SCHOOL NAME: WESTWOOD HIGH SCHOOL

CATEGORY: SENIOR/ 9TH GRADE

PROJECT TITLE: ADOPT AN H-TREE

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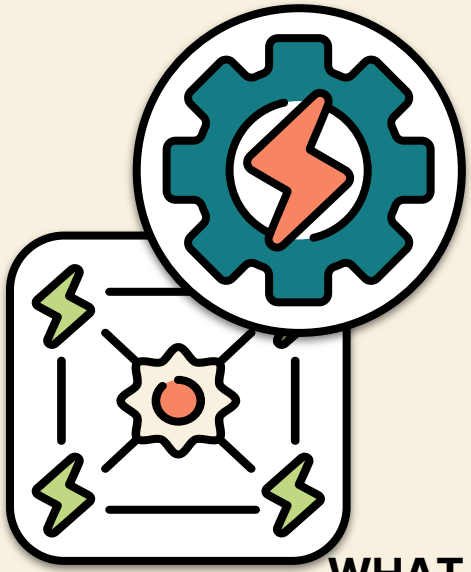

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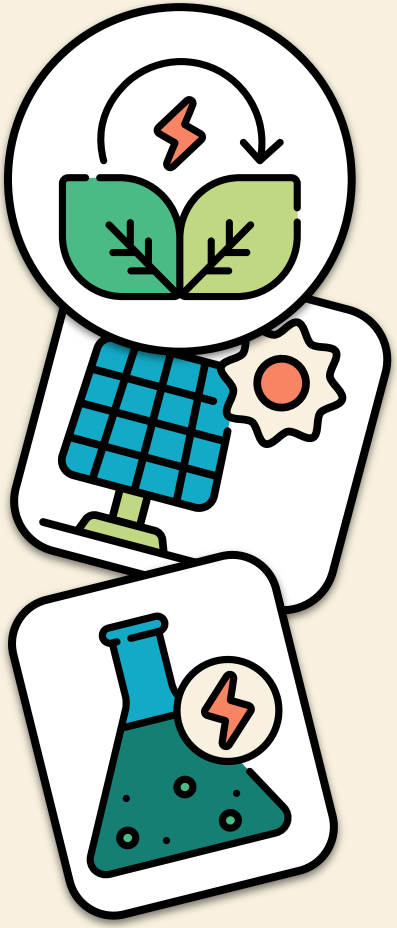


I call this project Adopt an H-Tree, The main idea of this project is to have a composter in your house using the organic trash of your house and turn the food into compost and that compost can be used to plant a tree and this tree can help us to get more water and generate more hydrogen energy.

