

Cool Fixes for Hot Cities

Part 2: Los Angeles

September 12, 2018

Hosted by:

U.S. EPA Heat Island Reduction Program



Los Angeles' Cool Roof Ordinance and Free Tree Program

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COOL ROOFS AND FREE TREES



COMBATING URBAN HEAT ISLAND IN LOS ANGELES

Craig Tranby
Efficiency Solutions



Los Angeles Department of Water and Power (LADWP)

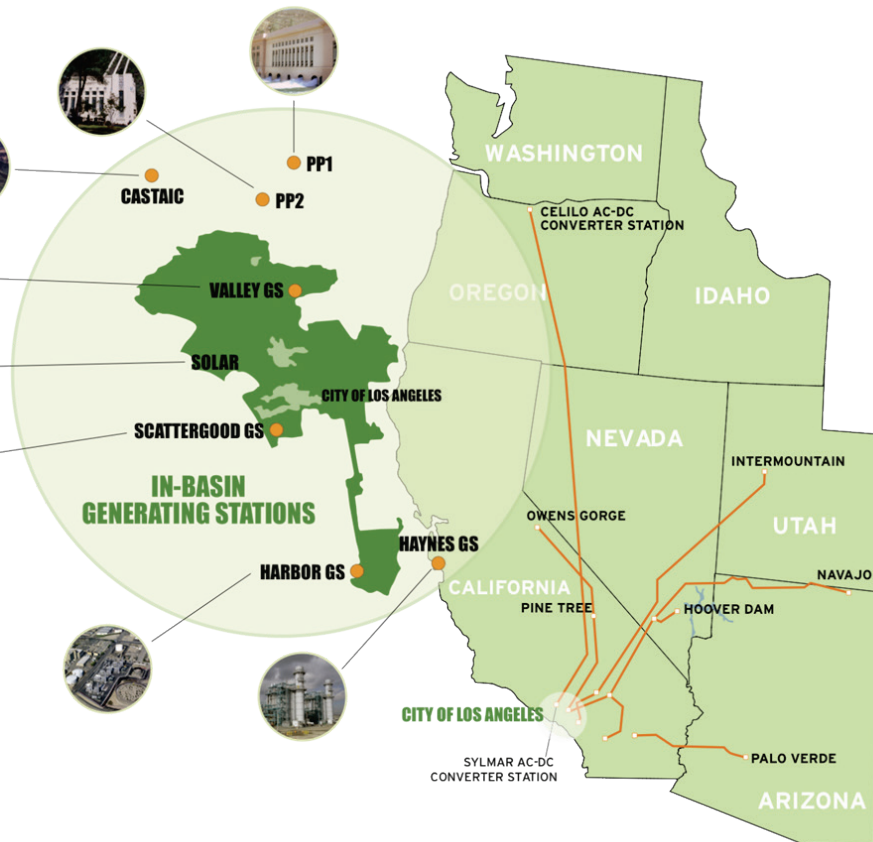
The nation's largest municipal electric utility, began delivering electricity in Los Angeles (LA) in 1916

Service Area

- 748 square kilometer area of LA
- Much of Eastern Sierra's Owens Valley

Population Served

- 4 million residents in the City of LA
- 1.4 million residential and business customers



Power System:

- Supplies more than 23 million MWh of electricity each year
- LADWP has over 7,640 MW of generation capacity from a diverse mix of energy sources
- Over the next 15 years, LADWP will replace more than 70% of its existing power supply

LADWP is a Vertically Integrated Utility

LADWP Efforts Relating to Urban Heat Island

Cool Roofs Rebate & Ordinance to Accelerate Adoption

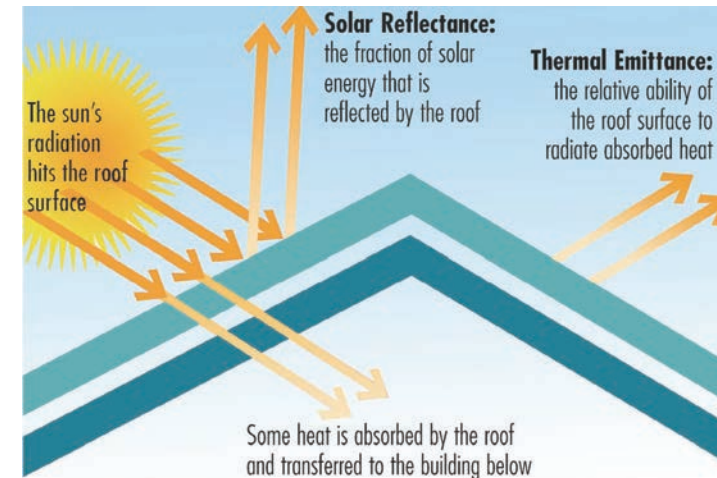
- Aggressive residential cool roof rebate introduced in October 2010; later expanded to support code requirement
- Mandatory code requirement fully in effect January 2015; also addressed non-roof areas of new construction projects

