

# Adobe vs. Masonry

# Research

- Adobe is made with dirt with a clay texture, straw, and sand, and dried in the sun after it is mixed with water and shaped into a brick.
- Adobe is used in places with hot conditions because it stays cool in the day and cool at night.
- Adobe stays cool during the day because it has thermal insulating properties because it is dried in the Sun, unlike masonry bricks that are cooked.
- Adobe is also energy efficient because the use of machines isn't needed to make adobe.

# Why did I research Adobe?

I decided to research Adobe because Adobe is helpful for states like Arizona. As you may know, Arizona citizens pay a lot to air condition their home from the scorching heat. In fact, Sense reports that in 2018, the nation average for A/C in the summer was about \$147.82, meanwhile for Arizona residents, the average was \$476.83. Adobe could help us keep our homes cool, therefore saving us money. Adobe is also energy efficient, giving our A/C less work, and using less energy.

## Research Question

Which type of brick is more energy efficient? The masonry brick that is commonly used, or the adobe brick?

## How I will test this question

I will test this question by building a mini square of both masonry and of adobe brick and leave them outside exposed to the sun. Then I will see check their temperature to see which one is cooler or warmer.

# My Hypothesis

If I leave two types of bricks, adobe and masonry, out in the Sun, then the adobe will stay the coolest in warm temperature, and warmer in cold temperatures because of the adobe's thermal insulating properties.

# Materials

- Clayey sand
- Silt
- Water
- Straw
- A bucket
- A 19 ½ long and 9 ½ wide molder
- Two La Crosse Technology Thermometers
- La Crosse Technology App (to help measure temperature.)





# Procedures: Acquiring materials

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- 1. Go to a rain channel with dirt and sand.
- 2. Search and dig until you find clayey sand.
- 3. Get around 3 pounds of clayey sand.
- 4. Silt will be anywhere in the channel, any will do.
- 5. Get around 3 pounds of silt.
- 6. Cut around half a pound of straw, it may be growing along the rain channel

# Procedures: Making the Adobe

1. Gather all the ingredients, the bucket, and selected mixing utensil.
2. Place all the ingredients into the bucket.
3. Place water and mix.
4. Mix until the mixture is pasta-like.
5. Place in the molder
6. Leave out for 2-3 days (shade is recommended)







# Setting up the two Bricks

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# The Temperature Data Table

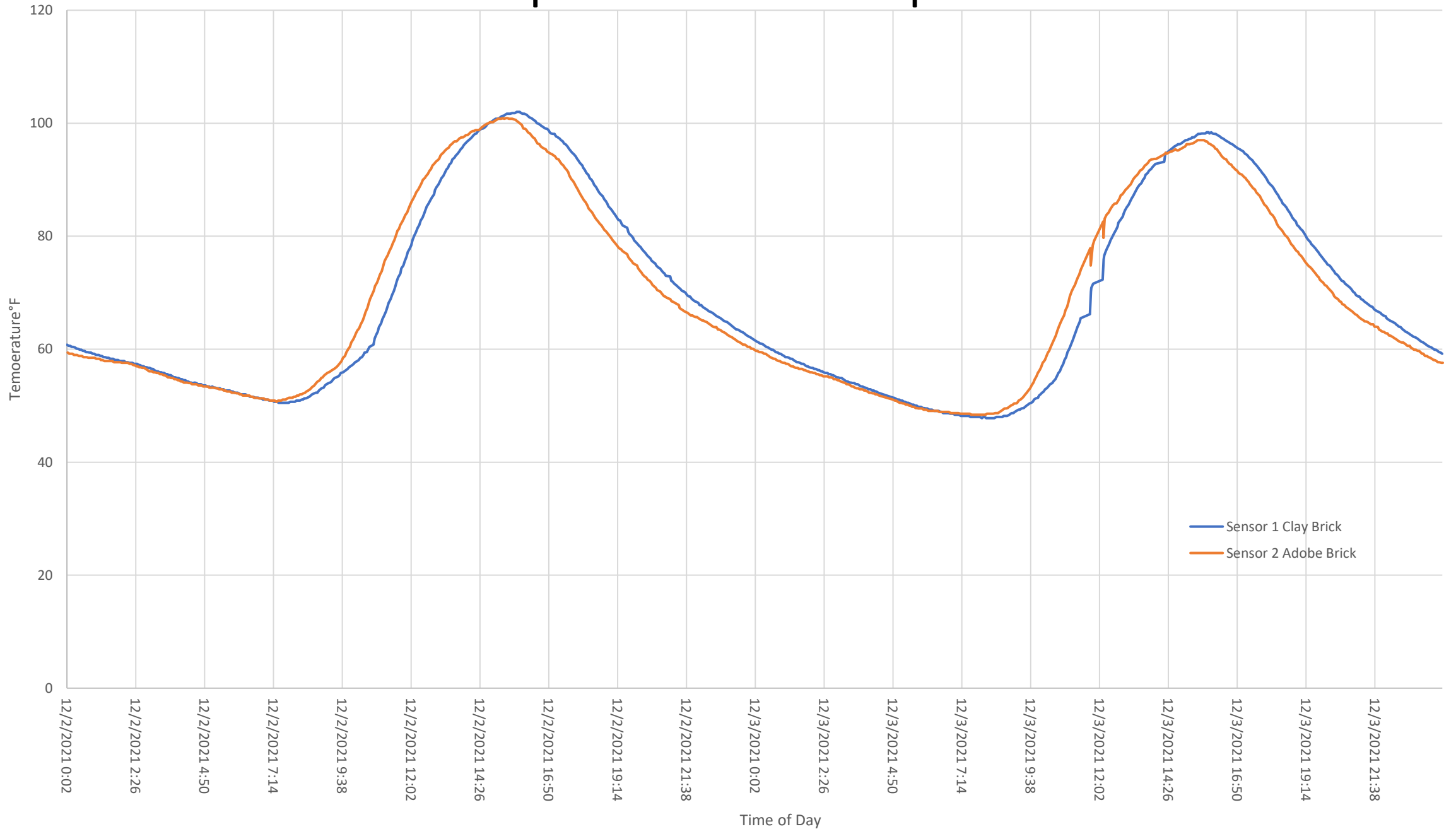
- Note: There are more temperatures, but too many to fit here.

