Residential Standards Research Tool – Calculation Engine Residential Analysis Preview

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Topics

- CSE a new California Simulation Engine
- 2013 Standards Research Program
- 2013 Residential Analysis Preview
  - New Weather
  - New Calculation Engine
  - New TDV
- Next Steps

CSE a new Public Domain California Simulation Engine

- Supported by the IOUs and the CEC
- Accurately estimate
  - solar gain impact on cooling energy and peak load
  - building shell and interior mass on cooling loads and indoor temperature variation
  - ventilation interaction with building mass and its impact on cooling energy and peak load
- Add new capabilities for comfort analysis, mechanical ventilation, evaporative cooling

2013 Standards Research Tool

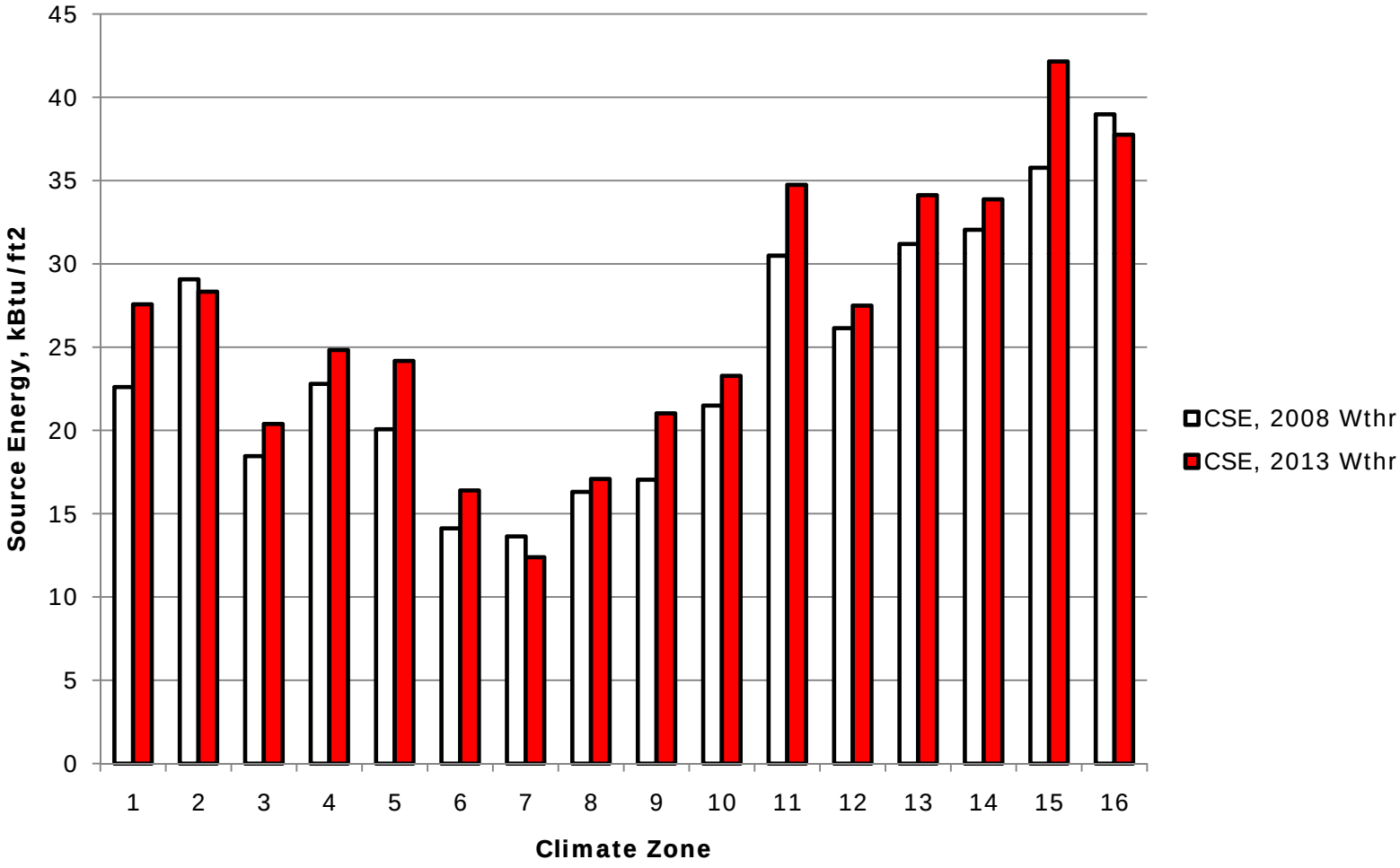
- Approach used for 2008 Standards
- Supported by the IOUs and the CEC
- Integrated CSE and UZM
- Current Micropas/CALRES User Interface, not public domain
  - Use by CEC, CASE, stakeholders for exploration of measures and ACM rules
  - New weather files
  - Life Cycle Cost using new TDV

2013 Residential Analysis Preview

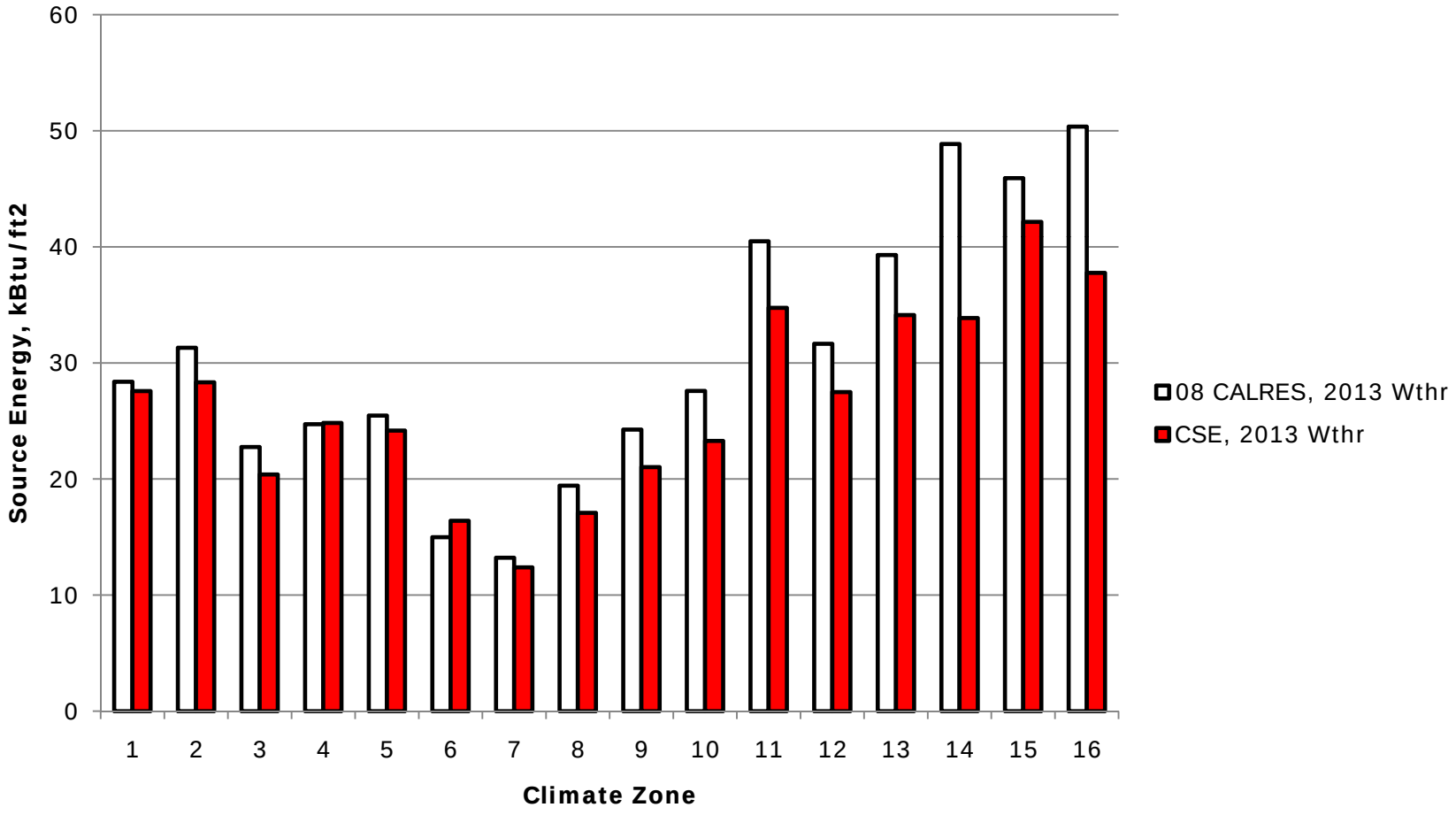
- Exploring the changes
  - 2013 versus 2008 Weather and TDV
  - **Preliminary** 2013 CSE versus 2008 CALRES
- Approach
  - Prototype home, 2008 Package D, 2008 ACM
  - Compare heating, cooling, hot water
  - Compare example measure savings
    - Air conditioner EER, furnace AFUE, water heater EF
    - Insulation quality and added roof deck insulation
    - Infiltration reduction (Specific Leakage Area or SLA)

2700 ft^2 Prototype House

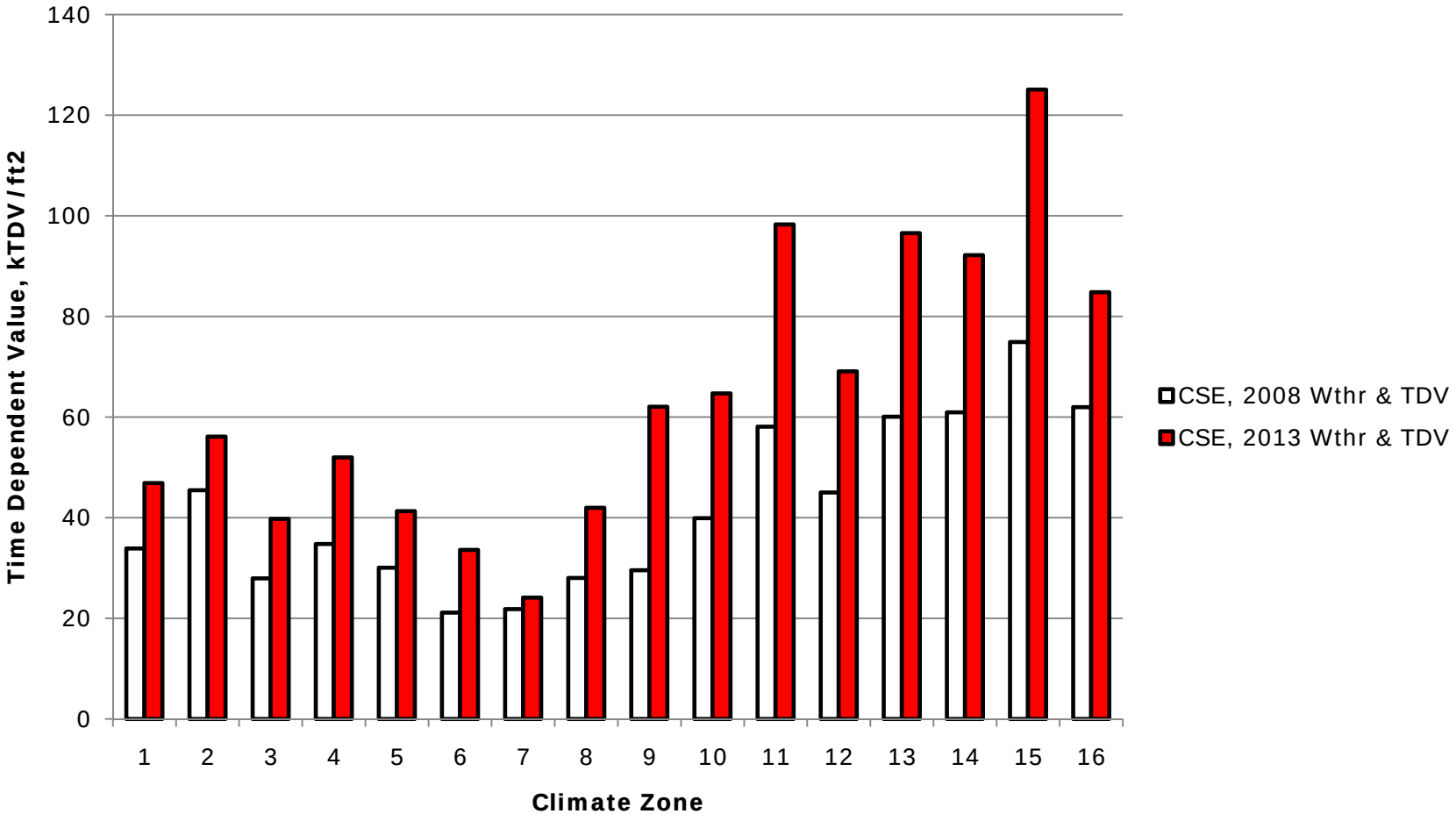
Impact of New Weather Data on Overall Energy Consumption is Minor



