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**Introduction**

High temperatures in the summer cause a high use of electricity for air-conditioning. One of the causes for the high usage of air-conditioning is a hot attic. Attic temperatures in residential homes can be up to 20°F to 30°F hotter than ambient air temperatures. Old attics act almost like a pressure cookers. They absorb thermal energy all day long and get hotter because the thermal energy is retained due to poor ventilation.

**Objective**

Reduce the high usage of air-conditioning in existing homes.

**Methodology**

Reduce the temperatures in existing attics by reducing the thermal conductivity between the roof and the attic.

- Apply modifications to traditional roofing assembly and roofing materials.
- Compare the results of each the modifications to each other and traditional models.
- Do a cost benefit analysis and choose the most efficient and cost effective modification.

**Thermal modifications**

Metal or shingle roof with a thermal and water barrier between the plywood and the roofing panels.

- The thermal barrier will protect the plywood the sun thermal energy from being transmitted through the roofing panels.
- The main aspect of the modification will be the selection of a thermal barrier that will be able to withstand extreme temperatures and be easy to incorporate into the construction process.

**3D roofing panels with thermal modification**

Metal roof with a thermal and water barrier between the plywood and roofing panels that have spherical depressions.

- A combination of the two modifications to create the most efficient thermal resistant roof.

**Hypotheses**

1. Reducing the thermal conductivity between roofing panels and the attic will decrease the amount of energy being transmitted to the attic and lower the temperature of the attic space.
2. Lower attic temperatures will correlate to lower temperatures in the house and therefore reduce cooling costs.
3. Cooling cost can be reduced to around 10% in average homes.
4. The savings can be more with older homes that do not have proper insulation and are poorly ventilated attics.

**Research endeavor:** One important aspect will be to test effective insulations that can withstand extreme temperatures and be cost effective to install - to benefit residential and commercial contractors in the coastal regions of Georgia and Florida.