



HERS vs. HERS (California vs. RESNET)

A technical comparison of rating systems

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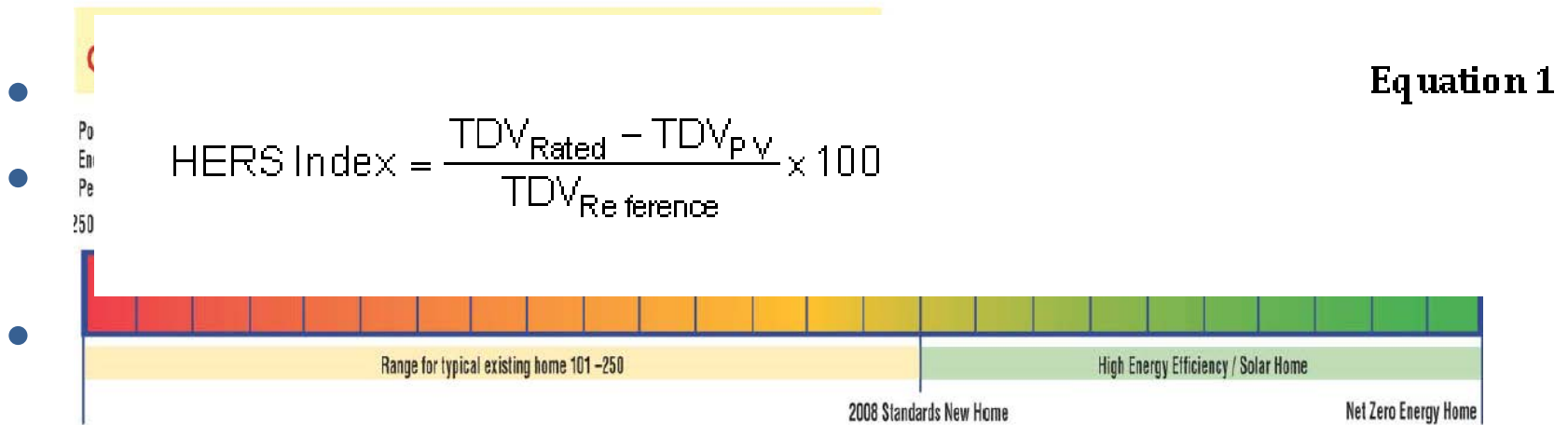
RESNET Conference - February 17, 2015

Agenda

- The Basics
- Calculation differences
 - Climate Zones
 - Energy Basis
 - Reference building
 - Simulation Method
 - Other oddities
- System differences
- The Results

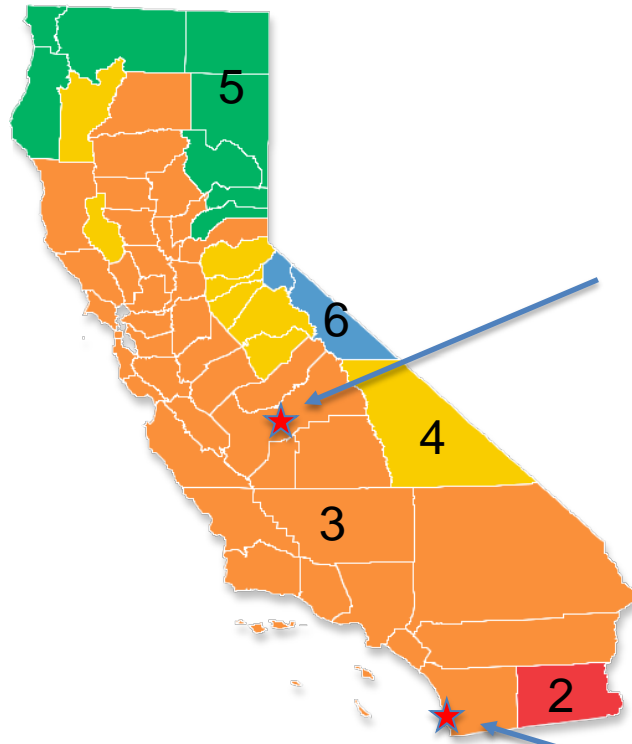
The Basics

Take the proposed, compare it to a reference, put it on a scale from 0-250 with 100 = reference.... Nothing could be more the same!

