

# Energy Efficiency: High Performance Buildings and Lamp Standards



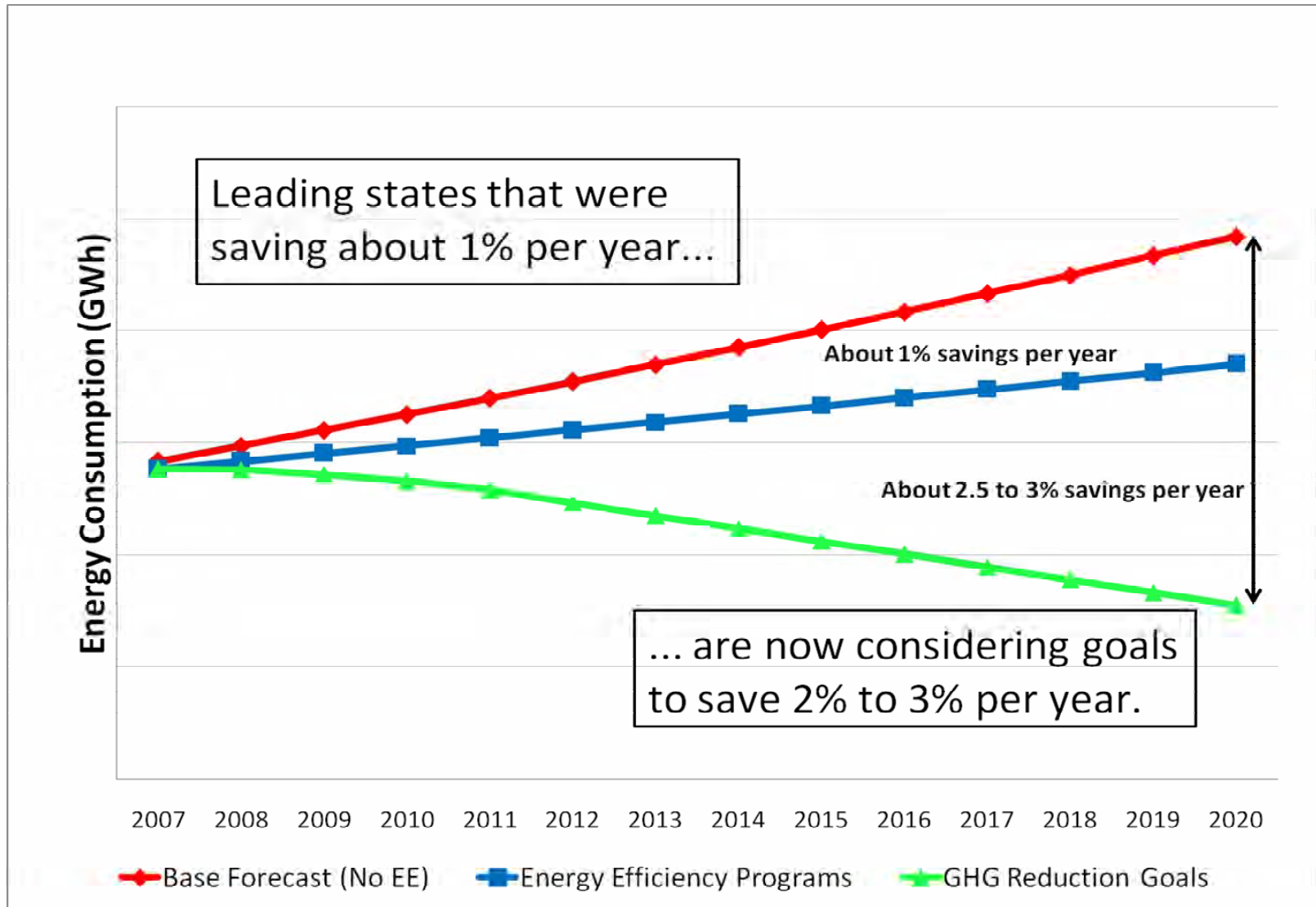
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# Because of high energy prices and climate change, states maximizing EE



