



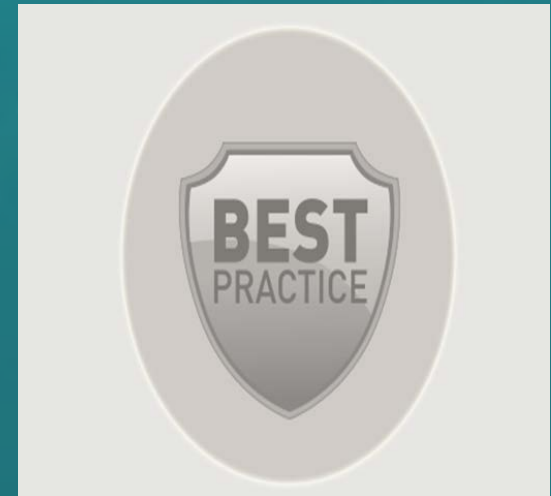
Designing Best Practices Guidance: Do We Have Enough?

Elizabeth Titus, NEEP, Moderator

Mimi Goldberg, DNV GL

Eliot Crowe, Lawrence Berkeley Lab

What does Best Practice Guidance Do?





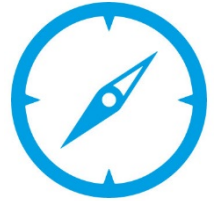
Designing Best Practice Guidance: Do We Have Enough?

NEEP EM&V Forum Fall Meeting: The Many Flavors of M&V

Miriam Goldberg

Some starting questions (from NEEP)

What's out there as guidance now?



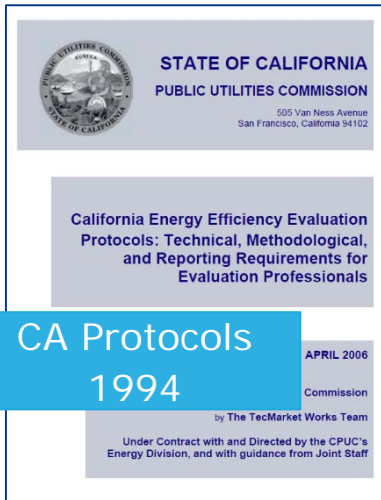
- Why was it developed?
- Who benefits from it?

Who are the users of guidance and what are their needs?

