

# The Writing's on the Wall

## Recent Cool Wall Research and Measures

February 22, 2018

Hosted by:

U.S. EPA Heat Island Reduction Program



# Hawaii's Adoption of Cool Wall Codes and Measures

Howard C. Wiig  
State of Hawaii



# The Writing's on the Wall: Hawaii's Cool Wall Energy Code Research

**Howard Wiig**

Hawaii State Energy  
Office

EPA's Heat Island Webcast  
February 22, 2018



# Cool Cars



- Toyota offers titanium dioxide ( $\text{TiO}_2$ )-infused colors that reduce interior temperatures by some  $12^\circ\text{F}$  on sunny days.
- One reviewer -- Ronnen Levinson: First Toyota, then the world?

# Incorporating Cool Walls into National Energy Codes

- Hawaii State Energy Office (HSEO) played key role in improving International Energy Conservation Code (IECC), including creating a Tropical Climate Zone and requiring reflective roofs.
- HSEO will propose reflective walls for future energy codes

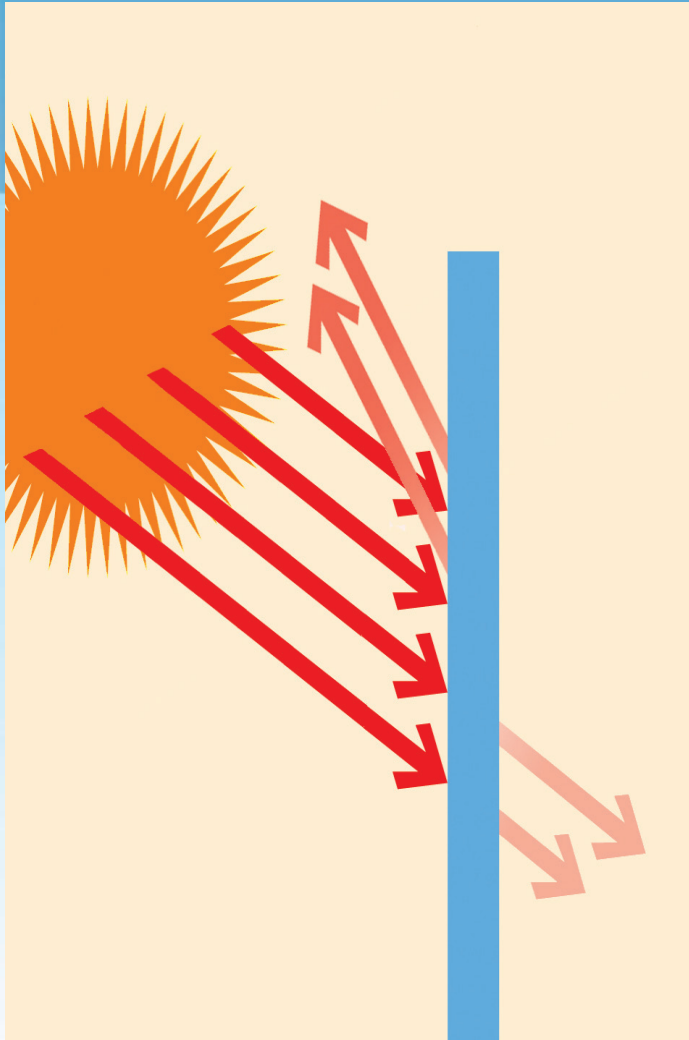


# Getting Codes Adopted

- At hearings, found a like-minded veteran
- Identify allies
- Horse trade
- Beer with builder