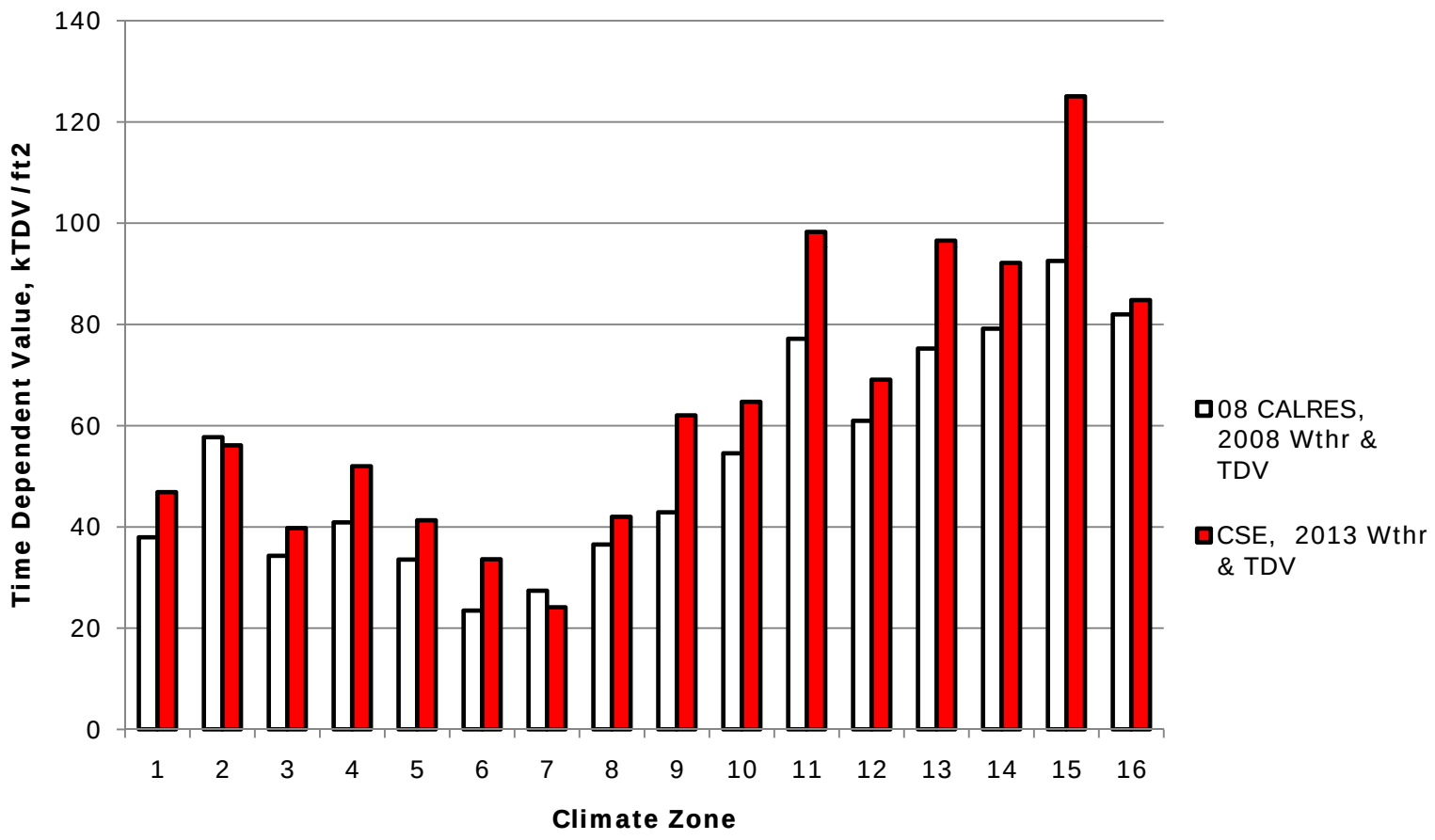
Impact of New Calculation Engine on Overall Energy Consumption is Larger



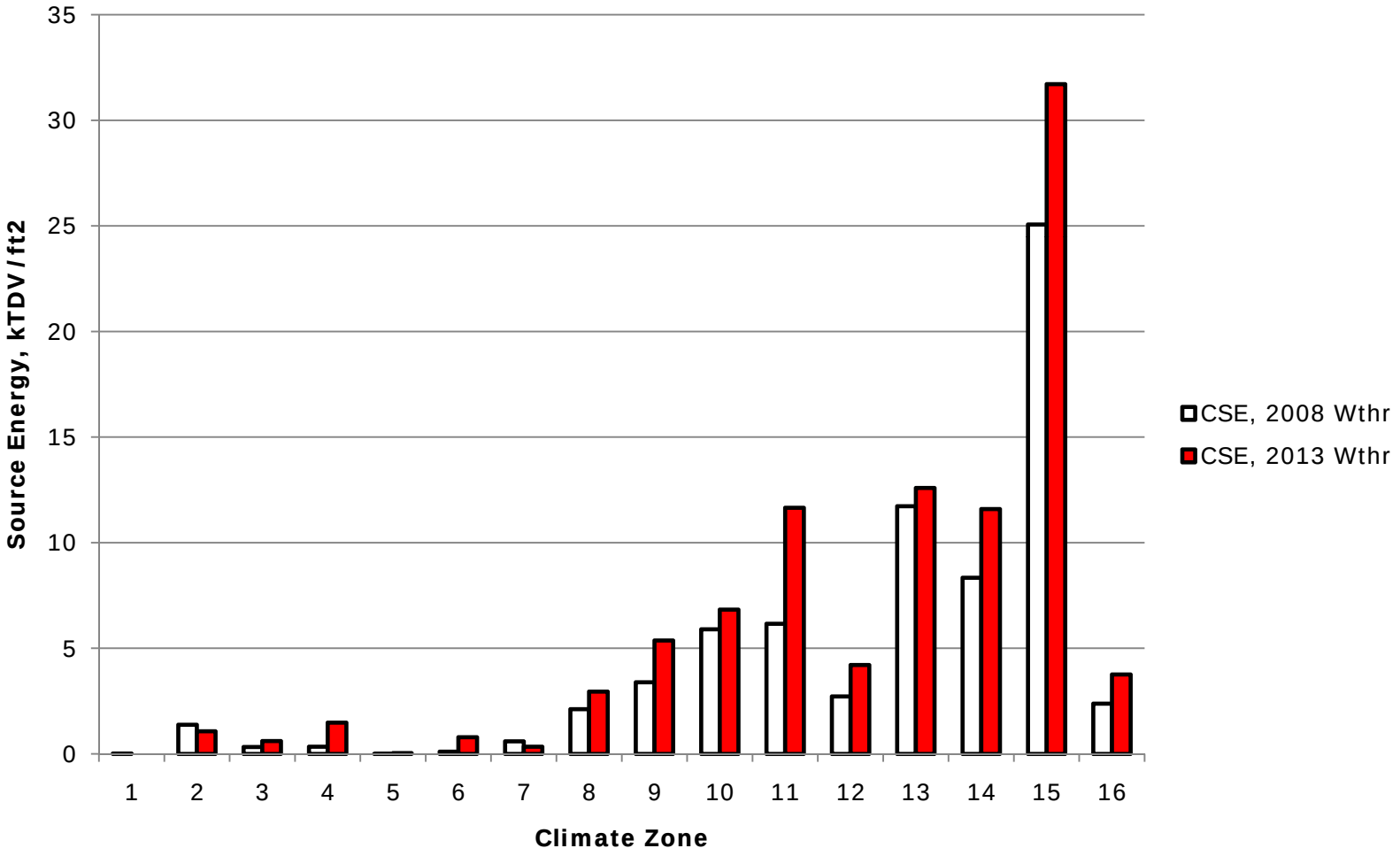
Impact of New TDV and Weather is Significant



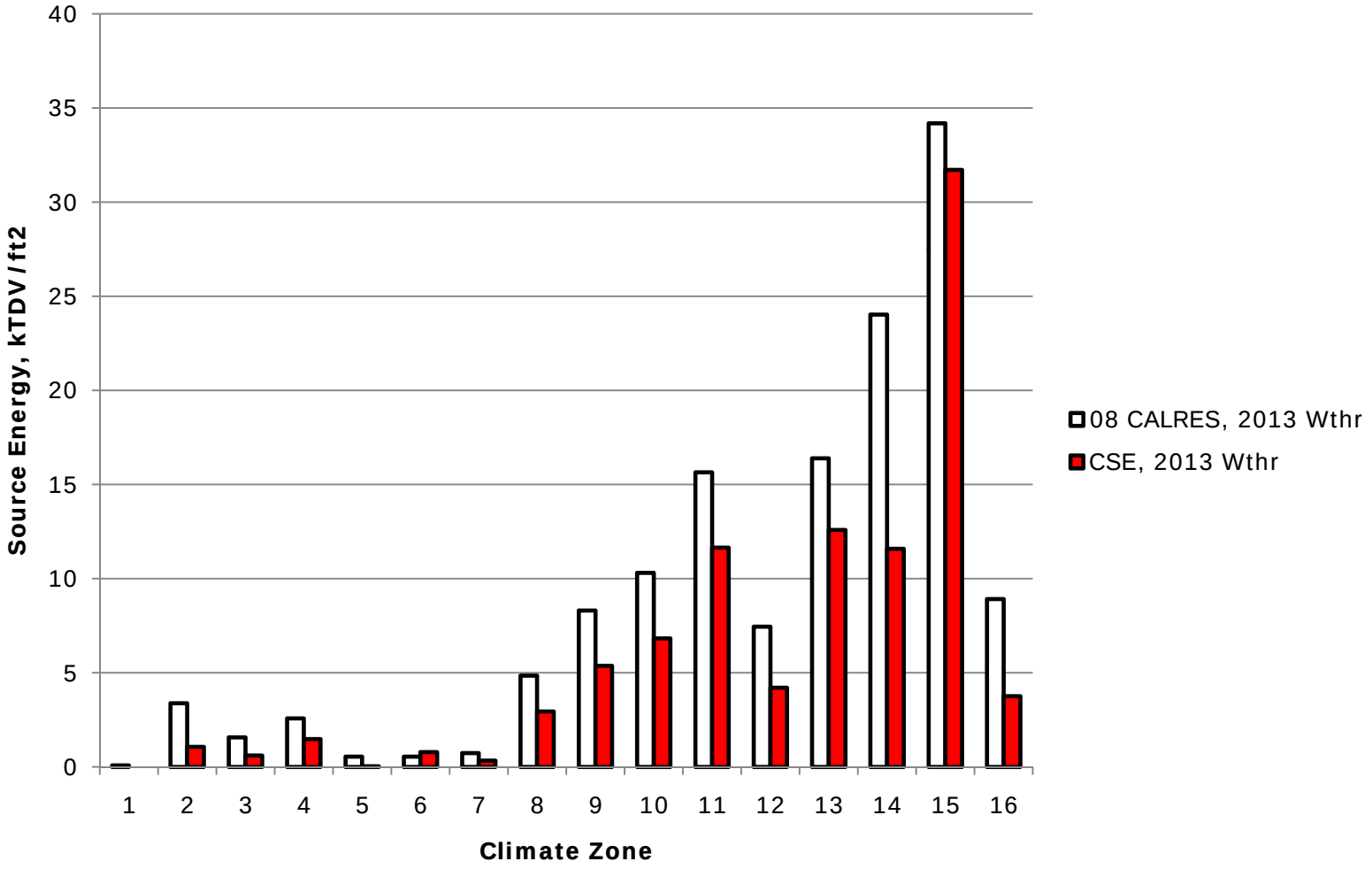
Combined Impact of Calculation Engine, Weather and TDV