Trees

- Tree planting programs 2002-present

Cool Pavements

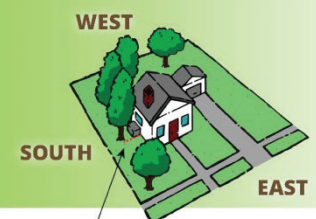
- Cool pavement facilitation



SAVE ENERGY

Plant trees to the West, South and East of your house to save energy.

Plant 15-20 feet away from your house. You can still get good energy savings at 40 feet with larger trees.



Plant trees 15-20 feet away from the house

City of L.A. Cool Roof Ordinance

Mandatory and Supported by LADWP Rebates

Los Angeles Municipal Code - Roof replacements of any value are subject to Cool Roof for Reduction of Heat Island Effect excepting roof repair, replacement of $\leq 50\%$, or building-integrated photovoltaics.



LADWP rebate was enhanced to include a lower tier starting at the compliance threshold

Avoiding Prescriptive Exceptions

- Low-sloped roofs
 - Attics with no ducts
 - Reflectance/insulation tradeoff, per [Table 150.2-A](#)
- Steep-sloped roofs (considered [equivalent](#))
 - Air space between roofing & roof deck
 - Profile ratio of roofing product
 - Existing ducts insulated & sealed (HERS)
 - Ceiling has at least R-38 insulation
 - Attics with radiant barrier
 - Attics with no ducts
 - Insulate above roof deck (CZ 10-15)



Cool Roof

Permit(s) are required, except for liquid applied coatings. Roofing material must meet the three year Solar Reflectance Index (SRI) as shown below.

[How to apply for the Consumer Rebate Program](#) →

Roof Slope	3 Year SRI	
	\$0.20 per sq. ft.*	\$0.30 per sq. ft.*
Low ($\leq 2:12$)	≥ 75 SRI	≥ 85 SRI
Steep ($> 2:12$)	≥ 16 SRI	≥ 35 SRI

*Square footage is subject to verification by the LADWP. The square footage of parapet is not included in the rebate.

SRI is rated by the Cool Roof Rating Council (www.coolroofs.org).

[Cool Roofs Ordinance Fact Sheet](#)

[Cool Roofs: Frequently Asked Questions](#) →

City of L.A. Cool Roof Fact Sheet



Cool Roofs

What You Need to Know About LADWP Rebates and Building Code Requirements

What is a Cool Roof?

A cool roof is a roofing product that reflects sunlight and absorbs less heat than traditional roofs. Cool roofs lower roof temperatures on hot sunny days and therefore keep homes cooler inside, saving energy by reducing the need for running air conditioning systems.

Although often light in color, cool roofs come in a wide variety of colors ranging from white to black and including blues, grays, greens, oranges, browns, and tans.

Cool roofs also are available in a variety of styles: shingle, shake, tile, membrane, and spray-on liquid coatings.

"Coolness" Factors

The "coolness" of a roof is determined by several properties of roofing materials and their combined effects on temperature. The primary factor is the material's ability to reflect the sun's energy back into the atmosphere ("solar reflectance"). A higher "solar reflectance" factor means the roof will stay cooler. Also the "solar reflectance" is measured by how long it retains its effectiveness ("aged solar reflectance"). If the product is new and the "aged solar reflectance" value is unavailable, it can be calculated using the following formula:

Formula:

$$3\text{-year Aged Solar Reflectance} = [0.2 + 0.7 \times (p_{\text{initial}} - 0.2)]$$
 (where p_{initial} = Initial Solar Reflectance)

In addition to "solar reflectance" a secondary factor used is known as "thermal emittance," which measures the material's ability to release heat. The Solar Reflectance Index (SRI) combines these two factors into a simple to use index value.