*HAWAII LAW:  
COOL  
WALLS*

# Cool Wall Code Option

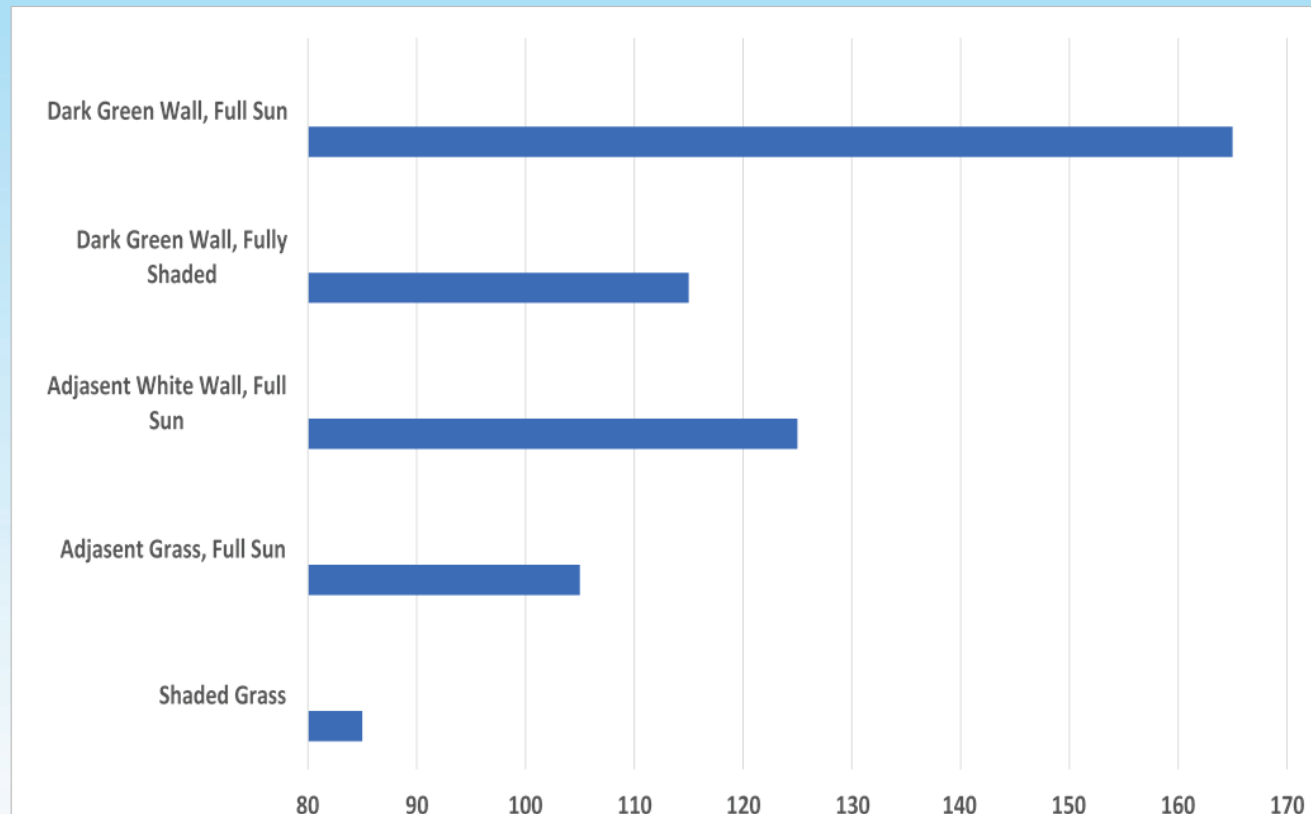


The 2015 IECC requires that steel-frame homes have R-4.2 exterior insulation, adding up to \$8,000 to a new home's cost and requiring 43 years to pay back.