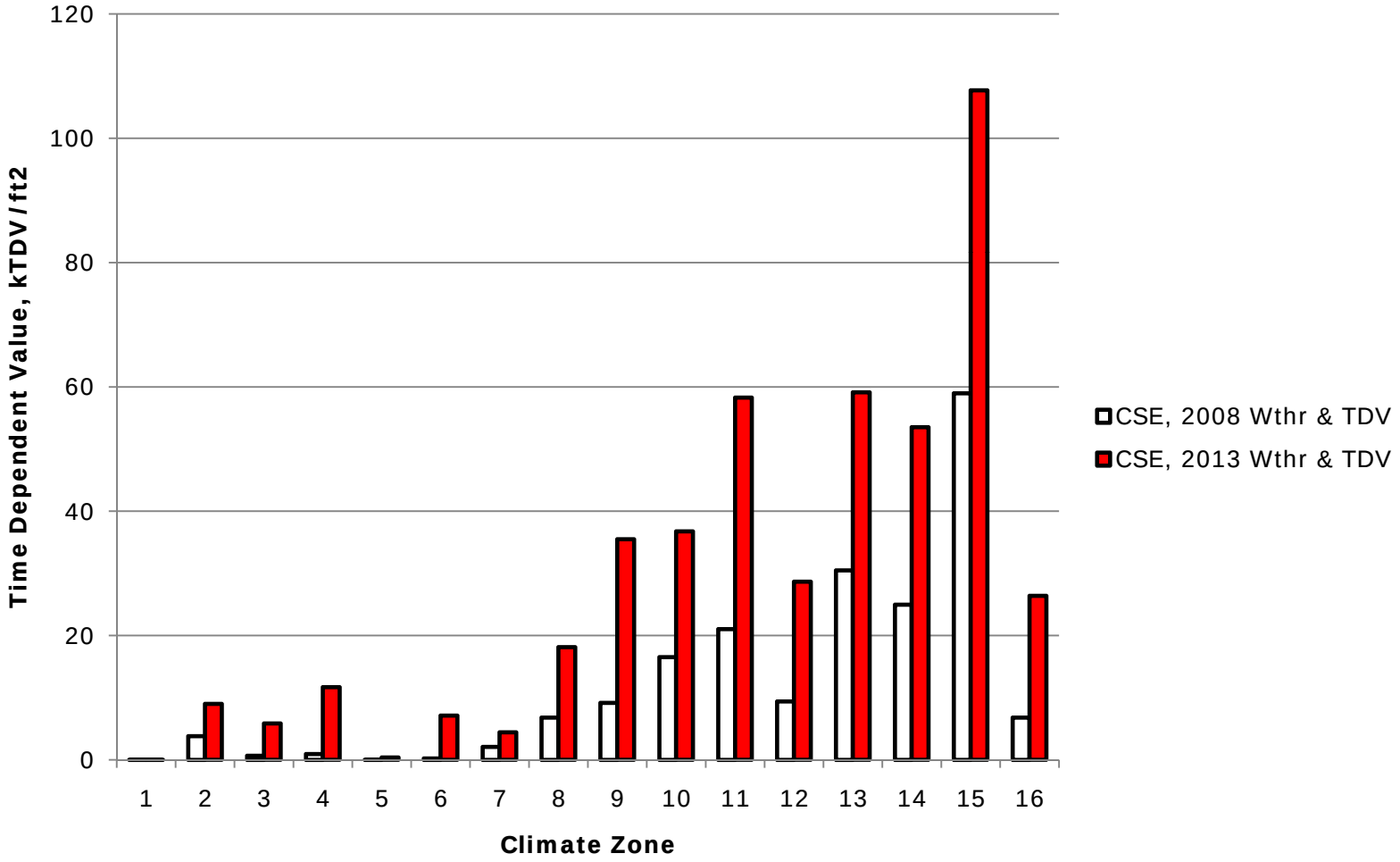
Cooling Calculations: Impact of New Weather



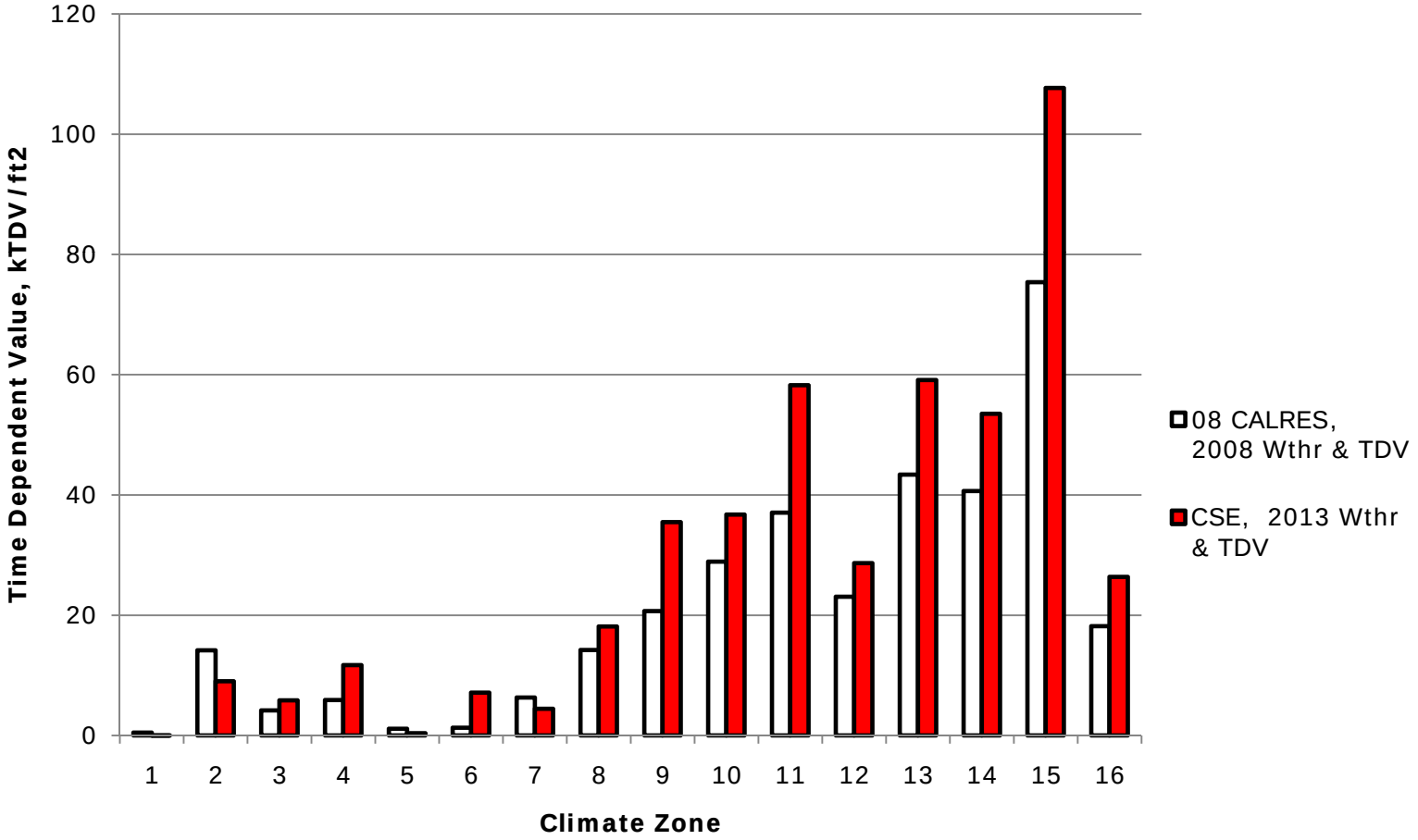
Cooling Calculations:
Impact of New Calculation Engine



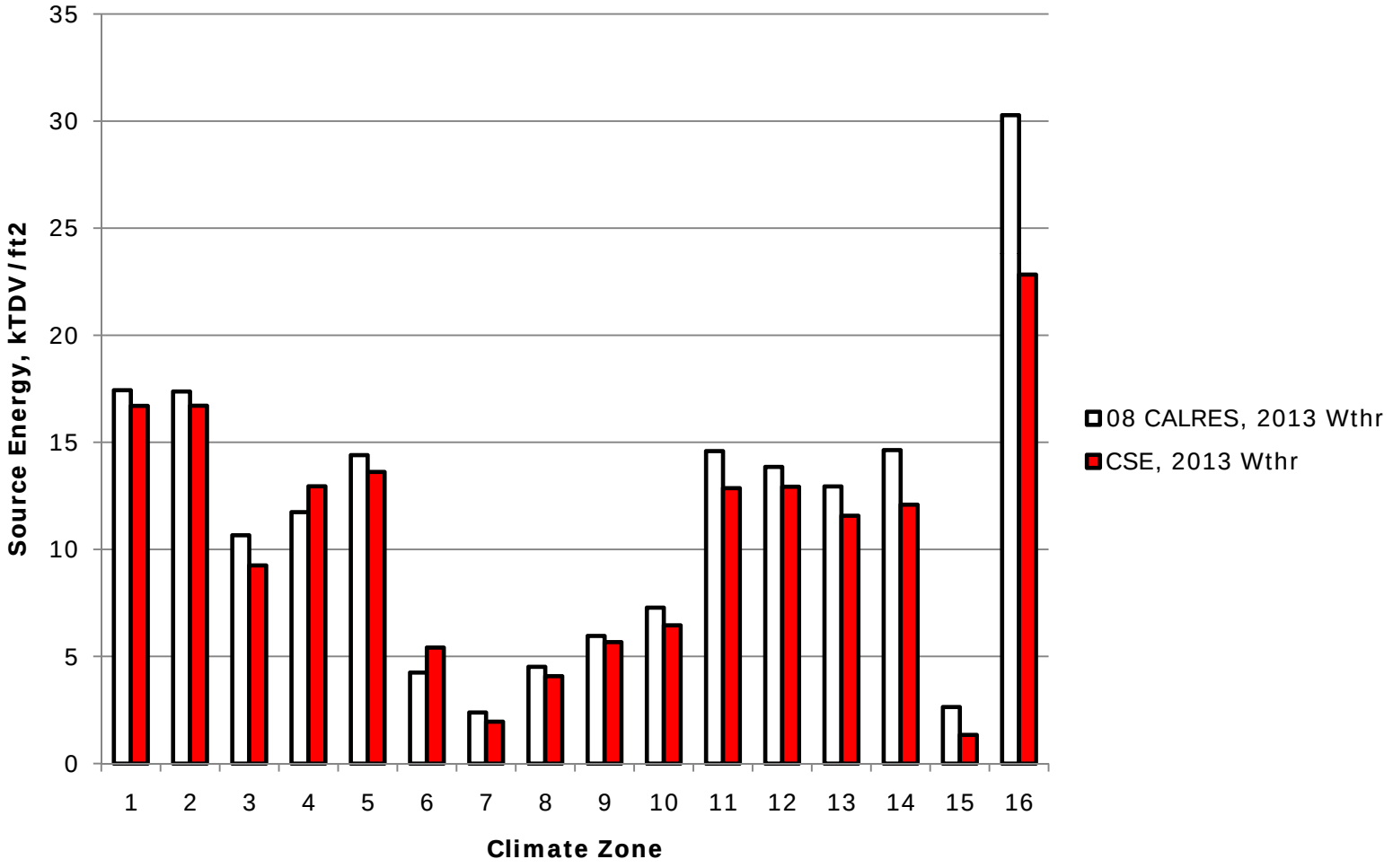
Cooling Calculations: Impact of New TDV and Weather