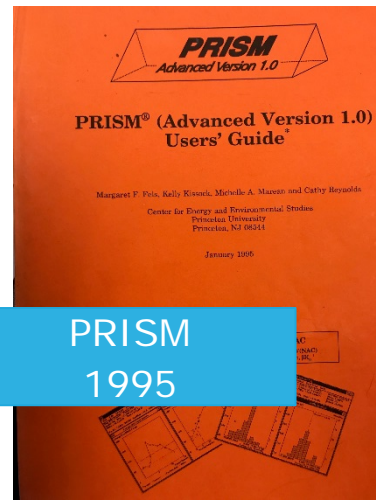


- Short term
- Long term

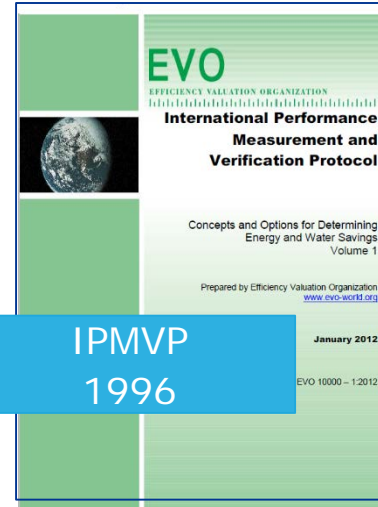
What's out there



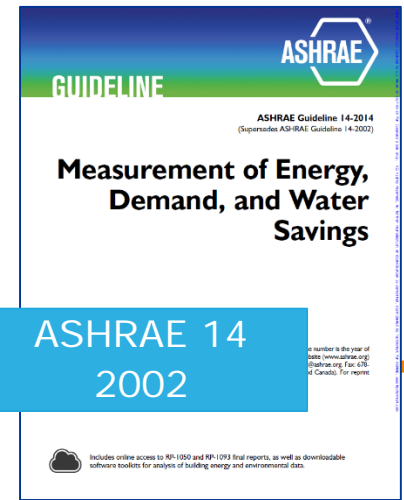
CA Protocols
1994



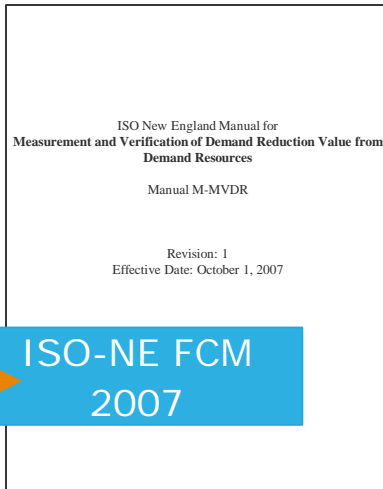
PRISM
1995



IPMVP
1996



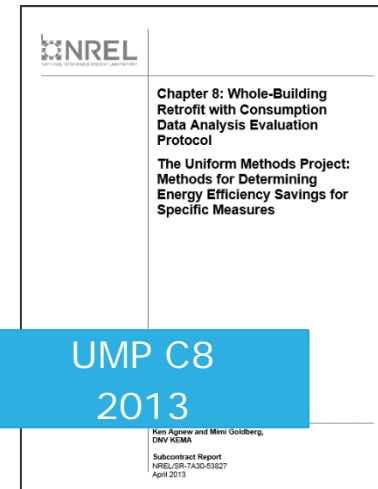
ASHRAE 14
2002



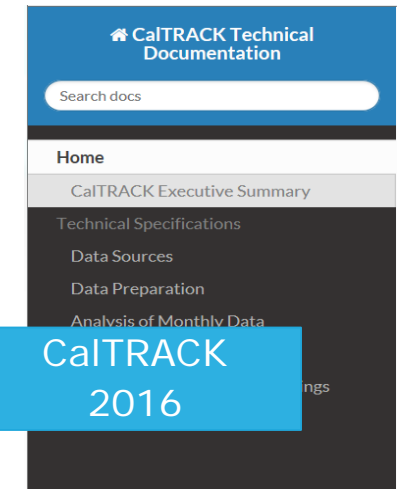
ISO-NE FCM
2007



SEP M&V
2011



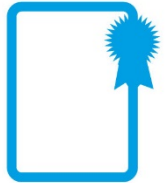
UMP C8
2013



CalTRACK
2016

Why and for who?

The overall goal of standards is to provide credibility of savings quantities



















- For parties to private transactions
- For regulators on behalf of the public (who foot the bill)

The down side



- Does it stifle innovation, and prevent thoughtful evaluators from taking the best approach?
- Do minimum standards become the maximal supported effort?

What's out there and why

Guidance Document	1st Pub	Primary Motivation	Individual or Aggregate	PRIVATE or PUBLIC
California Protocols 	1994	Assure regulators that evaluation accurately reflects benefits		PUBLIC
PRISM Users Guide 	1995	Research and Evaluation Tool		PUBLIC
EVO/IPMVP —Option C 	1996	Support private EE performance contracts		PRIVATE
ASHRAE 14 	2002	Support commercial transactions based on EE /demand savings measurement		PRIVATE
ISO–NE FCM M&V Manual 	2007	Market auction settlement		PUBLIC
SEP M&V Protocol 	2011	Support continuous improvement		PRIVATE
UMP C8 Whole-house 	2013	Strengthen EE programs credibility by improving the consistency and transparency of savings determination		PUBLIC
CaITRACK 	2016	NMEC per AB802, SB305 Manage EE programs Support P4P		PUBLIC

Framing perspectives

If it's M&V, it should do what M&V does, and follow the same rules

Why do we need anything different?

