CALGreen, Title 24 & the Net Zero Energy Standard

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- Title 24, Part 6
- Title 24, Part 11
- ZNE – Why and How

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Title 24, Part 6 – California Energy Code

http://www.energy.ca.gov/title24/

- Triennial rulemaking by CEC
  - Ø2013 code to be adopted by CEC late May 2012
  - Øeffective on January 1, 2014
- Residential and nonresidential buildings
  - Ønewly constructed
  - Øadditions/alterations to existing buildings
- Applies to covered loads
  - Øheating, cooling, water heating, lighting

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Title 24, Part 6 – California Energy Code

http://www.energy.ca.gov/title24/

- Covered loads
  - Ø 45% of total energy for single family homes
  - Ø federal preemption prohibits stricter state requirements (central AC, furnace, conventional WH)
  - Ø does not include appliances, plugs loads
- Mandatory features + energy budget
  - Ø prescriptive – checklist approach
  - Ø performance – modeling approach

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Title 24, Part 6 – California Energy Code

http://www.energy.ca.gov/title24/

- 40 + local jurisdictions have more stringent codes
- Proposed 2013 code
  - Ø 25% savings single family homes
  - Ø 30% savings nonresidential
  - Ø envelope focus – windows and walls
  - Ø lighting controls – daylighting, controllable ballasts
  - Ø field verification – HVAC system testing

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Title 24, Part 11 – California Green Building Standards Code (a.k.a. CALGreen)

http://www.bsc.ca.gov/Home/CALGreen.aspx

- Triennial rulemaking
  - Ø HCD for residential
  - Ø CBSC for nonresidential
- Mandatory and voluntary sections
  - Ø planning, energy, water, materials, environmental
  - Ø local jurisdictions may adopt voluntary

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Title 24, Part 11 – California Green Building Standards Code (a.k.a. CALGreen)

http://www.bsc.ca.gov/Home/CALGreen.aspx

- 2010 voluntary energy efficiency Tier 1 +15% and Tier 2 +30%
  - Ø efficiency program targets
  - Ø eligibility criteria for solar incentives programs
  - Ø basis of regional green building codes
- CEC will propose 2013 energy chapter
  - Ø residential +15% & +30%
  - Ø nonresidential +10% & +20%
  - Ø communicate measures for migration to Part 6

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Zero Net Energy – Why?

- AB32 (Global Warming Solutions Act of 2006)
- 2011 Integrated Energy Policy Report (http://tinyurl.com/837v6be)
- Long term EE strategic plan (http://tinyurl.com/5tkejy4)
- Other supporting policies (AB758, AB1103, AB1109)
- ZNE residential by 2020
- ZNE nonresidential by 2030

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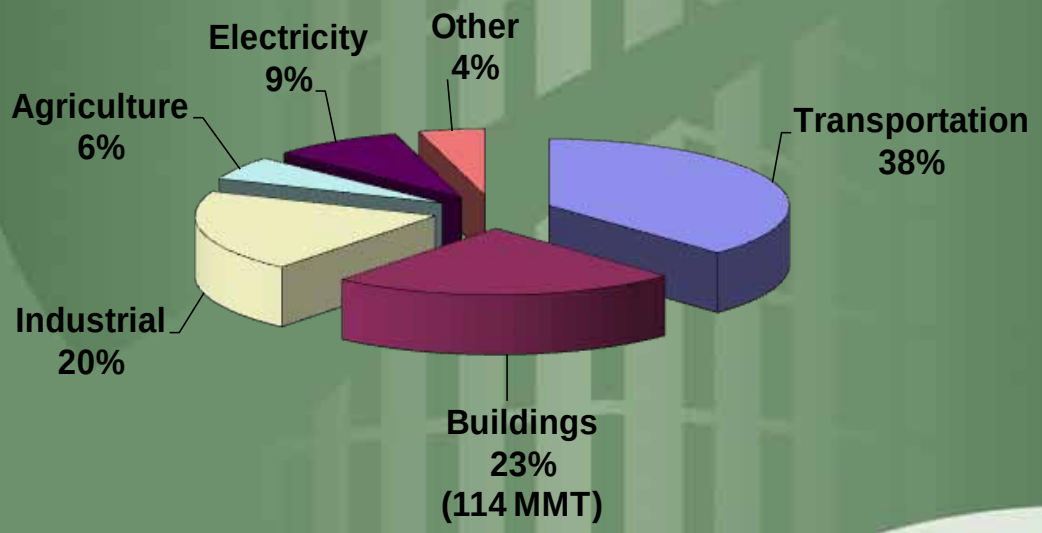
Zero Net Energy – Why?