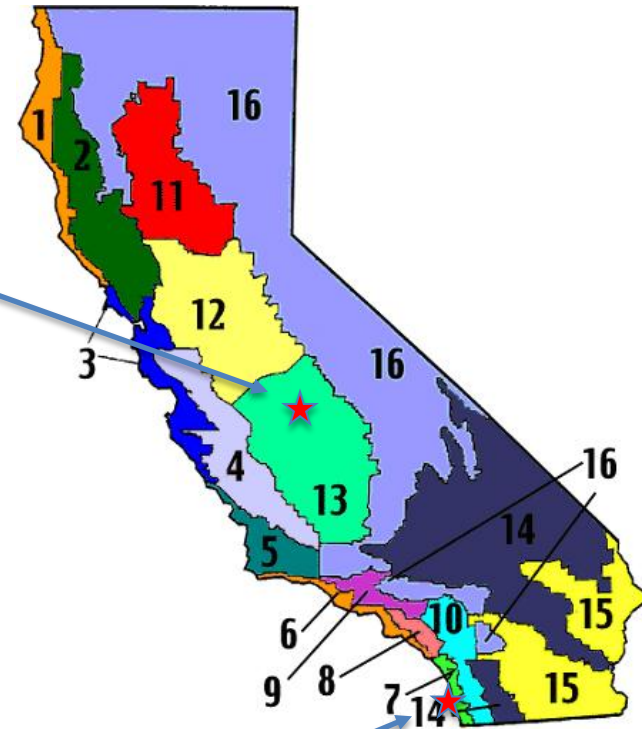


Calculation Differences – Climate Zones

IECC 2009



CA Title-24, Part 6



Fresno

San Diego

CA HERS Index Basics

Tools to reduce CA HERS Index

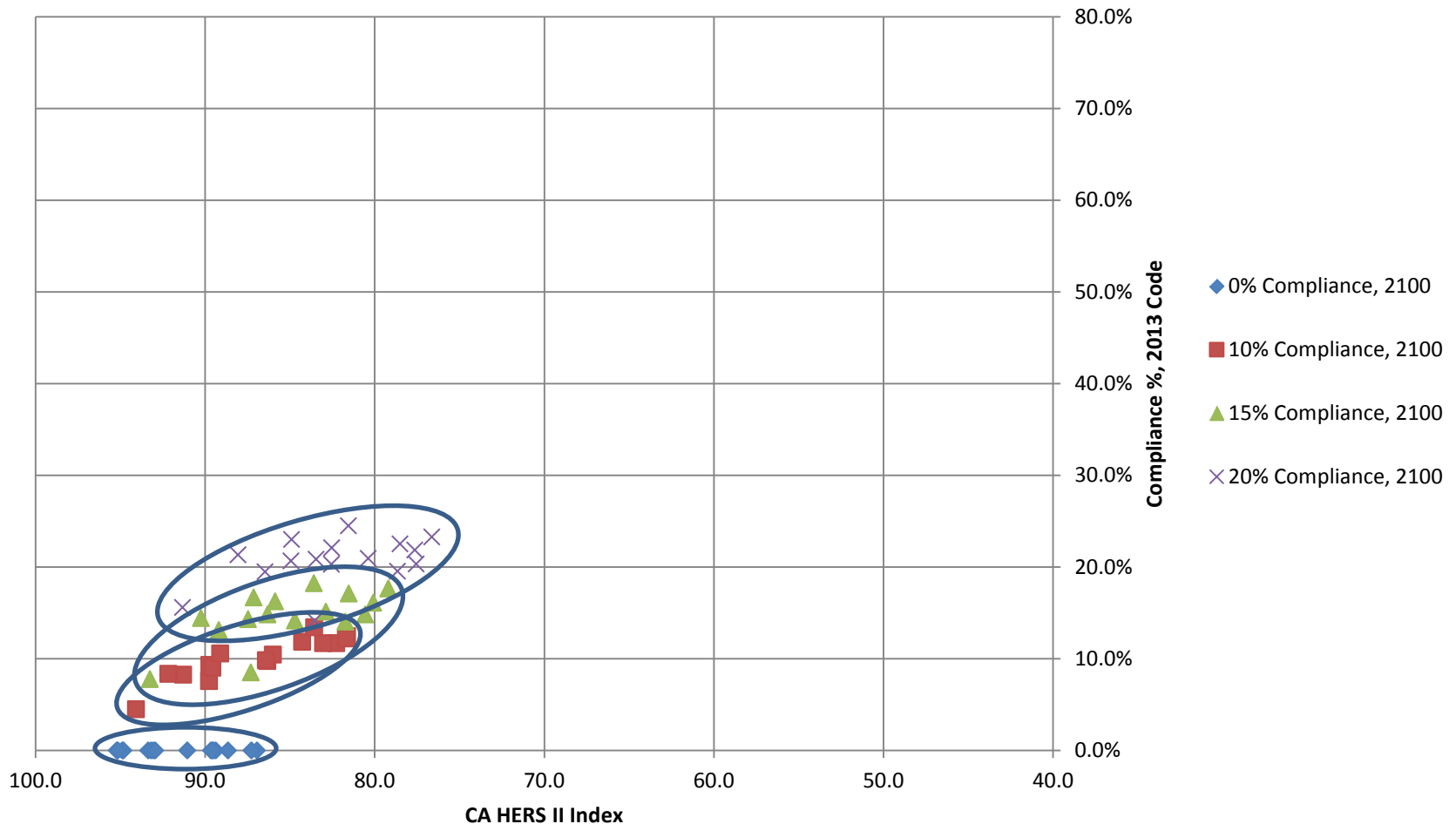
- All typical T24 modeling options
- Restrictive allowances for lighting, refrigerator and dishwasher
- Appliance fuel choice (washer, dryer, oven)
- House size
- Custom 'CAHP' Points as determined by the program (more on this later)

CA HERS Index – Compliance % correlation

- Geometries per CEC prototype 2,100 & 2,700 sq.ft. reference buildings
- Created 11 prototype building models/packages, designed to reach the following 2013 compliance levels in CZ 12:
 - 0%, 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%, 55%, 65%, 70%
- Ran each model in each CZ
- Design choices were iterative, using
 - The most common efficiency features seen in the current CAHP program
 - High savings measures identified in other research as integral to reaching zero net energy (ZNE Tech Potential Study, ZNE Roadmap Study)
 - Did not use any non-reg load features