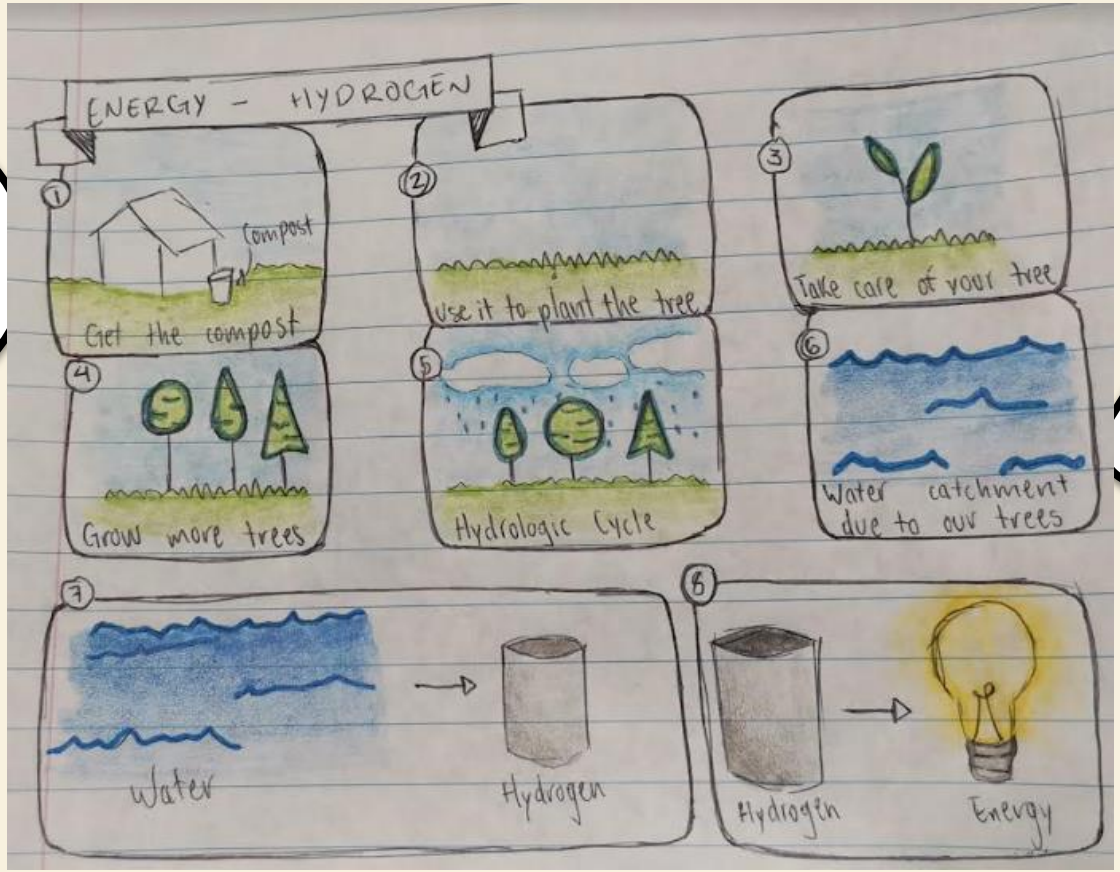
SUMMARY

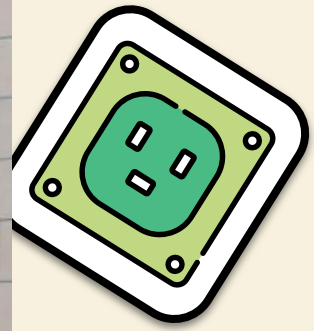
The project is basically making compost with only natural resources and organic food waste which can be reused at home, putting the organic waste in a container of your kitchen or in your garden.

Use our composter and at the end of the cycle get fresh and quality fertile land.

Then you can use it to plant a tree or use it as plant food in your garden or in your area.

DESIGN


ENERGY - HYDROGEN
1
Compost
Get the compost
2
Use it to plant the tree
3
Take care of your tree
4
Grow more trees
5
Hydrologic Cycle
6
Water catchment due to our trees
7
Water
Hydrogen
8
Hydrogen
Energy



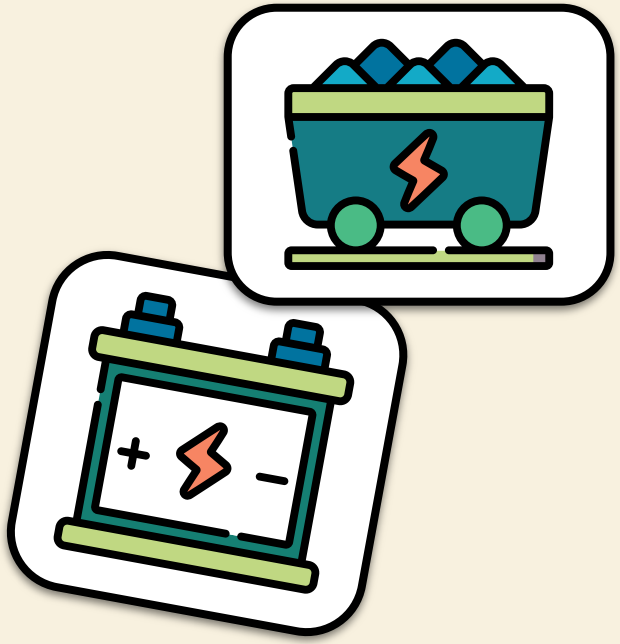
GOALS

The main goal is to become Arizona (A not very green place) into a Greener place using our home composter to grow at least one tree per apartment or house.