# States and Regions Setting Higher Goals and Leapfrogging Ahead

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- WGA goal: increase energy efficiency 20% by 2020
- WGA Energy Efficiency Workshop: 30% or greater efficiency improvement compared to current building energy code (IECC)
- Climate change and GHG reduction goals
- What does this mean?
  - Deeper and broader savings
  - *Instead of saving 5-20% for individual consumers and businesses, need to save 20-50+% now (and more over time)*

# Overview

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- Background: market trends, consumer opinion
- Three opportunities, as *examples* only:
  - New buildings: building energy codes, beyond-code enhancements, and high performance and green buildings
  - State and federal lamp standards
  - High-efficiency cooling
- Summary of key policies

# New Homes are 'Going Green'

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- ❑ Growing market for energy efficient homes
  - Homebuyers are motivated by energy, cost savings opportunities
  - About 50% of buyers willing to pay more for green homes
- ❑ Shelton Group (2006): WTP up to \$2,500 premium for EE features
  - Housing downturn likely means some caution and somewhat reduced willingness to pay (WTP); need credible claims and documented results
- ❑ Homebuilders see high-performance as market opportunity
  - Homes sell faster, higher customer satisfaction
  - Fewer warranty, 'call-back' issues
  - Better sales in market downturns; differentiates communities/homes
- ❑ State, local governments are raising the bar
  - Austin, TX adopts zero energy homes building energy code & targets
  - Albuquerque, NM adopts mandatory Green Building Ordinance
  - Boulder, CO updating Green Points program
  - California PUC adopts goal of 100% Net-Zero Energy Homes by 2020

<sup>1</sup> McGraw-Hill Construction. 2007 Market Research Study: The Preferences of Green Home Buyers

<http://www.construction.com/AboutUs/2007/GreenHomescustomersurveyApril2007.pdf>

2. Shelton Group, 2006. <http://www.nbnnews.com/NBN/issues/2007-04-09/Front+Page/index.html>

and Oct. 2007: <http://www.energypulse.org/PDFs/EP07-GreenHomes.pdf>

# Can it be done?

...YES!

- ❑ ENERGY STAR Homes & Communities (20-30% savings)
  - Las Vegas, Nevada (70% market share)
  - Daybreak, Utah (Kennecott Land)
  - Stapleton at Denver (Forest City Enterprises)
- ❑ Best Practice EE Homes (30-50% savings)
  - Artistic Homes, Albuquerque, NM
  - Aspen Homes, CO
  - Ence Homes and Needham Homes, UT
  - Guaranteed Performance/Tax Credit Homes, Tucson Electric Power
- ❑ Zero Energy Homes (50-60% savings)
  - Lennar Homes, Sacramento, CA (over 1,000 ZEH with SMUD)
  - Shea Homes, San Diego, CA
  - Harvard Communities, Stapleton at Denver (new project)
  - McStain Solar Advantage Homes, Broomfield, CO (new project)
  - Oshara Village, Santa Fe, NM (new project)
- ❑ Eliminates 50-70% of summer peak load

# Cost Effectiveness

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- Efficient homes are cost-effective to the builder and the homeowner
  - Incremental cost
    - ENERGY STAR: 1% (\$2-3,000)
    - Best Practice EE: 2-3% (~ \$3,500 - \$6,500)
    - ZEH, no incentives: 8-10% (~ \$21-26,000)
    - ZEH with federal, utility incentives: 4-6% (\$9-14k)
  - Net savings (mortgage + utilities): \$300 - \$1,000 annually versus typical new home
  - Highest savings in hot climates; higher total incremental costs in cold climates, but still cost-effective