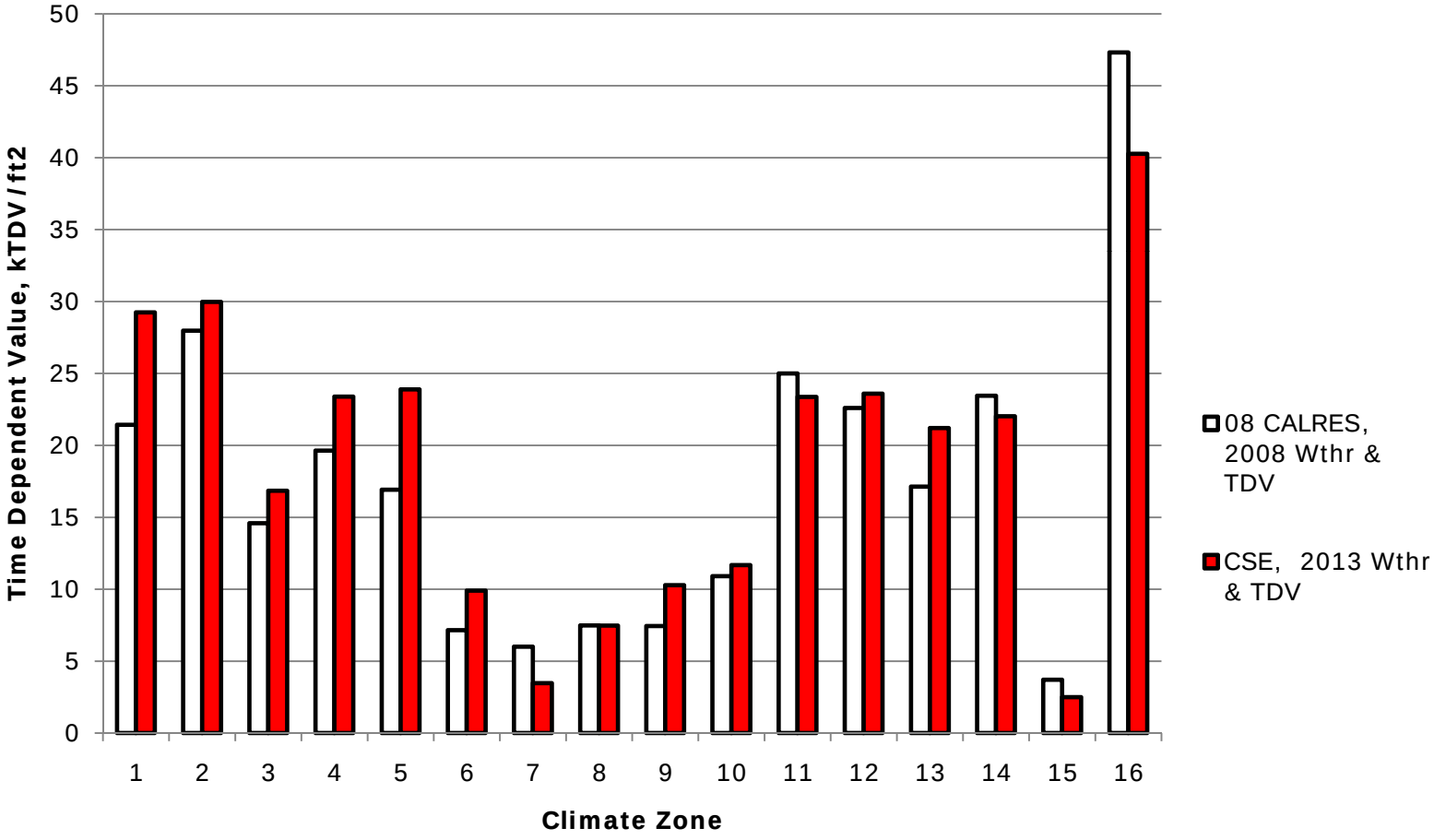
Cooling Calculations: Impact of Combined Changes



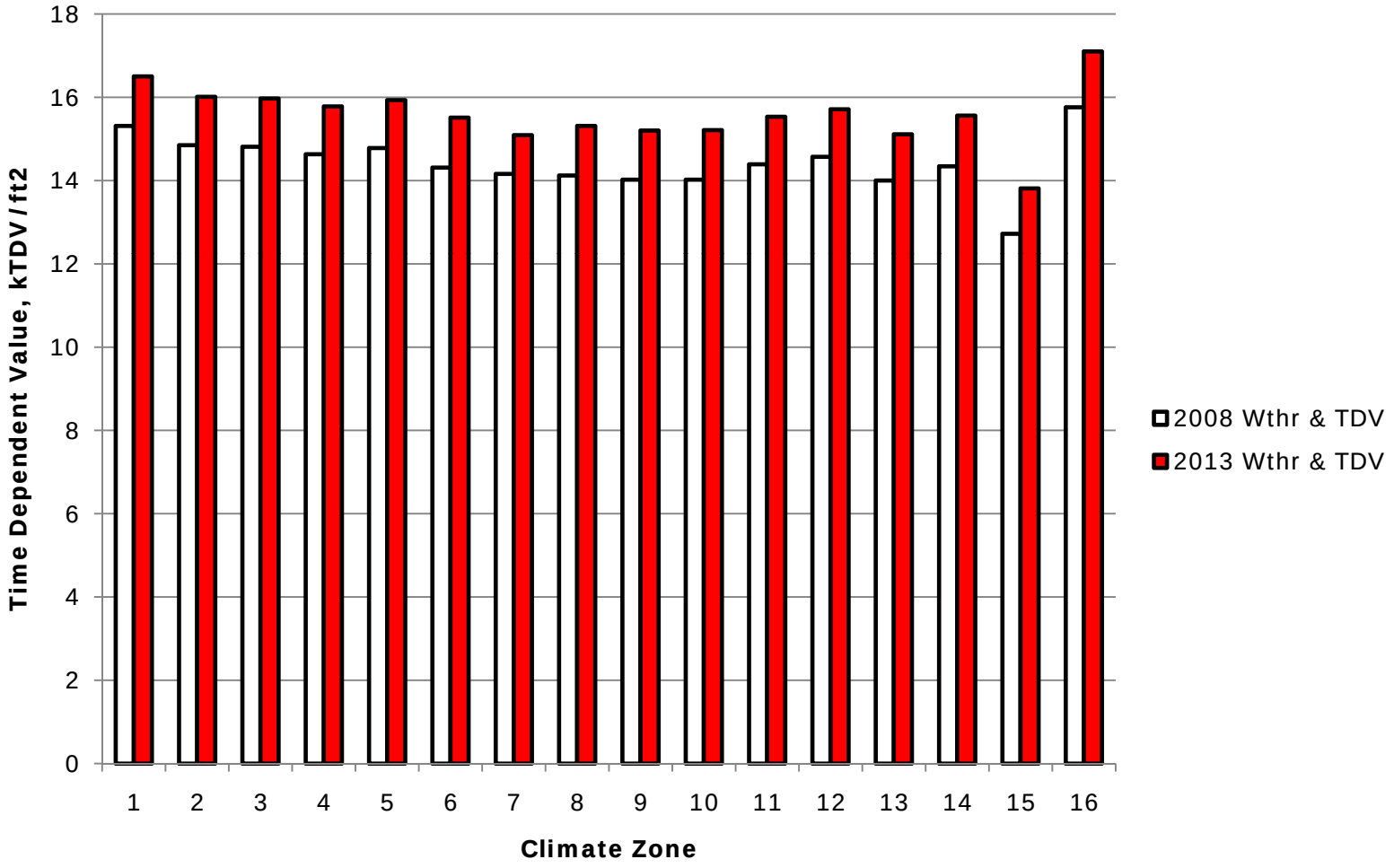
Heating Calculations: Impact of New Calculation Engine



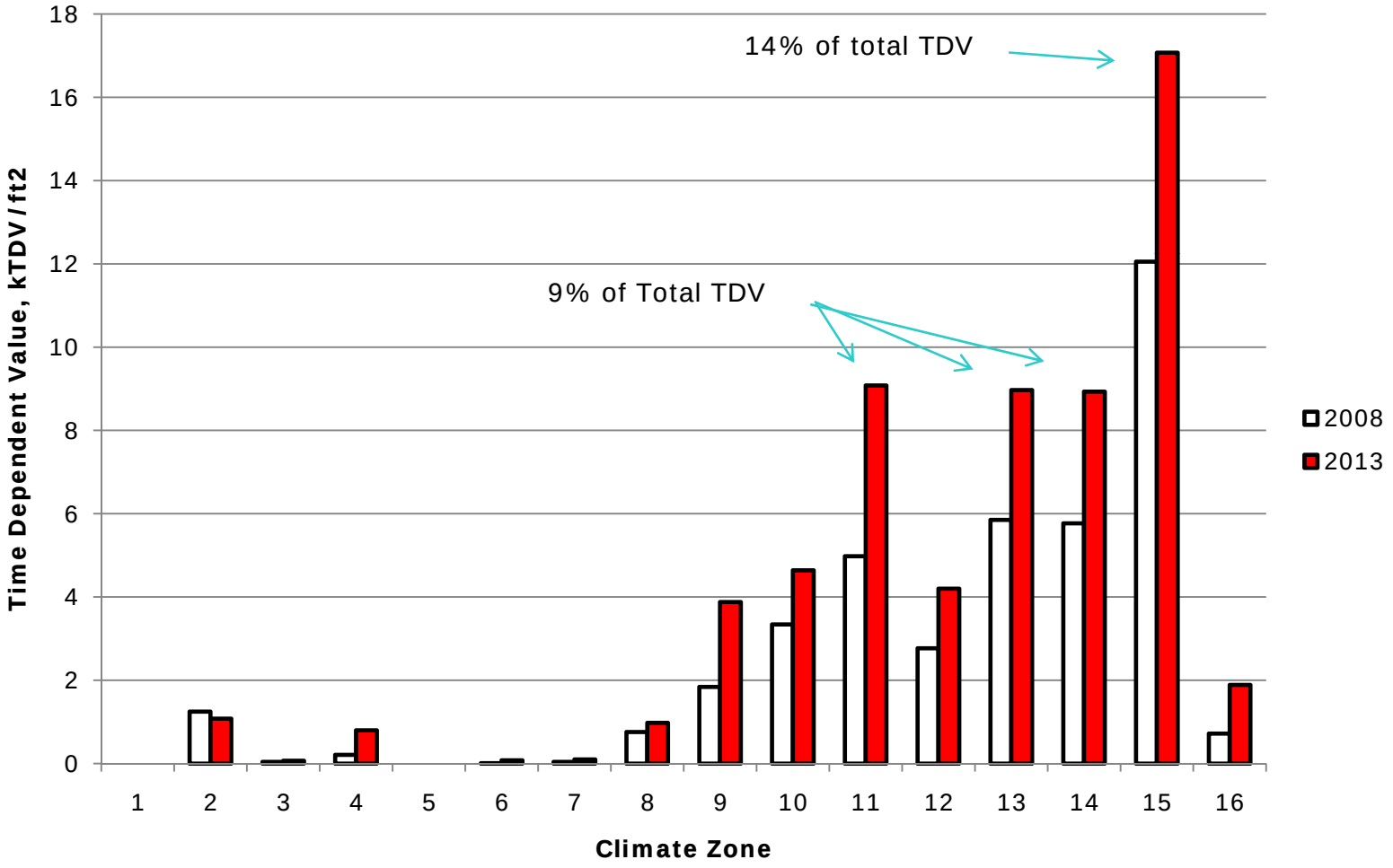
Heating Calculations: Impact of Combined Changes