Reuse the organic food waste (Short term)

Looking forward to making Arizona a place with more humidity and Improving the water cycle by considering water as a primary material for hydrogen energy

Help the change to clean hydrogen energy viable (Long term)



ACTIVITIES TO REACH THE GOALS

1. Look for the problem we want to solve/ Goals we want to achieve

2. We made Brainstorm all the ideas to get the final product

3. Get more informed

4. Design the product

5. Create

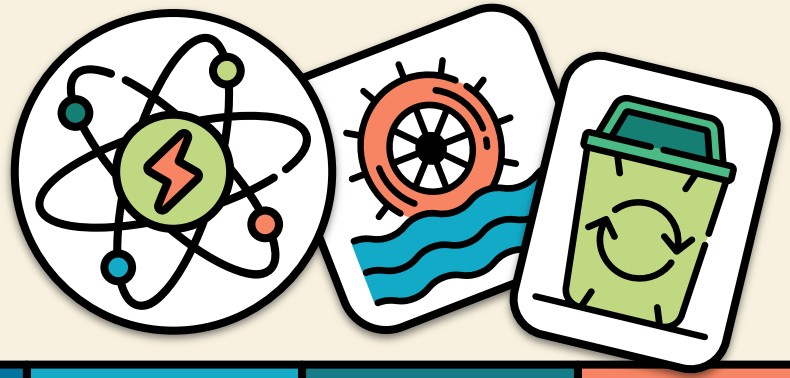
6. Test

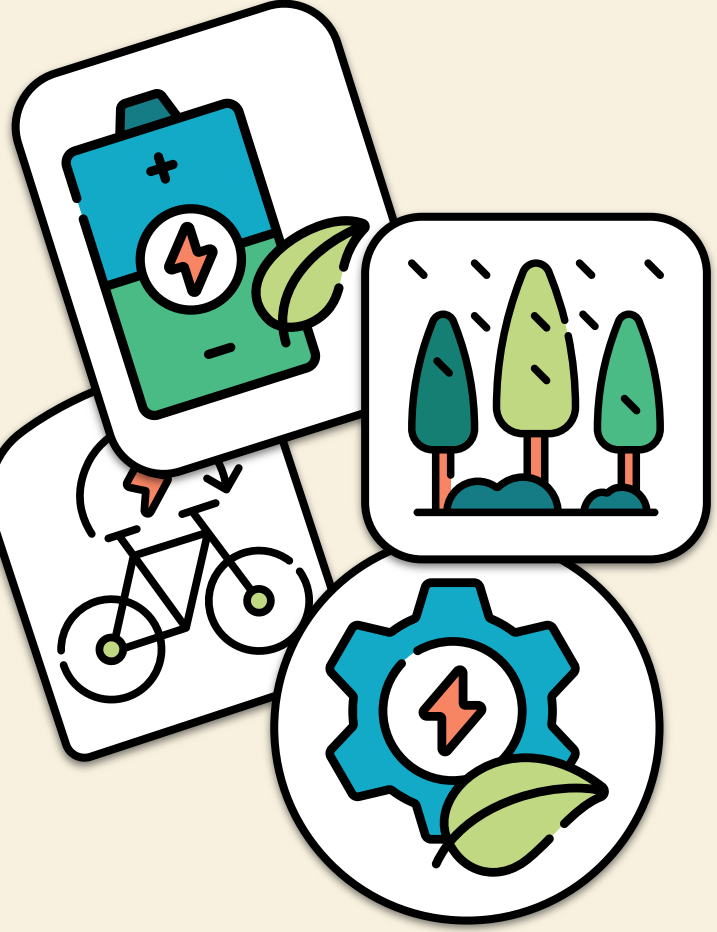
7. Look for bugs or improvements

8. Get the final product with the best quality and performance that meets the desired goals.

PROCESS

1. Start an awareness campaign at school and get them informed about organic waste reuse and hydrogen energy.
2. Have the composter
3. Keep all organic food waste in the composter
4. Wait between 2 and 3 months to get fertile land.
5. Get a seed to plant it and take care of your tree