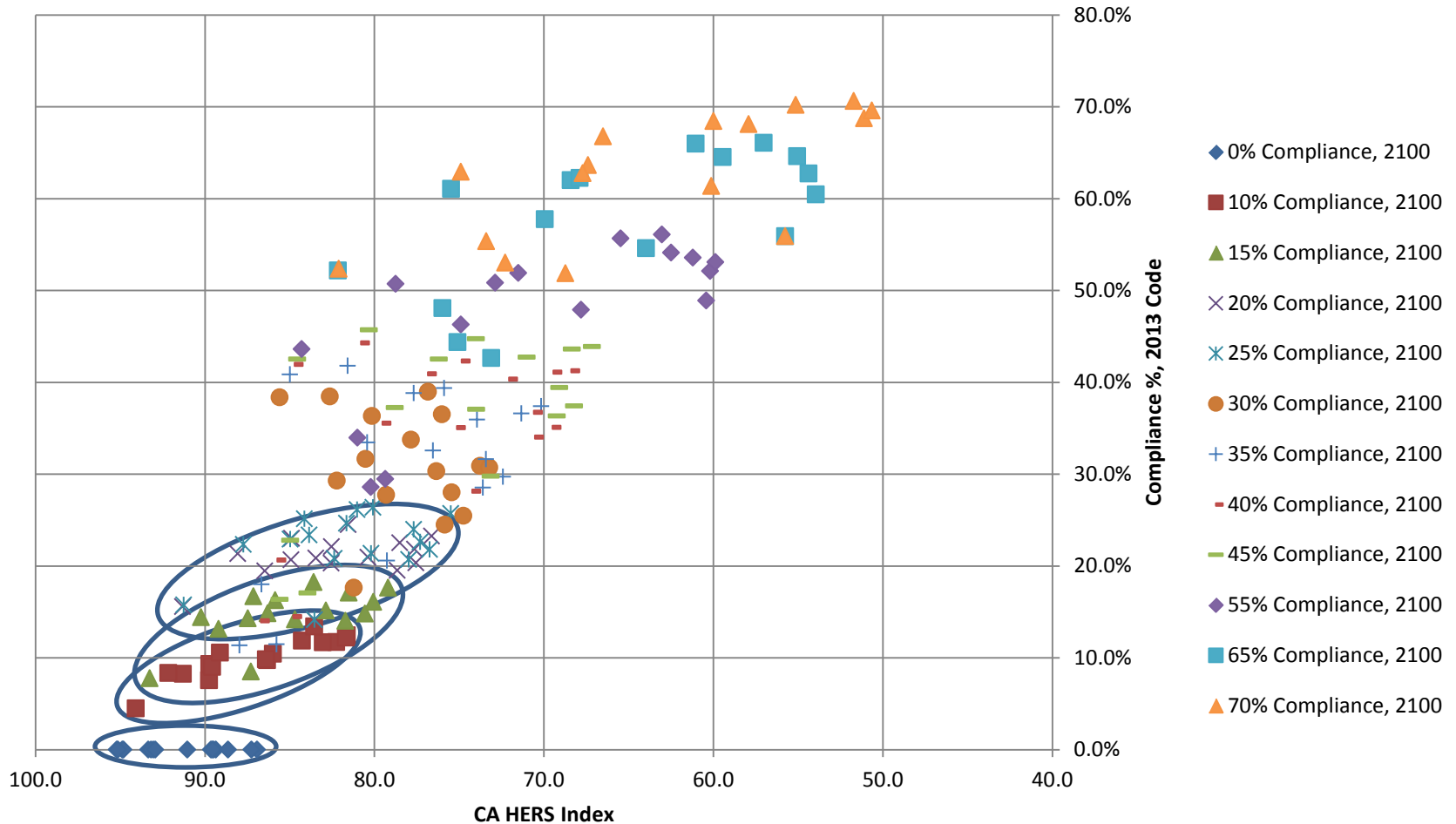
CA HERS Index – Compliance % correlation

CA HERS Index - Compliance % Correlation (2013 Code)



