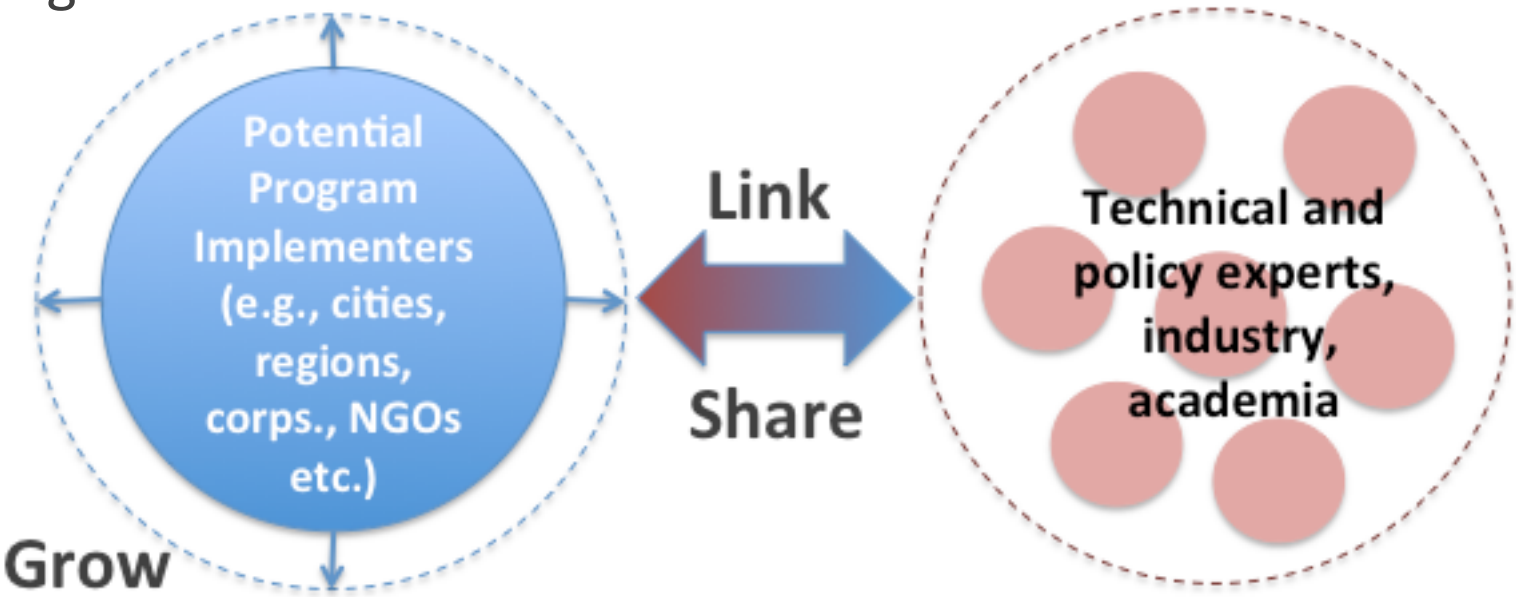
Cool Roofs in IECC 2015

Global Cool Cities Alliance
December 12, 2012

Global Cool Cities Alliance (GCCA)

The Global Cool Cities Alliance is dedicated to advancing policies and actions that increase the solar reflectance of our buildings and pavements as a cost-effective way to promote cool buildings, cool cities, and to mitigate the effects of climate change through global cooling.



Cool Roofs are in IECC 2012 Section C402.2.1.1

- Requires one of the following on low-sloped roofs in IECC climate zones 1 through 3.
  - Aged SR>=0.55, Aged TE>=0.75
  - Initial SR>=0.70, Initial TE>=0.75
  - Aged SRI>=64
  - Initial SRI>=82

- Exemptions for thermal mass, shade, green roofs, roof equipment, skylights, solar PV