CA GHG Emissions
484 MMT CO2e (2004)



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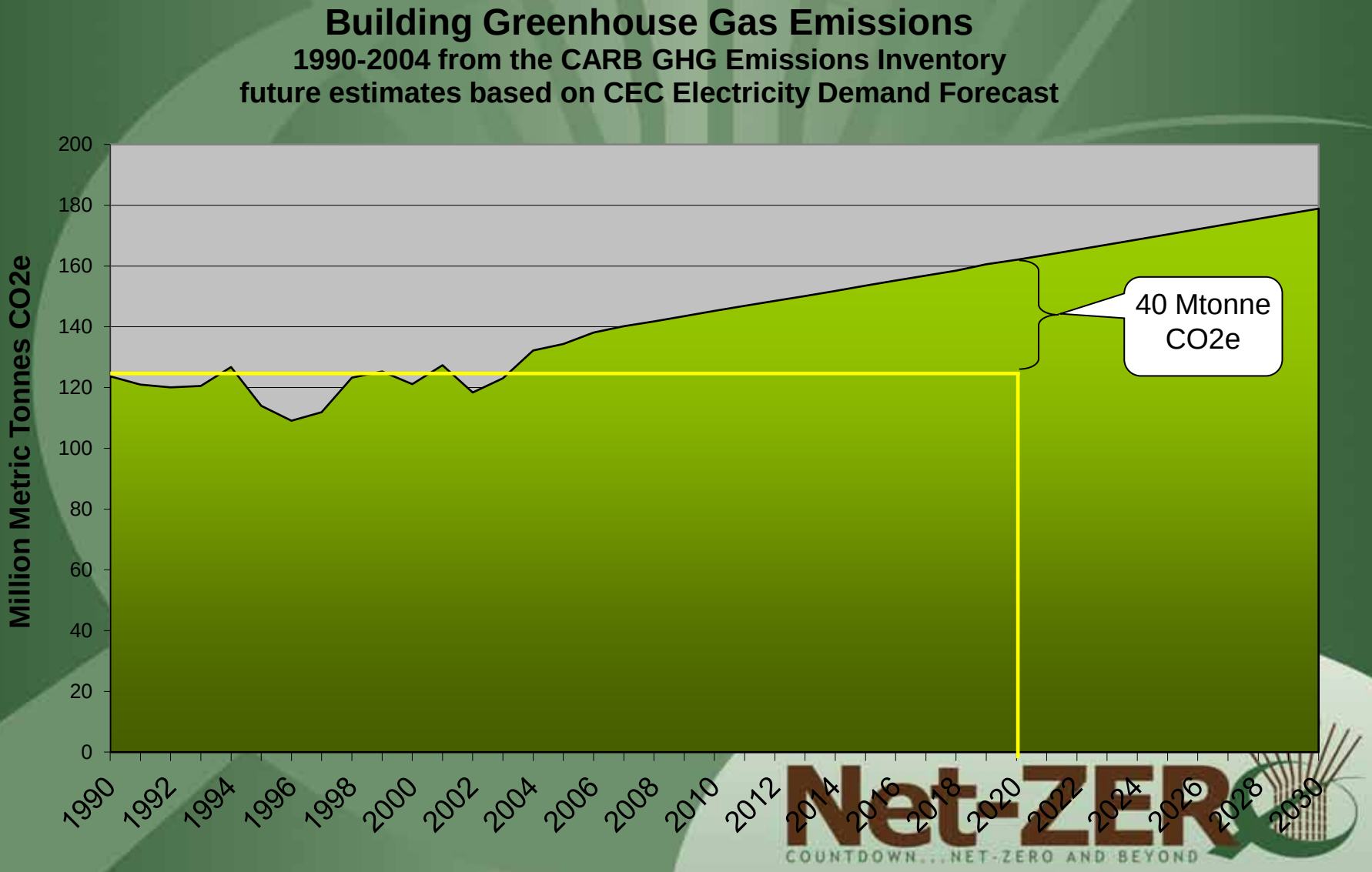
Zero Net Energy – Why?



