/ Grid Management

How does a program design change affect energy forecasts?

Inform Design & Delivery

What is the baseline? How are customers using energy?

THANK YOU!

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Common Sense M&V

Goals, AMI Analytics Methods & Outcomes

NEEP Stellar Evaluation
May 21, 2019

Pasi Miettinen
CEO, Sagewell, Inc.
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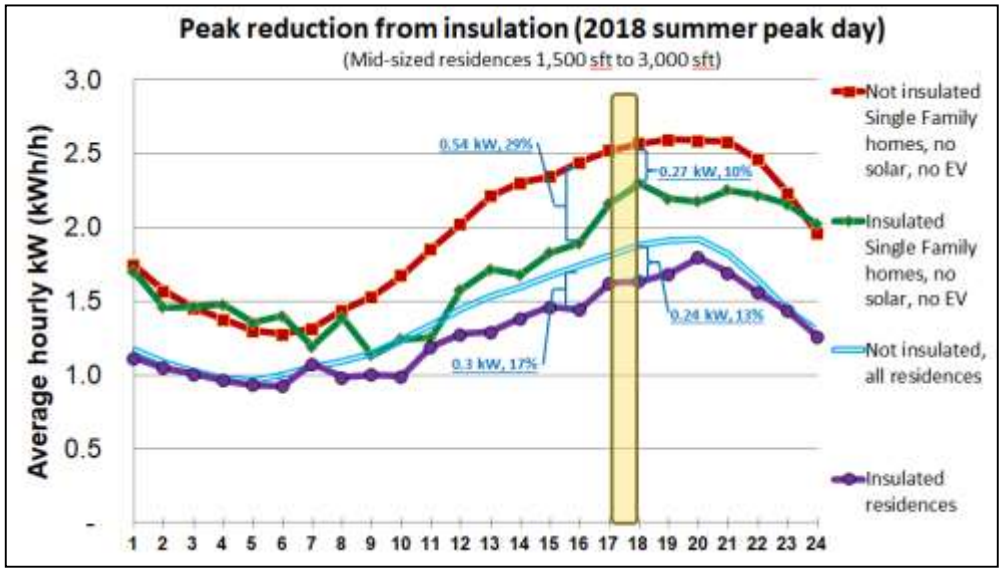
Energy efficiency – a success story?

sagewell Energy Analytics

Peak day AMI Meter data analysis



Total housing stock:	100	%	
% of all homes that get energy audit/yr:	3	%	
% of above homes that weatherize:	33	%	
Avg. weatherized home energy Savings:	~~10~~	%	100%
Annual energy savings from weatheriz.:	0.1	%	1%
Weatherization savings from last 10 years:	1	%	
Spending on EE programs/yr in MA:	$500	Million	

Peak reduction: typically 10% to 15%
Programs often assume 40%+

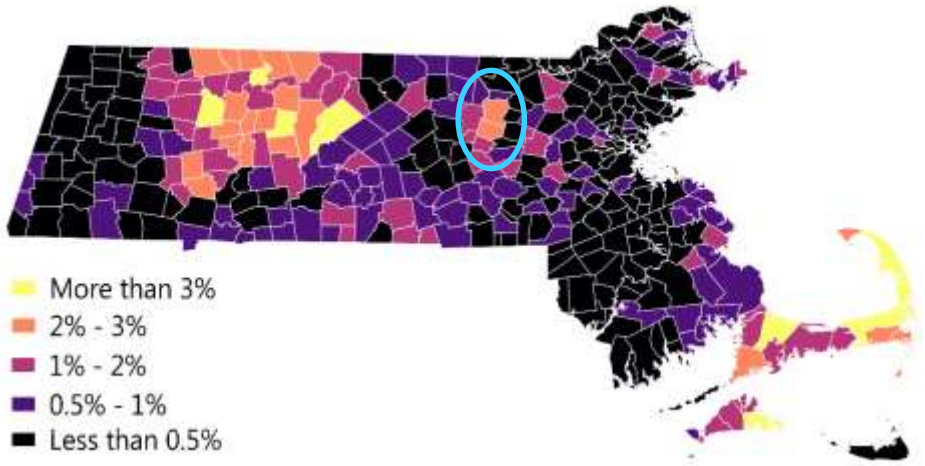
Effectiveness requires: Q * I
(Quantity times impact)

#EEexit?