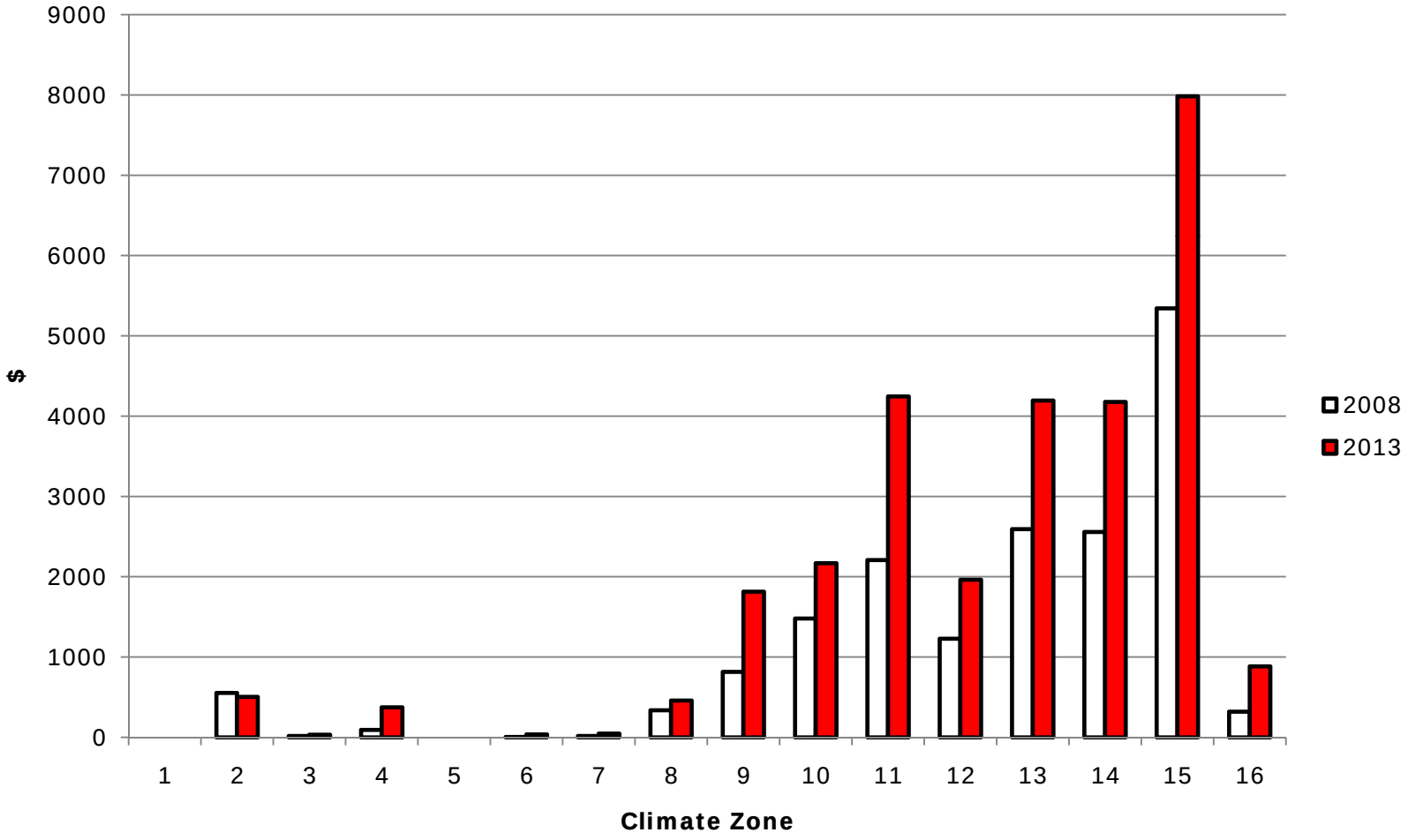
Domestic Hot Water Calculations



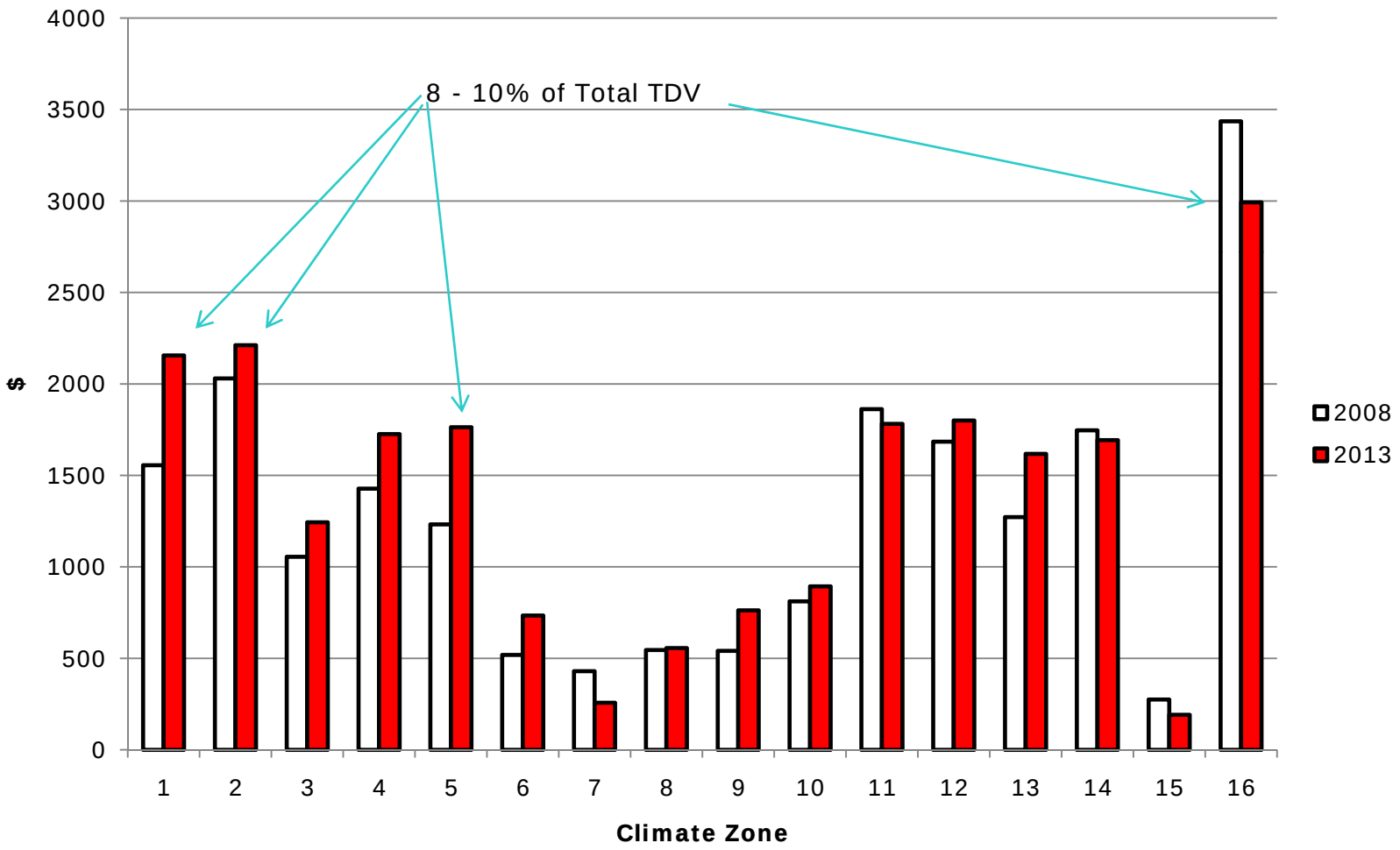
TDV Savings for changing from EER 10 to EER 12 Air Conditioner



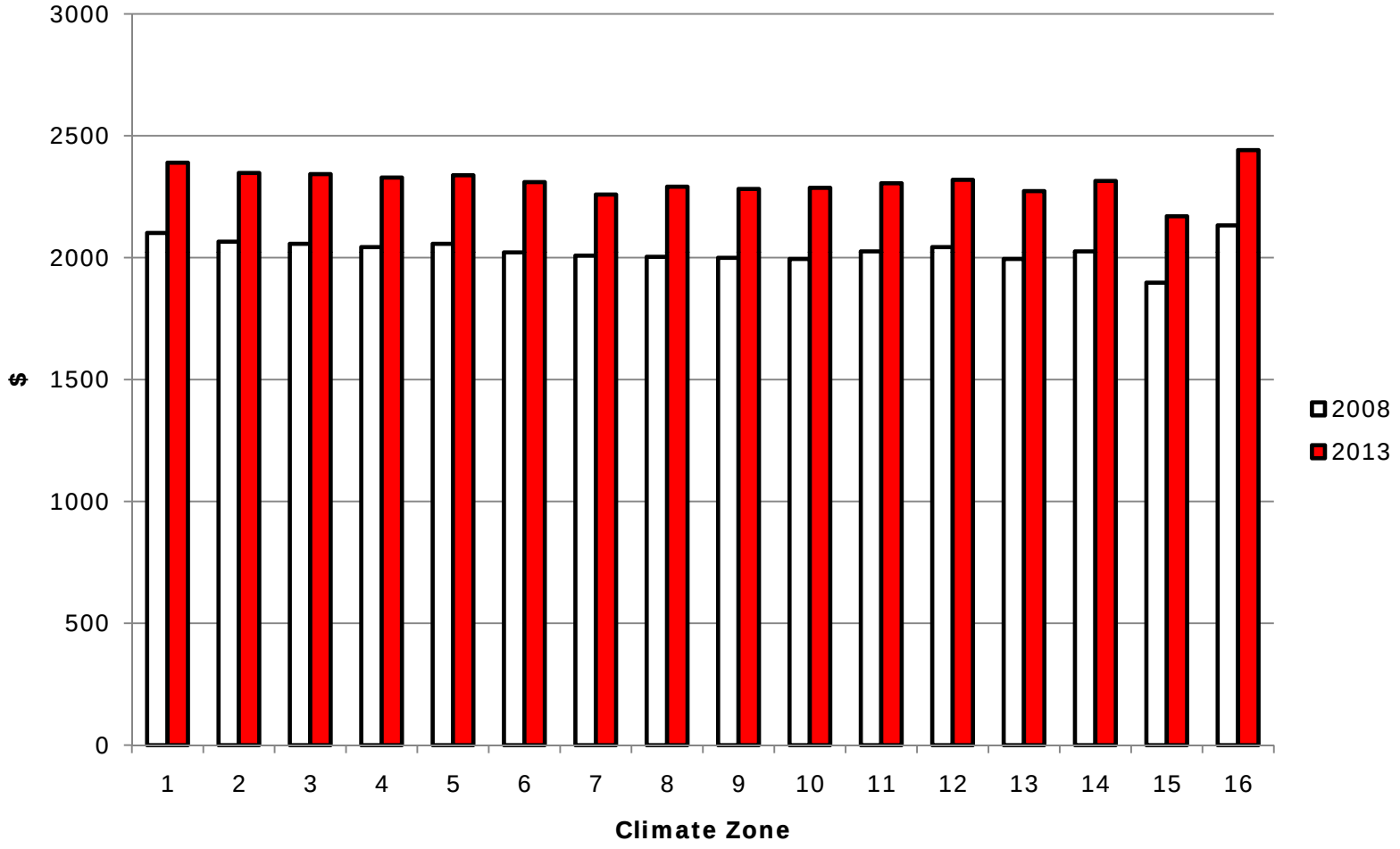
Present Value of of TDV Savings EER 10 to EER 12 Air Conditioner