Zero Net Energy – How?

- What is the correct metric?
  - Ø site energy
  - Ø source energy
  - Ø annual utility costs
  - Ø carbon/emissions
  - Ø grid neutral (electricity only)
  - Ø role of embodied energy & transportation energy

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Zero Net Energy – How?

- Policy Questions
  - Ø tradeoffs between fuel types
    - ü can a natural gas consuming building be ZNE?
  - Ø what on-site renewable generation is allowed?
    - ü is any form of combustion allowed?
  - Ø what is the boundary for the site?
  - Ø difficult buildings types
    - ü high EUI buildings
    - ü urban infill
    - ü limited renewables access

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Zero Net Energy – How?

- CEC working definition for ZNE
  - Ø based on definition developed in CPUC working group
  - Ø no consensus reached on definition
- ZNE = the societal value of energy consumed by the building over the course of a typical year is less than or equal to the societal value of the renewable energy generated on-site

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Zero Net Energy – How?

- Societal Value = Time-Dependent Valuation (TDV) Energy
  - Ø specialized version of source energy
  - Ø highly values energy coincident with peak demand
  - Ø allows tradeoff between fuel types
- On-site = property receiving development entitlements and building code permits

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Zero Net Energy – How?

- Renewable energy generation
  - Ø photovoltaics, solar thermal electric, micro-hydro, wind
  - Ø ground source heat pump, solar thermal treated as energy efficiency measures
  - Ø does not include off-site generation, renewable energy credits, biomass, biogas, etc.

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Zero Net Energy – How?

- Revised Zero-Net Energy Goals
  - Ø All new residential construction in California will be zero net energy or equivalent to zero net energy by 2020
  - Ø All new commercial construction in California will be zero net energy or equivalent to zero net energy by 2030

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Zero Net Energy – How?

- Possible concepts for “equivalent”
  - Ø purchase of renewable energy credits (RECs)
  - Ø averaging of multiple buildings under control of same owner (e.g. multiple schools in a school district, multiple buildings in a campus setting)
  - Ø off-site renewables
  - Ø reductions in embodied energy, water usage, transportation energy (location efficiency)
  - Ø housing density credit
  - Ø tracking and enforcement concerns

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Zero Net Energy – How?

- Asset rating = calculated, rates the building not the occupants
- Operational rating = measured, actual energy usage
- Hybrid = operational rating adjusted for weather & operating variables
- Zero Net Energy is zero on chosen rating scale

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Zero Net Energy – How?

- New paradigm for code development & compliance
- More & better collaboration with PIER, CPUC, ARB, utilities
- New partnerships with local governments
- Quicker migration from R&D and emerging tech

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Zero Net Energy – How?

- Expanded scope for Appliance & Building Efficiency Standards
  - Ø building standards on “whole building” metric
  - Ø consumer electronics
  - Ø residential general lighting
  - Ø process loads (e.g. data centers, laboratories, refrigeration systems)
  - Ø design phase code requirements
    - ü orientation
    - ü solar access
    - ü mass
    - ü glazing
    - ü daylighting
  - Ø commissioning
  - Ø energy monitoring & feedback

