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Becoming ClimateEfficient™
Effective Policies & Practices for
Building a Clean Energy Economy
June 23, 2010

A presentation by Assemblymember Nancy Skinner,
California, Representing the 14th District
Hosted by The Climate Registry's Cool Planet Project



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Reducing Energy Usage Reduces Greenhouse Gas Emissions!

1,400 kWh = One ton of CO₂e

200 therms = One ton of CO₂e

One ton of CO₂e is emitted when you:

- Run an average US household for 60 days
- Drive 1,900 miles in a mid-sized car
- Graze one Ugandan dairy cow for eight months

Step 1: Take Inventory!

Measure Your Carbon Footprint

Step 2: Set Reductions Goals!

The Most Cost Effective & Immediate Solution – Energy Efficiency





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The Cool Planet Project



- ✓ **Energy Efficiency & Climate Change mitigation marketing, education, and outreach program which incentivizes and rewards the installation of large EE projects**
- ✓ **Promotes energy efficiency as the most cost-effective and immediate solution to climate change**
- ✓ **Provides business customers assistance in measuring, verifying, and reporting their GHG emissions profile in exchange for installing energy efficiency (EE) projects**
- ✓ **Educates utility staff and their large commercial and industrial customers about the relationship between energy usage, energy efficiency and greenhouse gas emissions**
- ✓ **Communicates customers' leadership and successes to the public**



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Assemblymember Nancy Skinner, California, Representing the 14th District

- Named Chair of the Natural Resources Committee
- Member of the Utility and Commerce Committee
- Recently recognized as the *California Assembly's 2009 Rookie of the Year*
- Author of AB 758 – to achieve greater energy savings in existing residential and commercial buildings
- Previously served on Berkeley's City Council
- Founded ICLEI – Local Governments for Sustainability
- Held position as U.S. Director of The Climate Group
- Published the best selling book series *50 Simple Things You Can Do To Save the Earth*



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Effective Policies & Practices for Building a Clean Energy Economy

**Assemblymember Nancy Skinner,
California, Representing the 14th District**



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**“Building” a Clean Energy Economy:
*Achieving Greenhouse Gas Reductions,
Energy Savings and Green Jobs
through Building Retrofit***

**California Assembly Bill 758
Assemblymember Nancy Skinner**



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AB 758

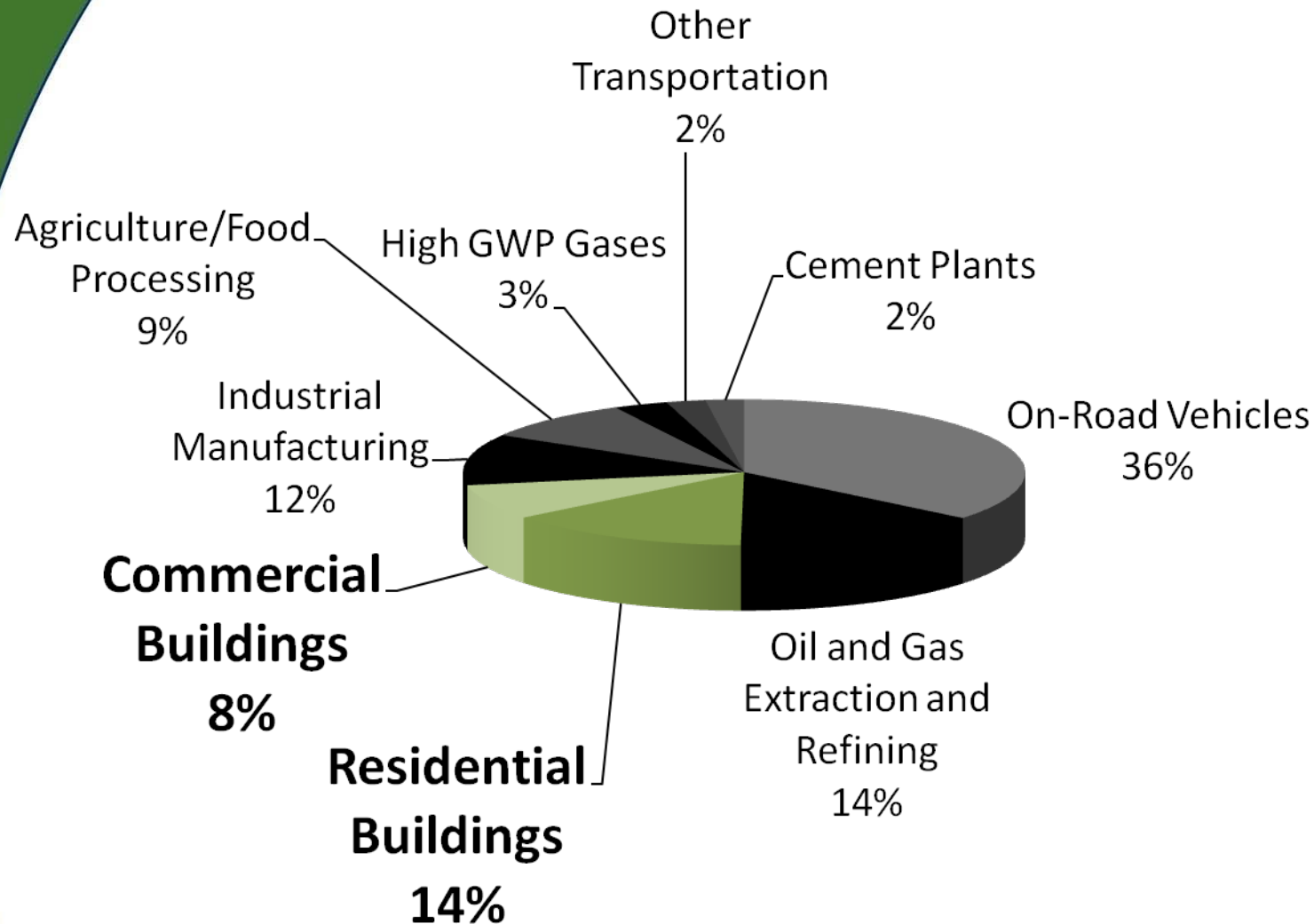
- Authored by Assemblymember Skinner and Speaker Karen Bass
- Signed into law by Governor Schwarzenegger October 12, 2009:

“California is a leader in fighting global warming and protecting our environment. And, we are showing the rest of the nation and the world that you can protect the environment and the economy at the same time.”
- Directs the California Energy Commission to develop a comprehensive program to retrofit existing residential and commercial buildings to achieve energy savings and GHG reductions.
- First comprehensive statewide energy efficiency retrofit program for *existing* buildings in the US.



