Home Energy Raters and California Energy Policy

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2007 RESNET Building Performance Conference

"Taking It To The Next Level"

California Relies on HERS Raters for Field Verification & Diagnostic Testing

- Fundamental Strategy:
  - Field Research to Find out Current Practice
  - Discount Savings of Measures Prone to Defects
  - Establish Protocol for High Quality Installation
- Trial Period:
  - Prescriptive Standards Based on Discounted Savings
  - Compliance Credit for High Quality Installation
- Post-Trial Period:
  - Prescriptive Standards for High Quality Installation
  - Penalty for Standard Practice (Discounted Savings)
- Field Verification & Diagnostic Testing for Credit

Quality Construction Measure	Standards Adoption (Option or Required)		
	1999	2002	2005
Ducts			
Sealing	New – O	New – R	New – R Alt – R
Design	New – O	New – O	New - O
Location	New – O	New – O	New – O
Surface Area	New – O	New – O	New – O
Buried in Insulation			New – O
Nonresidential Sealing		New - O	New – R Alt - R
Envelope Sealing	New - O	New - O	New - O

New = New Buildings and Additions Alt = Alterations

O = Option R = Required

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Quality Construction Measure	Standards Adoption (Option or Required)	
	2002	2005
Air Conditioners		
Refrigerant Charge and Airflow	New – R	New – R
Or	Alt - R	Alt - R
Thermostatic Expansion Valve		
EER		New - O
Fan Wattage		New - O
Sizing		New - O
Insulation		New - O

New = New Buildings and Additions Alt = Alterations

O = Option R = Required

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It All Started with Existing Buildings

- Weatherization programs in cold northeast states found huge consequences to defects in 1980s
- CEC conducted pilot programs on diagnostic testing in 1992; developed HERS sliderule
- Founding member of CHEERS in early 1990s
- National technical panel in mid-1990s advising DOE on HERS program required by EPAct
- PG&E's Stockton Training Center pro-active early
- PG&E and SoCalGas duct training aimed at existing housing in mid-1990s

Duct Sealing in 1998 Standards

- 1995 field research revealed - massive duct leaks; ducts in attics; peak demand problem
- Active in ASHRAE Standard 152 – developed duct sealing protocol and algorithms to determine energy impact; adapted for Title 24 use
- Established compliance option for duct sealing, location, insulation, surface area
- Set Fundamental Strategy:
  - Discount energy savings for "standard practice" to match field research;
  - Award compliance credit for installer following protocol on every house and HERS Rater field verification;
  - Never assume perfect installation

Third Party Verification a Must

- CBIA (and others) very strongly advocated for third party verification to reduce builder liability for defects
- Focus Standards on Construction Quality
- CEC Adopted HERS regulations establishing third party verification as condition for compliance credit
- Provider trains, certifies and oversees raters; raters are "Special Inspectors"
- Duct Sealing with Field Verification actively pursued by utility new construction and training programs starting in 1999

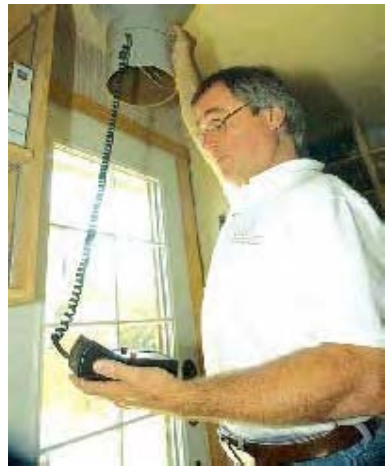
Quality Homes Collaborative

- Collaboration between CIEE, CBIA, utilities and the Commission – late 1990s
- Protocols for HVAC design and installation; installation of insulation; caulking and sealing; selection and installation of windows; framing design, and mechanical ventilation
- Protocols recommended for bid specs in all training sponsored by BII
- http://www.energy.ca.gov/efficiency/qualityhomes/index.html

2001 Emergency Standards

- Made duct sealing and air conditioner refrigerant charge/airflow or TXV prescriptive requirements
- Refrigerant charge, airflow and TXV protocols and algorithms for energy calculations based on Proctor's field research & PG&E lab testing
- Duct Sealing Compliance Credit for small commercial buildings
- EPA, CBIA & CA utilities base Energy Star Homes on 15% beyond Standards using all Standards calculation methods, protocols and field verification

