

WHPA/EBEE Stakeholder Education, Community
Outreach

“The Whole Building
Approach”

A Paradigm Shift

by

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(The content of this presentation represents only the author's information, perspective, and opinion and has not been endorsed or approved by
past utility employers or clients)

PARADIGM SHIFT? SHIFTING TO WHAT?

What is a “Paradigm?”

-Webster: “Model or Pattern”

What are we “Shifting” from?

-Single End Use HVAC System Focus With Incremental Savings

What are we “Shifting” to?

-Whole Building as a System with Deep Savings as the Goal

Why Shift the Paradigm?

- To comply with State Policy goals and codes
 - We Acknowledged this need in CPUC 2008 HVAC Action Plan in “Whole Building” Section; and we are now commenting on the CEC EBEE 2016 Action Plan
- As Climate Change accelerates, and our Governor pushes for leadership, we need to adjust aim to accomplish lasting, deep carbon reductions; not small, uncoordinated increments
- International Agreements and Commitments (i.e. Paris 2016 that California will adhere to) we need deep savings from existing buildings
 - We set the existing residential reduction at 40% based on consistency with Kyoto treaty

How do IOU Business Plans Treat This Paradigm?

- SDG&E Commercial Sector: “Move from simple lighting retrofits to Whole Building Approach”

Who Says Change the Paradigm?

- CEC Action Plan, State's Goals, CPUC Plans
- Governor Brown: "Under 2 Coalition"
- An International Perspective:
 - Bernt Steinmuller, German engineer calculated that we are using more than 3x more than our only planet can sustain! So, we need to go to ZNE for new buildings and 70% + Carbon Reduction or ZNE for Existing just to have a chance at sustainability

What Does the New Paradigm Look Like Through HVAC Lens?

- Step back from HVAC System as “the system” and look at whole building: How can the envelope be improved to lower loads and down-size equipment? (Windows, Air Sealing, Insulation, Ducts to Unconditioned Space or Deep Burial)
- What are internal gains and impact? Inefficient lighting=heat, Plug load parasitic heat gain, Cooking strategy
- Are external gains controlled for cooling load? Type of Windows and External Shading design
- What contributes to Human Comfort or not? Mean Radiant Temperature (1.5x more impact than Sensible Air Temp), Wet and Dry Bulb Temperatures, Air movement and Drafts. Behavior.
- Ventilation by design for safety and efficiency-get building tight then ventilate right
- 70 Percent Existing Building Efficiency improvement achieved

How Can This Be Done?

- 1000 Home Challenge Examples (Linda)
- Rick Chitwood in Redding with proper envelope, system design and tested performance: 1200 square feet/Ton A/C in a severely hot summer climate
- Changing Technologies: Electric option has lower Carbon Footprint in California. Heat Pumps gaining traction including Ductless and Ducted Mini-Splits, High Velocity/ Small Ducts
- Equipment affordability improves if smaller!
- Measured performance improvement, not models! Duct Pressure Test, Blower Door, Infra-red Thermography, ongoing circuit measurement, Flow Grid, Static Pressure, Ongoing Refrigerant charge measurement

When Are We Supposed to Change?

- The CPUC Action Plan’s “aspirational goals” seek:
 - New Construction: ZNE for Residential by 2020 and ZNE for Non-Residential by 2030
 - Existing Residential: 25% of existing homes have a 70% decrease in purchased energy from 2008 levels; 75% of existing homes have a 30% decrease in purchased energy from 2008 levels. 100% of existing multi-family homes have a 40% decrease in purchased energy from 2008 levels (much harder than new construction)
- The CEC Title 24 Path to ZNE: Three year Code Cycle Updates on Path to Zero by CPUC Goal
- CEC Action Plan Aspirational Goals, Doubling Energy Efficiency by 2030...and ZNE Existing Buildings (more like Moon/ Apollo Goal...)

Who Works On This Now?

- Home Performance Building Scientists
- Participants in Hot/Dry Climate HVAC Forum
- Home Performance with Energy Star Programs
- Training and Certification Entities
- Impacts for: HVAC Contractors (re-scope offerings?), Consumers, Lenders, Realtors and Green MLS, Local Government Climate Action Plans

Are We On the Path?

- Care is needed to avoid the pitfalls of partial solutions that are not on the path to DEEP Reductions and Reflect Decades of Built-in In-Efficiency:
 - Replacing Split or Package System with same, oversized system without allowance for load reductions
 - Getting the “Loading Order” wrong. (i.e. Solar before Efficiency, HVAC Equipment before air sealing and insulation, Missing high efficiency whole building opportunities with limited perspective)

Where?

- Deep Savings Retrofit Leaders in California
- 1000 Home Challenge Participants
- European Union: Germany and “Passive House” even Italy with energy score labeling
- Australia

Further Resources

- Home Energy Magazine
- Home Performance Coalition
- Building Performance Institute
- Home Performance with Energy Star
- 1000 Home Challenge
- Linda Wigington (introduce next module)