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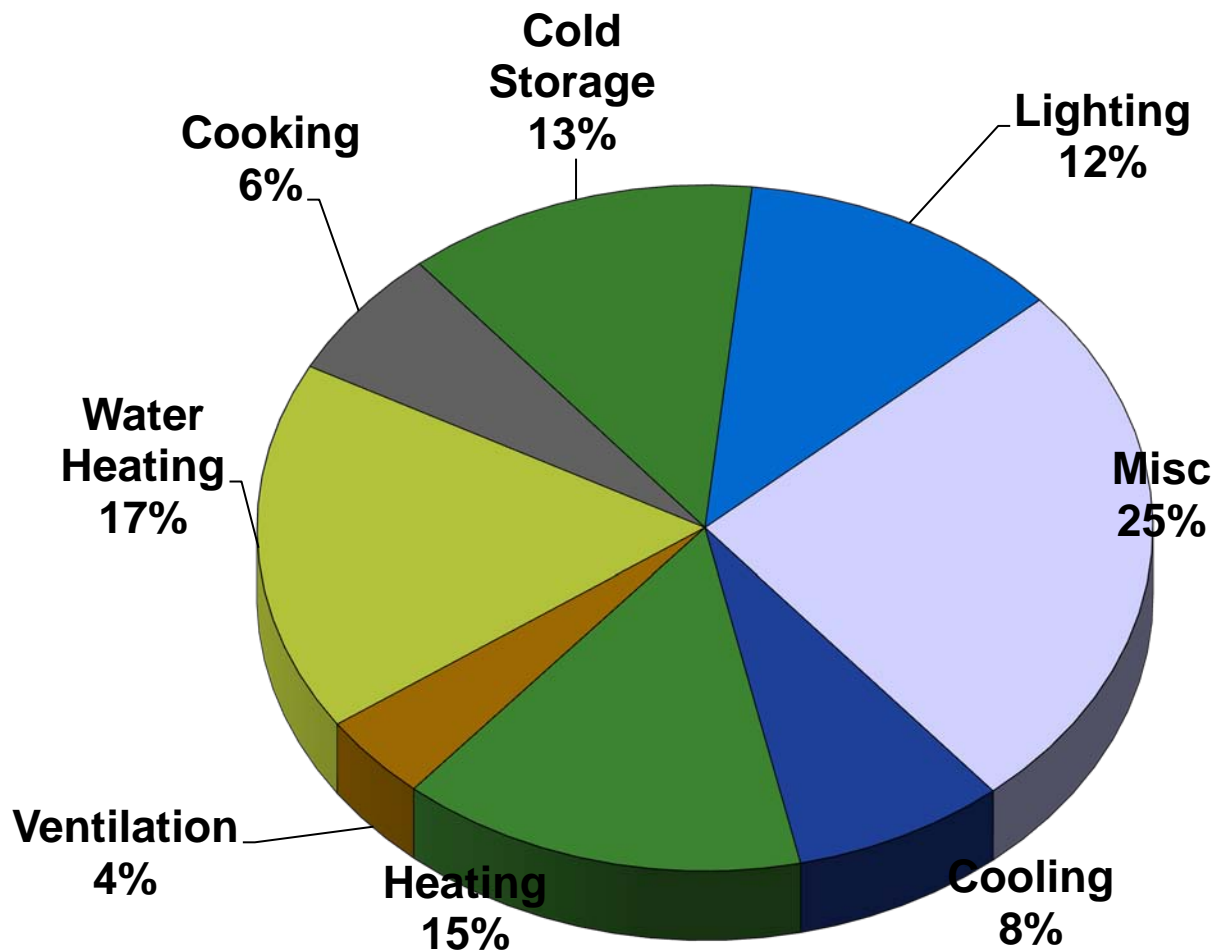
California Greenhouse Gas Emissions by End Use





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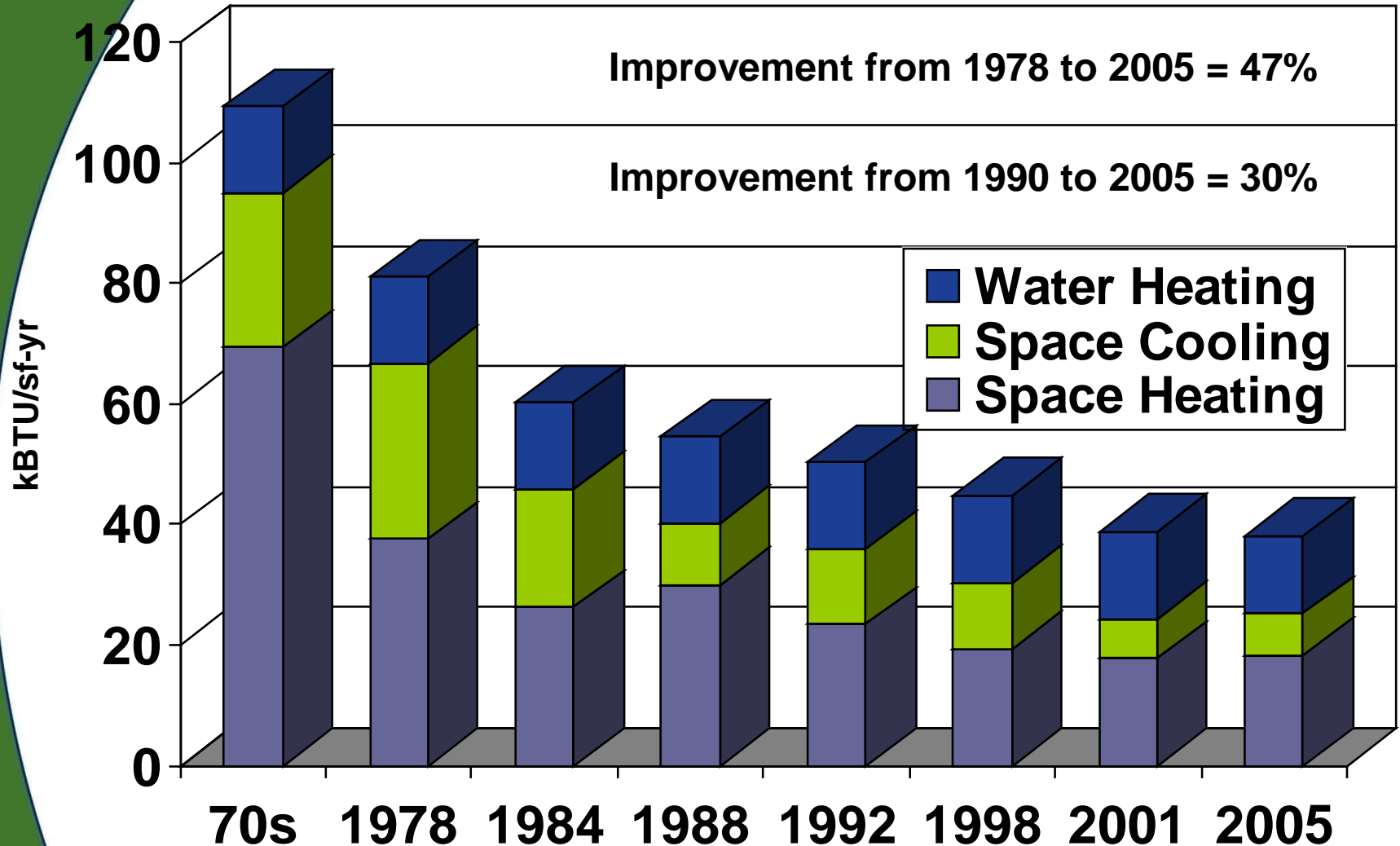
Sources of Greenhouse Gas Emissions in California Buildings (2004)





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Home Energy Use by Vintage





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Total Green Building Greenhouse Gas Reduction Potential (MMT CO₂e)

Green Building Strategies	New Construction		Existing Buildings	Totals
	Green Building Code	Beyond Code	Retrofits	
State	0.02	0.09	0.9	1.0
Public Schools	0.08	0.1	1.2	1.4
Residential	1.1	0.4	10.4	11.9
Commercial	1.7	3.0	7.5	12.2
Totals	2.9	3.6	20	26



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Greenhouse Gas Emissions from Existing Buildings in California

- Existing buildings are relatively inefficient:
 - 72% of residential buildings and over 5 billion square feet of commercial space were constructed prior to implementation of California's "Title 24" building efficiency standards in the early 1980's

- GHG emissions are significant:
 - 14% of California's total GHG emissions are attributable to residential buildings, 8% to commercial buildings.
 - 71% of residential building GHG emissions are attributable to homes built prior to implementation of Title 24.

