Successful Cost-Effective Green Implementations

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Introduction

We know climate change is affecting everyone and our current building stock is the largest contributor. Our current building stock emits the most carbon emissions to our atmosphere, and we have the technology to mitigate it; however, the best solutions are not financially friendly to the average home occupant. This study is not seeking new or modern green implementations for every homeowner; we know they work but are not easy for the average person to obtain. Rather, this study wants to know what will happen to the average home occupant when their A.C. or heating units stops working and they cannot comfort their home. The aim here is to find successful financially friendly green implementations. This study will assert successful cost-effective green implementations for home occupants.

Methodology

1. Homeowner Survey
2. Climate Consultant
3. Interview
4. Research Green Implementations

A random sample of 23-homeowners were asked if they have an alternative solution to cooling or heating units that may stop working in the summer or winter months:

Yes – 16.67%

Maybe – 20.83%

No – 62.50%

Tucson's Summer 2020 Average Temperature for July was 104° Fahrenheit

Arizona's Temperature is projected to increase by 10° Fahrenheit by 2090

What will happen to YOU if you cannot keep your home comfortable without a working A.C. or heating unit?

Data

Summer Green Implementations Needed	Hours [1]	Percentage (%) [2]	Actual Cost-Effective Prices ($) [3]
Sun Shading of Windows	1347	36.7	Window Overhangs $30 - $400
Two Stage Evaporative Cooling	1545	42.1	Evaporative Cooler $371.23
Natural Ventilation Cooling	347	10.2	Misters to cool natural air $8.07
Cooling	503	13.7	Ceiling Fan $49.97

Winter Green Implementations Needed	Hours [1]	Percentage (%) [2]
Internal Heat Gains [4]	1429	39.4
Passive Solar Heat Gain in Low Mass [4]	813	22.4
Passive Solar Heat Gain in High Mass [4]	587	16.2
Heating with Humidification [4]	1370	37.8

1 – Hours required of design strategy to maximize indoor human thermal comfort.
2 – Percentage required of design strategy to maximize indoor human thermal comfort.
3 – Cost-effective prices gathered for each green implementation from Home Depot.
4 – Winter implementation prices in this table are not included because many heating sources are dependent on building factors such as the house building materials, occupant indoor habits, and the solar heat they allow to enter.

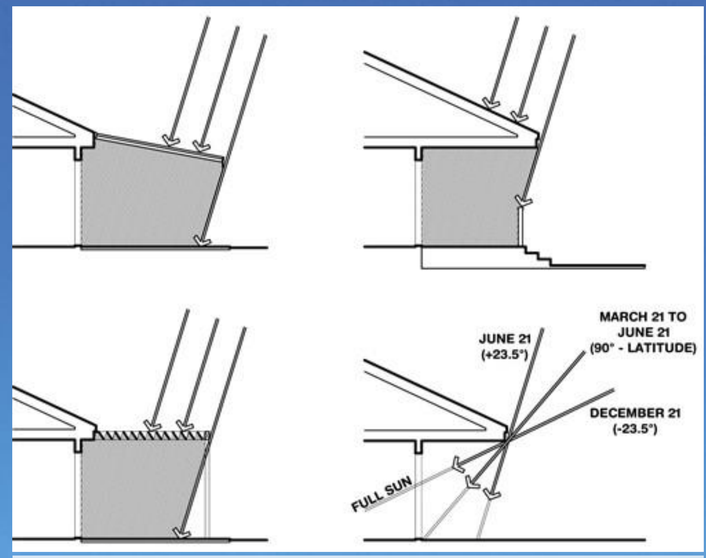

Figure 1. Overhang illustration to maximize shading in the summer and allow solar gain in the winter [5]

Findings and Future Work

This study found successful green implementation design strategies. Most prominently, according to Dr. Omar Youssef, "SHADING, SHADING, & SHADING" will maximize tolerable indoor conditions. Additionally, it found financially friendly green implementations any home occupant can install into their home, which might just save a person's life in the crisis of no working A.C. or heating unit to provide comfort, including:

1. Education
2. Trees and window overhangs for shade
3. Double pane windows for diffuse solar heat gain
4. Misters to cool the air during natural ventilation
5. Weather strips to contain warm or cool air indoors
6. Evaporative cooler to lower air temperature and reduce A.C. use
7. Wall insulation to keep indoor temperatures uniform
8. Fans to circulate indoor air
9. Thermostat setback to consume less energy and save money

Implementing these green design strategies help create tolerable indoor human thermal comfort conditions. Understanding that a disaster can occur and knowing that green design strategies can create tolerable indoor conditions with no mechanical systems, future research will be paramount in analyzing an average house with these implementations and make use of them in every home to avoid a crisis calamity and to save lives.

Citation:
5 – Liggett, R., & Milne, M. (2020). Climate Consultant (6.0 (Build 16)) [Computer software].