2002 Residential Construction Quality Assessment Project (RCQAP)



- Rick Chitwood did field inspections of 60 new homes
- Detailed visual inspections, IR camera, duct blaster, blowerdoor
- Evaluated duct installation, sealing, and airflow, building envelope leakage, insulation defects, draft stopping, framing, air pressure differentials, air conditioner sizing
- Found that Standards attention on duct sealing is working
- Recommended further attention in the Standards on areas where defects are common – recommended that the 2005 Standards address wall insulation defects

2005 Standards – Air Conditioning and Ducts

- Updated calculation algorithms for airflow/TXV based on newer research
- New compliance options (calculation algorithm and protocol) for ducts buried in attic insulation, high EER, low fan wattage, air conditioner sizing
- Duct sealing made prescriptive requirement for small commercial
- Duct sealing made prescriptive requirement when air conditioners are replaced (duct sealing plus insulation when ducts are replaced)

2005 Standards – Building Envelope

- Field research on extent of framing in residences (Chitwood did field work)
- Discounted energy savings for "standard practice" insulation based on framing research , ORNL research on common defects and Residential Quality Assessment Project
- Conducted industry task force in 2003 to develop insulation quality installation protocol (based largely on Quality Homes protocols and RCQAP)
- Overcame insulation manufacturer denial that standard practice commonly has defects and should be improved

How-To Training Videos

- Videos focus on how to properly install energy efficiency measures
- Use installation experts to demonstrate quality installation and use of diagnostic testing
- Follow Commission-developed protocols
- Used by thousands of people to gain information about quality installation and Standards compliance and used as tool for training sessions
- http://www.consumerenergycenter.org/videos/

Training on Quality Installation

- BII training to largest production builders focus on using protocols and bid specifications to insure quality installation
- Stockton Training Center and SoCalGas Training Center focuses on training contractors and HERS raters on protocols
- CABEC training focuses on importance of field verified measures and procedures
- Training to CALBO focuses on building officials' role in requiring field verification when needed for compliance

Blueprint Newsletter

- Emphasizes importance of field verification
- *Seeking Excellence* interviews focus on builders, building officials, HERS raters who are successfully implementing field verification
- Questions and Answers about how field verification works

- Information is reprinted in *Indoor Comfort News* monthly newsletter published by IHACI with circulation to 30,000 mechanical contractors

Changes Coming for 2008 Standards Impacting Field Verification

- New furnace fan efficiency, airflow and fan watt draw requirements and
- Requirements for air conditioning refrigerant charge and revised airflow and TXV treatment
- New Attic Model to more effectively address duct system improvements, cool roofs, attic ventilation, roofing material ventilation, radiant barriers
- Requirements for mechanical ventilation

Community Energy Efficiency Program

"…by promoting going beyond the minimum level of efficiency, you use third-party field verification. That helps us reduce, and in some cases eliminate, the prospect of construction defect litigation down the road."

— Bob Raymer, CBIA

- **Sponsored by CA Building Industry Assoc.**
- **Verified to Exceed Standards by 15% +**
- **Communities Encouraged to Identify Ways to Reward Local Builders that Participate**
  - **Expedite Plan Check and Inspection Process**
  - **Reduce or Defer Fees**
  - **Public Recognition for Builder Efforts**
- **Over 40 Communities Now Involved**
- **Morphed into the CA Green Builder Program**
- **Now Construction Waste Diversion, Water and Wood Conservation, Advanced Ventilation**

California's Energy Efficiency Policy Initiatives

- **Energy Crisis Legislation (2000/2001)**
  - Mandated Emergency Updates of Building Standards
- **Energy Action Plan**
  - Efficiency at the top of the Loading Order
  - Standards Most Cost Effective Way to Increase Efficiency
- **Green Building Initiative (Executive Order S-20-04)**
  - 20% Standards Increase for Nonresidential Buildings by 2015
- **West Coast Governors' Global Warming Initiative**
  - Governors of California, Washington, Oregon
  - 15% Standards Increase for All Buildings by 2015
- **AB 549 Report to the Legislature**
  - How to Increase Energy Efficiency in Existing Buildings
  - HERS Ratings at Point of Sale – Material Fact Requiring Disclosure
  - HERS Ratings for Affordable Housing

Existing Homes

- **2005 Building Standards - Alterations**
  - **Duct Sealing When Air Conditioners/Furnaces Replaced**
- **AB 549 Report to Legislature**
  - **Disclosure of HERS Rating at Point-of-Sale**
  - **Work with Realtors – Value Added Service**
  - **Work with Affordable Housing Authorities/NSHP**