- Reduction potential is also significant:
 - Retrofitting existing buildings to improve their efficiency is among the most cost-effective means to achieve GHG reductions.
 - Full implementation of AB 758 can meet or exceed ARB's 2020 targets for energy and water use efficiency – representing 12 percent of the reductions identified in the AB 32 Scoping Plan, or 20.9 MMT CO₂e.



\$Bottom Line\$ - Potential for Energy Savings and Job Creation

- Estimated potential savings in electric energy, peak demand, and natural gas consumption achievable in existing buildings (California Energy Commission):
 - Technical savings potential: 12 percent of statewide electricity consumption, 17 percent of peak demand, and 20 percent of natural gas consumption.
 - Cost-effective savings potential: 9 percent, 11 percent, and 5 percent, respectively.
 - Currently economic efficiency measures would save approximately \$5 billion in energy costs and 6,000 MW of electricity - avoiding the need for 12 new natural gas power plants.

- Estimated jobs created from a \$1 billion capital expenditure in energy and efficiency (Earth Policy Institute):

□ Retrofitting buildings:	6,750
□ Wind:	3,347
□ Solar thermal:	2,274
□ Nuclear:	1,016
□ Coal:	868



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California Climate Leadership: AB 758 is just the latest example

- **AB 32** – Statewide GHG cap (1990 levels by 2020, 25% below business as usual), sector-specific GHG reduction measures, additional reductions through market mechanisms (cap and trade proposed), 2050 goal of 80% reduction.
- **SB 1368** – Prohibits long-term purchase of electricity from power plants that don't meet a GHG emission performance standard (e.g conventional coal).
- **Renewable Portfolio Standard (RPS)** – Every California electric utility is required to buy 20% of its energy from renewable resources by 2010 and 33% by 2020.
- **AB 1493** – World's first tailpipe GHG emission limits for passenger cars.
- **Low Carbon Fuel Standard (LCFS)** – Regulation adopted by the Air Resources Board under AB 32 requires petroleum suppliers to achieve a 10% reduction in the carbon intensity of their fuels by 2020.
- **AB 118** – \$200 million/year fund to develop new alternative and renewable fuel and vehicle technologies to reduce GHG emissions and improve air quality. Funded by small surcharge on annual vehicle registration (\$5 or less/year).
- **SB 375** – Requires community development to be guided by regional “Sustainable Communities Strategies” linking regional transportation and housing planning to GHG reduction targets to further reduce GHG emissions from the transportation sector.
- **Property Assessed Clean Energy (PACE)** – Innovative method to finance building energy efficiency and renewable energy projects started in Berkeley, CA and spreading throughout CA and US. City provides capital – no up-front cost to the owner. Costs are paid back via property tax bill and offset by energy savings.
- What's next?



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Cool Roof Programs, Integration, and Recommendations



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White is 'cool' in Bermuda





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and in Santorini, Greece





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and in Hyderabad, India



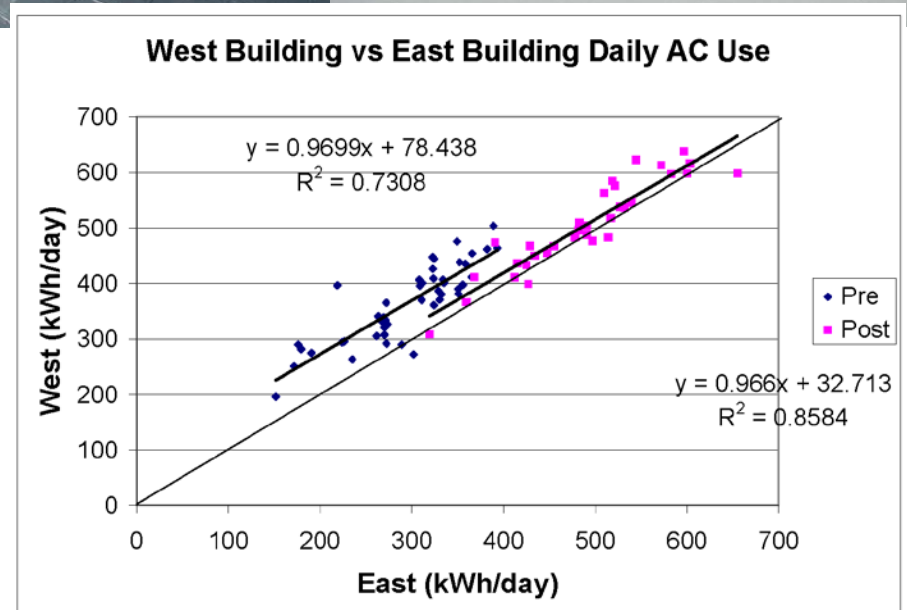
...and widely in the State of Gujarat, India



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Cool Roof Programs around the World

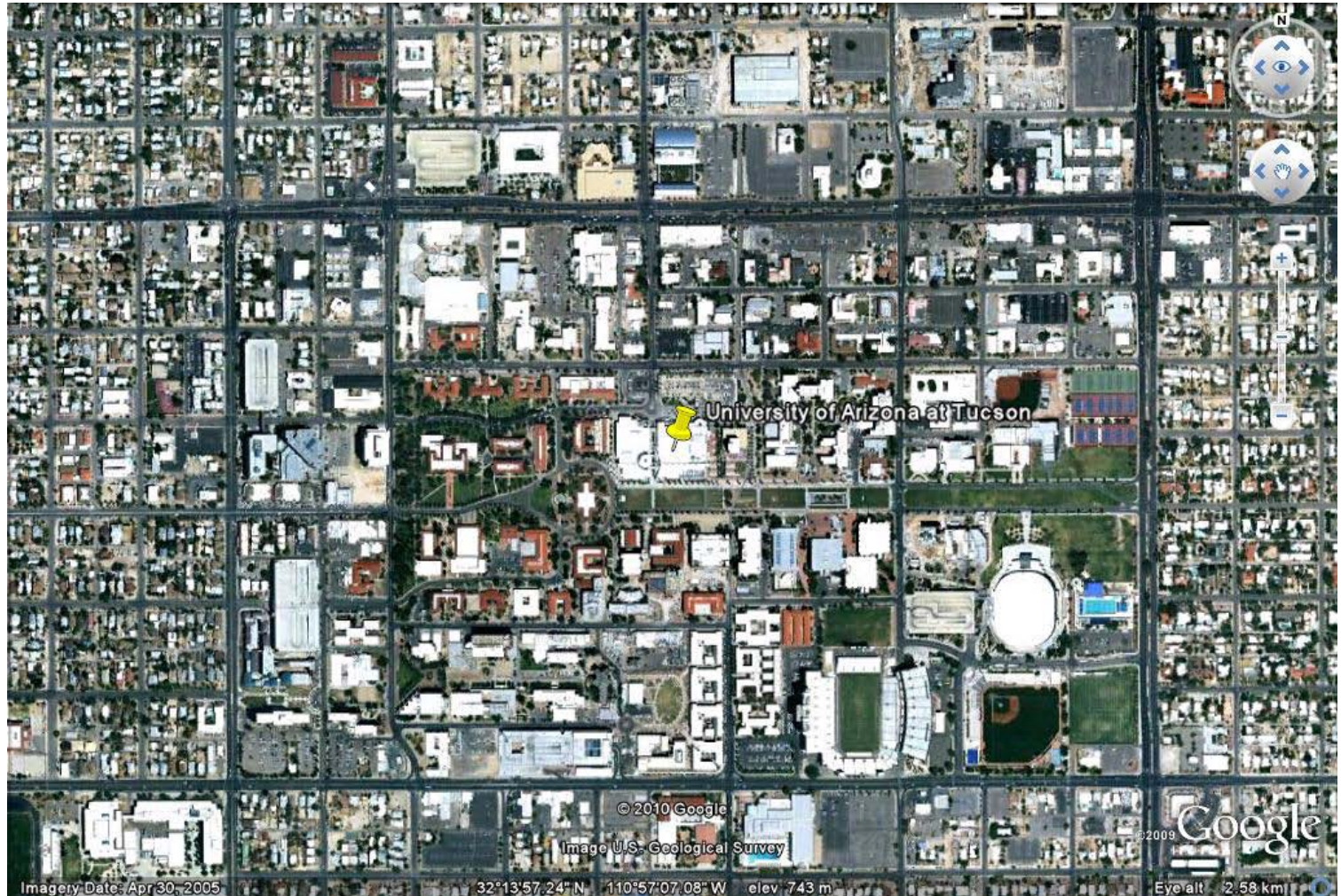
- U.S.
- Europe
- Asia
- Middle East
- China
- India (Hyderabad demos; see graph at right. White roof saved 15%)
- Oleson et al. (2010) ran NCAR's GCM & urban climate models: ~13 tons of CO₂ offset by 1000 sqft of white roof.





