ECOHOUSE PROJECT: SOLAR SYSTEMS REPAIR & SUSTAINABLE HAIR CARE

Fall 2020
By Elle Dickerman,
Virtual Ecohouse
Resident

ECOHOUSE SOLAR SYSTEMS: SOLAR PHOTOVOLTAIC

❖ Installed 2005

❖ Dovetail Solar & Wind

❖ 2.4 kW

❖ $20,000 after rebates

❖ 25% of Ecohouse electricity

❖ Main questions:

1. Is it functioning correctly?
2. How can output be monitored and displayed?

Image source: https://www.ohio.edu/ecohouse/house-features/landscaping

ECOHOUSE SOLAR SYSTEMS: SOLAR THERMAL

Image source:
https://www.ohio.edu/ecohouse/house-features/landscaping

❖ Third Sun Solar

❖ $4,000

❖ Water heating through a glycol solution

❖ Electric Backup

❖ Main questions:

1. Is it functioning correctly?
2. How can output be monitored and displayed?

PROJECT BENEFITS

❖Education

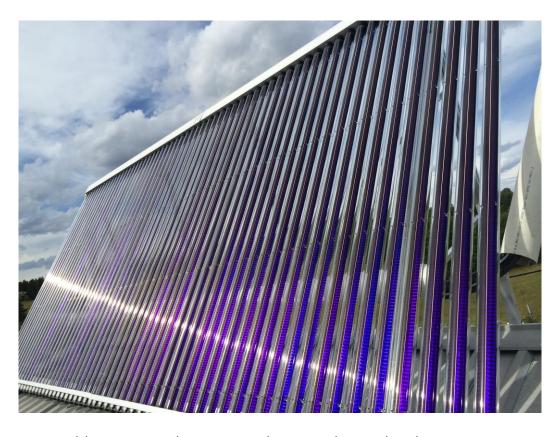❖Public perception

❖Research Opportunities

❖Sustainability

Image source: http://media.cleveland.com/metro/photo/ohio-university-college-greenjpg-b5781a28d5c23d83.jpg

INITIAL INVESTIGATION

❖ October 5th: Initial Investigation of the systems with Elle, Pao, Elaine, Jeffery Hamilton

❖ Solar PV:
  ❖ Determined to be working properly
  ❖ The bush
  ❖ No way to see output

❖ Solar Thermal:
  ❖ Pump had been replaced
  ❖ Breaker turned off
  ❖ New water heater installed in 2017

https://gulfpowernews.com/wp-content/uploads/2015/01/SolarFacility.jpg

FOLLOW-UP INVESTIGATION

https://raysolar.ca/wp-content/uploads/2015/05/IMG_0207.jpg

❖October 30th – Me, Pao, Elaine, Jeff, Karl, and Allen to take a more in-depth look

❖Solar PV:
  ❖Needs a data monitoring system

❖Solar Thermal:
  ❖Would need significant repairs

NEXT STEPS

❖Solar PV:
  ❖Figuring out the best option for recording & displaying data
  ❖Obtaining funding
  ❖Creating a plan for data management

❖Solar Thermal:
  ❖What is the cost to make repairs?
  ❖Is the panel itself functioning?
  ❖Is it worth it to repair, or would it be better to look at a new system?

  ❖Summary Document

Solar Project Summary

Elle Dickerman

Fall 2020

Summary:

The OHIO Ecohouse, in an effort to reduce its environmental impact, features two solar installations. The first is a traditional set of solar panels, which produces the equivalent of 25% of the house's energy. The other, a solar thermal unit, uses heat from the sun to provide hot water to the house. However, currently there is no tracking mechanism in place to gather data on the energy production of these systems. This causes a few issues – for one, it is difficult to find out if the systems are functioning properly, and it also limits the panels' capacity as a teaching tool and promotion tactic for renewable energy.

My semester project for the Ecohouse course involved attempting to: 1) find out if the two systems are functioning; 2) look into ways to track the output of the systems; and 3) if the systems are not functioning, find out what it would take to fix them. As I did not actually live in the Ecohouse this semester due to COVID, this work had to be done remotely, which was challenging given the nature of the project. With the help of the other two Ecohouse residents, Tristian and Pao, Office of Sustainability Director Elaine Goetz, and other university staff members, progress was made in reaching these goals. This document will serve as a summary of the work that has been done on the project and can be referenced in the future as the project continues.