Building Code Requirements

Starting Oct. 1, 2014, the 2014 Los Angeles Green Building Code requires that roofing material used in residential buildings meet certain values for the "aged solar reflectance" and "thermal emittance," or for "SRI".

	Min. 3-yr Aged Solar Reflectance	Min. Thermal Emittance	SRI
Low-slope \leq 2:12	0.63	0.75	75
Steep-slope $>$ 2:12	0.20	0.75	16

Exceptions... Cool roof is NOT required for:

- Roof repair; or
- Roof replacement when the roof area being replaced is equal to or less than 50% of the total roof area, or
- Where building-integrated photovoltaics (BIPV) are installed
- Permits issued prior to January 1, 2015, for the replacement of an existing roof with asphalt roof shingles or asphalt composition roll roofing.

Please note: Funding is limited and rebates are not guaranteed. This program shall at all times be subject to change or termination without notice.



City of Los Angeles Cool Roof Ordinance FAQ

Why did the City pass the Cool Roof Ordinance?

In March 2013, the City helped convene a cool roofs conference where researchers, policy makers, industry representatives, and other stakeholders gathered to exchange information about cool roofs. The conference identified a number of benefits that cool roofs would bring to Los Angeles, including reduced smog formation, reduced heat-related illness/death, and increased energy savings. Recognizing the array of benefits and the untapped potential for residential roofs, the City Council unanimously approved a residential cool roof requirement as part of the Los Angeles Green Building Code. After a grace period for the roofing industry to prepare for enforcement, the code went into full effect on January 1, 2015. The Department of Building and Safety is responsible for permitting and inspection, and LADWP broadened its residential cool roof incentives to support the transition to the new requirement. (See reverse for information on the incentive program.)

What cool roofing products are available to comply with the ordinance?

There are hundreds of products that comply with the ordinance which can be searched on the Cool Roofs Rating Council's (CRRC's) website at www.coolroofs.org/products. These products occur in a variety of colors across all types of roofs, including, asphalt shingles, tiles, flat roofs and coatings. Additionally, the City has been working with the roofing manufacturers and suppliers to provide easy to understand information about key compliant product types. Here are just a few sample images of compliant roof products:



Do cool roofs cost more?

Most types of compliant roofs (such as tiles, flat roofs, and coatings) have little or no increased costs over non-cool roofs.* Costs can increase for asphalt shingle roofing products when purchasing a color other than white. To offset increased costs, LADWP has enhanced its cool roof rebate to offer between \$0.20 and \$0.30 per square foot of roofing, found at www.ladwp.com/rebatesandprograms (click on "Building Products"). Additionally, the building owner should realize reduced energy consumption, better indoor comfort, and increased life expectancy of the roof.

How do I find compliant roofing products?

As noted in a previous section, to see the entire array of cool roof options, one can search www.coolroofs.org/products. Each search result links to product websites where you can inquire about local distributors. If you need further help identifying product options, you can also contact the CRRC at info@coolroofs.org or (866) 445-2523. The nonprofit organization Climate Resolve features guidance on its website <http://climateresolve.org/hot-city-cool-roofs>. Of course, your local contractor can often best advise on the right roof for you.

What about historic buildings or zones?

For historic buildings and zones, the approval process for cool roofs is the same as for any other roof. Cool clay tile products, in particular, are offered in a wide variety of colors and styles.

Do other efficiency measures, like increased insulation and radiant barriers, provide the same benefits as cool roofs?

No. While other measures may also cost-effectively save energy within a building, they do not provide the area wide cooling of cool roofs which helps reduce Los Angeles' pronounced urban heat island effect. In this era of rising temperatures, the additional benefits of cool roofs above and beyond energy savings include: reducing heat-related illness and death, reducing smog formation, and reducing cooling loads for all buildings in the City.

Where can I learn more about cool roofs and their benefits, along with the urban heat island effect?

The Global Cool Cities Alliance is a good place to learn about the science behind cool surfaces and benefits cool roofs bring to cities and their residents. The California Energy Commission's Consumer Energy Center is a good place to learn about the basics of cool roofs, in particular their role in saving consumers money on their energy bills.