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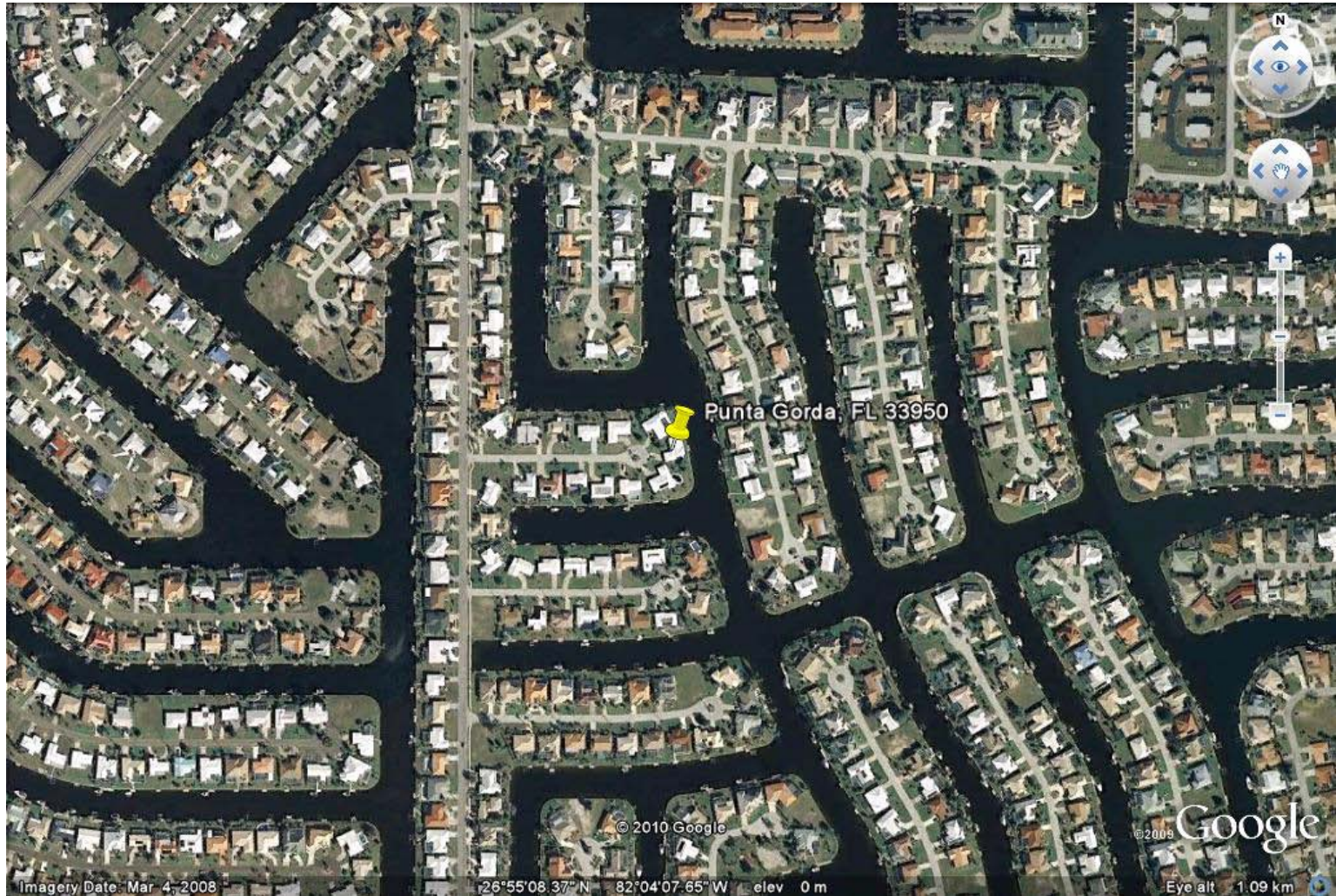
White roofs are popular in Tucson, AZ