Letter To Homeowners on Requirements for Changeouts

- **You Will Benefit!**
- **Average Ducts Leak 30%**
- **Money Straight Out of Your Pocket**
- **Sealed Ducts Lower Energy Bills, Improve Indoor Air Quality, Increase Comfort, Avoid Blackouts**
- **Pull a Permit – It's the Law**

STATE OF CALIFORNIA — THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor

CALIFORNIA ENERGY COMMISSION
1516 Ninth Street
Sacramento, California 95814
Main website: www.energy.ca.gov

LETTER TO HOMEOWNERS:

NEW DUCT SEALING REQUIREMENTS - YOU WILL BENEFIT

Beginning October 1, 2005, you must have your home's ducts tested for leaks when you have a central air conditioner or furnace installed or replaced. Ducts that leak 15 percent or more must be repaired to reduce the leaks. After your contractor tests and fixes the ducts, you choose whether to have an approved third-party field verifier check to make sure the duct testing and sealing was done properly or to have your house included in a random sample where one in seven duct systems are checked.

Duct sealing is not required in the following situations: 1) when homes are in specific coastal climates; 2) when systems have less than 40 feet of ductwork in unconditioned spaces like attics, garages, crawlspaces, basements or outside the building, or 3) when ducts are constructed, insulated or sealed with asbestos. There also are specific alternatives that allow high efficiency equipment and added duct insulation to be installed instead of fixing duct leaks.

You also should know that any contractor failing to obtain a required building permit and failing to test and repair your ducts is violating the law and exposing you to additional costs and liability. Real estate law requires you to disclose to potential buyers and appraisers whether or not you obtained required permits for work done on your house. If you do not obtain a permit, you may be required to bring your home into compliance with code requirements for that work and you may have to pay penalty permit fees and fines prior to selling your home.

The greatest energy use in California homes is for central air conditioning and heating. Most homes with central air conditioning and heating systems have ducts that were never properly sealed. **The average home's ducts leak around 30 percent of the conditioned air outside the home. These leaks are taking money straight out of your pocketbook.** Properly sealed ducts will lower your energy bills, reduce pollution inside your home, and help to avoid a repeat of the inconvenience and health and safety risks that we suffered during the power blackouts in 2000.

For more information, please contact the Energy Commission Efficiency Hotline at (800) 772-3300, or visit our website at www.energy.ca.gov/title24/changeout.

Date: August 2, 2005

JACKALYNE PFANNENSTIEL
Vice Chair

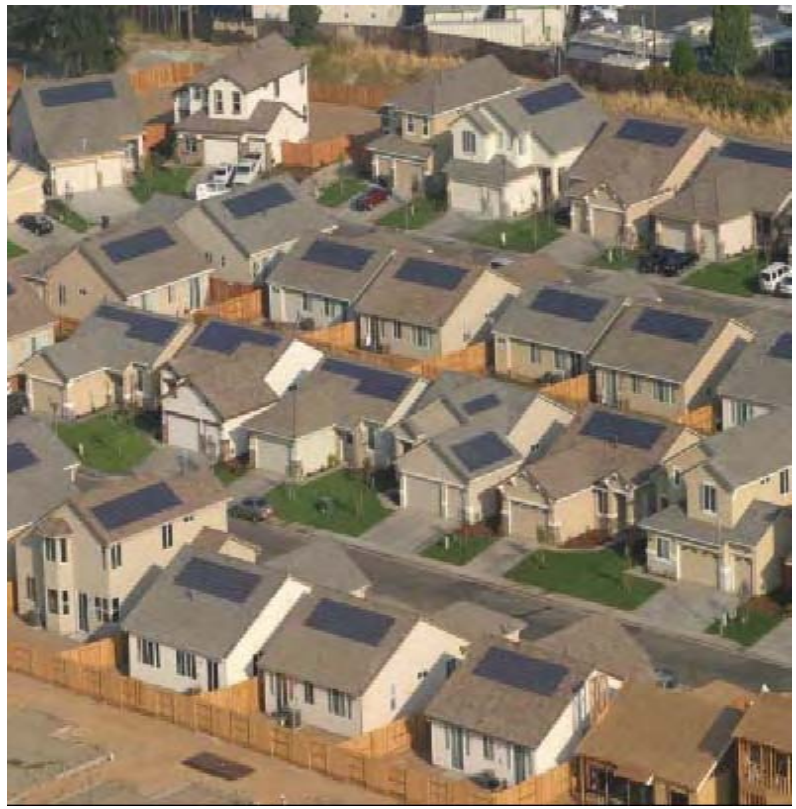
ARTHUR H. ROSENFELD, Ph. D.
Commissioner