Project Participants:

Elle Dickerman, Virtual Ecohouse Resident

Paola Munoz-Gamboa, Ecohouse Resident

Tristan Mandeville, Ecohouse Resident

Jeff Hamilton, Manager: Heating, Ventilation & Air Conditioning, and Control Shops

Karly Suchy, Consultant, Building Control Integrators

Allen Acord, Low Voltage Maintenance Shop

Shari Gillispie, Facilities Work Center Manager

Claire Najshy, Building Systems Integration Manager

Jeremy Daniels, Plumbing Shop Manager

Project Timeline:

September:

- I researched the Ecohouse's Solar PV and Solar Thermal systems, as well as small-scale solar systems in general to gain some background knowledge
- I met with Elaine Goetz and we discussed the two systems and the potential issues with them

October:

- I did some research on common problems with solar thermal and solar PV systems
- Created a list of important things to check on the systems to help diagnose potential problems
- Met with Elaine Goetz and Jeff Hamilton via Teams to examine the systems
- Developed an idea to create this record of the project work
- Met with Elaine, Jeff, Karl, & Allen to examine the systems again

November:

- Created summary document
- Brainstormed next steps for the project
- Prepared for project presentation

Summary of Progress: Solar Thermal

The solar thermal system at the OHIO Ecohouse was installed by Third Sun Solar. The system costed $4,000. The system absorbs the heat from the sun into a glycol solution, which flows into the house and heats the water through heat transfer. The system is backed up by electricity, which is used when the solar thermal heat production is not sufficient to meet the house's needs. The system originally used a display dashboard by Lucid, an energy information company. This dashboard, which was also connected to the Solar PV, allowed anyone to view the production of the system via the university's website.

By 2014, the information displaying on the Lucid dashboard was never correct, so the university ended its contract with the company a few years ago. There is no way to currently view how much energy the system is producing, so it was unclear if the system was functioning

PART II: SUSTAINABLE HAIR CARE

COMMERCIAL HAIR CARE PRODUCTS

❖Oftentimes contain harmful chemicals

❖Causes hair to dry out

❖Cost $$

❖Plastic waste

https://i.pinimg.com/originals/c1/cb/5e/c1cb5eee6efd3c692232738641514f4f.jpg

HAIR ROUTINE GOALS

SIMPLE, TAKES MINIMAL TIME

LESS EXPENSIVE

ENVIRONMENTALLY-FRIENDLY

HEALTHY FOR MY HAIR

DIY SHAMPOO & CONDITIONER

❖Ingredients can be found at home

❖Using old shampoo/conditioner bottles

❖Healthy for your hair, all natural

❖Easy to make

❖Saves money

INITIAL RECIPES

Shampoo:

- ❖ ¼ cup water
- ❖ ¼ cup liquid castile soap
- ❖ ½ teaspoon light vegetable oil
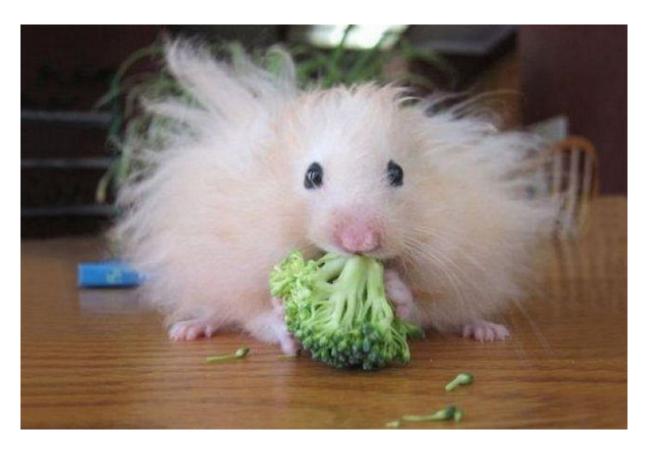- ❖ 1/8 teaspoon essential oils

Conditioner:

- ❖ 1 tablespoon apple cider vinegar
- ❖ 1 cup water

RESULTS

❖ Poor consistency of Shampoo/Conditioner

❖ Oily, unclean hair

https://boredbug.com/wp-content/uploads/2015/02/niceanimalshair8.jpg

NEXT STEPS

❖Additional Ingredient: Baking Soda

❖More oil, vinegar

❖Second attempt

https://i.pinimg.com/originals/6a/c6/1c/6ac61cfb81801bac
9b9879b32acf2391.jpg

FINAL SHAMPOO RECIPE

Ingredients:

❖½ cup water

❖½ cup liquid castile soap

❖4 teaspoons light vegetable oil (ex. grapeseed oil)

❖5 teaspoons baking soda

❖¼ teaspoon essential oil

Steps:

1. Mix all ingredients in a container. Old shampoo containers work well for this purpose.

2. Shake well prior to each use

3. To use – scrub roots and length of hair. The shampoo is a bit more watery than traditional shampoo, so pouring it directly on your scalp works well.

FINAL CONDITIONER RECIPE

Ingredients:

❖ 3 tablespoons apple cider vinegar

❖ 1 cup water

Steps:

1. Combine the ingredients in a container.

2. Shake well prior to each use

3. To use – Coat the length of your hair in the conditioner. Let sit for a few minutes before rinsing.

ADDITIONAL SUGGESTIONS

❖Washing hair less frequently

❖Using up old shampoo/conditioners first

❖Sharing benefits with family and friends

THANK YOU!

https://static.boredpanda.com/blog/wp-content/uploads/2014/03/funny-hairy-animals-fb.jpg