Proposed Changes: Proposal A

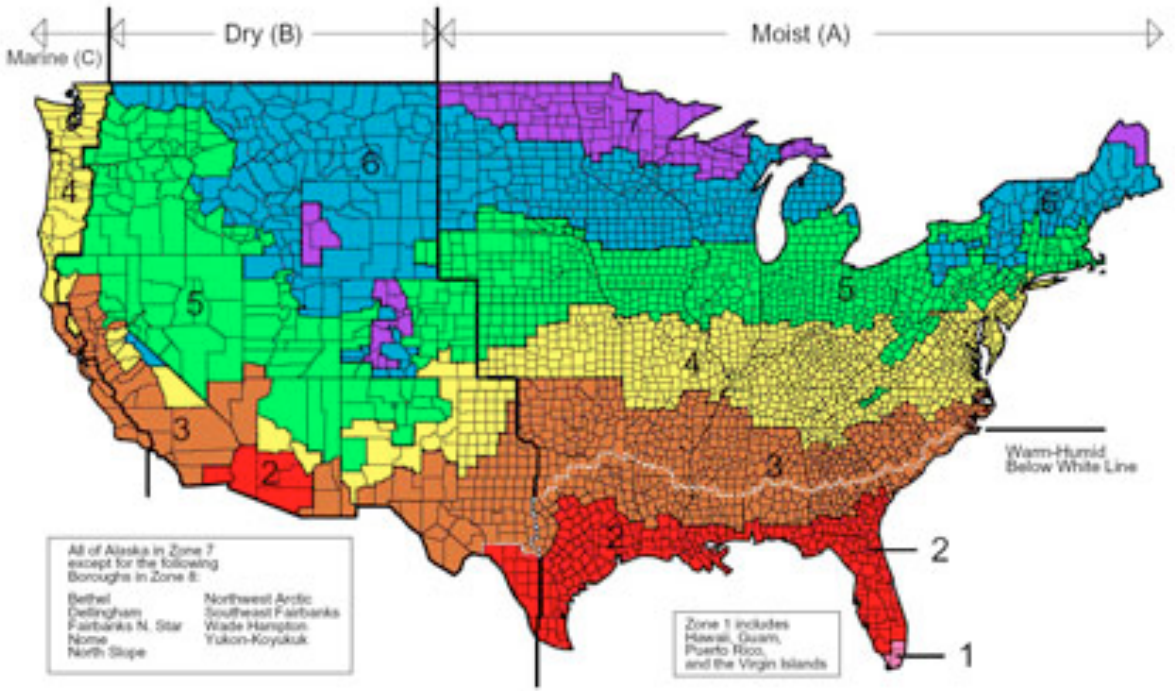
1. Change the definition of low-sloped roofs from a rise to run ratio of less than 2:12 to a rise to run ratio of less than or equal to 2:12.
   - This change will make the definition of low slope consistent with ASHRAE 90.1 and CA Title 24.
2. Add existing vegetation to the shade exemption
3. Strike thermal mass exemption.
   - Insufficient research to show where ballasted roofs are or aren't viable substitutes for a cool roofs.
   - Roofs with high thermal mass such as ballasted roofs may not save cooling energy in climates with hot days and warm nights and may also contribute to nighttime urban heat islands.