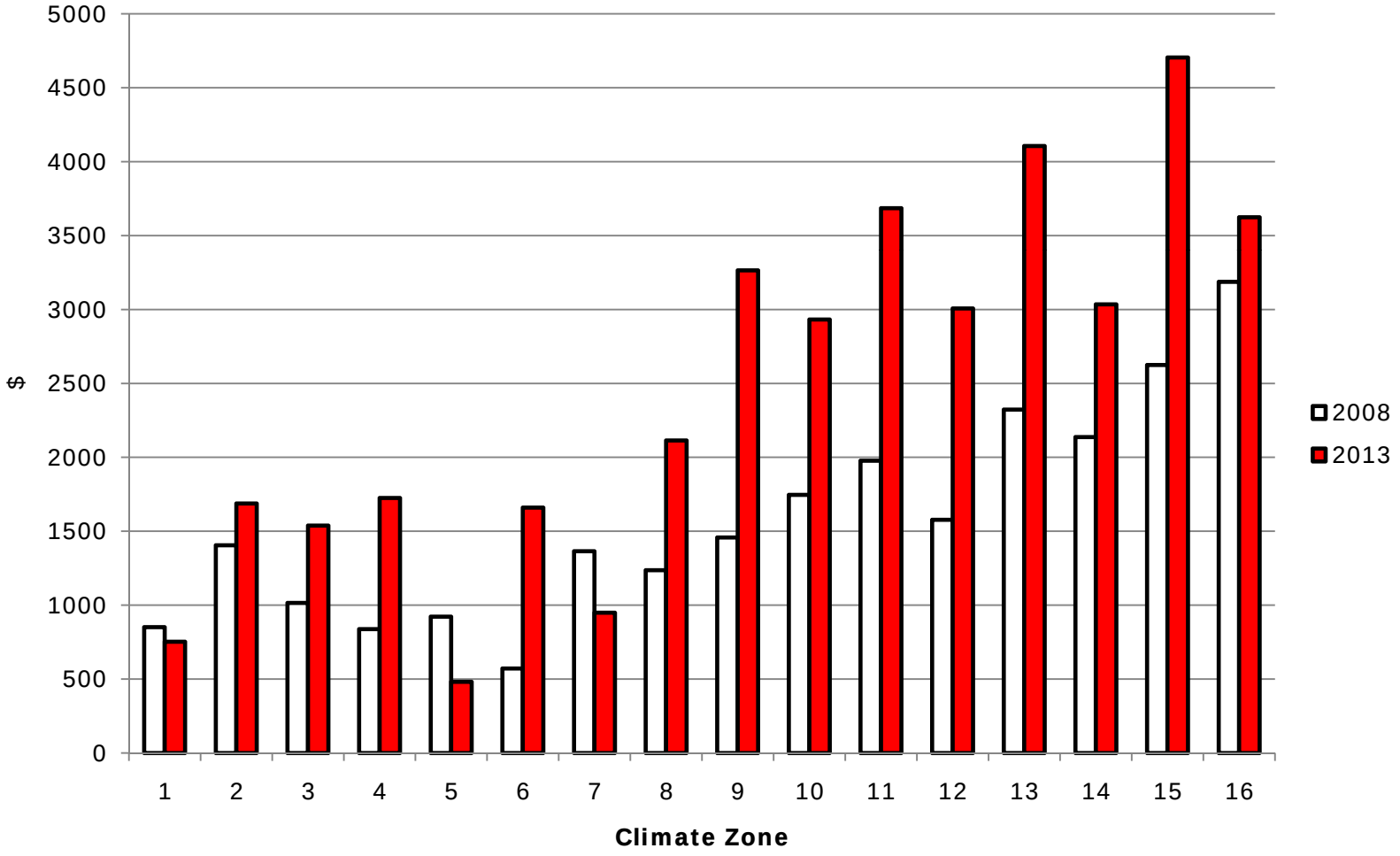
Present Value of of TDV Savings AFUE .72 to AFUE .95 Furnace



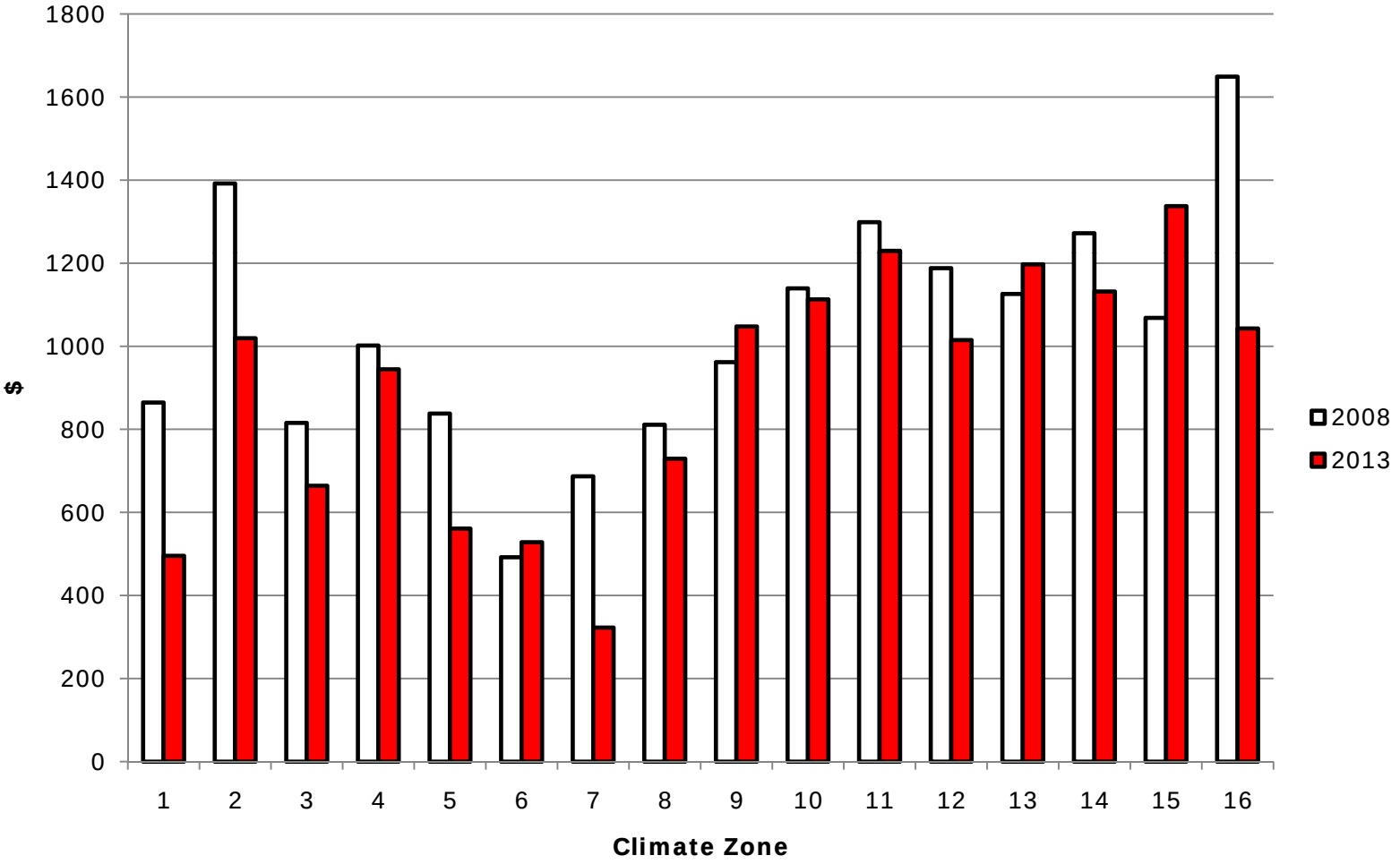
Present Value of of TDV Savings Standard to EF .85 Gas Water Heater



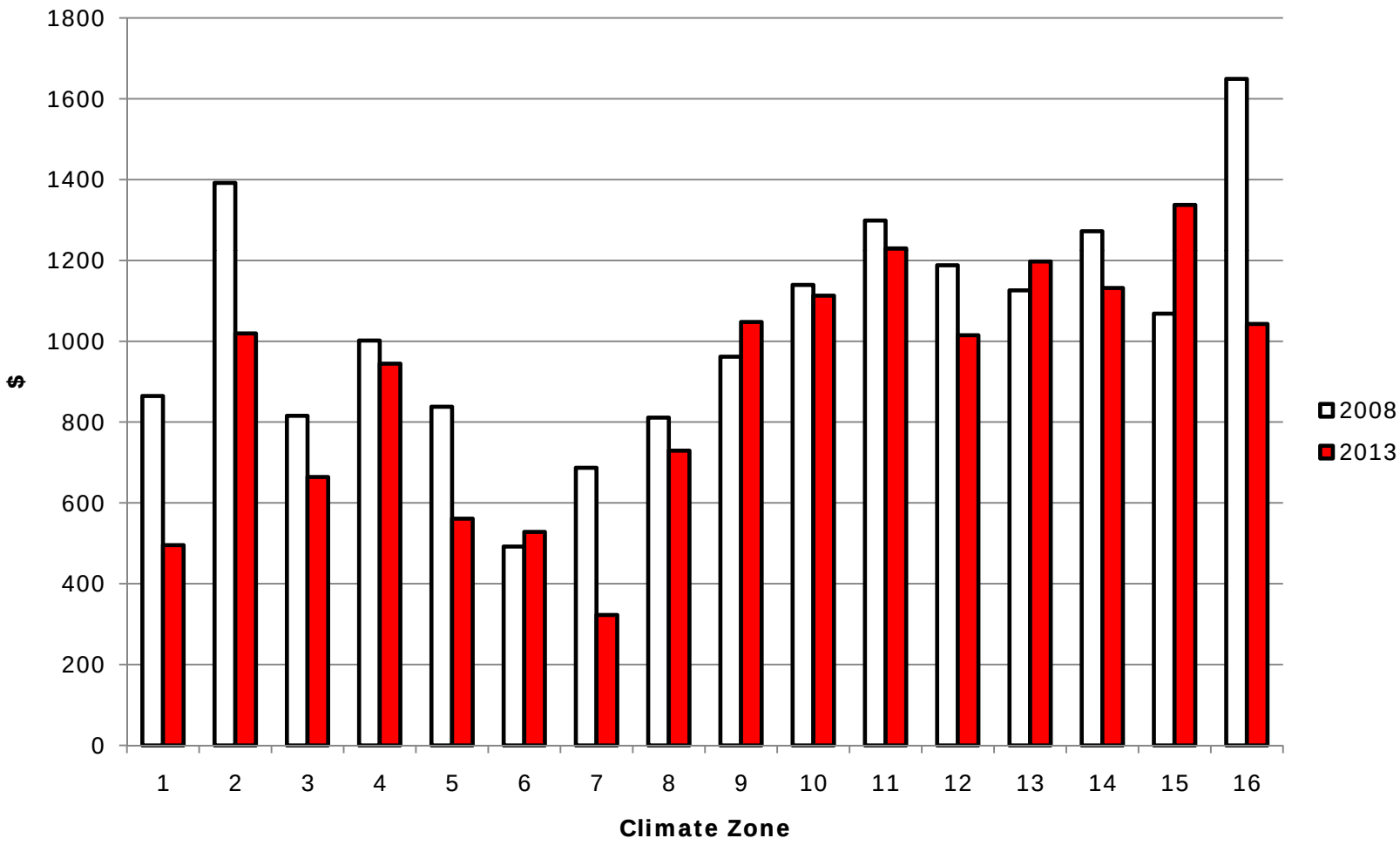
Present Value of of TDV Savings Adding R13 Insulation to the Roof Deck