Walls with a visible light reflectance of .64 yielded equal savings at little or no added cost.

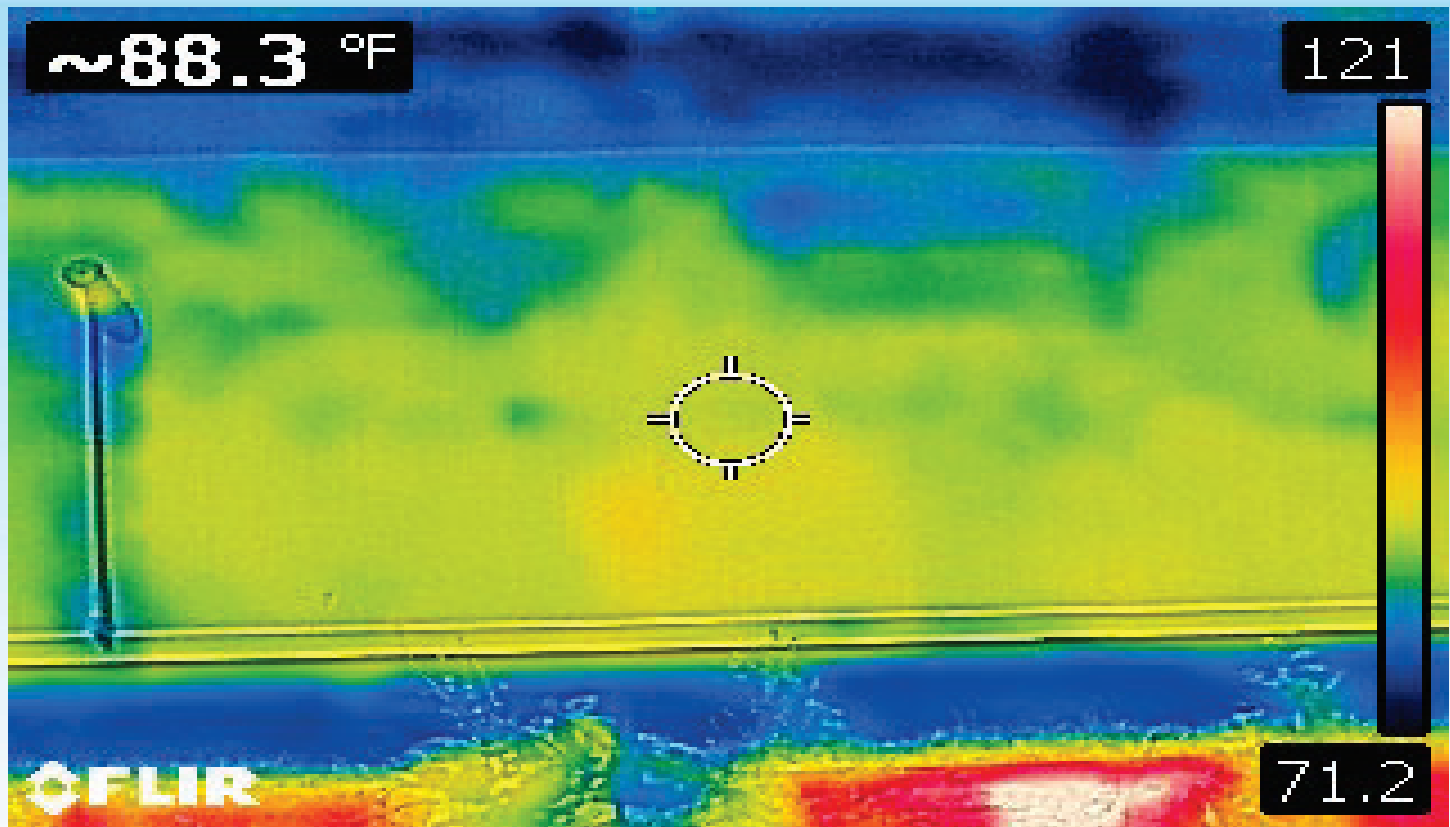
# Surface Temperature Comparisons: Sun/Shade/ Light Color/Grass