## Sensor 1 Clay Brick

## Sensor 2 Adobe Brick

Time	Temperature °F	Time	Temperature °F
12/2/2021 0:02	60.8	12/2/2021 0:03	59.4
12/2/2021 0:05	60.6	12/2/2021 0:07	59.2
12/2/2021 0:09	60.6	12/2/2021 0:10	59.2
12/2/2021 0:12	60.4	12/2/2021 0:13	59.2
12/2/2021 0:15	60.4	12/2/2021 0:16	59
12/2/2021 0:19	60.3	12/2/2021 0:20	59
12/2/2021 0:22	60.1	12/2/2021 0:23	59
12/2/2021 0:25	60.1	12/2/2021 0:26	58.8
12/2/2021 0:29	59.9	12/2/2021 0:29	58.8

# Temperature Graph



# Discussion of results

In the end, the adobe stayed the coolest. In the first heat spike, the masonry brick was at 101.7, while the adobe stayed at 100.9. However, when it was cold out you could see that in the end, the masonry was warmer. For example, at the first minutes of the first day, 12/2/2021, adobe was at 59.4 Fahrenheit, while the masonry was at 60.8 Fahrenheit, consequently making it warmer.



# Conclusion

At the start of the experiment, my hypothesis was if I placed two types of bricks, adobe and masonry, out in the Sun, then the adobe would stay the coolest during heat spikes and warmest in the cold. In the end, I was partially right. While the adobe did prove it could stay the coldest, for example in the second heat spike at 15:22, the masonry was at 97.7, the adobe was at 97, the masonry in the end stayed the coolest. Something that could've interfered with my research is the amount of time I measured the temperature. To be able to get more accurate results, I could've extended the experiment to about a week. Another thing I think could've interfered is human error. I made the adobe bricks, so there is a possibility that I made one of the bricks incorrectly by add too much or too little of an ingredient.



# Implication and ideas for future research

An idea for future research is that instead of doing the experiment during November and December would be to do it during summer months, June and July. The reason for this is because that way, we would get more significant results since in those months it is hotter. Another idea would be to measure the temperature for about one or two weeks.

# References

- “Adobe: An Environmentally Friendly Construction Material”. Name of the website: WITPress. Publication date: April 23, 2009.  
URL: [www.witpress.com/elibrary/wit-transactions-on-ecology-and-the-environment/120/19826](http://www.witpress.com/elibrary/wit-transactions-on-ecology-and-the-environment/120/19826)
- “The ABCs of Green Building Materials-Adobe (New Series!)”. Name of the Website: Green Building Elements. Publication Date: October 04, 2021. URL: [www.greenbuildingelements.com/the-abcs-of-green-building-materials-adobe](http://www.greenbuildingelements.com/the-abcs-of-green-building-materials-adobe)
- “Adobe: The Most Sustainable Recyclable Building Material”. Name of the Website: ArchDaily. Publication Date. August 26, 2020.  
URL: [www.archdaily.com/945692/adobe-the-most-sustainable-recyclable-building-material](http://www.archdaily.com/945692/adobe-the-most-sustainable-recyclable-building-material)
- Gheorghiu, Iulia. “Arizona, New Jersey Homes Costliest to Cool in Summer, Sense Finds.” *Utility Dive*, 25 June 2019, <https://www.utilitydive.com/news/arizona-new-jersey-homes-costliest-to-cool-in-summer-sense-finds/557569/>.