# Spectrum of Efforts and Policies for New Buildings

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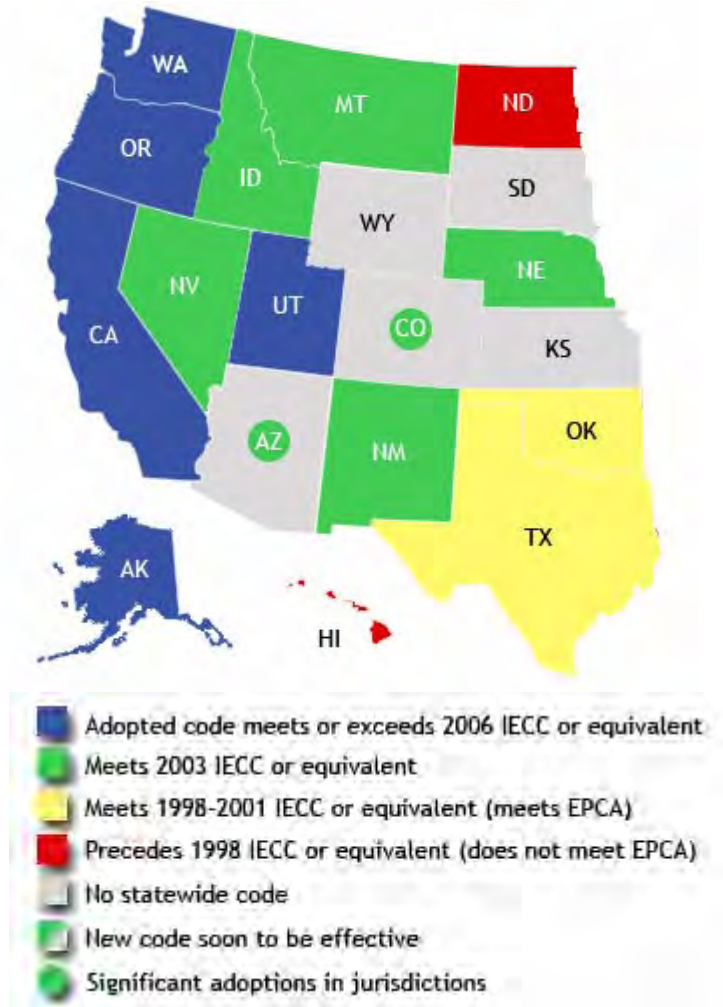
- Building energy codes and code support (bring up the bottom)
- Mainstream, mass market programs such as ENERGY STAR, utility DSM programs
- Highly efficient, best practice buildings to “push the envelope” and leapfrog ahead
- *Recently, increased emphasis on highly efficient, best practice buildings, to leapfrog ahead*



# Building Energy Codes

## □ Key actions

- Bring all state / local codes in region up to minimum level (IECC 2006)
- Training and code support to improve code compliance, enforcement
- Regular code updates
- Adopt minimum performance standards for state buildings
- Promote higher minimum efficiency levels regionally, nationally



Source: Building Codes Assistance Project  
Note: BCAP map slightly out of date for some states

# Code Enhancement Activities

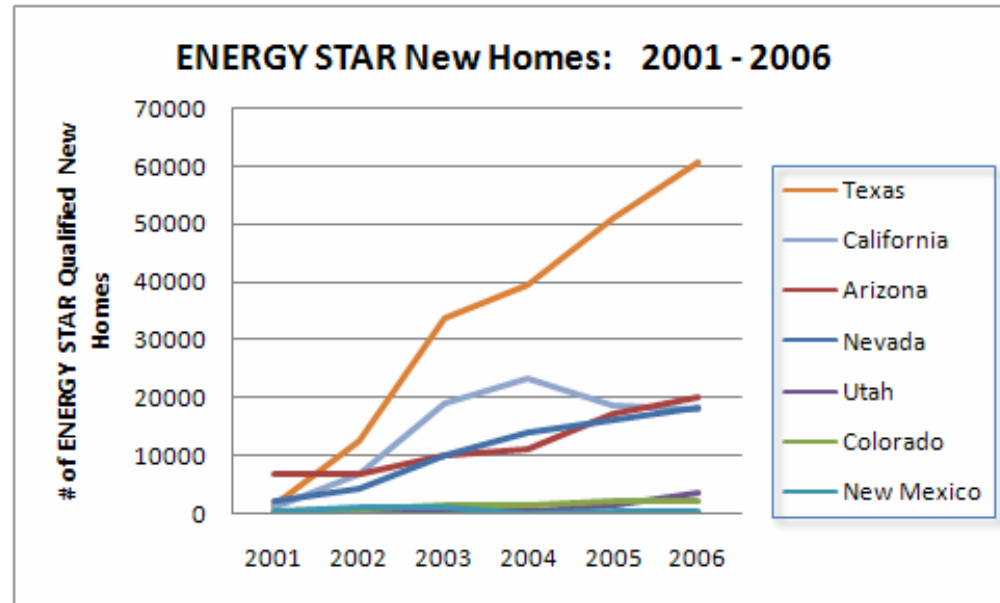
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- ❑ Adopt enhanced statewide code
  - California Title 24
    - ❑ 20-40% savings versus 2006 IECC
  - Oregon proposal (15% savings versus code)
  - New Mexico green building code (savings vs. 2006 IECC)
- ❑ Adopt beyond-code building energy standard
  - ❑ Sustainable Energy Standard, Tucson/Pima County, AZ
  - ❑ Green building standards (see examples, slide 12)
- ❑ Enhance IECC requirements
  - Require tight building envelopes, quality insulation, & performance testing (envelope, HVAC, ducts); address lighting and appliances
  - Examples
    - ❑ Town of Parker, CO
    - ❑ City of Albuquerque, NM
- ❑ Regularly update codes
  - 3-year cycle