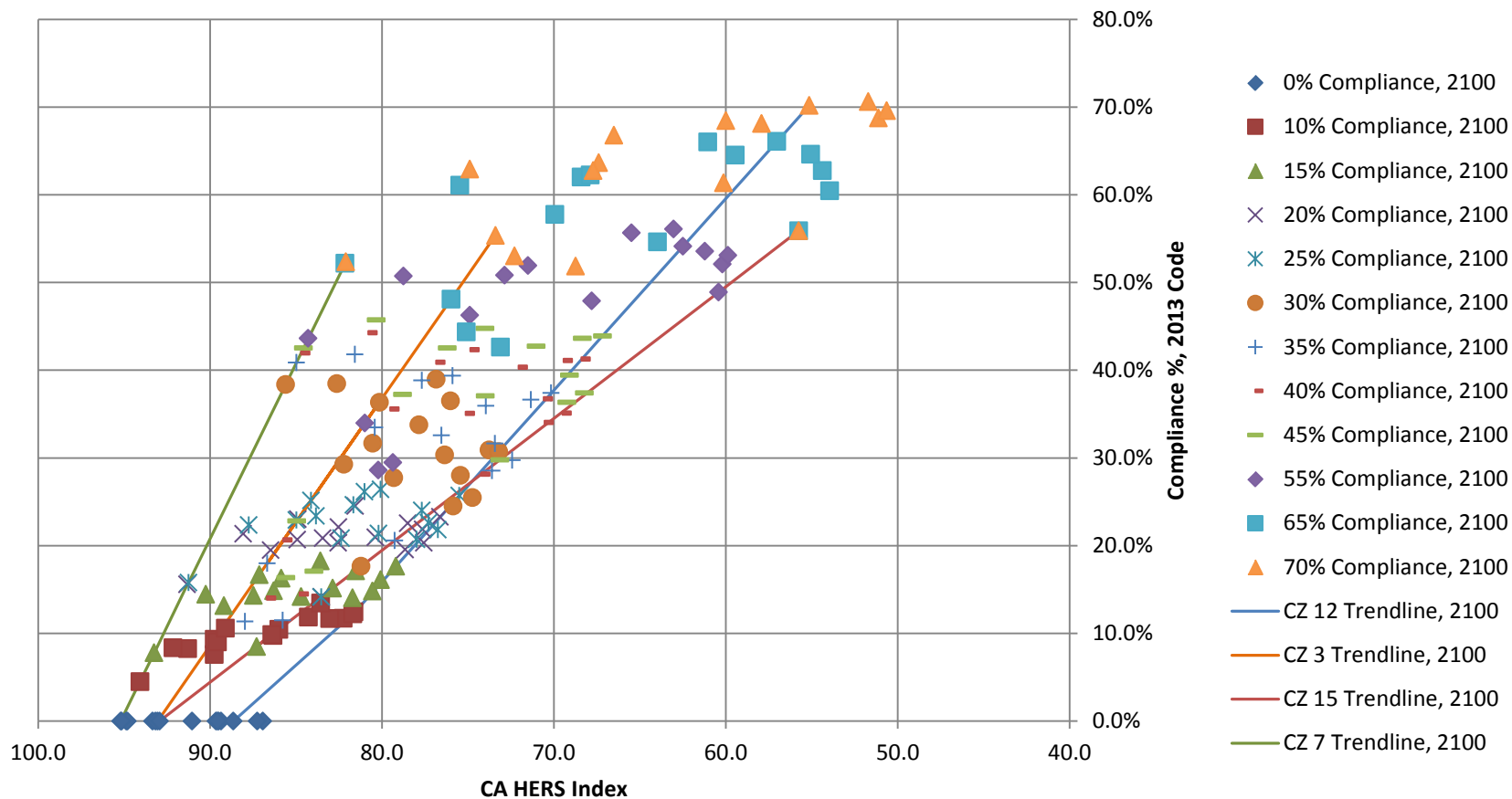
CA HERS Index – Compliance % correlation

CA HERS Index - Compliance % Correlation (2013 Code)



CA HERS Index – Compliance % correlation

CA HERS Index - Compliance % Correlation (2013 Code)



Measures Packages

Nominal % Compliance	Envelope	DHW	Cooling	Heating	Distribution
10%	--	--	EER 12, SEER 14	84% AFUE	--
15%	QII	--	--	--	--
20%	QII	EF = 0.62	EER 12, SEER 14	84% AFUE	--
25%	QII	EF = 0.62	EER 12, SEER 14	92% AFUE	--
30%	QII	EF = 0.82 (tankless)	EER 12, SEER 14	84% AFUE	--
35%	QII U30/S22 windows	EF = 0.82 (tankless) all pipes insulated	EER 12, SEER 14	92% AFUE	R-8 ducts
40%	QII U30/S22 windows R-21 wall cavity	EF = 0.82 (tankless) all pipes insulated	EER 13, SEER 15	92% AFUE	R-8 ducts
45%	QII U28/S22 windows R-21 wall cavity 3.0 ACH50 0.90 roof emittance	EF = 0.82 (tankless) all pipes insulated	EER 13, SEER 15	92% AFUE	R-8 ducts