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Punta Gorda, FL





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Cool roof technologies

Old

New



flat, white



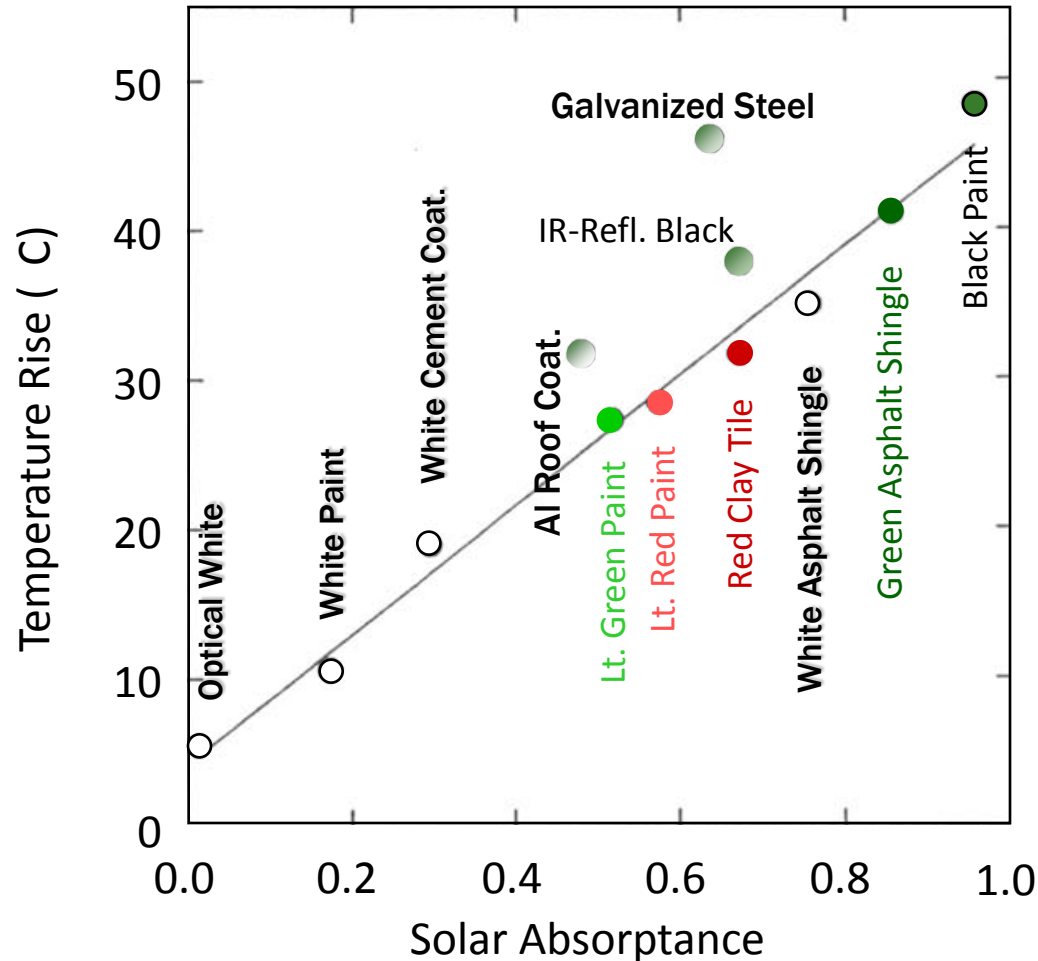
pitched, white



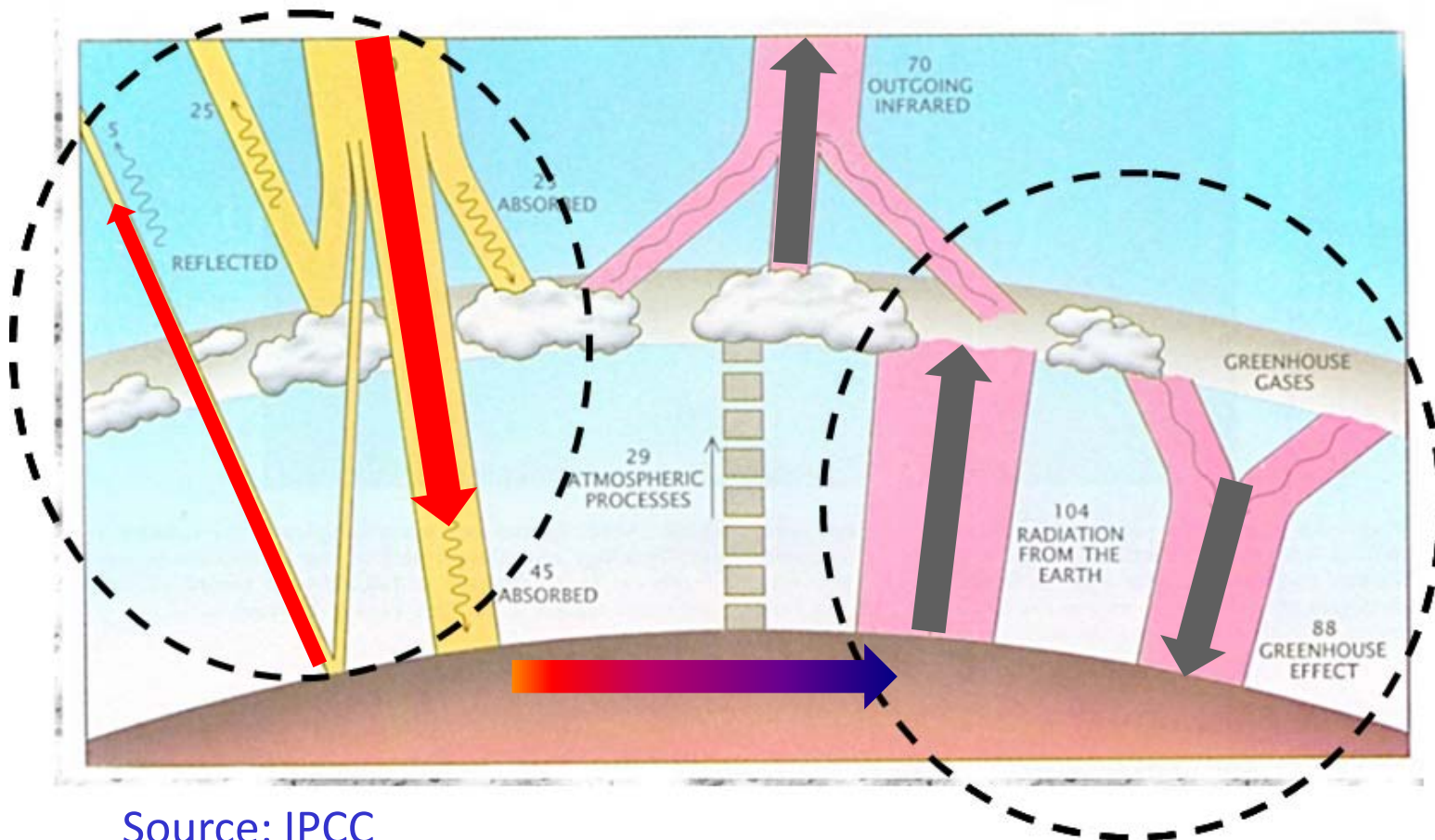
pitched, **cool & colored**



Reflective roofs have lower temperatures in sunlight



Solar reflective surfaces also cool the globe



Source: IPCC



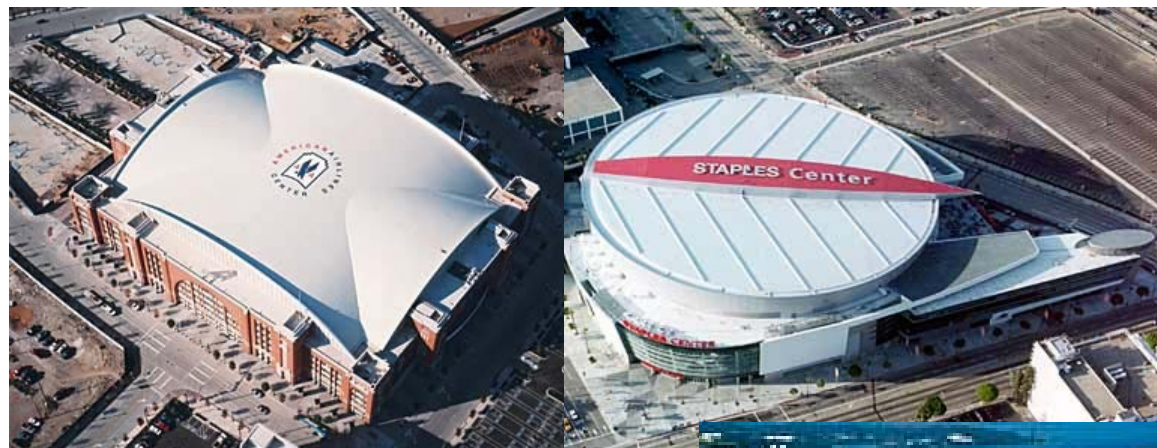
Akbari et al. data confirmed by general circulation model runs