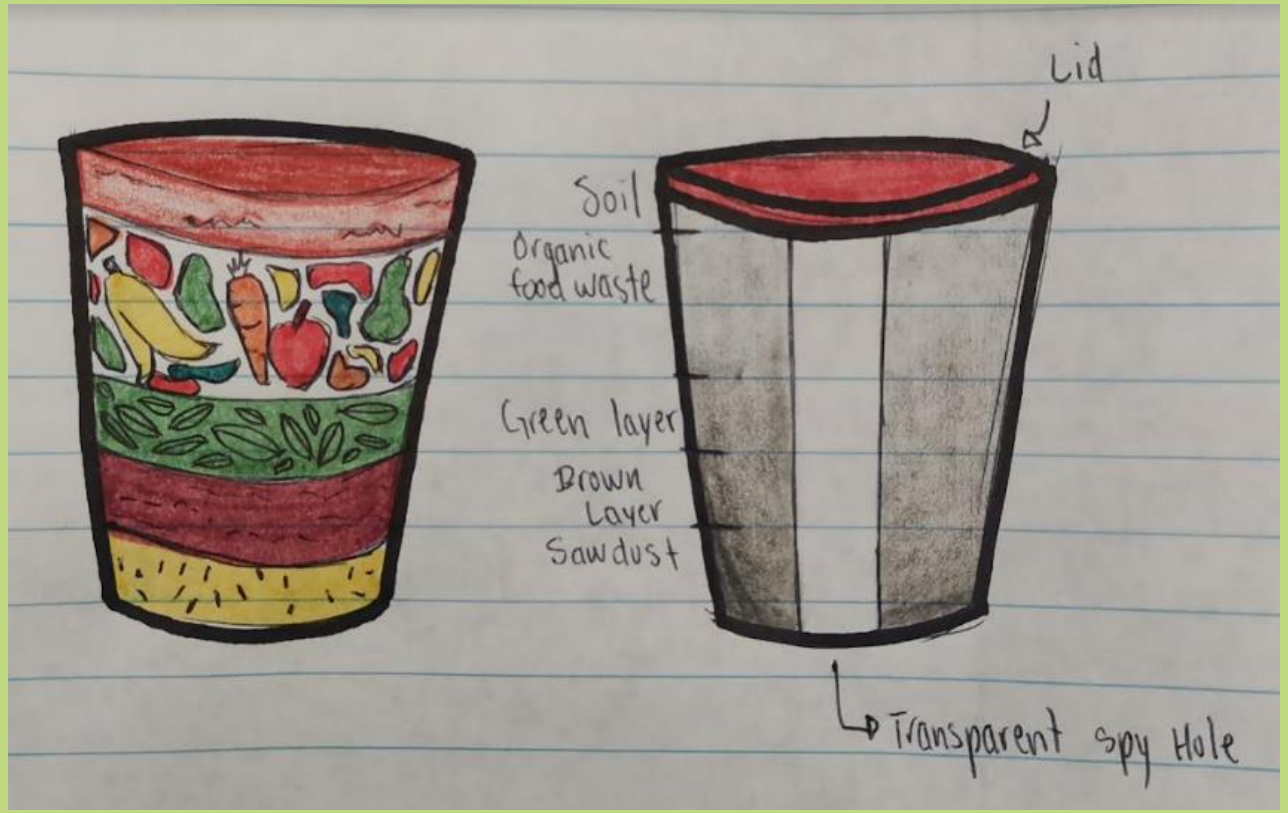


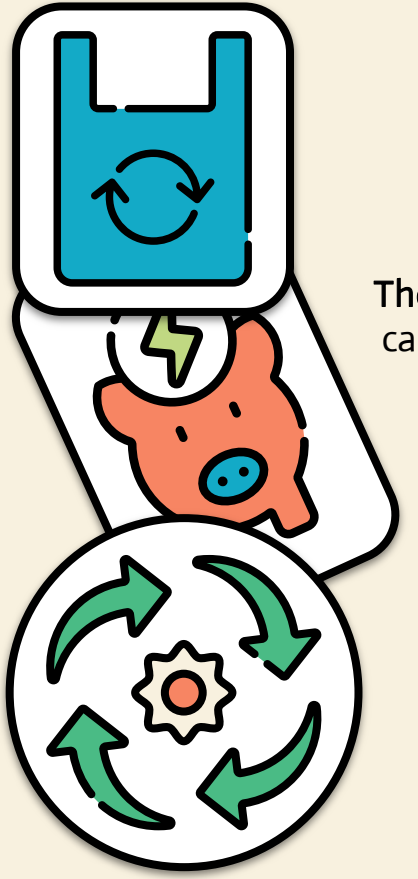


HOW DOES IT WORK?

The composter is a bucket with a lid, a spy hole, and a lever to remove the contents or materials inside the composter. A bucket was chosen for its round shape so that it is possible to roll it to mix the contents when necessary. The idea is that it is easy, practical, and accessible so that anyone can do it at home. The bucket can be of 5 gallons size preferably.

PROTOTYPE


Lid
Soil
Organic food waste
Green layer
Brown Layer
Sawdust
Transparent spy Hole



ENERGY CONTENT KNOWLEDGE

(THE SCIENCE OF ENERGY, ENERGY SOURCES, ENERGY USES)

The science of Energy: Hydrogen is an energy carrier, not an energy source, and can deliver or store a tremendous amount of energy. Hydrogen can be used in fuel cells to generate electricity, or power and heat.

