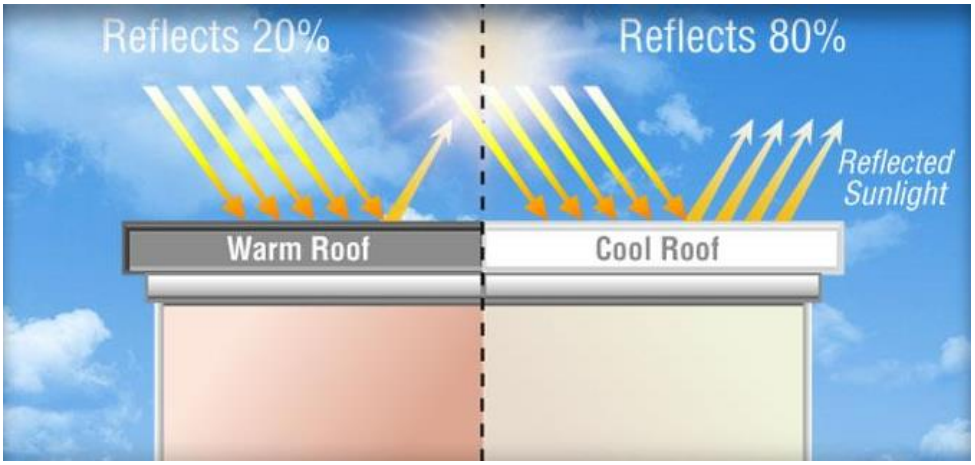
MUNICIPAL CLIMATE ACTION OPPORTUNITY

SMART ROOFS

Rooftops provide large untapped opportunities for reducing a building's carbon footprint– and energy use – through the use of reflective coatings, rooftop solar, and/or green roofs. The quickest and least expensive option, cool roofs markedly reduce the absorption of the sun's energy, and a building's summer air conditioning load, using high reflectivity coatings. Typically, treating a black rooftop with a reflective white coating flips the roof's performance from absorbing 80% of the sunlight to reflecting 80%, a change which can reduce air conditioning loads by 30% and annual electric use by 10%. An analysis by one of our national labs estimated that this leads to 10 tons of avoided CO_2 for each 1000 square feet of cool roofing installed.



Effect of cool roof coatings *Source: Lawrence Berkeley Lab*

Rooftop solar offsets all daytime electrical uses in a building (air conditioning, lighting, electronics, etc.). Depending on the type of building and the size of the system installed, roof top solar may save one-third of a facility's electrical use.[1] Since most of a building's carbon footprint is attributable to its energy use, this equates to a substantial reduction in greenhouse gas impacts. While once prohibitively expensive, solar costs have declined by about 60% since 2005, making the technology cost-effective and providing attractive returns on investment for many. Another bottom-line factor to consider is that a solar-powered facility is also buffered from future electric rate increases, allowing the municipality to better budget for future energy costs.

Roof with both reflective coating and solar *Source: Cool Roofs Rating Council*

[1] Estimate for public school system in Philadelphia. *Solar Schools for Philadelphia,* by Frontier Group and Penn Environment, 2016, p4.

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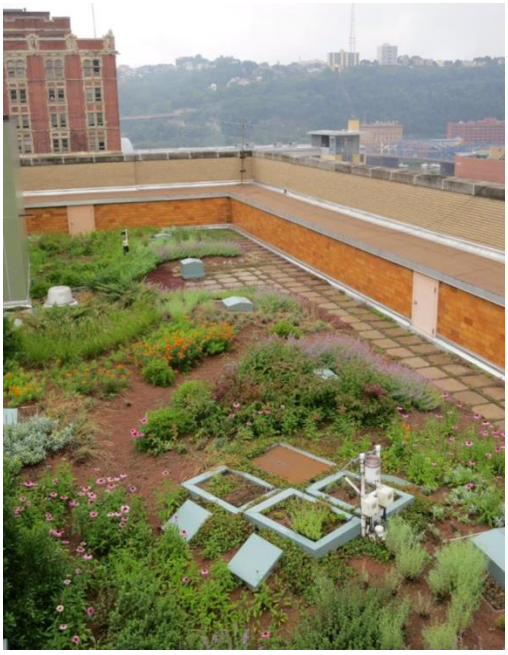
Green roofs, in which a vegetated cover is created, are often installed as a stormwater management practice but the green roof will also improve the thermal performance of buildings. A green roof will provide a degree of insulation in the winter in addition to reducing the need for summer air conditioning. Once again, reduced energy usage translates to a reduced carbon footprint and a useful sustainability measure.



Green Roof on Allegheny County building

Where to get more information

An informative examination of these smart roof options was produced by the city of Washington DC. Their cost-benefit report and their presentations on their overall initiative contain a lot of useful information for others assessing these options. https://cap-e.com/dc-smart-roof/

White Roof Project has general information on the benefits of white roofs as well as useful links. http://www.whiteroofproject.org/research

The Cool Roof Rating Council provides information on how to select a cool roof product for your building. http://coolroofs.org/resources/home-building-owners

The article "Cool Roofs and Photovoltaics: An Unlikely Pair" discusses the benefits of coupling the two technologies at one site. http://d3n8a8pro7vhmx.cloudfront.net/roofproject/legacy_url/100/For-profit-White-and-Solar.pdf?1408324279

The Solar Energy Industries Association assessed solar for schools in its *Brighter Future* report. http://www.seia.org/research-resources/brighter-future-study-solar-us-schools-report

Pennsylvania's Department of Environmental Protection and Dept. of Community and Economic Development offer financial incentives to municipalities for solar projects. Interested municipalities should contact the departments for current details. http://dced.pa.gov/programs/solar-energy-program-sep/#.WJosa_krLIV

The US Dept of Energy report, *Procuring and Implementing Solar on Public Buildings,* provides useful information on solar applications in the public sector. https://energy.gov/eere/slsc/downloads/procuring-and-implementing-solar-projects-public-buildings-how-avoid-common

A Quick Guide to Green Roofs provides some basic information on this option. More detailed information can be found on the website of the International Green Roof Association. http://www.igra-world.com/links_and_downloads/images_dynamic/IGRA_Green_Roof_Pocket_Guide.pdf