therma-Q: Analyzing the thermal performance of a quercus suber insulation.

**Problem:**
Can a quercus suber (cork) composite insulation be devised and compared against a rigid board based material of the same thickness, then the quercus suber composite insulation will thermally outperform the rigid board insulation, resulting in a safer, eco-friendly, sustainable and superior energy-saving building material?

**Hypothesis:**
If a quercus suber (cork) composite insulation is devised and compared against a rigid board based material of the same thickness, then the quercus suber composite insulation will thermally outperform the rigid board insulation, resulting in a safer, eco-friendly, sustainable and superior energy-saving building material.

**Materials:**
- QTY MATERIAL(S)
  - 5 Glass terrariums (hypothetical houses)
  - 5 Digital thermometers with wireless sensor
  - 10 12" x 12" x 1/4" cork tiles
  - 1 board 2" thick expanded polyurethane rigid board insulation (EPS)
  - 1 foam Geometry expanded polyurethane rigid board insulation (EPS)
  - As required Foam Gear
  - 1 Cutting Tool and Replacement Blades
  - 1 Ruler
  - 1 Masking Tape
  - 1 Marker
  - 1 ex. Lint-remover, Pet & digital camera to record results
  - Traditional Oven (large enough to hold all three houses at once)
  - 3 small bead ice packs (frozen)
  - 1 X-Large Cookie Sheet
  - 1 Personal Protective Equipment (safety glasses, gloves, face mask, etc.)

**Results:**
The results from this experiment proved that a quercus suber (cork) insulation can be created and compared against a rigid board based material of the same thickness. The Researcher's hypothesis was correct. The data showed that the cork insulation composite provided superior performance compared to the rigid polyurethane insulation (EPS) in both scenarios. The EPS held the inside of the house warmer when the enriched outdoor temperature was lower, but the cork was slightly better. Both outperform RPS insulation. When the outdoor temperature was hot, the cork composite outperformed the EPS by 10%. This EPS was about two to three degrees hotter than the cork, and the EPS was about nine to ten degrees hotter than the cork. The EPS was the poorest performer overall.

**Conclusion:**
The findings of this experiment mean that by using a cork insulation material, it would take less energy to heat buildings in the colder months and less energy to cool buildings in the hotter months. The findings also mean that we would take less thickness of cork insulation to achieve the same thermal resistance as a Hicker-rigid insulation. In addition to it's superior thermal performance as shown on this experiment, cork has many benefits that make it a better performing product to both EPS and RPS rigid board insulation.

- It is harvested from the bark of a living cork oak tree, which makes it a renewable and sustainable resource.
- It is biodegradable and recyclable into many different types of products.
- Cork is fire-resistant.
- Cork is termite-resistant.
- Cork is free of harmful toxins.
- Cork is low cost, and cork can withstand up to 14,000 lbs of pressure without breaking.
- It is also a good sound insulator.

On a material level, cork looks like a homogenous of air pockets, which is what makes it a great insulator. Each cell has 14 sides, and this makes the cell walls flexible, strong, waterproof and airtight. Making it a superior product to other rigid insulations.

Energy consumption, pollution, greenhouse gas emissions are all topics that we've all become very familiar with, because these are the effects they have on climate-change. This graphic helps explain the importance of this study.

When cork is harvested, it releases CO2 molecules, which is why cork insulation, which is why cork insulation...