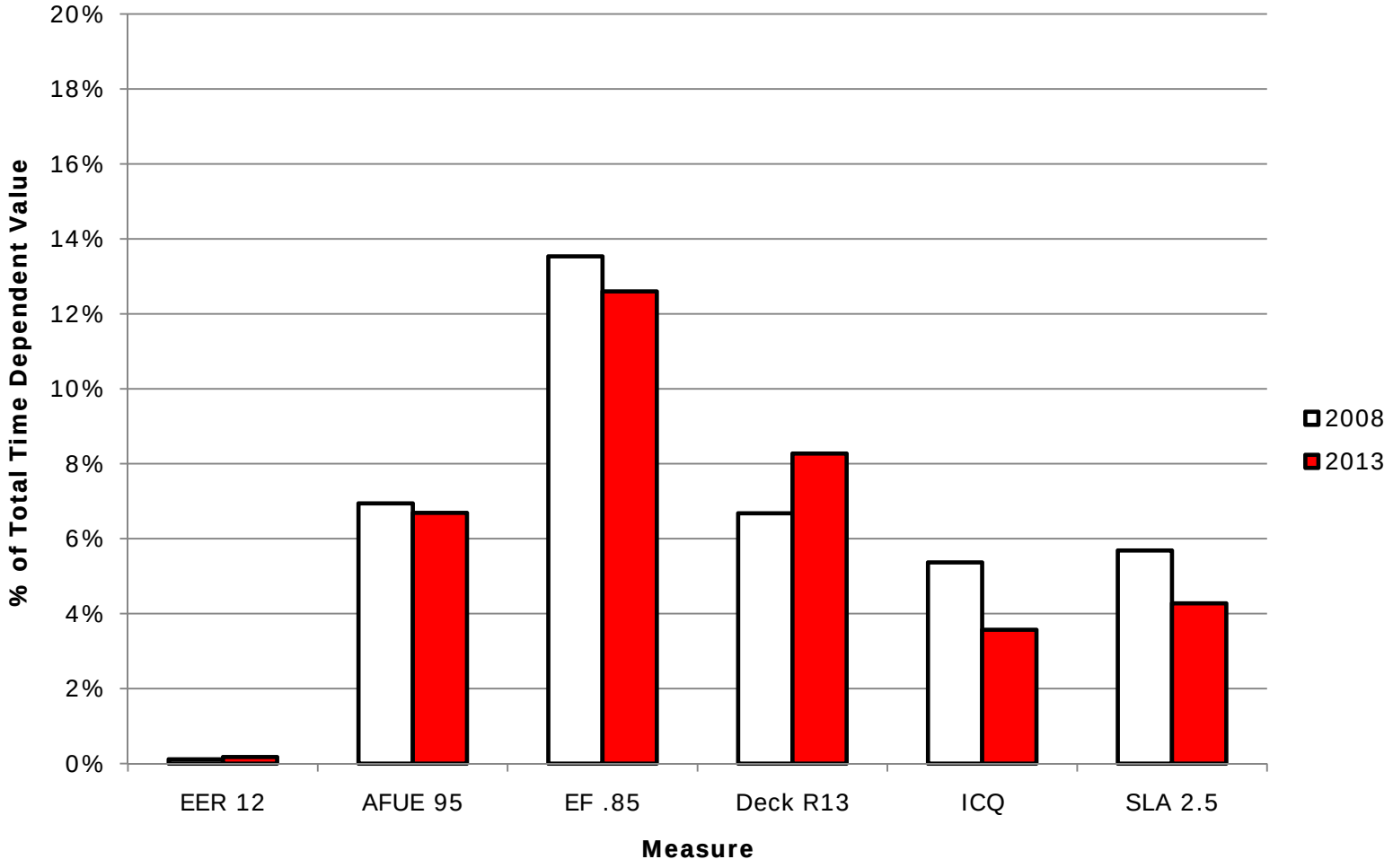
Present Value of TDV Savings Improved Insulation Quality



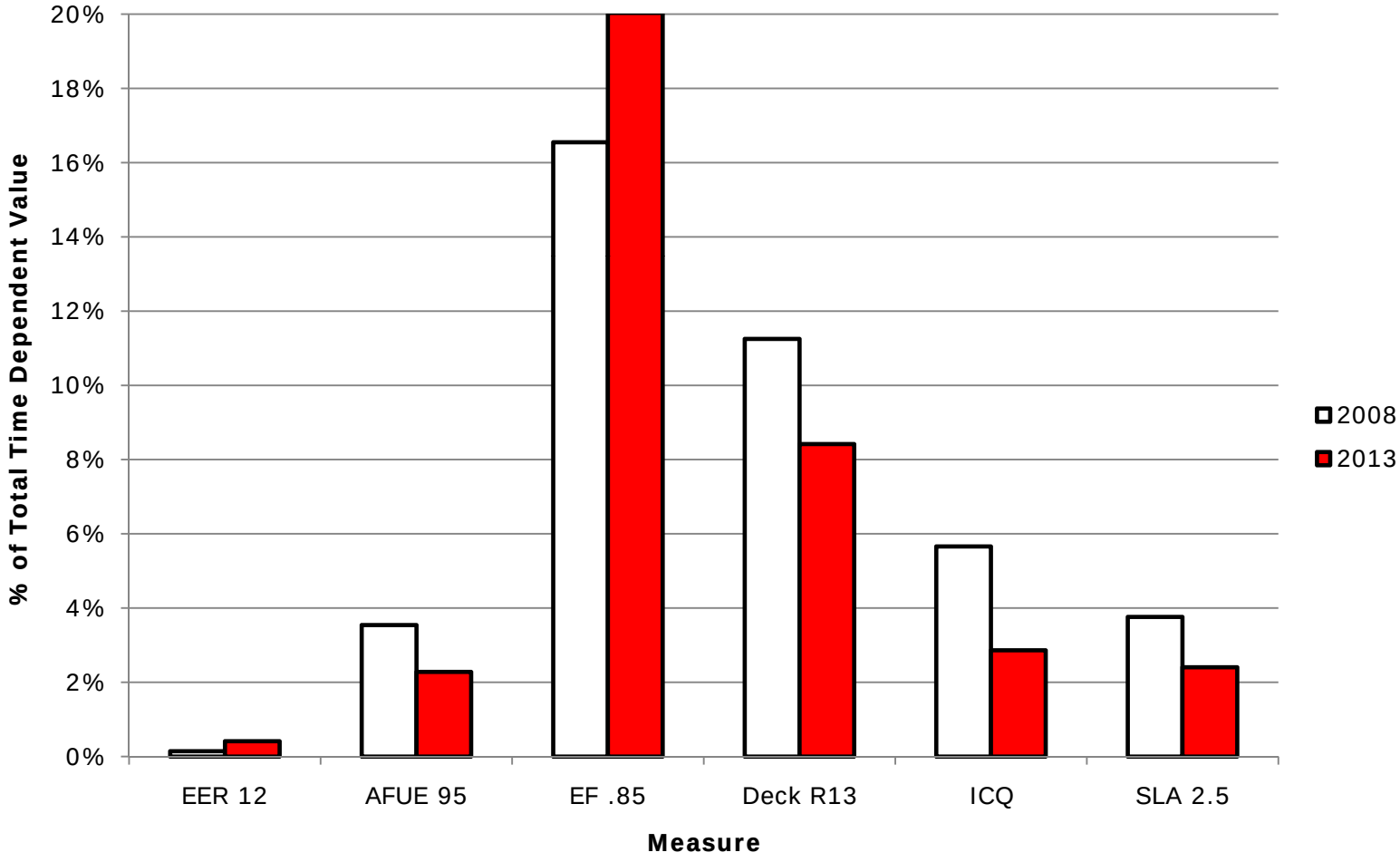
PV of TDV Savings for Reducing Air Leakage from SLA = 3.8 to 2.5



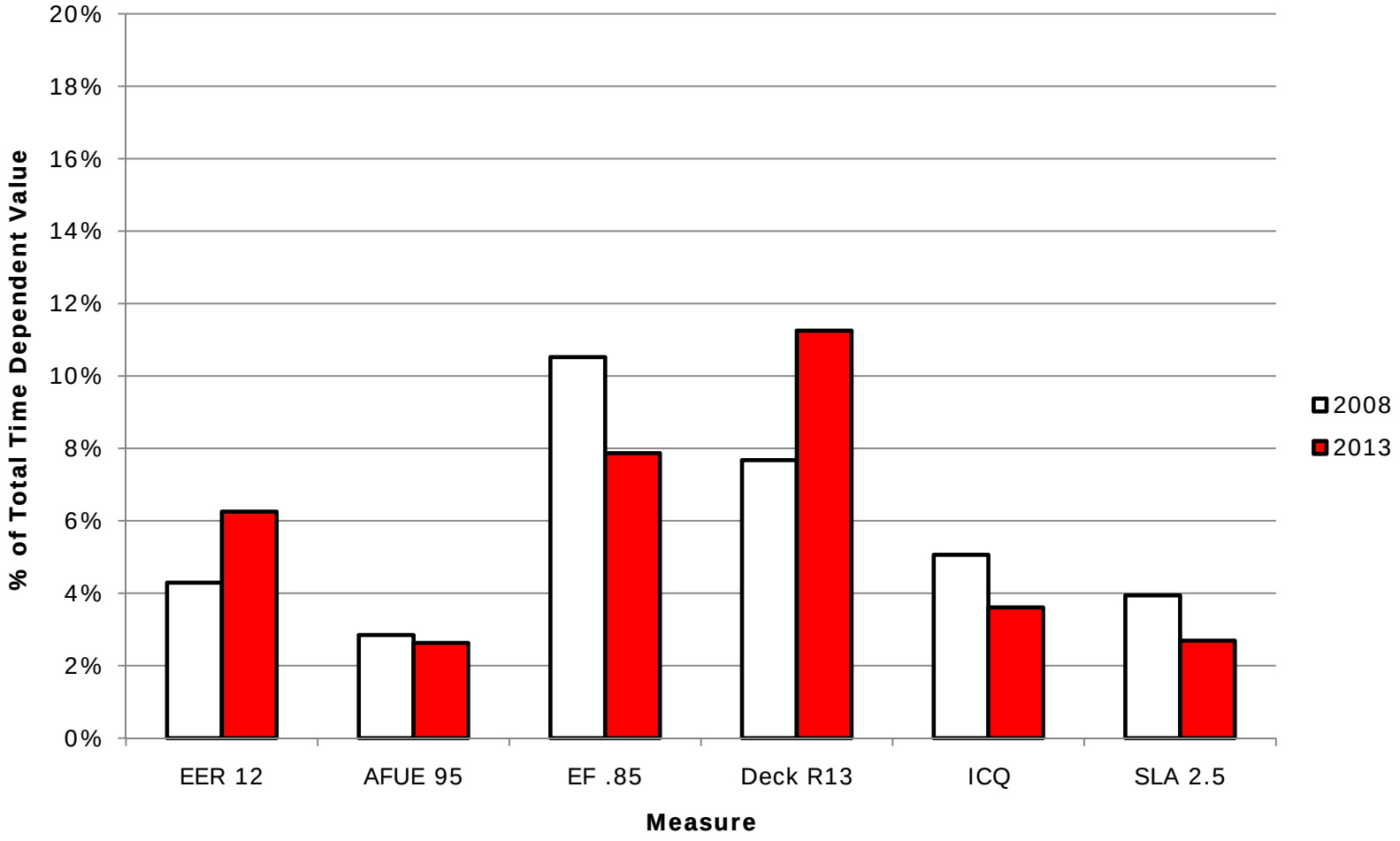
Comparison of TDV Savings for 6 Measures in Zone 3 (Oakland)



