

Use of Technical Reference Manuals for DSM program performance measurement

Pros and Cons

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What is a TRM?

- A collection of protocols and measures
- Provides guidance for DSM programs
 - Tracking
 - Impact evaluation
 - Process evaluation
 - NTG ratio calculations
 - Roles and responsibilities
- Provides algorithms, deemed values and methods on a measure by measure basis

History of M&V methods and documents

1980's and before

- Engineering analysis

1980-1990's

- M&V focusing on field verification

1994 - onward

- NAEMVP -> IPMVP, FEMP M&V Guidelines

1990-2000's

- Appendices added to DSM programs directing M&V
- Tools developed, calmac

2000-2010's

- Citations start to become more important

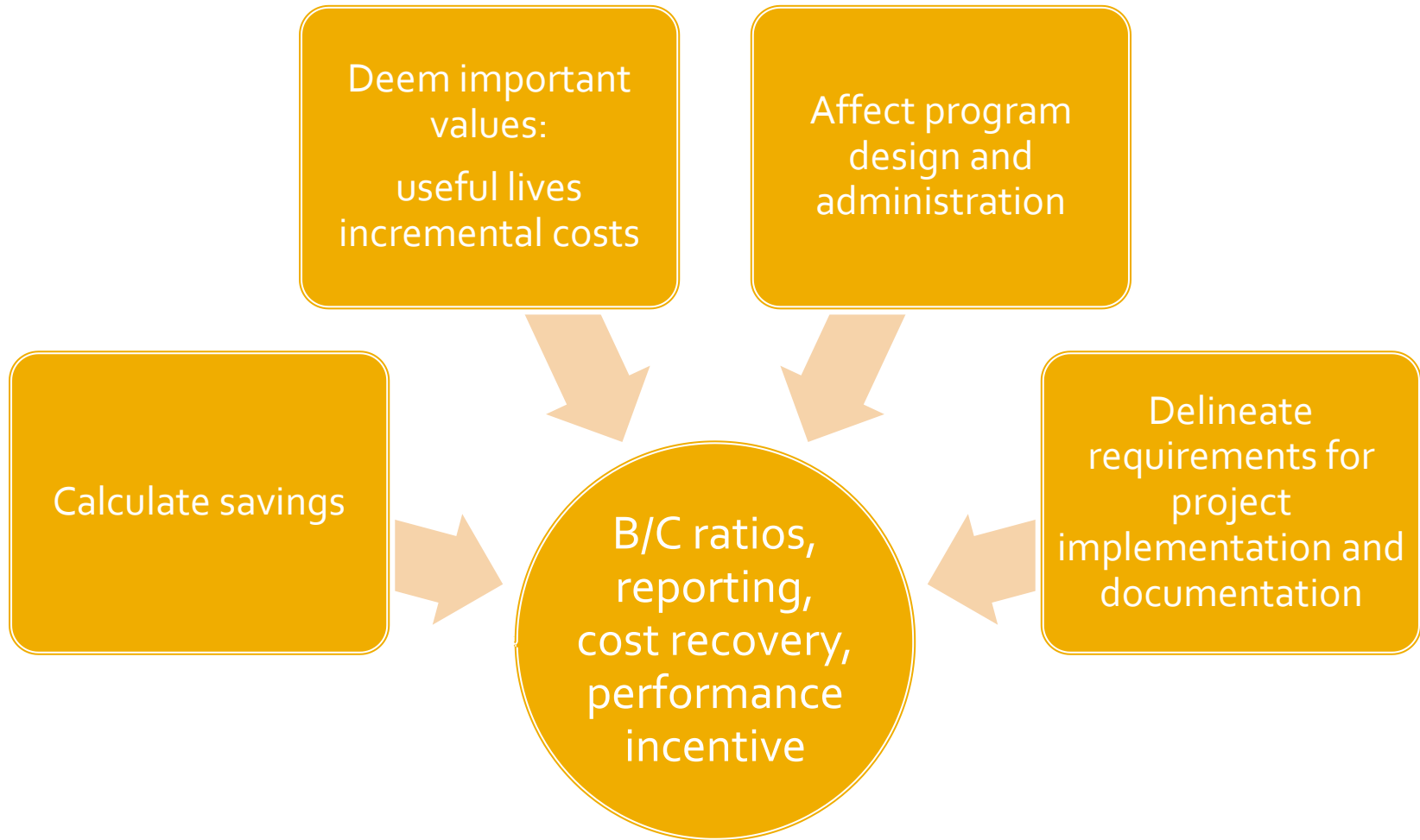
2010's

- Increased number of TRMs

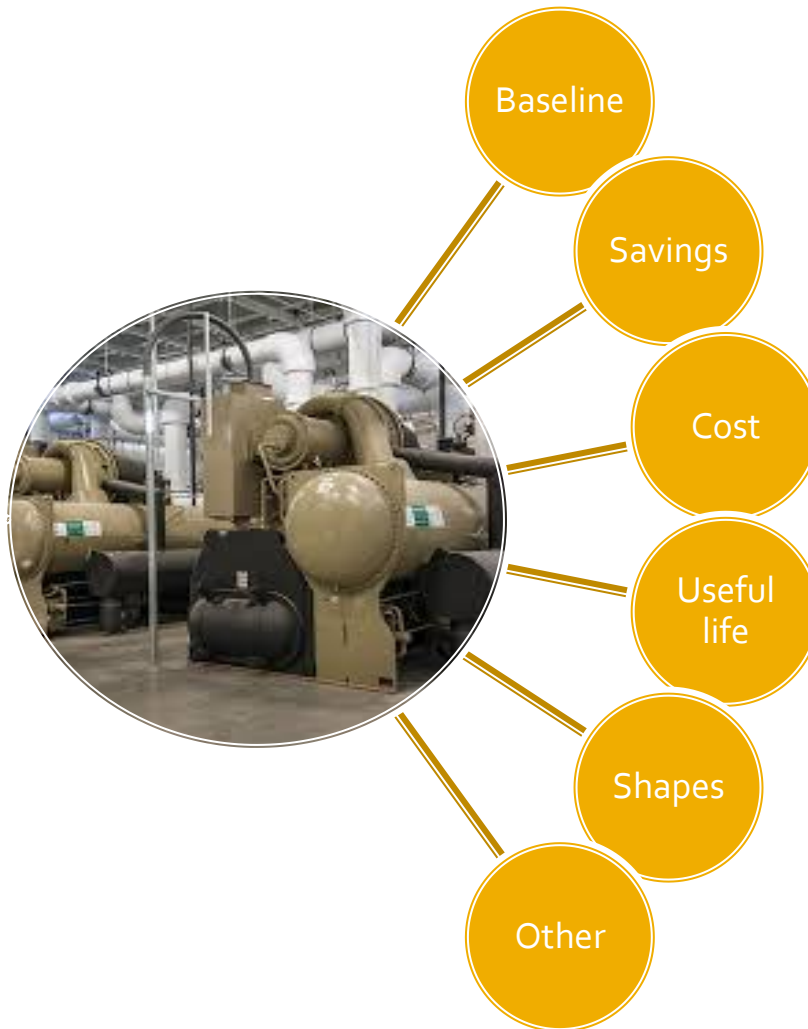
The Future

- Continue to improve TRMs

TRMs are used to:



Measure by Measure



Each deemed parameter drives program 'performance'

Pros

- Transparency and consistency
- Promotes inclusion