Heat pump trends

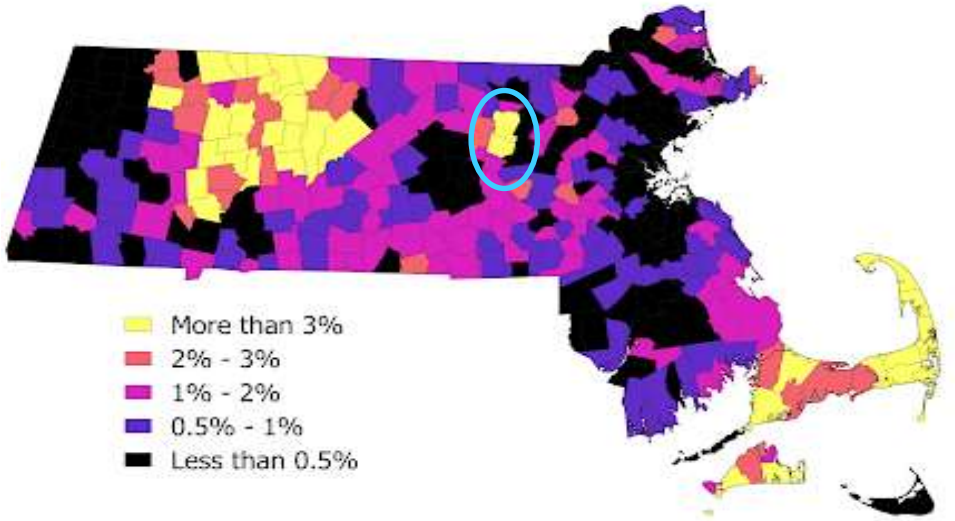
MA Heat pump sales Q4 2014 – Q4 2018

MA Residential Heat Pump Market share – through '17

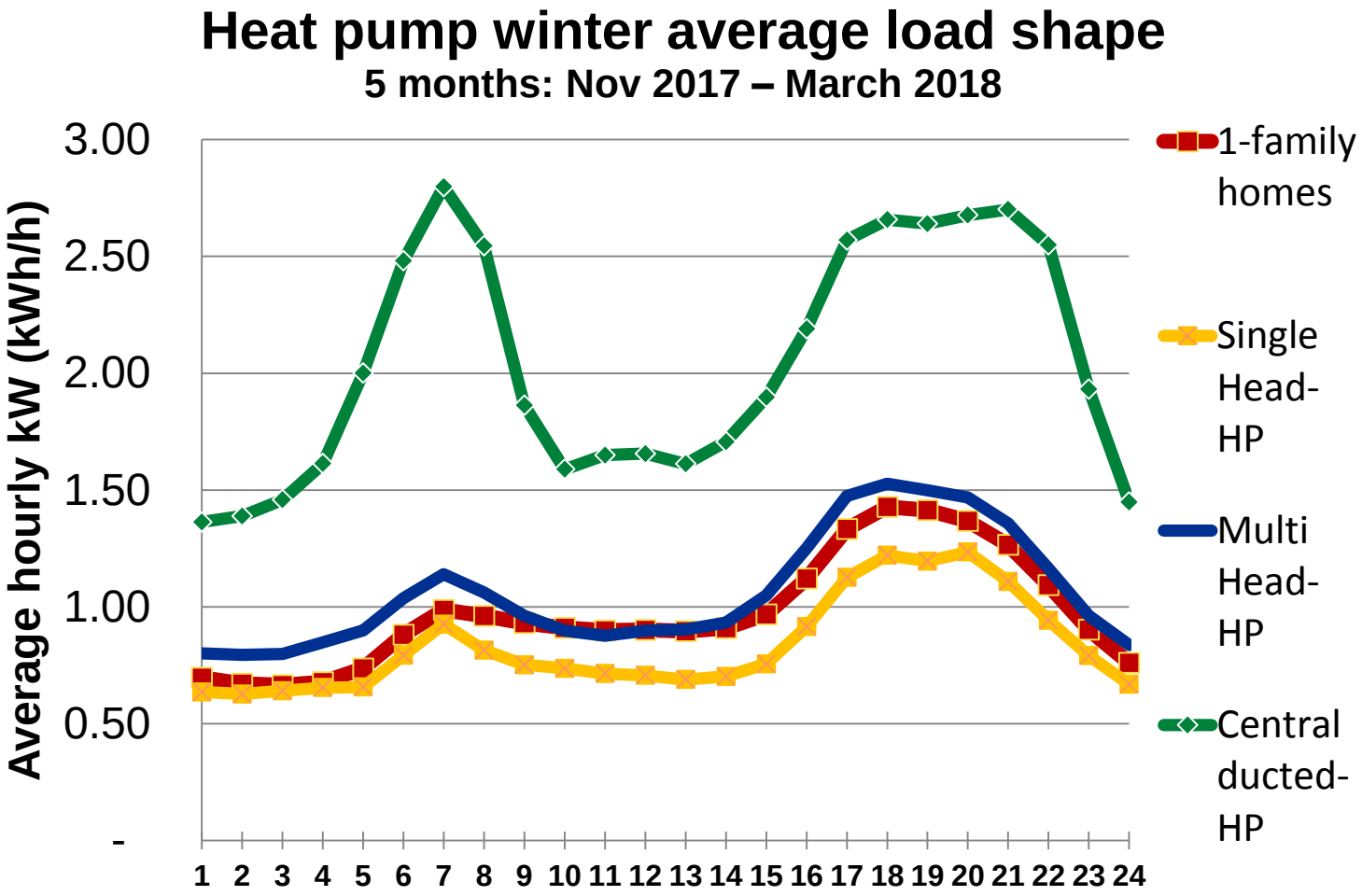


Excludes municipal utilities

MA Residential Heat Pump Market share – through '18



If we electrify home heating, what technology should we use?