Proposed Changes: Proposal A

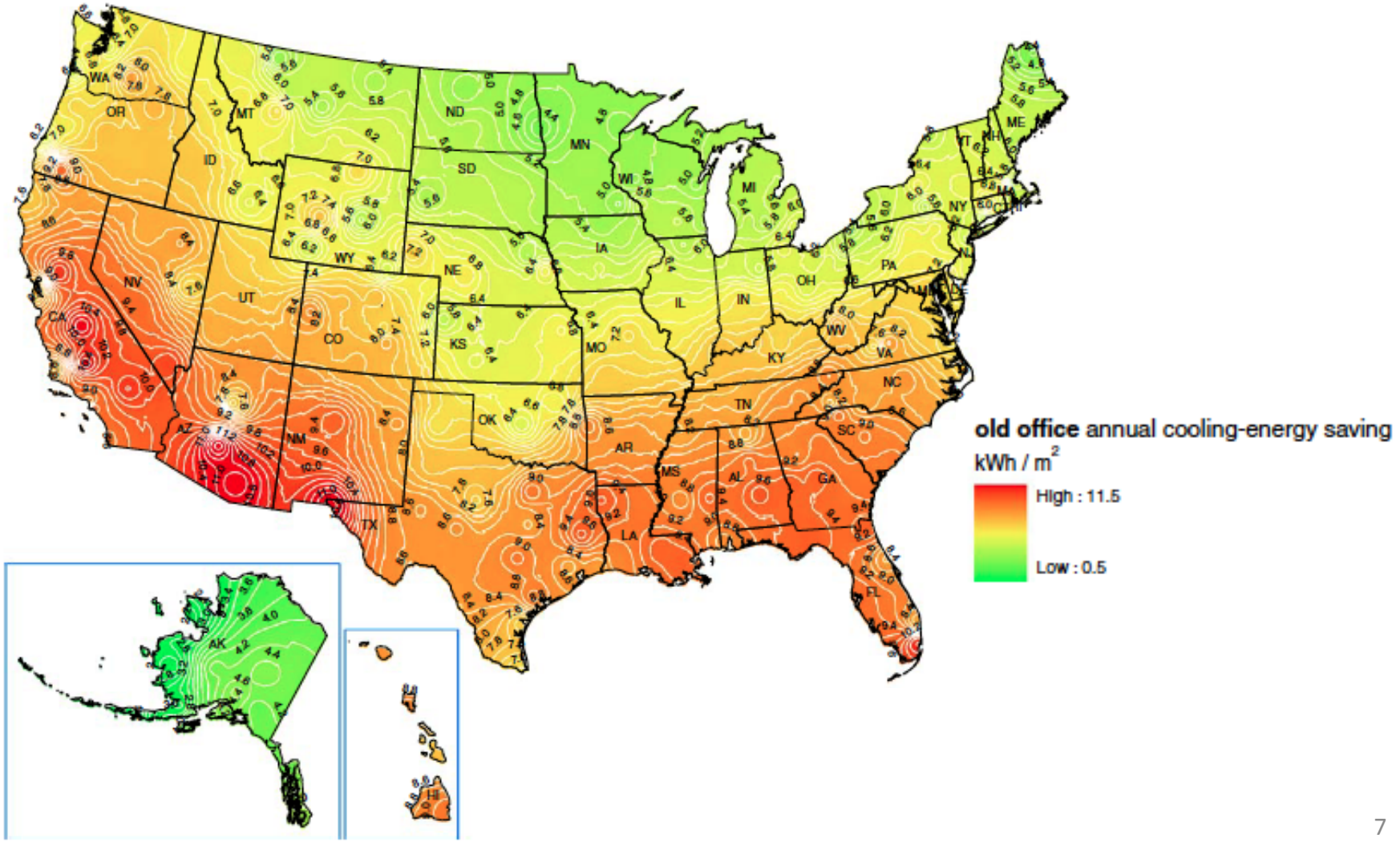
4. Add a protocol that defines how aged values are defined, using the CRRC standard.
   - The CRRC-1 standard was not available when 2012 IECC was finalized, but is now an ANSI approved standard which incorporates the test standards in the existing IECC. ASTM standards to not specify standards for aged samples.
5. Clarify the notation for the convection coefficient for the Solar Reflectance Index
6. Relocate the footnotes that pertain to the testing requirements into a new section titled “Roof Testing”

