

Potential Annual Savings from Changing Roof Reflectivity in 11 Metropolitan Areas

Note: Numbers are in millions of dollars.

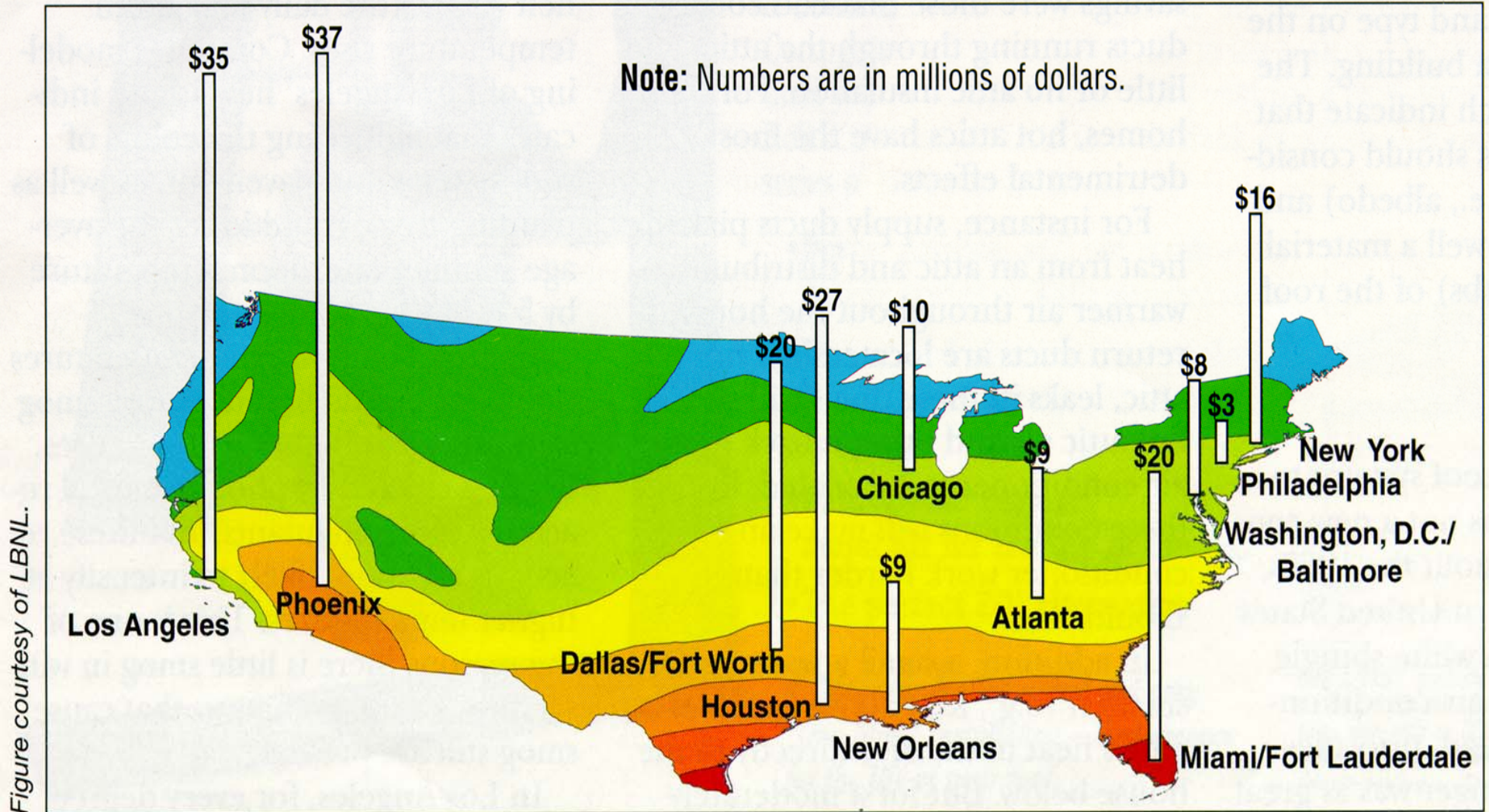


Figure courtesy of LBNL.

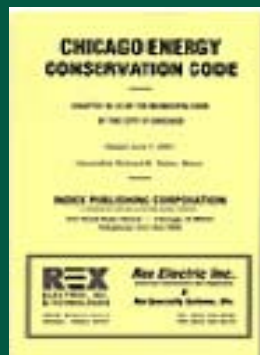
Figure 1: Annual net cooling energy savings for 11 metropolitan areas.

I-Codes[®] Adopted with Cool Roofs

Chicago Energy Conservation Code

Commercial Provisions

(Adapted from 2000 IECC[®] w/ 2001 Supplement)





‘Cool Roofing Materials’

(Chicago-Centric Properties...since 2001)

- Reflectance (ASTM E903, E1918, or field reflectometer verified)
 - Low-Sloped roofs (\searrow 2:12)
 - Initial \approx 0.65, Maintain \approx 0.50 for 3 years, **BUT**
 - Minimum 0.25 if installed on or before 12/31/2008
 - EPA Energy Star label standards thereafter
 - Medium-Sloped roofs ($2:12 < X \searrow$ 5:12)
 - Initial \approx 0.15, Maintain \approx 0.15 for 3 years
- Emissivity \approx 0.9 (ASTM E408)
- Exceptions:
 - Roof top gardens
 - Solar thermal systems
 - Photovoltaics



Chicago – §303 Urban Heat Islands

- **These reflectance and emittance requirements are intended to minimize the urban heat island effect**, as defined in the Definitions Section.
 1. The portion of the roof that is covered by a rooftop deck covering 1/3 or less of the aggregate area of the roof, or a rooftop garden, or a green roof, is exempted from the requirements of this section.
 2. An area including and adjacent to rooftop photovoltaic and solar thermal equipment, totaling not more than three times the area that is covered with such equipment, may be exempted from the requirements of this section.
- **Solar Reflectance.** All roof exterior surfaces shall have a minimum solar reflectance as specified when tested in accordance with ASTM E903, ASTM E 1918 or by testing with a portable reflectometer at near ambient conditions.
- **Roofing materials** used in roofs with slopes of 0 in 12 to 2 in 12 shall meet the following requirements:
 1. Roofs installed prior to and including 12/31/08 shall have a minimum solar reflectance, both initial and weathered, of 0.25.
 2. Roofs installed after 12/31/08 shall utilize roofing products that meet or exceed the minimum criteria to qualify for an Energy Star label as designated by the USEPA Energy Star program.

Chicago's City Hall Grows Green Skin

- “Twelve-stories above Chicago’s busy financial district sits an island of greenery snuggled amid a sea of boiling-hot tar roofs...”



Cool Roofs and Green Space



- Light-colored roofs reflect more sun than dark roofs
 - Buildings cooler; Reduces air conditioning demand
 - Inhibits formation of smog
- Trees & vegetation shade walls/windows
 - Evapotranspiration
 - 30-foot tree-crown ~ 40 gal./day