Notes:

1. All runs included Package A prescriptive requirements except as noted above
2. **Bold** indicates measure added or changed from the previous package

Measures Packages

Nominal % Compliance	Envelope	DHW	Cooling	Heating	Distribution
55%	QII U28/S22 windows R-21 wall cavity 3.0 ACH50 0.90 roof emittance R-44 ceiling ins	EF = 0.82 (tankless) all pipes insulated	EER 14, SEER 16	92% AFUE	R-8 ducts Low-leakage ducts in conditioned space
67%	QII U28/S22 windows R-21 wall cavity 0.90 roof emittance 1.0 ACH50 R-8 ext wall ins R-49 ceiling ins R-10 24" slab edge insulation 24" oc ext wall stud spacing R-13 roof deck ins	EF = 0.97 (tankless) all pipes insulated	EER 14, SEER 18	95% AFUE	R-8 ducts Low-leakage ducts in conditioned space
70%	QII U23/S23 windows R-21 wall cavity 0.90 roof emittance 1.0 ACH50 R-8 ext wall ins R-60 ceiling ins R-10 24" slab edge ins 24" oc ext wall stud spacing R-13 roof deck ins U40 exterior doors	EF = 0.97 (tankless) all pipes insulated	EER 15, SEER 19 Multi-speed AC compressor 400 cfm/ton airflow	98% AFUE	R-8 ducts Low-leakage ducts in conditioned space ECM furnace motor

CAHP Score – CA HERS Index minus CAHP Points

- Give CAHP points for energy saving designs features that aren't captured in the HERS Index directly
- CAHP Points would need vetting, white papers, and documentation
 - No Cooling
 - Meet a Lighting Power Density design criteria
- Desired by C&S as well as CEC to drive next code and HERS index development
- Could allow for truly 'Advanced' home designs
- **Aggressively explore the option to go 'non-resource' (fold into C&S)**

Program Entry Threshold

- TRC proposes threshold of an 82 CAHP Score (roughly 20% above code, highly dependant on CZ)
 - Deep enough to drive EE design decisions
 - Achievable in all CZs with standard measures (though some need non-reg load measures)
- Advise against splitting threshold by CZ type (Coastal, Inland, etc.)
 - Coastal climates would need more non-reg load measures and/or CAHP points
 - Consider CAHP point bonus for total TDV score?

Program Incentives (full analysis incomplete)

- Anchor incentive rates to 50% incremental building cost at entry point.
- TRC proposes \$-for-HERS Index structure instead of \$-per-commodity
 - Dummy example: \$400 entry, \$50 per HERS point below 82, \$75 per HERS point below 70
 - More transparent for the builder, easier to plan around
- TRC proposes a HERS rater incentive to drive participation and improve verification