- **Akbari et al. (2009)** conducted calculation based on current knowledge and estimates that the cloud cover over all cities averaged 50% all year. This corresponds to **10 tonnes of CO₂ offset per 1000 square feet of white roof (vs. dark roof).**
- **Menon et al. (Jan 2010)** in *Environmental Research Letters* ran a Global Land Surface Model (part of GCM). Research corroborated Akbari et al. In fact Menon model got **30% larger cooling, e.g. 13 tonnes of CO₂ offset per 1000 square feet of white roof (vs. dark roof).**



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A small house, 1000 ft², of white roof, replacing a colored roof, offsets the emission of *10 tonnes of CO₂*





California “Title 24” building energy efficiency standards

- **Title 24, 2005, effective 2007**
 - Commercial Buildings
 - If roof is “flat” and building has a/c, then white is “prescribed.”
- **Title 24, 2008, effective 2010**
 - Residential: if roof is flat, white is prescribed statewide
 - If sloped, in 5/16 hottest climate zones, white or cool colored roofs are prescribed.
- **Georgia and Florida credit white roofs**
- **ASHRAE credits white and cool roofs.**
- **IEEC, next cycle, will probably credit cool colors & white roofs**



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CA Energy Commission Changes proposed for Title 24-2011

- When calculating economic optimum design, internalize the complete CO₂ externality, so include non-air conditioned buildings.
- Apply this externality also to pavements, automobile roofs; indeed roofs of all passenger vehicles including trains.



How much CO₂ is offset if we whiten all eligible urban flat roofs world-wide?

- Answer: **15 gigatonnes (Gt)**
 - half a year's worldwide emission
 - gigatonne = billion metric tons
- If implemented over **15 years** (the life of a roof or a program) this is **~1 Gt/year**
- **1 Gt/year** is equivalent to **offsetting the emissions of 250 million cars for 15 years.**
 - There are about 600 million passenger cars world wide, and they each emit **~4 t CO₂/year**.



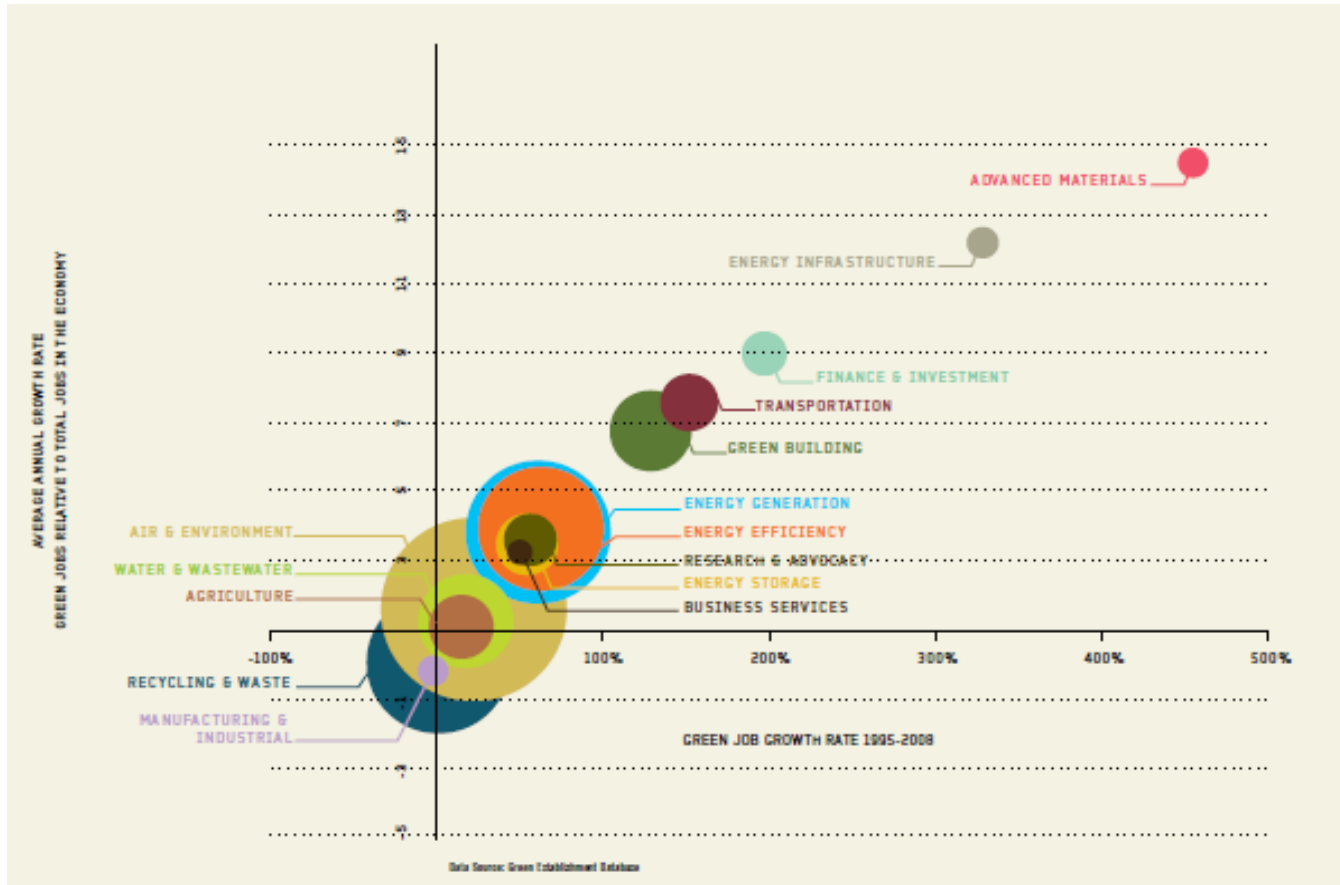
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Economic Impact of Climate Policies in California



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California currently has a wide range of Green Job opportunities with regards to skill level and job type, with qualifications ranging from on-the-job training to the Ph.D. level



