

ADVANCING COOL SURFACES

Domestic and International Activities



Jacqueline Wong | U.S. Department of Energy | February 2012

DOMESTIC

INTERNATIONAL





COOL ROOF SELECTION GUIDE

<http://www1.eere.energy.gov/femp/pdfs/coolroofguide.pdf>


DE-AC05-00OR22725

Guidelines for Selecting Cool Roofs

July 2010





Prepared by the Fraunhofer Center for Sustainable Energy Systems for the U.S. Department of Energy and Oak Ridge National Laboratory under contract DE-AC05-00OR22725. Additional technical support provided by Lawrence Berkeley National Laboratory and the Federal Energy Management Program.
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U.S. Department of Energy
Energy Efficiency and Renewable Energy
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

Figure 4: A CRRC Product Label

		Initial	Weathered
	Solar Reflectance	0.87	0.77
	Thermal Emittance	0.87	0.86
	Rated Product ID Number	0614-0036	
	Licensed Seller ID Number	0614	
	Classification	Production Line	

Cool Roof Rating Council ratings are determined for a fixed set of conditions, and may not be appropriate for determining seasonal energy performance. The actual effect of solar reflectance and thermal emittance on building performance may vary.

Weathered solar reflectance values should be used when evaluating roof energy cost savings. *Image Source: CRRC*

Figure 5: Cool Dark Colors

R=0.41	R=0.44	R=0.44	R=0.48	R=0.46	R=0.41
black	blue	gray	terracotta	green	chocolate
R=0.04	R=0.18	R=0.21	R=0.33	R=0.17	R=0.12

Cool-colored tiles (top row) look just like conventionally colored tiles but have higher solar reflectance (R). *Image Source: American Rooftile Coatings and Lawrence Berkeley National Laboratory*

ROOF SAVINGS CALCULATOR

Roof Savings Calculator (RSC)

Beta Release v0.92

Oak Ridge National Laboratory
Lawrence Berkeley National Laboratory

- Covers both commercial and residential buildings

- Runs full simulations

- Reports annual energy savings based on heating and cooling loads

- See www.RoofCalc.com

Introduction

The Roof Savings Calculator was developed as an industry-consensus roof savings calculator for commercial and residential buildings using whole-building energy simulations. It is built upon the DOE-2.1E engine for fast energy simulation and integrates AtticSim for advanced modeling of modern attic and cool roofing technologies. An annual simulation of hour-by-hour performance is calculated for the building properties provided based on weather data for the selected location. Annual energy savings reported are based upon heating and cooling loads and thus this calculator is only relevant to buildings with a heating and/or cooling unit.

Roof Savings Calculator

To begin, please select from the following options:



Feedback

Please give us [feedback](#) with any issues, ideas, or suggestions for improvement regarding this service.