Proposed Changes: Proposal B

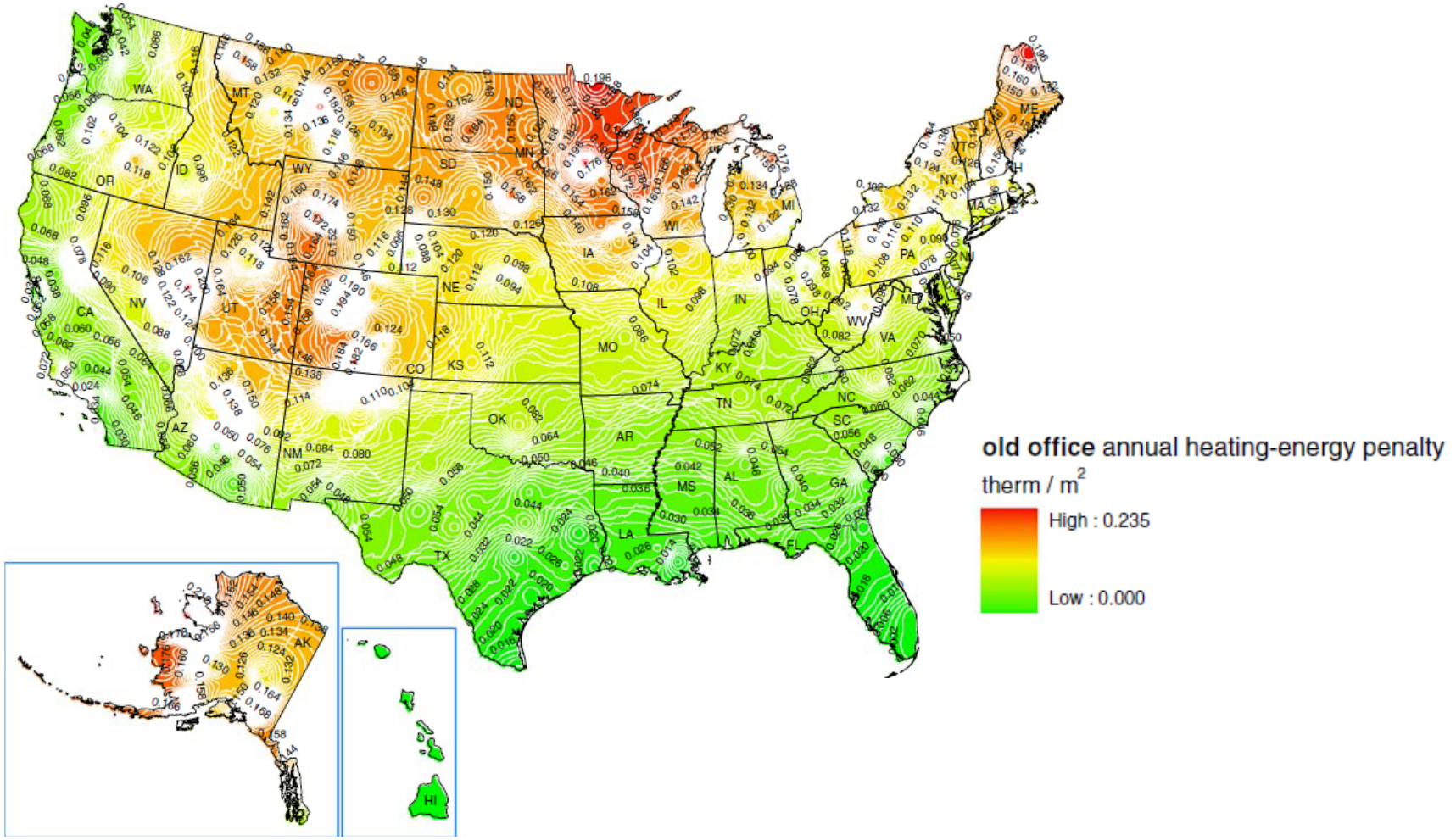
1. Extends existing performance requirements in IECC 2012 to Climate Zones 4a and 4b.