New players

- Consolidate, prioritize, rationalize existing guidance

Large-scale automated processes

- Can't rely on tailored expert judgment
- We might have benefited all along from more structure for some of this

Hourly and finer consumption data

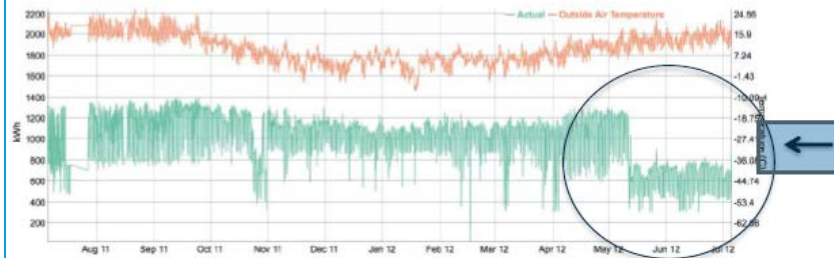
- Standard errors and model selection for individual sites are different with highly correlated data

New uses and risks

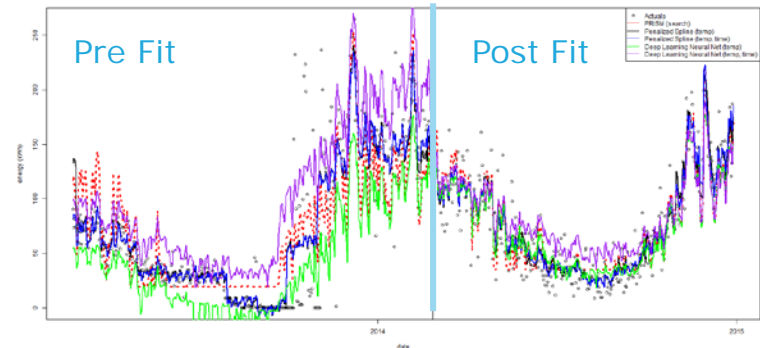
- P4P
- NMEC
- Faster results
- Internal program feedback
- Customer engagement
- Time-Differentiated Savings

What needs more guidance?

Non-Routine Event Identification and Adjustments

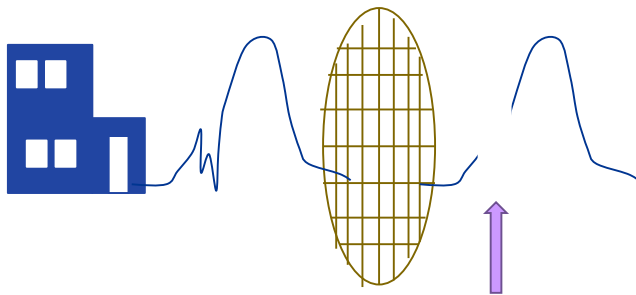


Model Selection Criteria

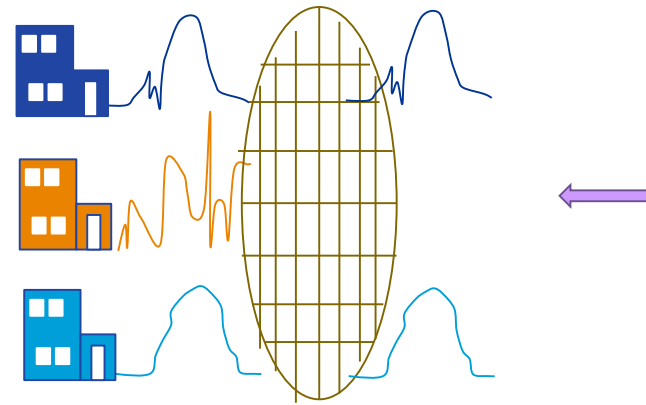


What is Normal Weather?

Data Screening



Time points within an individual site



Sites within a group

What guidance is needed?

- Promulgate, prioritize existing whole-premise guidance
- Demonstrate (test) that tools predict well in “typical” data sets
- Document, Document, Document

Short Term



- Rules for identifying and addressing non-routine events
- Data cleaning criteria
- Accuracy metrics for high frequency data
- Protocols for “bad” cases in samples of premises
- Protocols/documentation for model selection rules
- Demonstrate tools follow the protocols or documentation
- (Re)defining “normal”

Long Term



- Details will need to depend on the application.
- How do we avoid molding tools to the tests and test data?

Thank You!