California's Solar Policy Initiatives

- **Governor's Million Solar Roofs Vision**
  - "Every Rooftop Can be a Clean Solar Power Plant"
- **Launched Under Administrative Authority**
  - California Solar Initiative – CPUC – Existing Homes/Commercial
  - New Solar Homes Partnership – Energy Commission
- **SB 1 Comprehensive 10 Year Program**
  - $3.3 Billion for Energy Efficient, Solar Buildings
  - Self-sufficient Solar Industry
  - Solar is Mainstream on Homes and Businesses
  - Solar Systems on 50% of New Homes
  - Energy Commission Determines
    - Eligibility Criteria, including Energy Efficiency Levels
    - When Solar Should be Required by Building Standards

New Solar Homes Partnership

- **Achieve Dramatic Penetration of Highly Energy Efficient, Solar Powered Homes**
- **$400 Million Over 2007-2011**
- **Targeted at California Production Housing**
- **Expected Performance Based Incentives**
- **Field Verified Performance of Energy Efficiency and Photovoltaics**



Energy Efficiency First

- **Tier I – Minimum Condition of Participation**
  - **15% Savings Beyond T-24 Total Energy Budget**
  - **Current Utility New Construction Programs**
  - **$500/house for hot summer climate zones**

- **Tier II – Immediate Positive Cash Flow**
  - **35% Savings Beyond T-24 Total Energy Budget**
  - **40% Savings Beyond T-24 Space Cooling Budget**
  - **Commission Preferred Level**
  - **Moves Towards Zero Energy New Homes**
  - **Achieved by Current Building America Homes in California**
  - **$2,000/house for hot summer climate zones**

- **Both Tiers: Energy Star Appliances**

SB 1 Eligibility Criteria

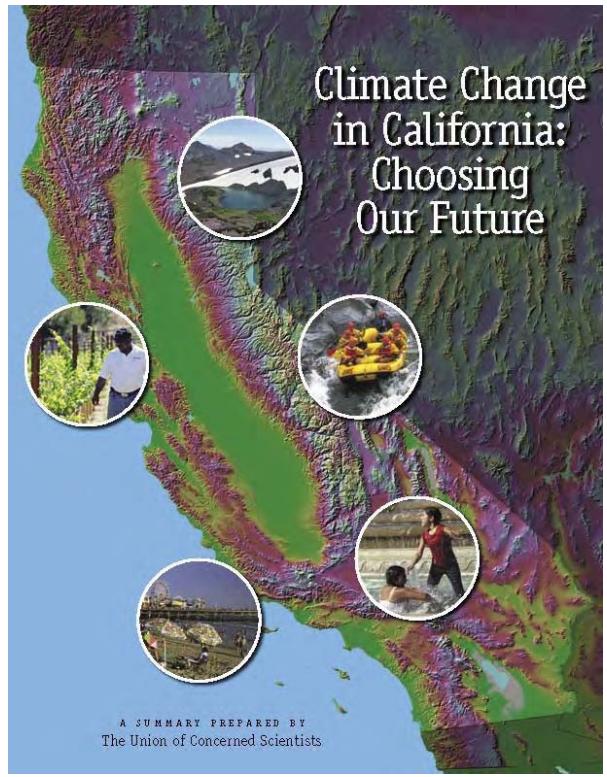
- Design, Installation and Electrical Output
- Installation Guidelines -- Proper Siting & High Quality Installation to Maximize Performance – Field Verification
- Optimal Performance During Peak Periods
- Energy Efficiency Measures for New or Existing Homes or Commercial Buildings
- Rating Standards for Equipment, Components & Systems