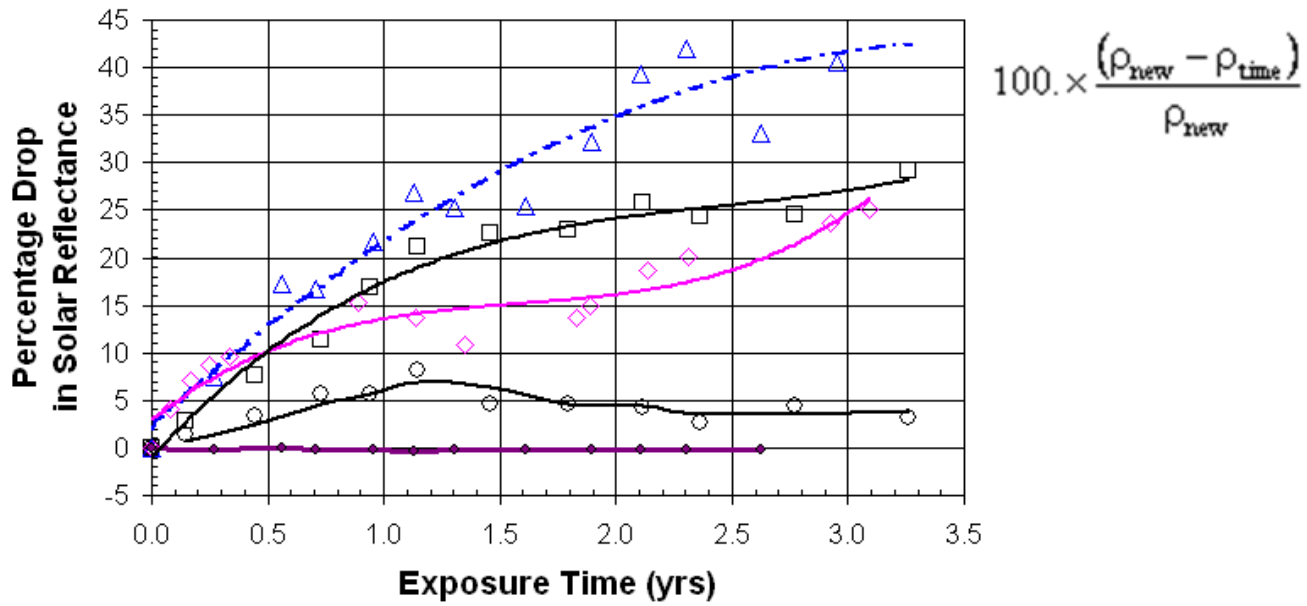
DOE COOL ROOF POLICY

- *A low-sloped roof (pitch less than or equal to 2:12) must be designed and installed with a minimum 3-year aged solar reflectance of 0.55 and a minimum 3-year aged thermal emittance of 0.75 in accordance with the Cool Roof Rating Council program, or with a minimum 3-year aged solar reflectance index (SRI) of 64 in accordance with ASTM Standard E1980-01. Steep-sloped roofs (pitch exceeding 2:12) must have a 3-year aged SRI of 29 or higher.*
- Requires R30 insulation
- Required unless determined to be uneconomical by lifecycle cost analysis



ACCELERATED 3-YEAR AGED RATINGS

A major effort is underway to develop an accelerated aged rating protocol to get results in six months rather than three years



3½ year aged reflectance

- 0.623 ○ SR64E83 White Painted PVDF
- 0.486 □ SR69E06 Unpainted Galvalume
- 0.623 ◇ SR83E88 White Ceramic Coating
- 0.489 △ SR86E90 Thermoplastic membrane - White
- 0.104 ◆ SR09E89 Asphalt Shingle



NEXT-GENERATION ADVANCED MATERIALS

- Develop affordable cool asphalt shingles
- Evaluate de-soiling and anti-soiling additives/functionalities and self-cleaning materials
- Develop higher-performing and more durable field-applied coatings
- Develop thermochromic intelligent roof coatings
- Explore cool pavements



NEXT-GENERATION WINDOWS

- Passive heating and dramatic peak cooling reduction (SHGC 0.53–0.09)
- Market ready
- Prices will drop with more investment
 - Cost neutral by 2020
- Many new projects underway
 - Competitive market in 2012–2014



VERY-LOW-EMISSIVITY FILMS

- ~40% improvement in single-pane glass insulating performance
- Improves U-value of single-pane to that of dual-pane
- 2x-3x year-round energy savings relative to non-low-e films



	SHGC	Winter U-Value	Emissivity	Visible Light Transmission	Light to Solar Gain Ratio	Visible Reflectance Interior
Single Clear Glass	0.86	1.04	0.84	0.90	1.05	8%
With EnerLogic 35	0.24	0.60	0.07	0.33	1.38	30%
With EnerLogic 70	0.51	0.61	0.09	0.70	1.37	4%

DOMESTIC

INTERNATIONAL



CLEAN ENERGY MINISTERIAL

Ministers and other high-level representatives from 24 governments convened for the Clean Energy Ministerial in Washington in July 2010 and in Abu Dhabi in April 2011 to collaborate on policies and programs that accelerate the global transition to clean energy technologies