As represented in the Next 10 report

http://www.next10.org/next10/pdf/Many_Shades_of_Green_1209.pdf

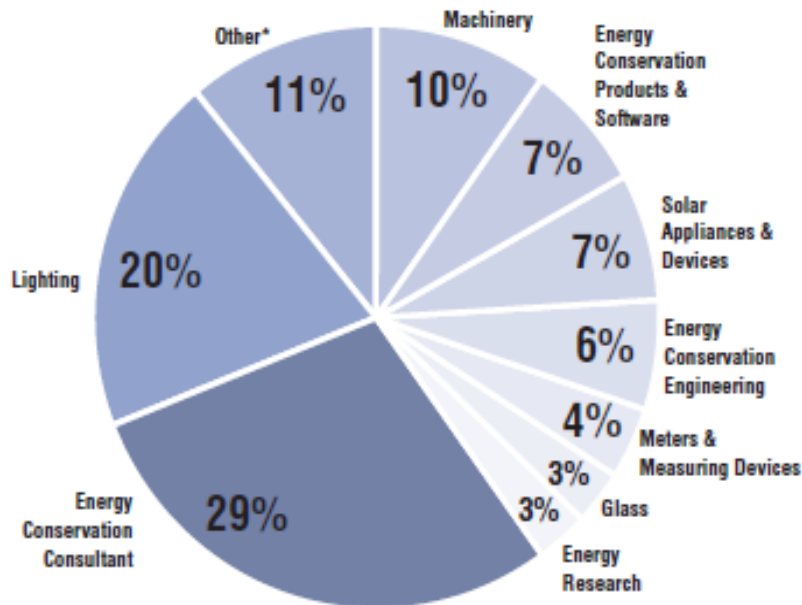


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California Green Jobs

Jobs in Energy Efficiency

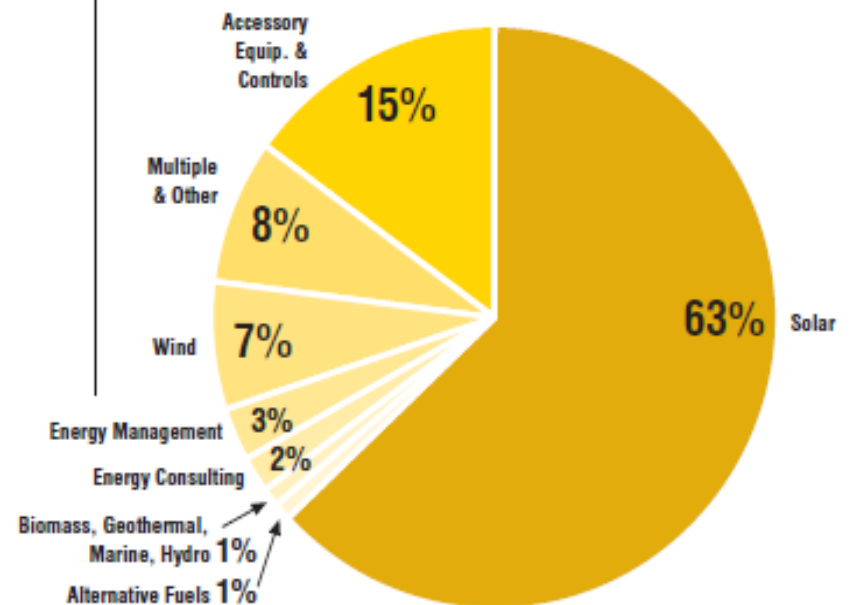
California 2007



*Other includes energy management controls and various services
Source: Green Establishment Database
Analysis: Collaborative Economics

Jobs in Energy Generation

California 2007



Source: Green Establishment Database
Analysis: Collaborative Economics

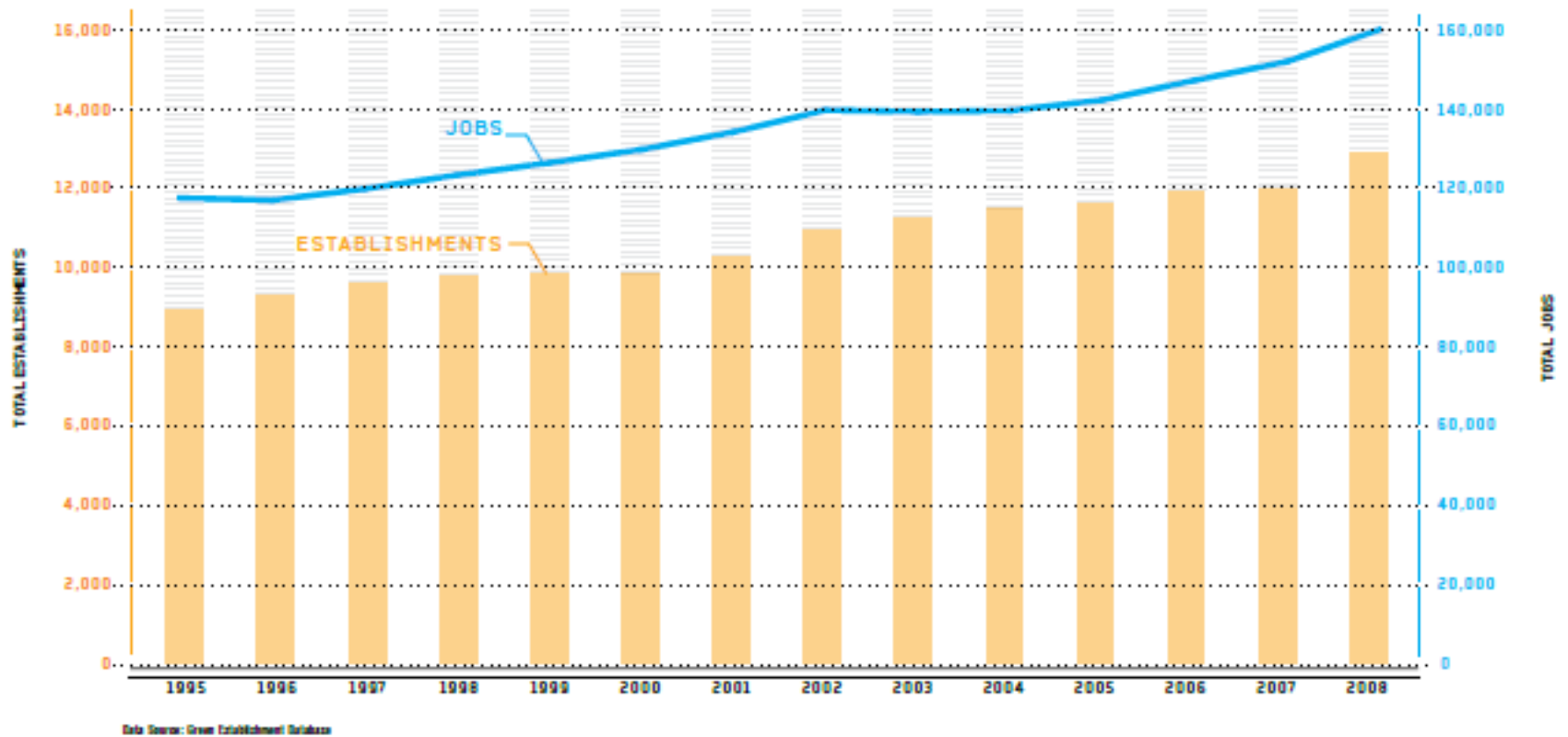
As represented in the Next 10 Green Innovation Index

<http://www.next10.org/next10/publications/greenInnovation09.html>



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Total growth of Green business establishments & Green Jobs in CA