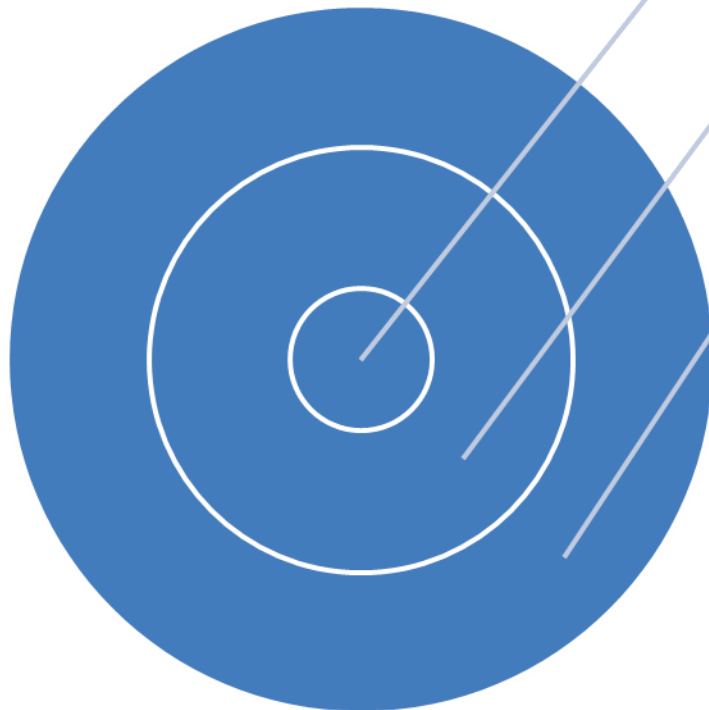
For more information, please visit www.coolrooftoolkit.org or www.consumerenergycenter.org

*Energy Cost-Effectiveness Study for Cool Roofs, July 2014. TRC Solutions, Inc. Approved by the California Energy Commission.

Cool Roof Collaboration

- City Departments – LADWP, Los Angeles Department of Building and Safety, Board of Public Works (City Plants), Bureau of Street Services
- Non-Profit – Climate Resolve, Cool Roof Rating Council, outreach grantees
- Academic – Lawrence Berkeley National Laboratory, University of Southern California, University of California Los Angeles, and more
- Business - Roofing industry, Los Angeles Better Buildings Challenge, Los Angeles Cleantech Incubator
- Local Govts./Utilities – L.A. County, Pasadena, Southern California Edison, others

Cool Roof Results



Over 2,200 rebates paid since 2010, covering ≈ 7 million sq ft, saving over 1.5 GWh/yr

Over 18,000 permitted roofs since in effect (1/1/15), covering ≈ 26 million sq ft., saving over 3.6 GWh/yr

Market transformation underway

- Manufacturers adjusting product offerings
- Expect effects on non-permitted roofs and other local jurisdictions



LADWP provides free trees to customers through its partnership with and funding of City Plants.

City Plants is a tree planting organization administered by the City's Board of Public Works.

Growing Benefits

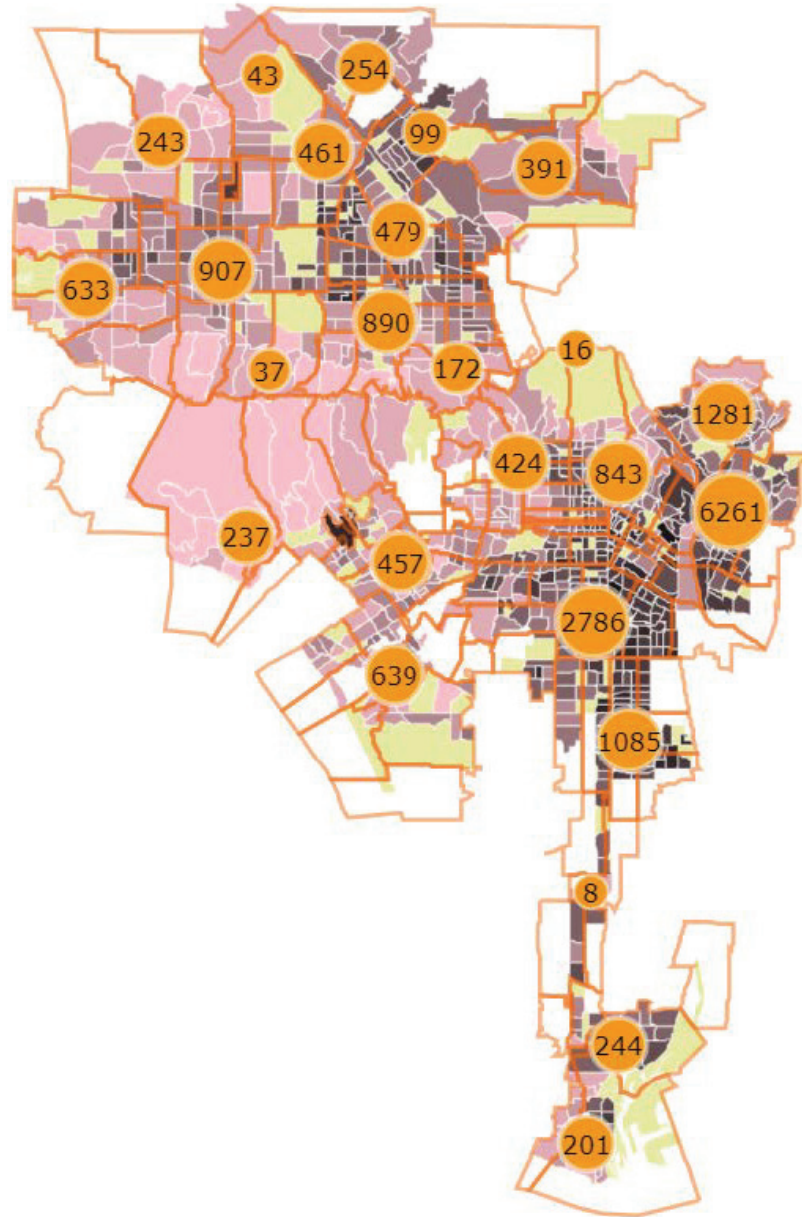
Trees are infrastructure that increase in value over time – saving customers money and energy by providing shade while improving the community.