- Avoids gaming
- Provides reliable estimates (?)
- Pools development resources
- Saves M&V dollars
- It is really great to have a good resource for calculations!

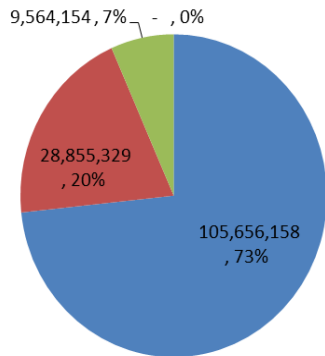
Cons

- Inaccurate savings
 - Over simplification
 - Improper application
 - Does not provide needed flexibility in inputs
- Errors propagate
- Large differences exist
- Significant reliance on computer simulations
- Development and maintenance expenses

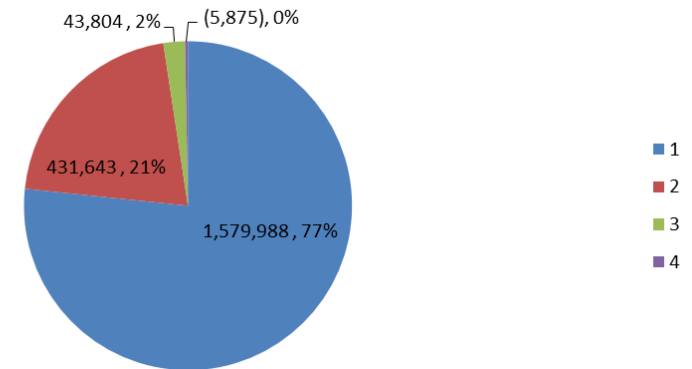
High Impact Measures

Top 3 electric measures make up 73% of kWh savings. (Res light, com light, compressed air)

kWh savings by tier



Therm savings by tier



Top 6 gas measures make up 77% of therm savings (furnace, aerators/showerheads, insulation)

Shifting responsibilities

Evaluator



Regulator



TRM

Utility



Implementer

Common Citations / Sources

- Energy Star Calculators
- Energy Codes
- Computer simulations
- Evaluation studies from other jurisdictions
- Recognized resources such as ASHRAE
- Research
- DEER

Is application reliable?