Future Program Design Needs

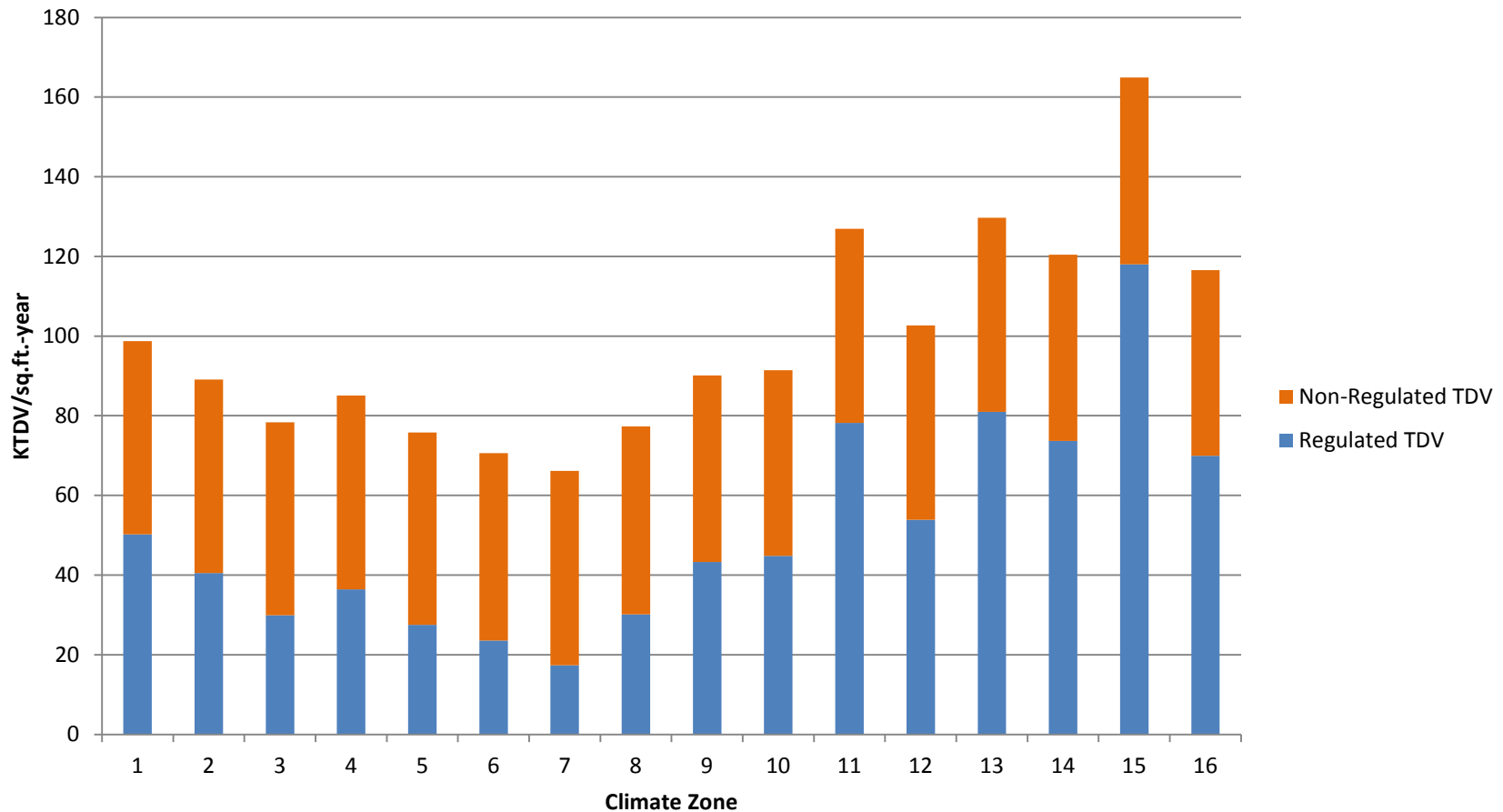
- How to apply to MF?
- Determine ‘ZNE ready threshold’ (likely in range of 40-45) and appropriate program kicker
 - Perhaps consider ‘Annual TDV’ definition, regardless of CZ, house size, etc.
- Determine ZNE pilot project scheme
- Finalize incremental cost and incentive structure analysis
- Determine modeling and registration/verification requirements

Thank you

Questions?