# Beyond Code: ENERGY STAR

## New Homes

- Market-driven – better home performance, comfort and value to homeowner, builder
- Achieves cost-effective savings
  - 20-30% whole-house savings
  - Average savings of \$300 per year
- Very popular with consumers and building industry
  - 12% of market nationally;
  - 70% in NV; > 30% in AZ, TX
  - > 5,000 participating builders
  - 200,000 homes built in 2006
- State, utility incentives help transform the market:
  - Arizona: Utility incentives, builder training
  - Texas: went from 1% to 37% market share in 5 years
- Best Practices Guide available from ENERGY STAR



Source: ENERGY STAR New Homes  
<http://www.energystar.gov/homes>

# Green Building

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- Incorporate criteria and minimums for EE
  - Many “green” programs, but inconsistent standards
  - State programs: CO, WA, CA, HI, NV, NM, UT
  
- State initiatives
  - Lead by Example – adopting green building standards for public facilities: AZ, CA, CO, NM, NV, OR, UT, WA
  - Establish tax credits for green building (e.g., New Mexico)
  
- Local government green building standards
  - Albuquerque, NM: mandatory Green Building Ordinance for residential and commercial buildings (20-30% savings)
  - Boulder, CO updating Green Points program
    - 30-75% savings goals, based on house size
  - Scottsdale, AZ: green building program
  - Denver, CO: GreenPrint Denver Climate Action Plan

# Zero Energy Homes - Leapfrog Ahead

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- ❑ Goal: Design a highly efficient home that produces as much energy as it consumes
  - Current designs achieve 50% or greater energy savings
    - ❑ Cost-effective energy efficiency measures
    - ❑ Renewable energy (PV, solar hot-water)
  - Achieve net savings for homeowner
  - Deliver 50% or greater reductions in peak electricity demand
- ❑ Policies and programs
  - Utilities: incentives for EE, RE measures, new homes programs
  - States: tax credits, PV buydowns, builder training and education
  - Local governments: incentives, fee exemptions, training and education
- ❑ Projects and Initiatives
  - SMUD, Sacramento, CA: Solar Smart Homes Program
  - Austin, Texas: Adopted ZEH building ordinance
    - ❑ Incrementally raises building code to achieve ZEH capable home by 2015
  - California PUC: adopted goal of 100% Net-Zero Energy Homes by 2020; Net-Zero Energy Commercial Buildings by 2030
- Commercial Buildings: Advanced Buildings (NBI), Architecture 2030 (50% savings now, carbon neutral by 2030), Getting to Fifty

# Lamp Standards – State

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## □ Nevada Standards

- Establishes minimum efficiency standard of 25 lumens/watt for general-purpose lamps, beginning in 2012; second tier by 2016
  - Effectively bans general service incandescent lamps
- Estimated savings
  - 1,200 GWhs electricity annually
  - \$1.3 billion in net economic benefits through 2020
  - Avoids 850,000 tons of CO2 emissions annually (~160,000 automobiles)