www.ladwp.com



Using data, we can determine where to plant trees and target our communities lacking adequate canopy cover.





Accomplishments

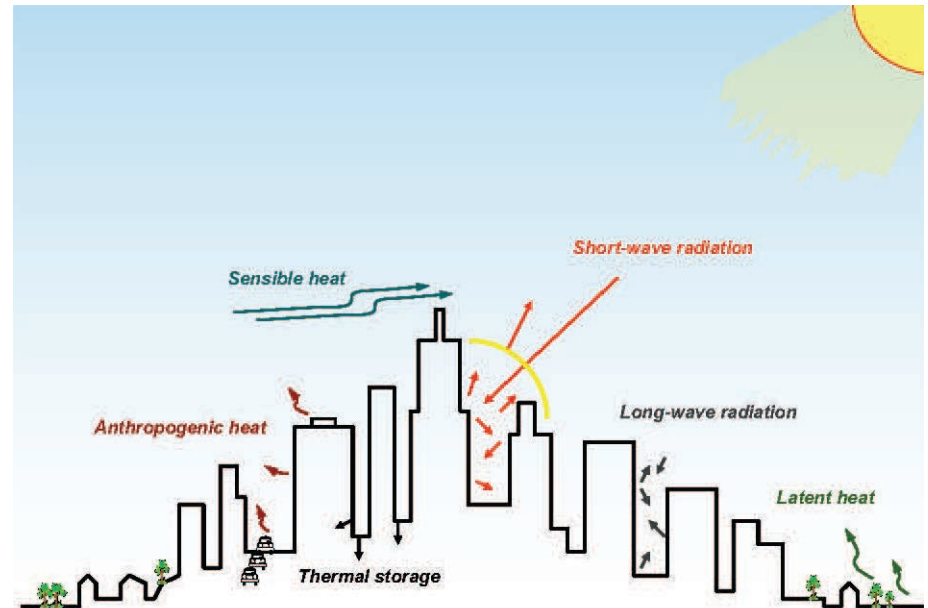
**City Plants distributed/
planted 80,000 trees
saving nearly 21 GWh
of energy in about 3 ½
years**

Barriers, Challenges, and Lessons Learned

- Barriers/Challenges
 - Cool Roofs:
 - Lacking precedents
 - Understanding & reaching marketplace
 - Trees: matching locations with needs, drought
- Lessons Learned
 - Cool Roofs: phasing, incentives, collaboration
 - Trees: orienting around energy savings ensures funding

Contact

- Craig Tranby, craig.tranby@ladwp.com, 213.367.2795
- www.ladwp.com/rebatesandprograms
- www.cityplants.org



Question and Answer Session



Clean Energy Finance: Green Banking Strategies for Local Governments

Hosted by: U.S. EPA State and Local Energy and Environment Program

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