For more information:

Miriam.Goldberg@dnvgl.com

608-259-9152

www.dnvgl.com

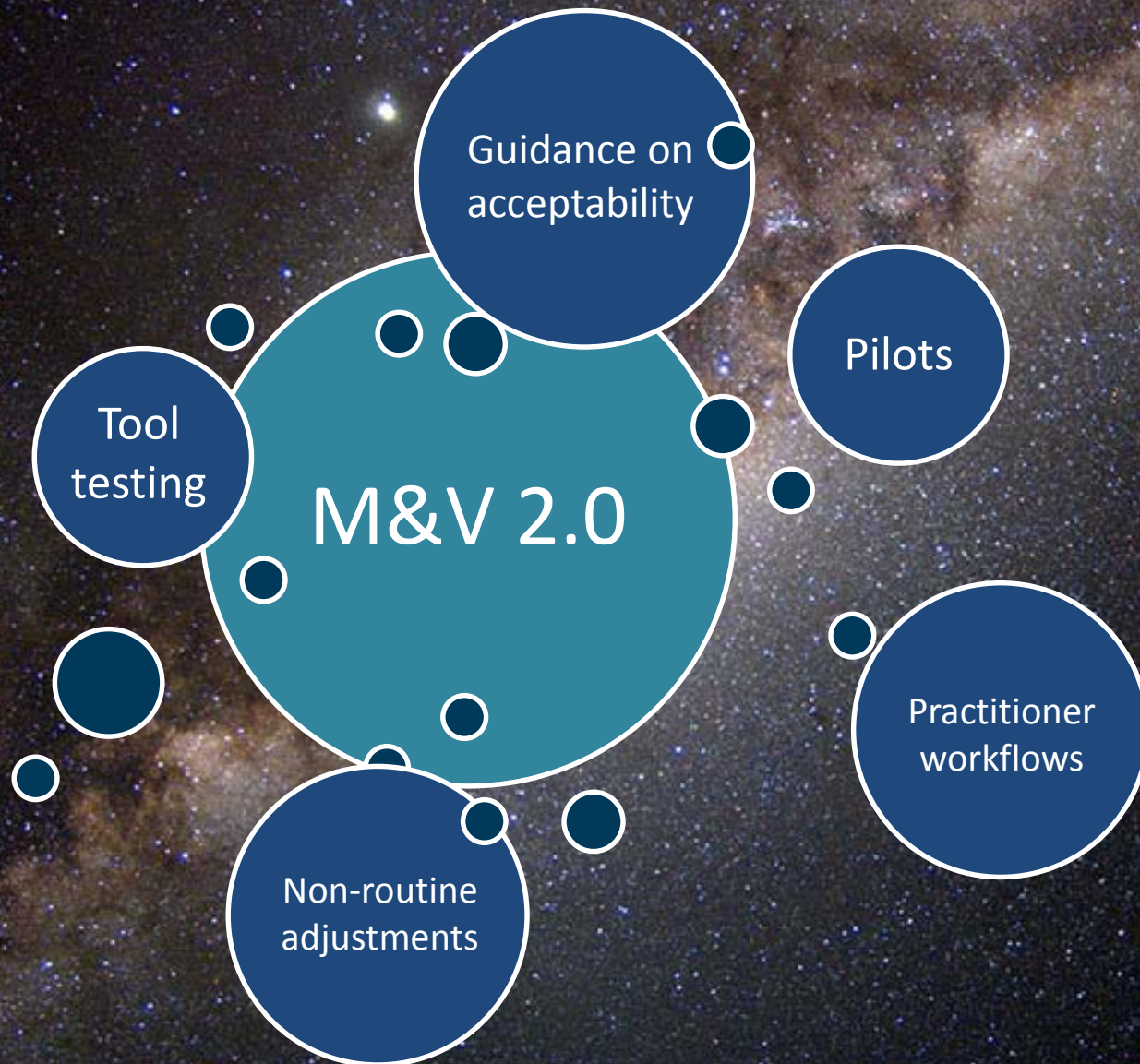
SAFER, SMARTER, GREENER

NEEP Regional EM&V Forum Fall Meeting October 3, 2017

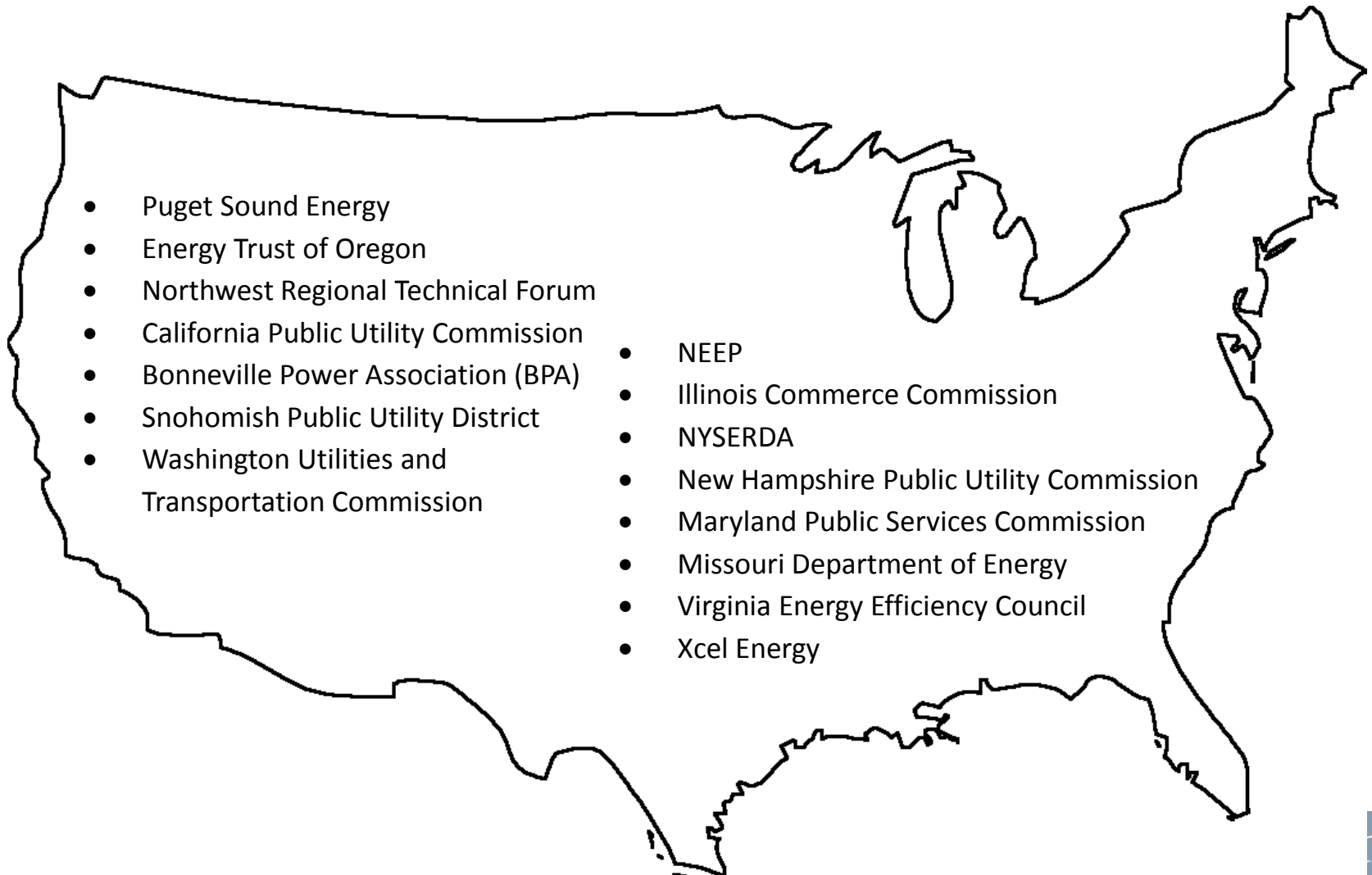
Eliot Crowe
Lawrence Berkeley National Laboratory

$$\begin{bmatrix} 80.8 & 2.3 \\ 2.3 & 0.28 \end{bmatrix} \begin{bmatrix} \ddot{\phi} \\ \ddot{\delta} \end{bmatrix} + \left\{ v \begin{bmatrix} 0 & 33.9 \\ -0.85 & 1.69 \end{bmatrix} \right\} \begin{bmatrix} \dot{\phi} \\ \dot{\delta} \end{bmatrix} + \left\{ g \begin{bmatrix} -80.9 & -2.6 \\ -2.6 & -0.8 \end{bmatrix} + v^2 \begin{bmatrix} 0 & 76.6 \\ 0 & 2.65 \end{bmatrix} \right\} \begin{bmatrix} \phi \\ \delta \end{bmatrix} = \begin{bmatrix} T_\phi \\ T_\delta \end{bmatrix}$$