## □ Other states developing or considering standards

- California: AB 1109, signed by Governor 10/12/07
  - Directs CEC to set standards within 12 months to meet goal of 50% efficiency improvement by 2018
  - Will save consumers up to \$3 billion annually and offset need for 5 additional power plants
- Colorado: Climate Action Plan includes lamp standards policy
  - Net benefit: \$9 billion in savings; 3.25 MMT CO2 by 2020
- Arizona, New Mexico, other states considering legislation

# Lamp Standards – Federal

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- ❑ Energy efficiency advocates and lamp manufacturers have been meeting
- ❑ Lamp standards in the House energy bill but not in the Senate (conference committee)
- ❑ Sen. Bingaman (NM) introduced a new lamp standards bill
- ❑ Tier I phases in (2012-14) at various lumen/watt levels; Tier II (2020) at 45 lumens per watt
- ❑ Preemption of state standards not resolved
- ❑ Timing and final details (strength of the federal standards) uncertain
- ❑ Need strong standards in several states

# Western U.S. Electricity Challenges: Cooling is a Key Culprit

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- ❑ Cooling loads cause summer peak demands 30-35% above winter peaks
- ❑ Electric use patterns for current cooling systems are unprofitable for utilities (low load factors)
- ❑ Dry climates offer opportunities to reduce cooling demand and energy use by 50%+
- ❑ High efficiency cooling systems are the most cost-effective new peak capacity resource, due in part to cooling's near-perfect alignment with utility summer peaks



# Proposed Actions for the West

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Proposed: two key activities aimed at climate-responsive cooling:

- Establish “year 2020” cooling efficiency goals:
  - New buildings- zero peak demand, 50% lower energy use
  - Existing buildings- 50% lower peak, 25% lower energy use
  - Track progress toward goals
- Develop and market advanced climate-responsive rooftop HVAC units (RTUs):
  - Cooling performance- reduce peak demand 40%, annual energy use 50%
  - Environmental- reduce net water use, supply more fresh air
- If we meet these goals, the West will save in 2020:
  - 60,000+ GWh energy savings
  - \$10+ billion annually at \$0.12/kWh
  - And avoid many new power plants...
- Western Cooling Efficiency Center (WCEC), UC Davis

# Collaborative Example: The Roll-out Radiant Floor

- ❑ Collaboration of WCEC, Wal-Mart, tubing manufacturer
- ❑ Prior cost \$6-7/sqft
- ❑ Rollout cost ~\$2/sqft
- ❑ 02/07 tested at WM West Sac. store
- ❑ 08/07 full-store Implementation, Las Vegas
- ❑ Widescale rollout expected in Western US stores
- ❑ Expected 50% energy savings



**Source: Western Cooling Efficiency Center (WCEC)**

# Summary: Key Policies for States

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- ❑ Building codes and high performance buildings
  - Enhance performance of code-built homes
    - ❑ Regularly update state/local codes
    - ❑ Code support: training, technical assistance, and compliance support
  - Adopt beyond-code building energy standards as code enhancements
  - Lead by example
    - ❑ Adopt Green building standards for all new state-funded projects
  - Promote high performance and highly efficient, best practice buildings
    - ❑ Set aggressive statewide EE goals for buildings and utilities
    - ❑ Provide incentives / tax credits for EE and RE in buildings
    - ❑ Establish high performance new home partnerships with utilities, building industry
    - ❑ Educate consumers about available options and savings potential
    - ❑ Support “leapfrog” transition to zero energy homes and commercial buildings
- ❑ Lamp standards
  - Adopt minimum standards for general service lamps, similar to NV, CA
  - Support federal lamp standards legislation, with no or limited preemption
- ❑ Efficient Cooling
  - Support cooling efficiency goals
  - Develop and market advanced rooftop units with 50% or more energy savings

# SWEEP:

*Dedicated to More Efficient Energy Use in the Southwest*

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Resources available online at:

[www.swenergy.org](http://www.swenergy.org)

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