>90% of Global Clean Energy Investment > 80% of Global GHG Emissions



Australia



European Commission



Brazil



Canada



China



Denmark



Finland



France



Germany



Hungary



India



Indonesia



Italy



Japan



Korea



Mexico



Norway



Russia



South Africa



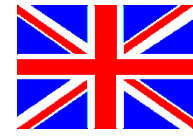
Sweden



Spain



United Arab Emirates



United Kingdom



United States



OVERALL STRATEGY

Overarching Goal: High-level policy dialogue grounded in technical cooperation and stakeholder engagement to drive investment in clean energy and efficiency

- 1 High-Level Policy Dialogue
- 2 Technical Cooperation that Informs Smart Policy
- 3 Engagement with the Private-Sector and Other Stakeholders



CORE PRINCIPLES

- “Deliverables” are concrete and transformative clean energy initiatives led by like-minded and willing governments
- No expectation that each government participates in all initiatives
- No communiqué or other negotiated text
- Distributed leadership model



INITIATIVES LAUNCHED IN JULY 2010

I. Energy Efficiency

- Appliances
- Smart Grid
- Buildings and Industry
- Electric Vehicles

II. Clean Energy Supply

- Solar and Wind
- Carbon Capture, Use & Storage
- Hydropower
- Bioenergy

III. Cross-Cutting

- Clean Energy Solutions Center
- Off-Grid Lighting
- Women in Clean Energy

Participation in Clean Energy Ministerial Initiatives

January 2012

	AUSTRALIA	BRAZIL	CANADA	CHINA	DENMARK	EUROPEAN COMMISSION	FINLAND	FRANCE	GERMANY	INDIA	INDONESIA	ITALY	JAPAN	KOREA	MEXICO	NORWAY	RUSSIA	SOUTH AFRICA	SPAIN	SWEDEN	UNITED ARAB EMIRATES	UNITED KINGDOM	UNITED STATES
APPLIANCES (SEAD)	●	●	●		●			●	●	●			●	●	●		●	●		●	●	●	●
BIOENERGY		●			●						●									●			
BUILDINGS AND INDUSTRY (GSEP)	●		●		●	●	●	●		●			●	●	●		●	●		●			●
CARBON CAPTURE (CCUS)	●		●	●				●	●				●	●	●			●			●	●	●
CLEAN ENERGY POLICY	●							●		●		●	●		●			●		●	●		●
ELECTRIC VEHICLES (EVI)				●	●		●	●	●	●			●					●	●	●		●	●
ENERGY ACCESS (SLED)											●												●
HYDROPOWER		●						●							●	●							●
SMART GRID (ISGAN)	●		●	●		●	●	●	●	●		●	●	●	●	●	●		●	●		●	●
SOLAR AND WIND	●	●			●	●		●	●				●	●	●	●		●	●		●	●	●
WOMEN IN CLEAN ENERGY (C3E)	●				●										●	●		●		●	●	●	●

GLOBAL SUPERIOR ENERGY PERFORMANCE PARTNERSHIP (GSEP)

- GSEP aims to reduce global energy use in industrial facilities and commercial buildings in order to improve energy security and to reduce global greenhouse gas emissions by:
 - Encouraging industrial facilities and commercial buildings to pursue continuous improvements in energy efficiency
 - Promoting public-private partnerships for cooperation on specific technologies or in individual energy-intensive sectors

GSEP Partnership

ENERGY MGMT
WORKING GROUP
(Lead: U.S.)

CHP
WORKING GROUP
(Lead: Finland)

COOL ROOFS
WORKING GROUP
(Lead: U.S.)

POWER
WORKING GROUP
(Lead: Japan)

STEEL
WORKING GROUP
(Lead: Japan)

CEMENT
WORKING GROUP
(Lead: Japan)