California's Climate Change Policy Initiatives

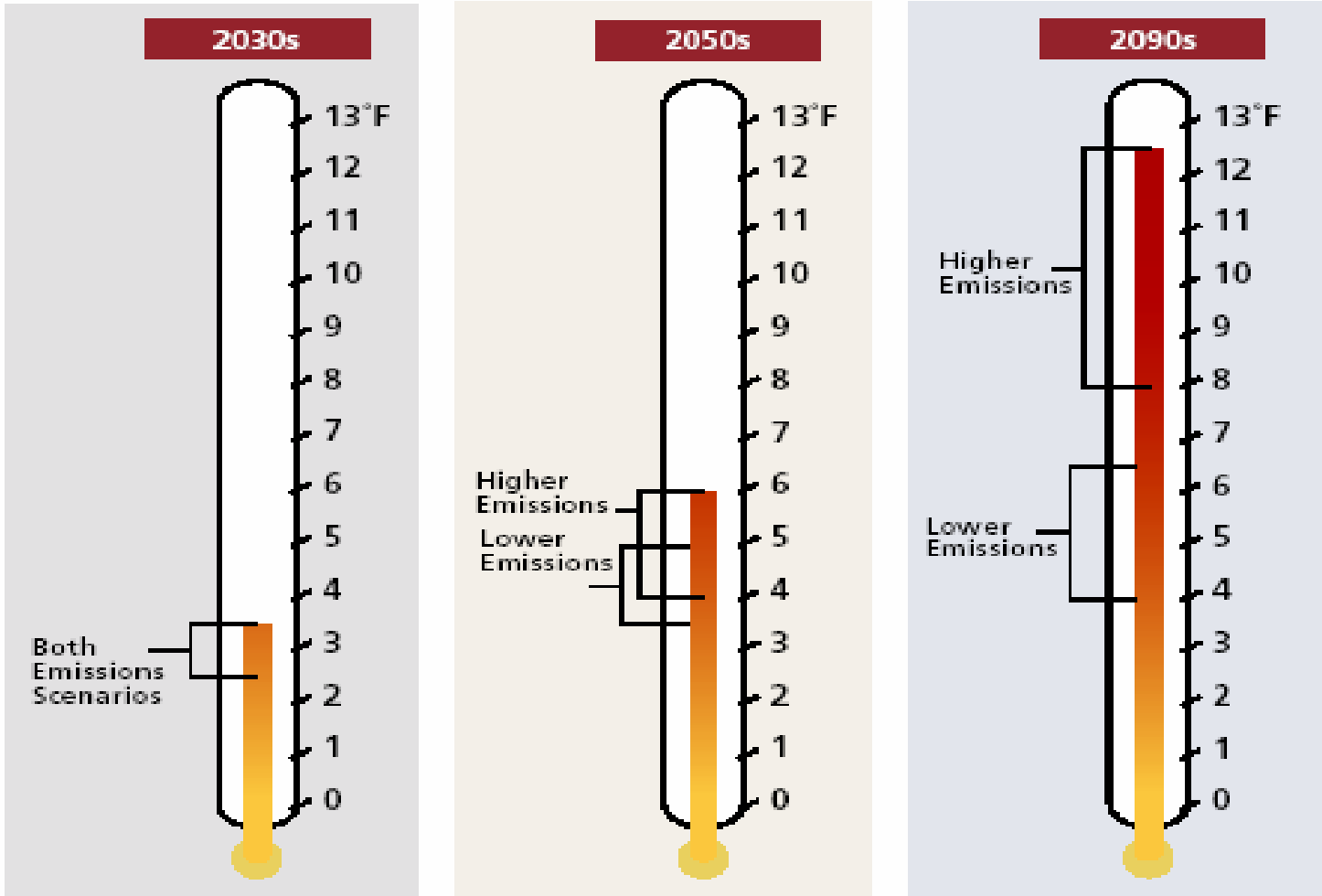
- **Climate Action Initiative (Executive Order)**
  - Reduce GHG Emissions to 2000 Level by 2010
  - Reduce GHG Emissions to 1990 Level by 2020
  - Increased Standards is Explicit Strategy

- **AB 32 California Global Warming Solutions Act**
  - Cap and Trade Market System Beginning in 2012
  - Building Energy Efficiency Will Be a Focus
  - Reliability and Verification Will Be Critical
  - Opportunity to Aggregate GHG Emissions Reductions Across Subdivisions, Large Buildings, Campuses