Cooling energy savings - *findings from Levinson & Akbari, 2010*

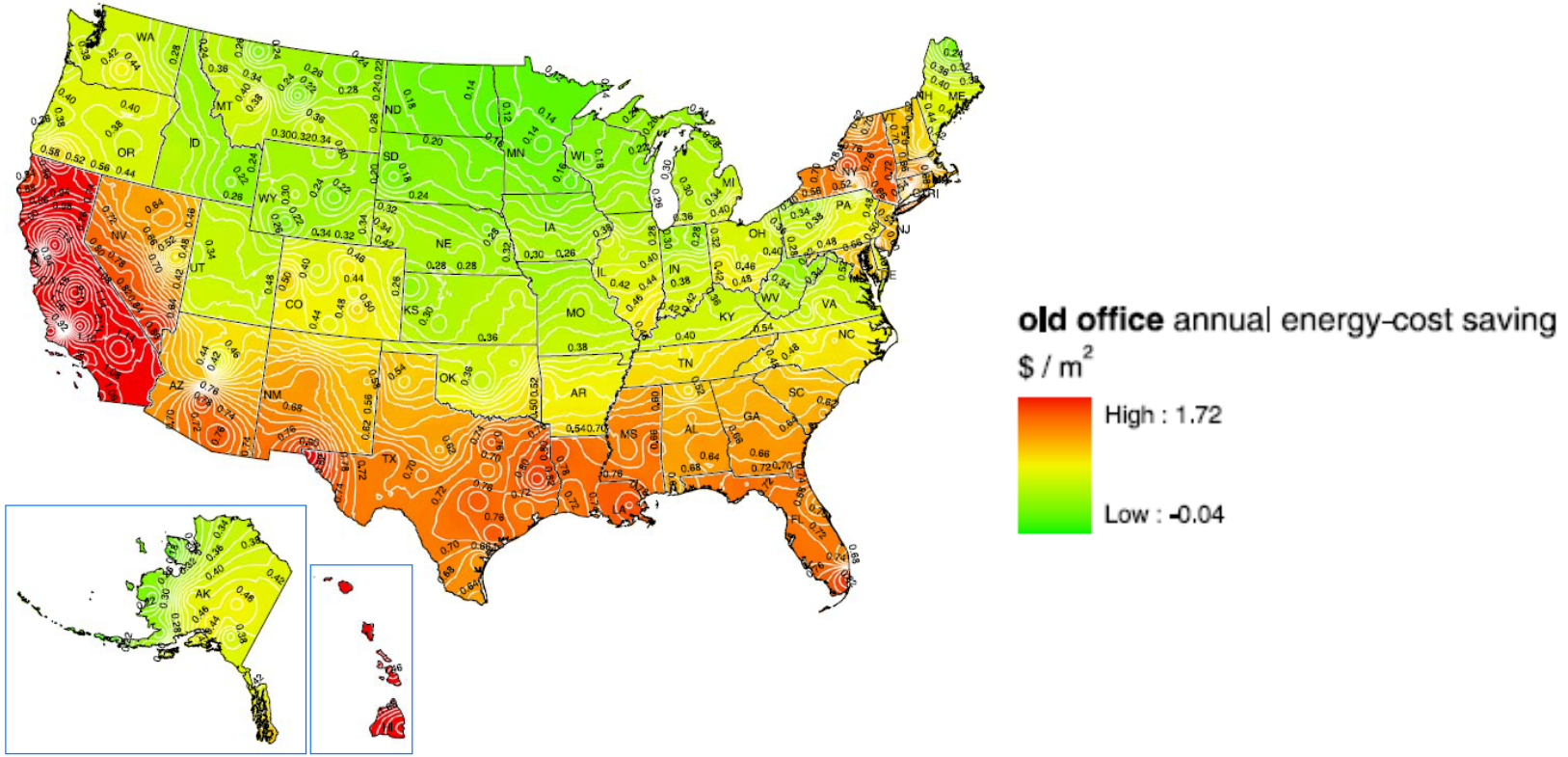


Heating penalty - *findings from Levinson & Akbari, 2010*



Net energy cost savings *- findings from Levinson & Akbari, 2010*

Cooling energy savings outweigh heating penalty almost everywhere in the country. Further, electricity prices (typically used for air conditioning) are rising and natural gas prices (typically used for heating) are falling, thus the cost savings from cool roofs have been amplified in recent years.



Support for Extending Cool Roofs to CZ4

DOE Benchmark Cities	State	Climate Zone	Cooling Degree Days	Heating Degree Days	Annual Office Energy Savings ($/ft²)	Annual Retail Energy Savings ($/ft²)
Miami	FL	1A	2,292	79	$0.06	$0.07
Houston	TX	2A	1,555	867	$0.05	$0.07
Phoenix	AZ	2B	2,115	645	$0.07	$0.08
Atlanta	GA	3A	895	1,716	$0.05	$0.06
Los Angeles	CA	3B	340	729	$0.05	$0.07
Las Vegas	NV	3B	1,688	1,289	$0.06	$0.07
San Francisco	CA	3C	57	1,800	$0.04	$0.06
Baltimore	**MD**	**4A**	**624**	**2,743**	**$0.04**	**$0.05**
Albuquerque	**NM**	**4B**	**672**	**2,426**	**$0.05**	**$0.07**
Seattle	WA	4C	73	2,740	$0.03	$0.04
Chicago	IL	5A	410	3,604	$0.03	$0.04
Denver	CO	5B	322	3,461	$0.04	$0.05
Minneapolis	MN	6A	346	4,458	$0.02	$0.03
Helena	MT	6B	182	4,336	$0.03	$0.05
Duluth	MN	7	103	5,528	$0.01	$0.03
Fairbanks	AK	8	16	7,830	$0.02	$0.03

Cooling Degree Days and Heating Degree Days:
- Baseline is 18
- Units are Celsius

Office Energy Savings and Retail Energy Savings are both averages of New and Old buildings using a 50/50 ratio.

California Title 24

In May of 2012, California expanded its cool roof requirements for low-sloped roofs to all California climate zones. There are several areas of California (Sierras, North Coast) which are in IECC climate zones 4, 5, and even 6.

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