Pupukea Heights, North Shore, Oahu (°F)

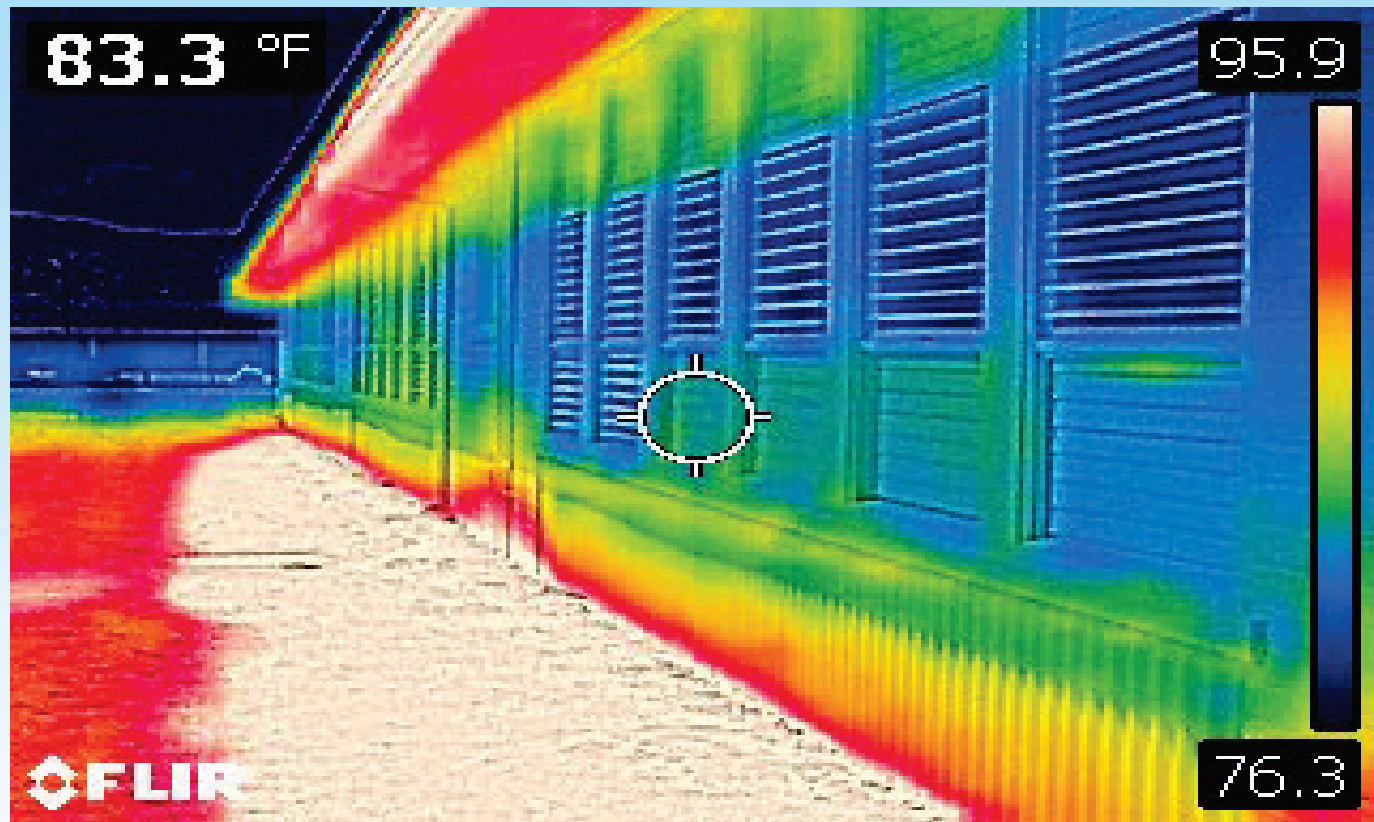




# Before Light Coating: Laie Elementary School Interior Temperature



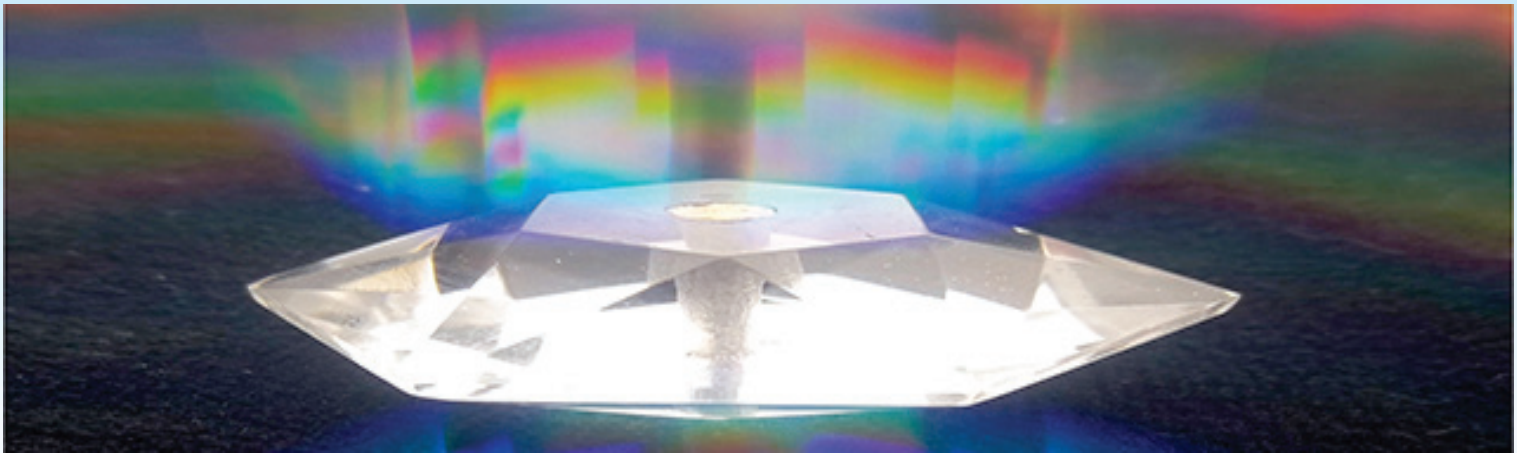
# After Light Coating: 5°F Interior Temperature Drop



# Extreme Materials Lab at Hawaii Institute of Geophysics and Planetology

Dr. Przemyslaw Dera

The size of pigment particles/crystallites has a strong effect on the performance of reflective paint pigments. Nanocrystalline  $\text{TiO}_2$  has been shown to have superior properties over standard  $\text{TiO}_2$ .



# Cool Walls Intern at Hawaii State Energy Office?

Dr. Dera may be able to secure Science Foundation grant to include a summer intern to conduct cool walls research.



# Follow up Research

Question: Should shading be added to a cool walls code? Shading makes a huge impact in cooling-dominated climates

## Question:

Does the addition of  $\text{TiO}_2$  add to coatings' cost?

Exempt the north faces of buildings from cool wall requirements?  
Architectural flexibility

# Mahalo

Howard. C. Wiig

Energy Analyst, Hawaii State Energy Office  
Office (808) 587-3811

[Howard.C.Wiig@hawaii.gov](mailto:Howard.C.Wiig@hawaii.gov)

The 2015 IECC:

<http://shop.iccsafe.org/codes/2015-international-codes-and-references/2015-international-energy-conservation-code.html>

State Energy Code Website:

<http://energy.hawaii.gov/hawaii-energy-buildings-Code/2015-iecc-update>



# Connect with the Heat Island Program

[Victoria Ludwig](#)

U.S. Environmental Protection Agency

202-343-9291



[Webcast Feedback Form](#)



[Heat Island Program Website](#)



[EPA Heat Island Newsletter Sign-Up](#)