Data from **Sagewell SageSight℠** AMI meter data analytics software and Sagewell's AMI meter data library

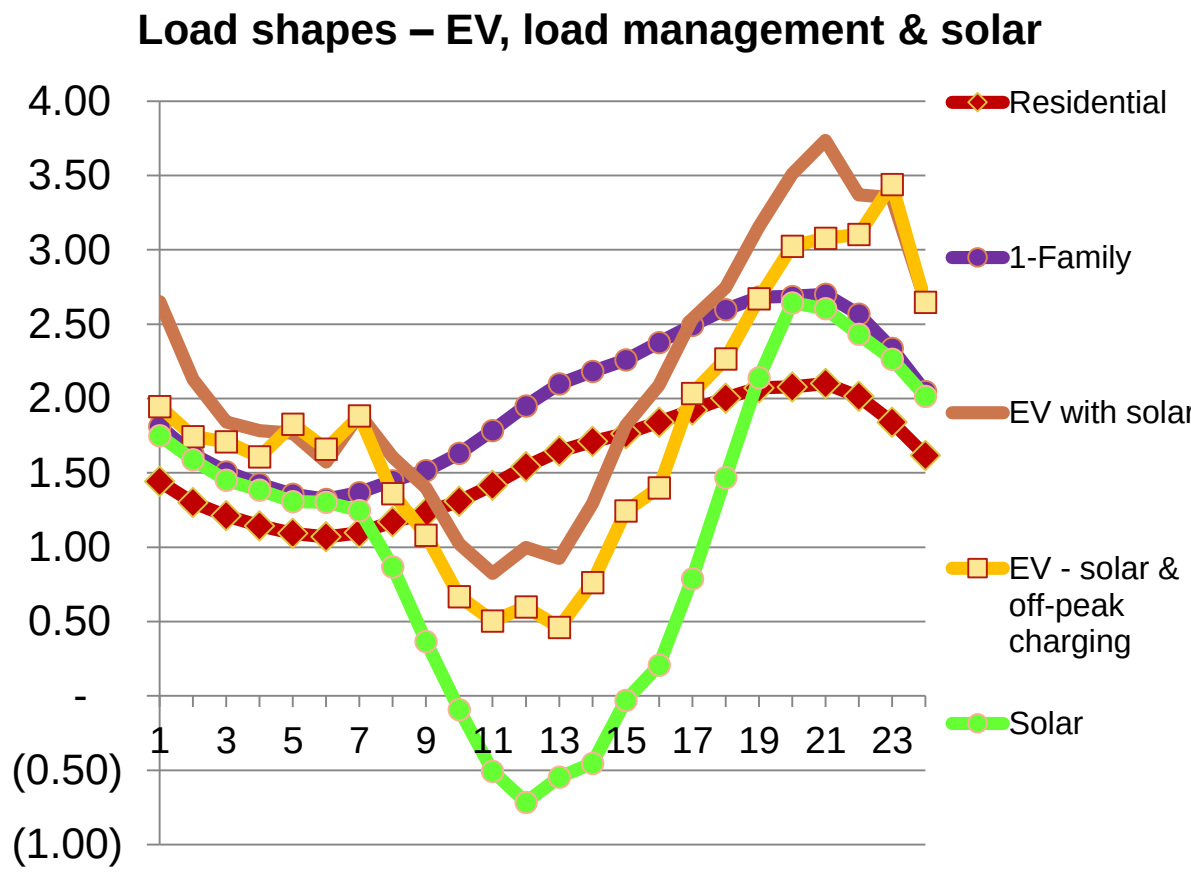
- Not all heat pumps are worth the same environmentally or economically
- Ductless heat pumps are typically not used for heating
  - **Must remove fossil fuel system to achieve results**
- Ducted heat pumps use about 4,000 kWh/yr more than average home
  - Reduce C02 by 30% to 50% over natural gas and oil

Importance of experimentation & failure

- "Fail fast" is important
- Celebrate failure, but change programs!
- EV Case study: trial and error
- Success! Finally! AMI data to the rescue.

	Option 1: AMI Data-driven prgrm	Option 2: hardware	Option 3: hardware	TOU Rate
Market penetration potential	85%	<30%	<30%	<30%
Effective off-peak charging success	95%+	80%+	50%+	33%
Works with Teslas?	✓	×	✓	✓
Works without connectivity issues?	✓	×	×	✓
Market penetration potential	85%	30%	30%	25%
Effective off-peak charging success	95%	80%	50%	33%
Maximum peak reduction	**81%**	**24%**	**15%**	**8%**

WHAT IF:				
Market penetration potential	85%	30%	30%	5%
Effective off-peak charging success	30%	80%	50%	99%
Maximum peak reduction	**26%**	**24%**	**15%**	**5.0%**



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