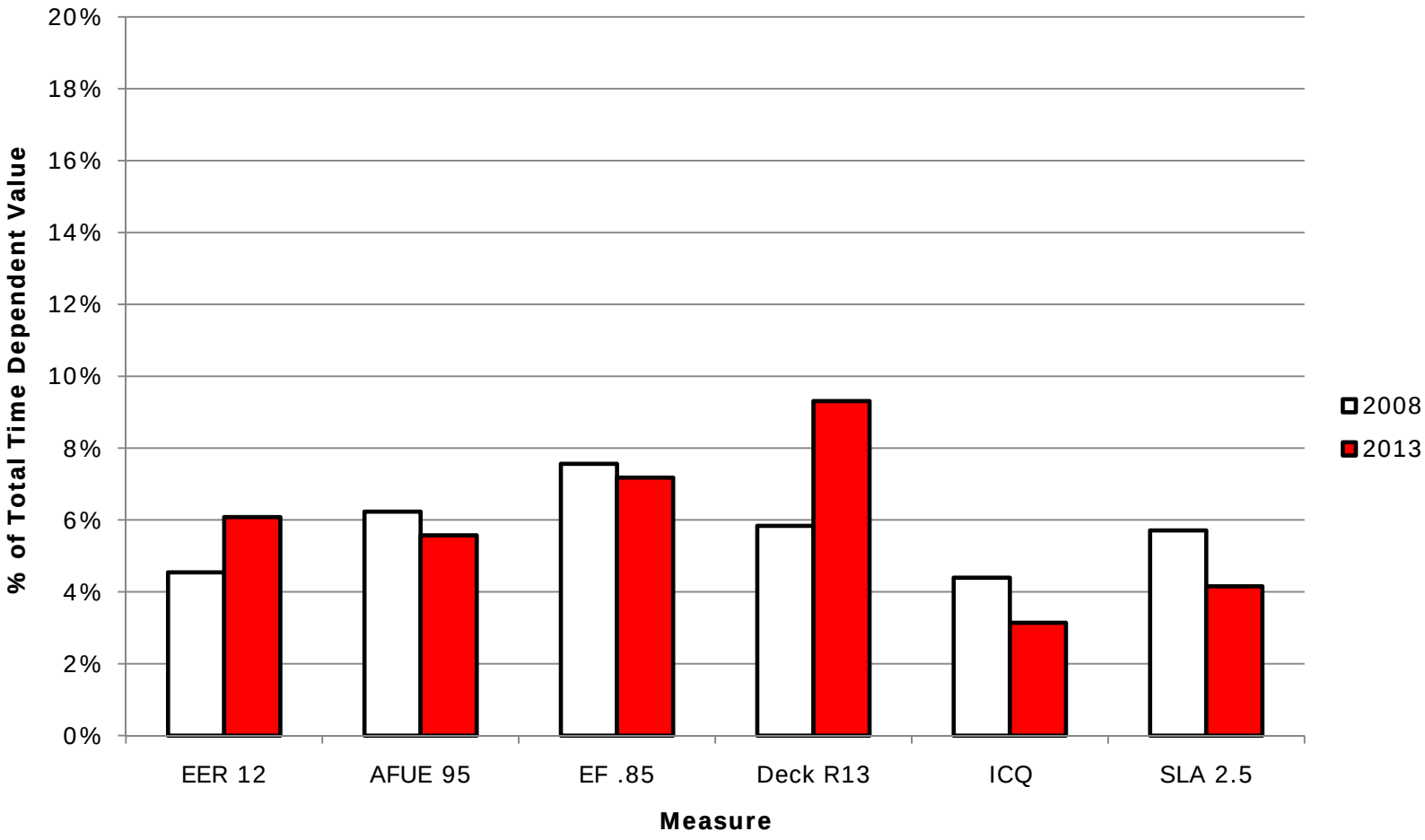
Comparison TDV Savings for 6 Measures in Zone 7 (San Diego)



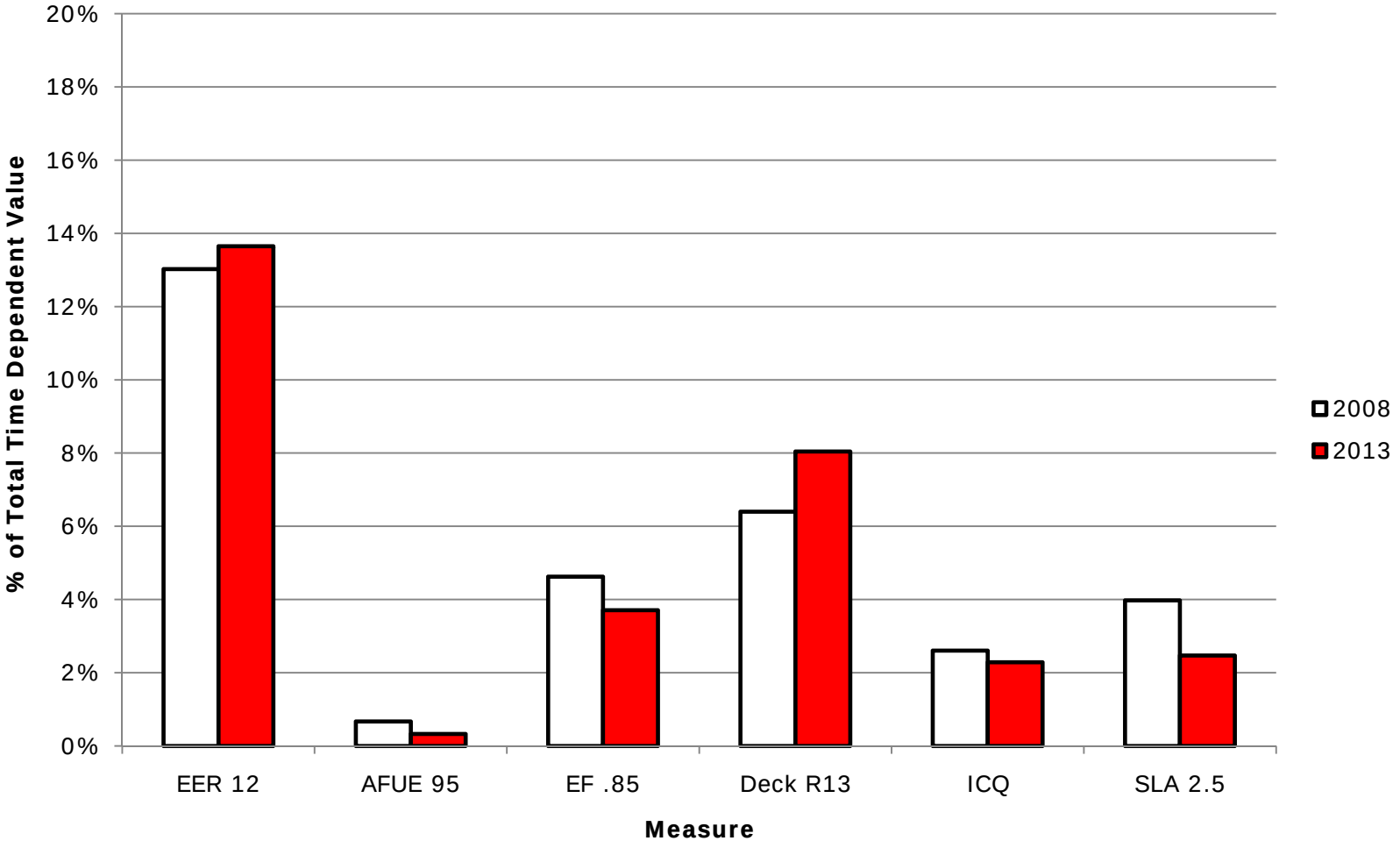
Comparison TDV Savings for 6 Measures in Zone 9 (Burbank)



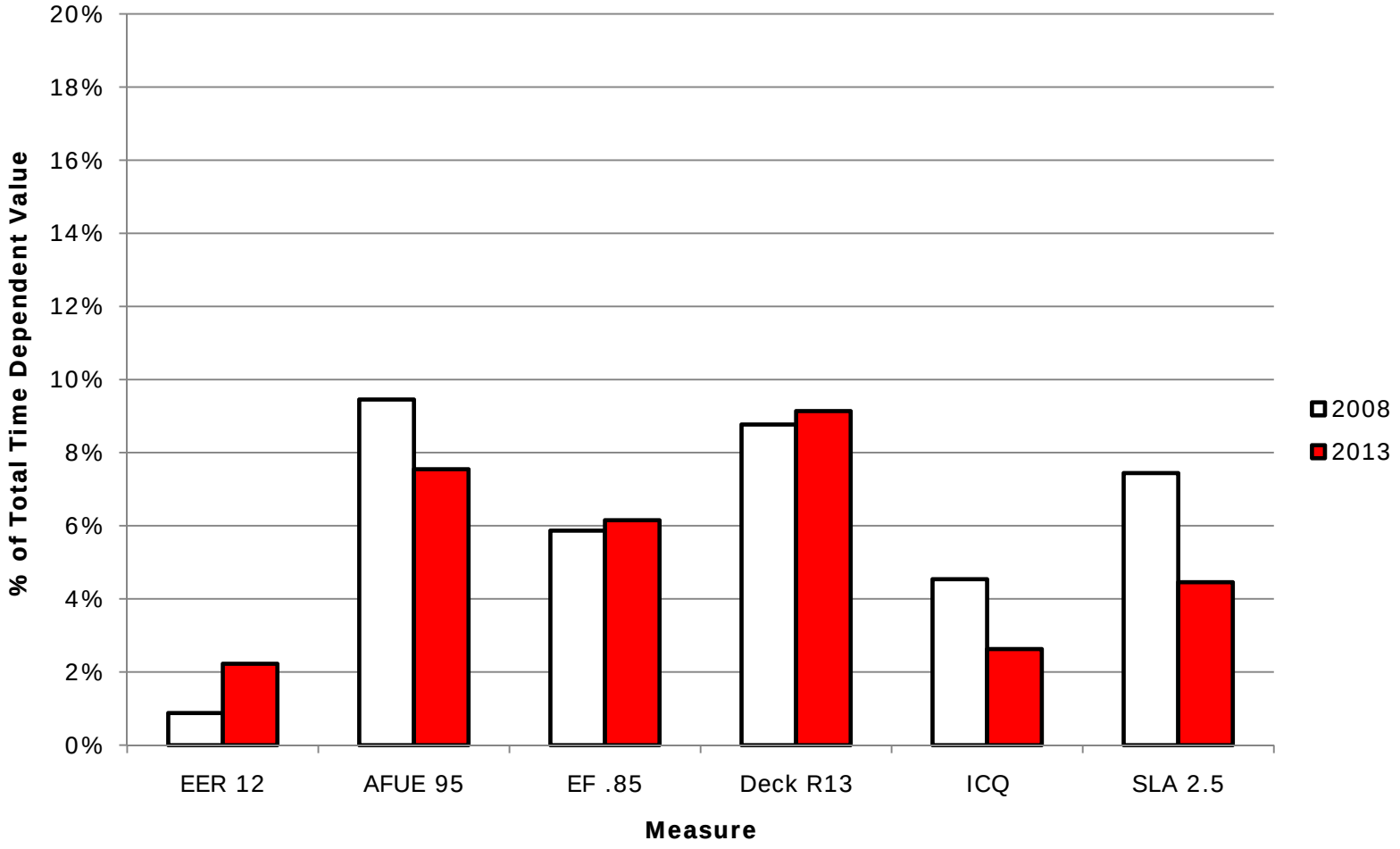
Comparison TDV Savings for 6 Measures in Zone 12 (Sacramento)



Comparison TDV Savings for 6 Measures in Zone 15 (Palm Springs)



Comparison TDV Savings for 6 Measures in Zone 16 (Blue Canyon)



Next Steps

- Finish CSE model
  - Finish new window model
  - Comfort analysis
  - Evaporative cooling
- Review and revise RACM rules including
  - Coordinate internal gains with HERS II
  - Review and potentially adjust thermostats
  - Update thermal mass for new model
  - Adjust natural ventilation to match data