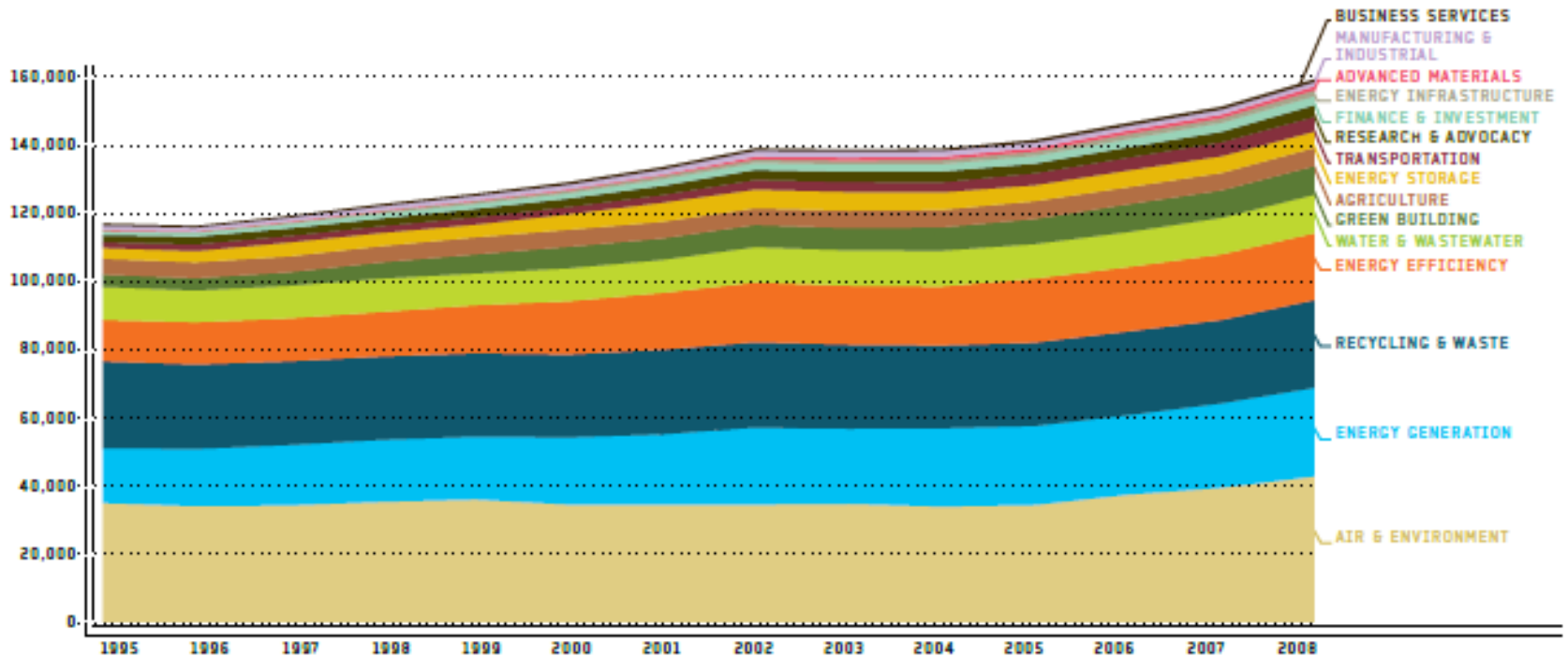
As represented in the Next 10 report

http://www.next10.org/next10/pdf/Many_Shades_of_Green_1209.pdf



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Accumulation of Californian Green Jobs representing the diversity of job categories and of job relative growth rates between 1995 and 2008



Data Source: Green Establishment Database

As represented in the Next 10 report

http://www.next10.org/next10/pdf/Many_Shades_of_Green_1209.pdf

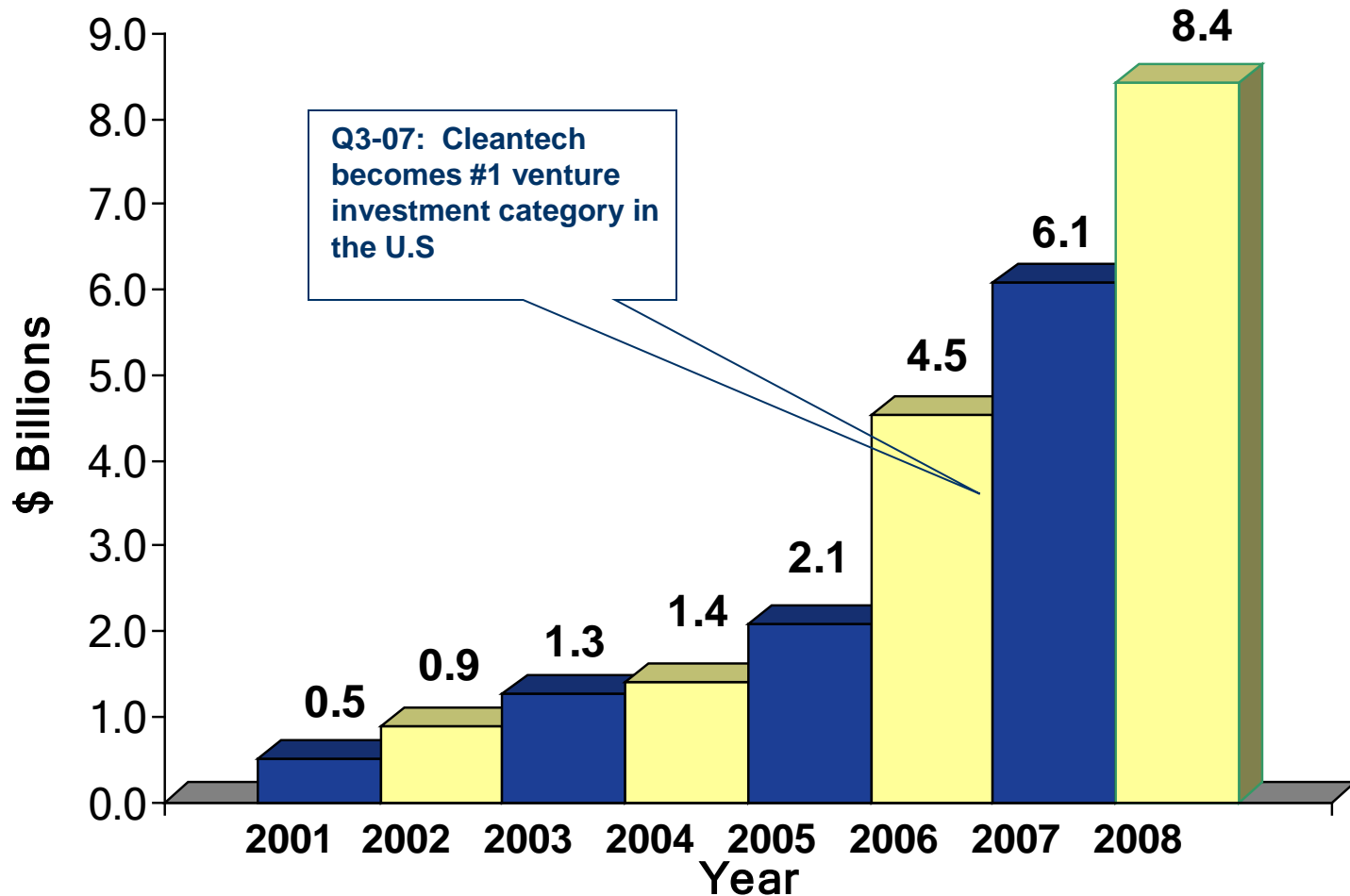


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Cleantech Venture Capital

Only the Beginning

Cleantech Venture Investments (N. America & EU)



Source: Cleantech Network 2008 Trends Report www.cleantech.com



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California Start-Ups are the Leaders

Five Largest Cleantech Rounds in 2008

Company	Tech	\$ Raised (millions)	Location
NanoSolar	Solar	\$300	San Jose, CA
Solyndra	Solar	\$219	Fremont, CA
SoloPower	Solar	\$200	San Jose, CA
WinWinD Oy	Wind	\$177	Finland
Solar Reserve	Solar	\$140	Santa Monica, CA

Source: Cleantech Network 2008 Trends Report www.cleantech.com

Privately held corporations.



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Thank you!