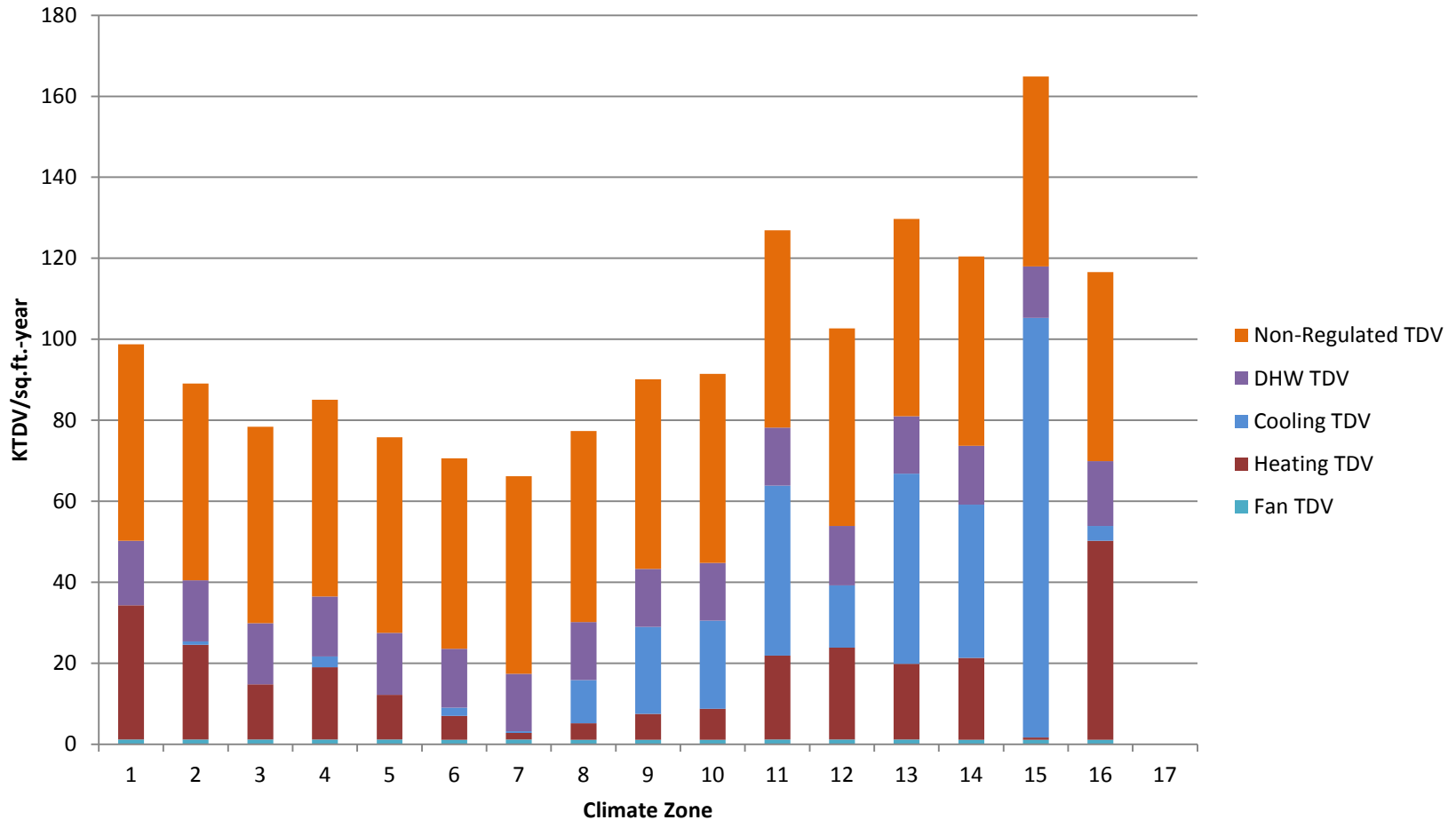
Energy Use by Climate Zone

Total TDV Use by Climate Zone -2013 Code home



Energy Use by Climate Zone

Total TDV Use by Climate Zone -2013 Code home



Energy Use by Climate Zone

Total TDV Use by Climate Zone -2013 Code home