Translating from one region to another

- Studies from different regions of the country are often applied
- Extensive use of secondary research
- Mix and match
 - Commercial measures use one method
 - Residential measures use another
 - Within measures
- TRMs, then, are a compendium

Propagation of Imperfections

- TRMs can cause and propagate errors and biases in savings estimates
- Any port in the storm
 - -RLW Analytics: Final Report Coincidence Factor Study Residential Room Air Conditioners, June 23, 2008
 - Does this study translate well? I hope so!

HVAC Equipment Savings

()

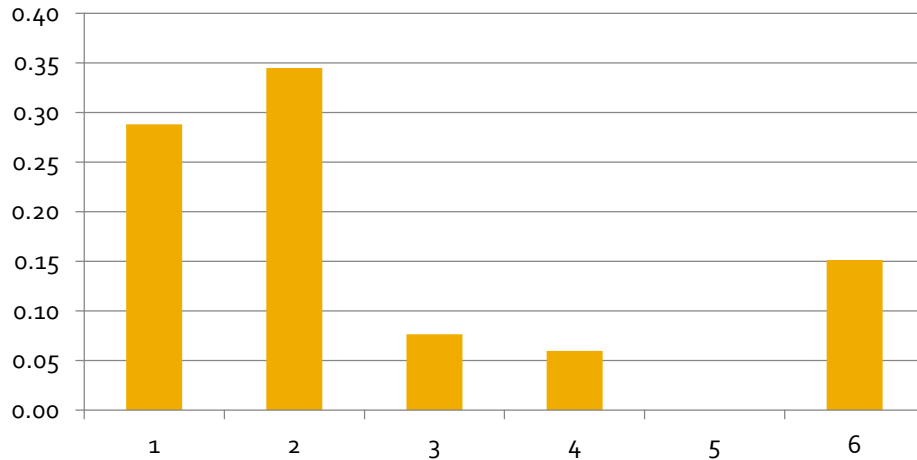
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- Simple analysis method
- Not a lot of validation
- Basic engineering calculations

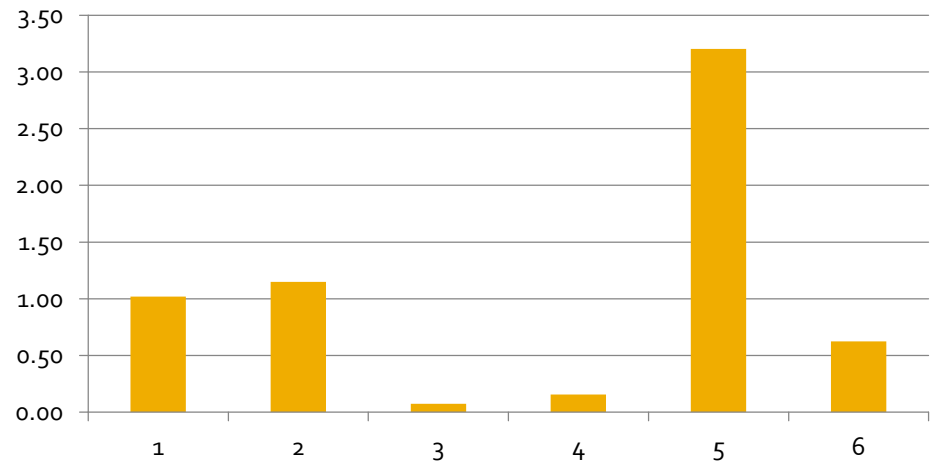
TRM savings Comparison

Wall insulation

Heating Savings Thrm/SF



Cooling Savings kWh/SF



EFLH

- Uncertain value generally derived using building simulations
 - Weak correlation to HDD and CDD
 - Strong savings driver for many retrofits
 - AC, Chillers, Boilers, etc.

Other Comparisons

- Motor run hours – Cv 0.28
- Cool roofs – Cv 0.62
- Tuneup % savings Cv 1.15 (orifice) 0.82 (TXV)
- Split / Unitary kWh – Cv 0.46
- PTAC kWh – Cv 0.27
- Chiller kWh – Cv 0.36
- Etc....

Costs

- TRMs can be expensive to maintain
 - AR Annual spend \$59,000,000
 - EM&V spend \$3,000,000 ??
 - AR spending over \$200k/year in direct consulting hours for TRM update
 - Other spending by PUC staff, interveners, implementers, utilities, etc.
- TRMs then, are probably a great deal.

Suggestions

- Tie evaluation closely to TRM
 - Now they are on parallel paths, but don't overlap enough (this is somewhat surprising)
- Question everything
 - Use program data and findings to refute or validate TRM
- Benefits outweigh costs
 - Working together is good for everybody
 - Fund good work for TRMs

Questions

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