M&V 2.0 – Laying the Groundwork

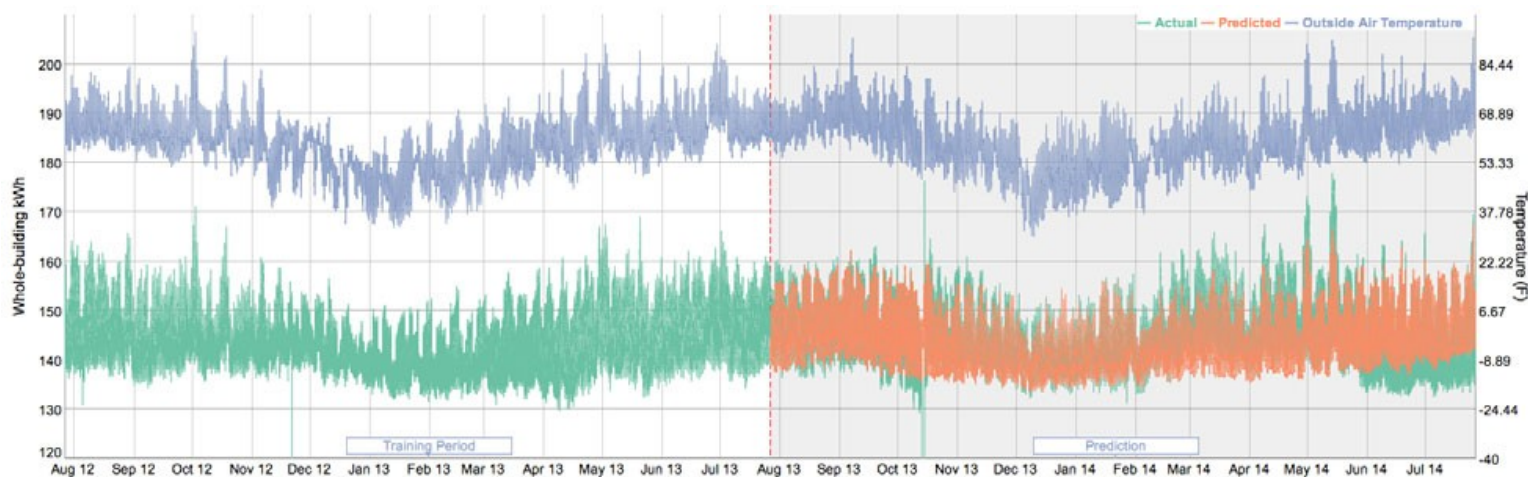


Stakeholder Engagement

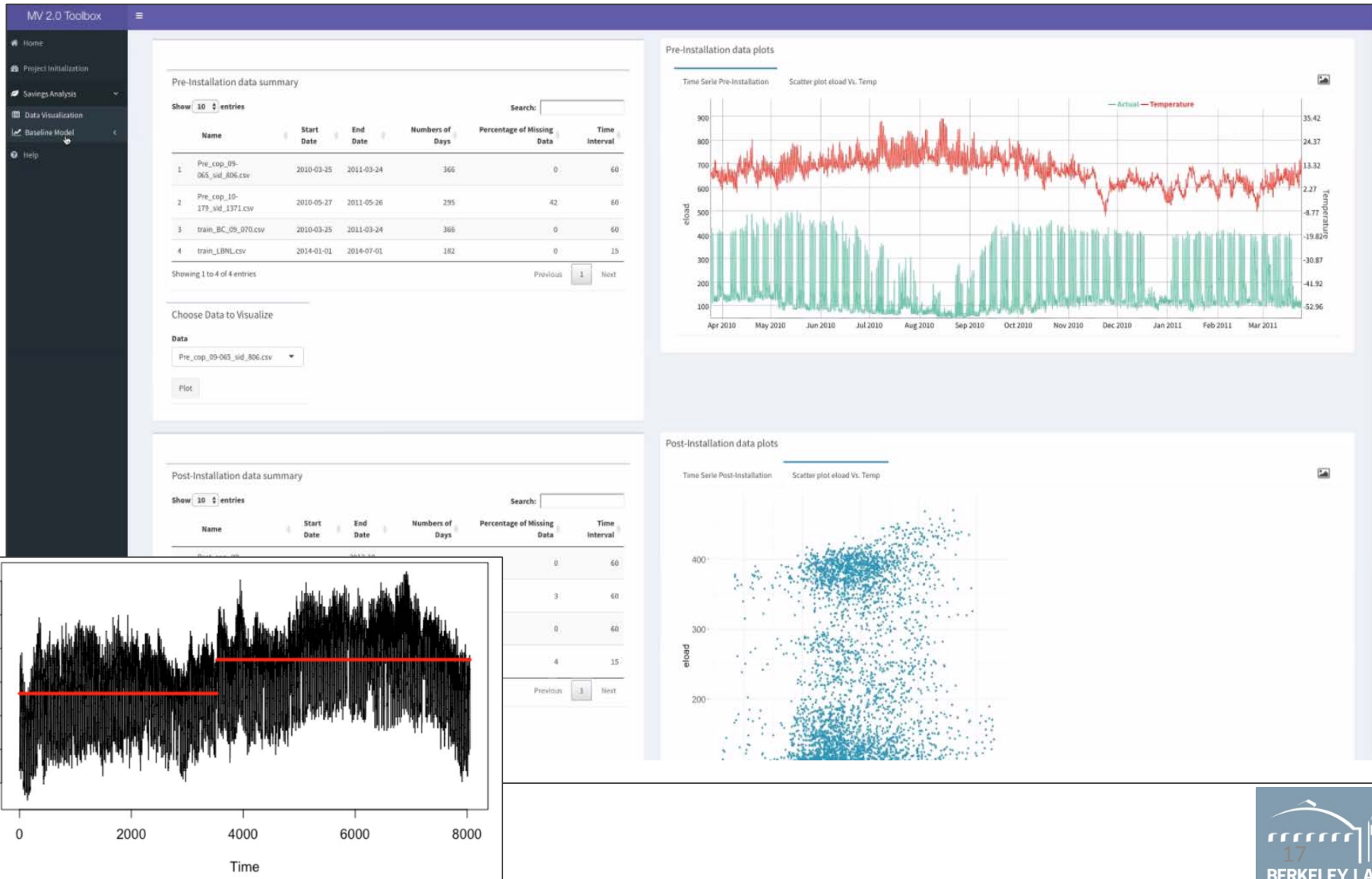


Tool Testing

- Objective assessment: Actual metrics
- Comparative assessment: Better, worse, or same as the benchmark tool?
- Key point: Focus on ability to predict future consumption across many buildings not limiting to baseline fitness for single building



M&V Tool



$$\begin{bmatrix} 80.8 & 2.3 \\ 2.3 & 0.28 \end{bmatrix} \begin{bmatrix} \ddot{\phi} \\ \ddot{\delta} \end{bmatrix} + \left\{ v \begin{bmatrix} 0 & 33.9 \\ -0.85 & 1.69 \end{bmatrix} \right\} \begin{bmatrix} \dot{\phi} \\ \dot{\delta} \end{bmatrix} + \left\{ g \begin{bmatrix} -80.9 & -2.6 \\ -2.6 & -0.8 \end{bmatrix} + v^2 \begin{bmatrix} 0 & 76.6 \\ 0 & 2.65 \end{bmatrix} \right\} \begin{bmatrix} \phi \\ \delta \end{bmatrix} = \begin{bmatrix} T_\phi \\ T_\delta \end{bmatrix}$$



Walk & Bike to School Day, tomorrow! <http://www.walkbiketoschool.org/>

Thank You!

Ecrowe@lbl.gov, 541.708.3034

eis.lbl.gov/auto-mv.html