California Climate Change Impacts

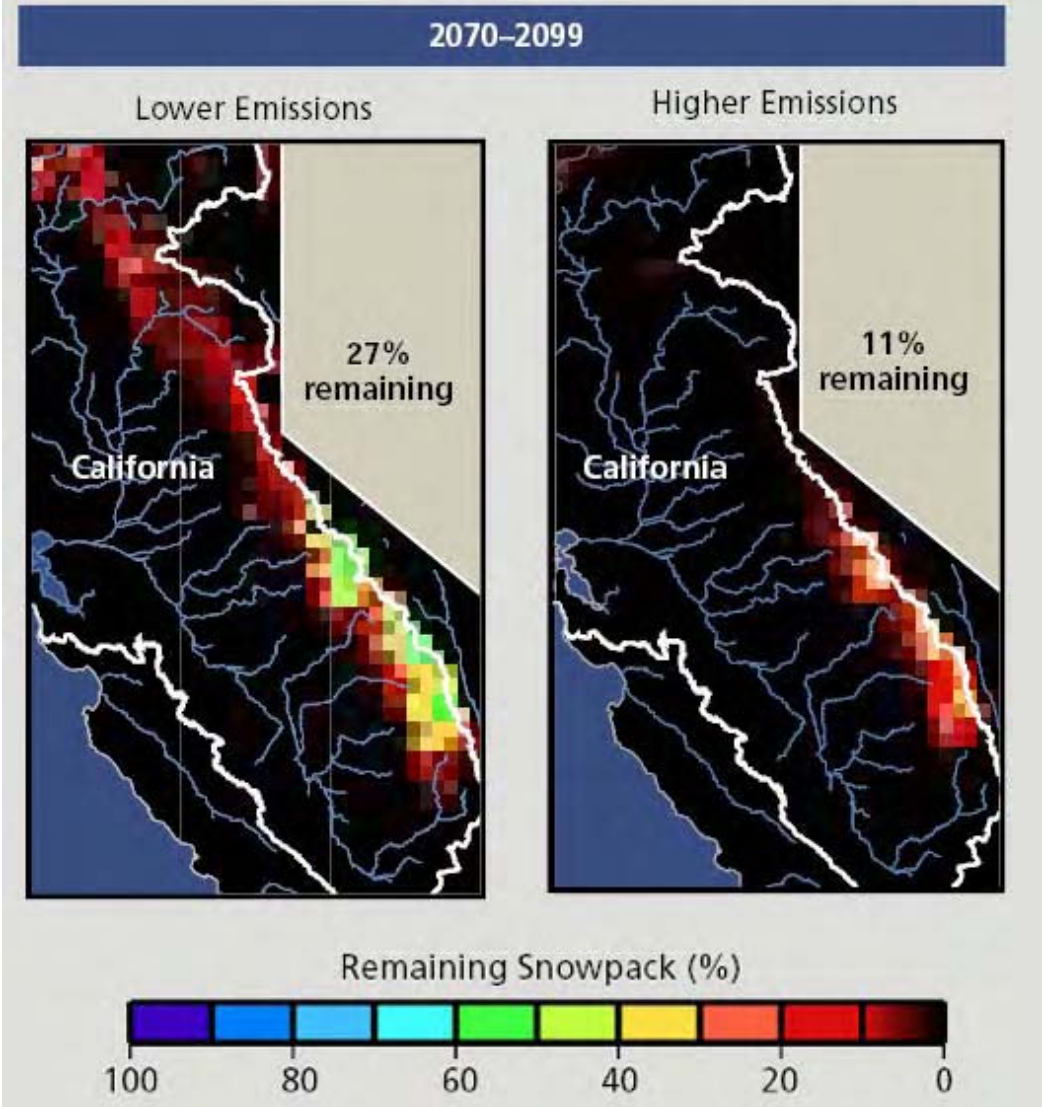


- **Severe Water Resource Problems**
  - **Increased Winter Runoff Will Overwhelm Dams and Levee Systems**
  - **Reduced Snowpack Will Cause Low Summer Stream Flows, Drought Conditions**
- **Central Valley Will be Hotter and Dryer – Problems for Agriculture**
- **Population Migration from Central Valley/Desert to Coastal Regions**
- **California Population will Double by 2050, Triple by end of century**
- **Impacts to Public Health, Life Expectancy, Quality of Life**



California is expected to experience dramatic warming during this century, and the amount of warming depends on our emissions of heat-trapping gases. This figure shows projected increases in statewide average annual temperatures for three 10-year periods. Ranges for each emissions scenario represent results from two climate models.

Decreasing Sierra Nevada Snowpack



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Commission Standards and Initiatives Called Upon to Deliver

- Reduced Energy Bills
- Reduced Air Pollution
- Increased Energy System Reliability
- Increased Comfort
- Improved Indoor Air Quality
- Reduced Construction Defects
- Photovoltaics
- Reduced Greenhouse Gas Emissions

Will Increasingly Rely on HERS Raters to Do So

For More Information

- http://www.energy.ca.gov
  - Click "Title 24 Building Standards"
  - Click "Go Solar California!"
  - Click "California Climate Change Portal"
- bpenning@energy.state.ca.us