



# Energy Analysis of Cool Roofs for Residential Buildings in a Hot or Dry Climate

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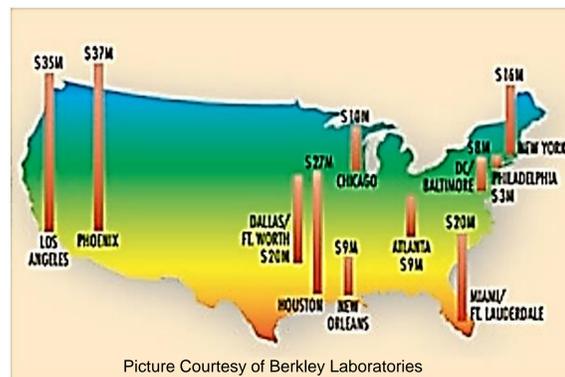


## Introduction

- Cool roofs reflect the sun's energy away to significantly reduce surface temperature which reduces energy cost
- Annually reduces 15% of energy usage
- Reduces residential energy cost by 50%
- Improves occupant comfort
- Works best in hot climates such as El Paso

## Research Question

How can cool roofs save money & reduce energy consumption in hot and dry climates?



Picture Courtesy of Berkley Laboratories

## Objectives

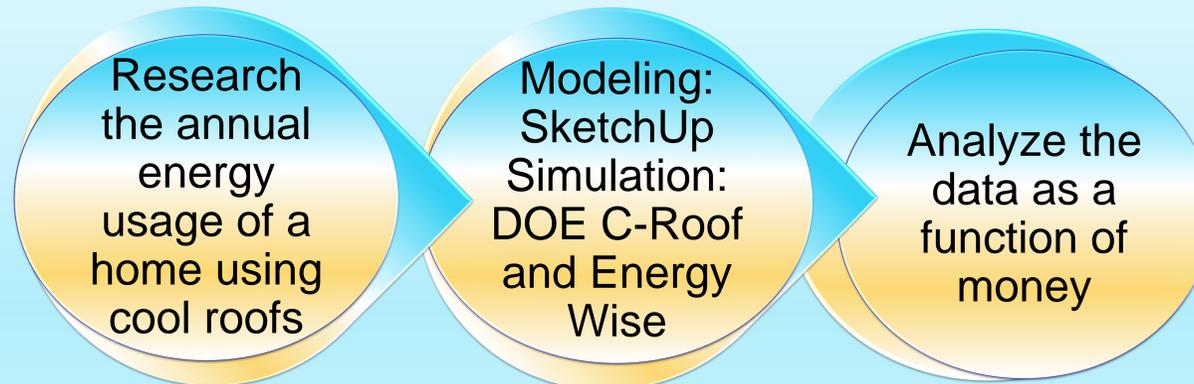
- Effectively analyze cool roofs impact on energy
- Explain the benefits of having cool roofs in the El Paso region.

## Significance

- Reduce energy cost
- Reduce emissions
- Positively impacting the community
- Successfully keeps homes cool in hot climate areas

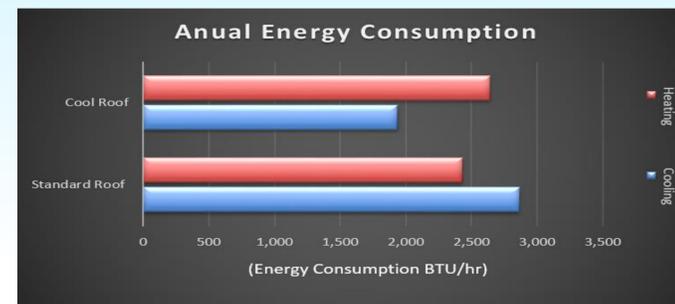
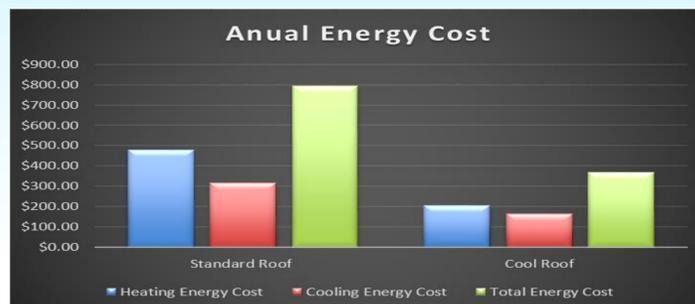


## Methods and Tools



## Results

- The cool roof saved 53% of cost compared to the standard roof.
- The DOE C-Roof data displayed that the cool roof reduced energy consumption by 927 BTU/hr.
- Standard roof absorb 22% more heating from outside.



### Properties of Standard Roof

Standard Roof	R-Value Cooling	R-Value Heating	Thickness (inches)
Materials			
Air Film- Outside	0.17	0.25	N/A
Felt & Asphalt Membrane	0.12	0.12	N/A
Asphalt Core Board	0	0	1
Plywood	1.26	1.26	0.5
Air Space	1.16	1.16	0.75
Sheet Rock	0.45	0.45	0.5
Air Film- Inside	0.61	0.92	N/A

### Properties of Cool Roof

Cool Roof	R-Value Cooling	R-Value Heating	Thickness (inches)
Materials			
Air Film- Outside		0.25	0.17 N/A
BUR (aggregate surfaced)		0.33	0.33 N/A
Permeable Felt		0.06	0.06 N/A
Glass Fiber		2.78	0.75
Plywood		1.26	1.26 0.5
Loose Fill, Cellulose		3.13	3.13 1
Sheet Rock		0.45	0.45 0.5
Air Film- Inside		0.92	0.61 N/A

## Discussion

This project analyzed the energy usage and cost of two homes using different roofing systems. The initial hypothesis was that the cool roof system will save both energy and money. After the experiment concluded, the data proved the hypothesis correct, proving that cool roofs significantly reduced energy usage and the cost of it.

## Future Works

Future work may include an actual experiment with the help of sensor technology to get an actual data from standard and cool roof to verify the energy trends.



## References

- [http://coolroofs.org/documents/CEU\\_WhatsSoCool.pdf](http://coolroofs.org/documents/CEU_WhatsSoCool.pdf)
- <http://www.coolroofs.org>
- <https://www.epa.gov>
- <http://energy.gov/energysaver/cool-roofs>
- <http://science.howstuffworks.com/environmental/green-science/urban-heat-island1.htm>
- <http://energywise.nrca.net/project/report>
- <http://web.ornl.gov/sci/roofs+walls/facts/CoolCalcPeak.htm>

## Acknowledgments

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