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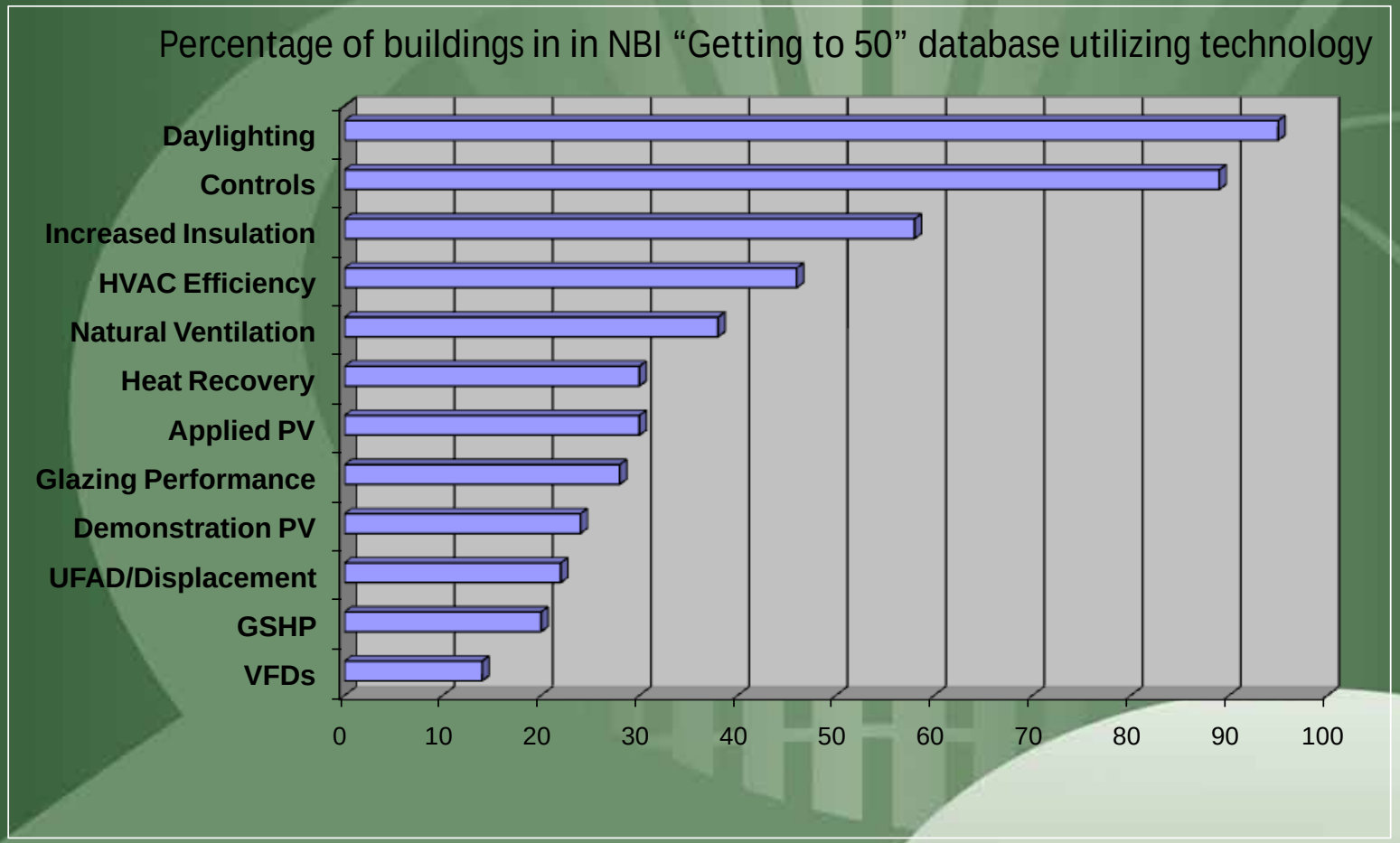
Zero Net Energy – How?



Source: Dave Hewitt, New Buildings Institute
Getting To Fifty presentation, 2008 ACEEE Summer Study

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Zero Net Energy – How?

- Conservation ethic
- Social marketing
- Education & outreach
- Medium term goals for single family homes
  - Ø reduce loads so ZNE can be achieved with 3-4 kW of PV
  - Ø 2019 Title 24, Part 6 requirement for residential buildings is ZNE or equivalent

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Thank You

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