Energy Sources: Hydrogen can be produced from diverse, domestic resources. Most hydrogen is produced from fossil fuels, specifically, natural gas, and electricity from various sources can also be used to produce energy.

Energy Uses: Hydrogen is a clean fuel that, when it is consumed in a fuel cell, produces only water, electricity, and heat. Hydrogen has potential in all sectors, transportation, commercial, industrial, residential, and portable. And also it can give energy for lots of things, for example, distributed or combined heat and power; backup power; systems for storing and enabling renewable energy; portable power; auxiliary power for trucks, aircraft, rail, and ships; and passenger and freight vehicles including cars, trucks, and buses.

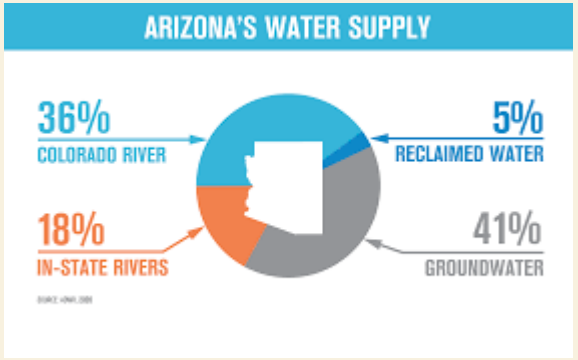
DATA COLLECTION AND ANALYSIS

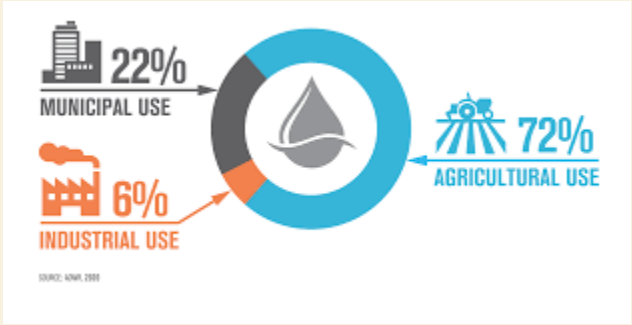
An average, a mature tree can produce 1,000 gallons of usable water (Transpiration Ratio)

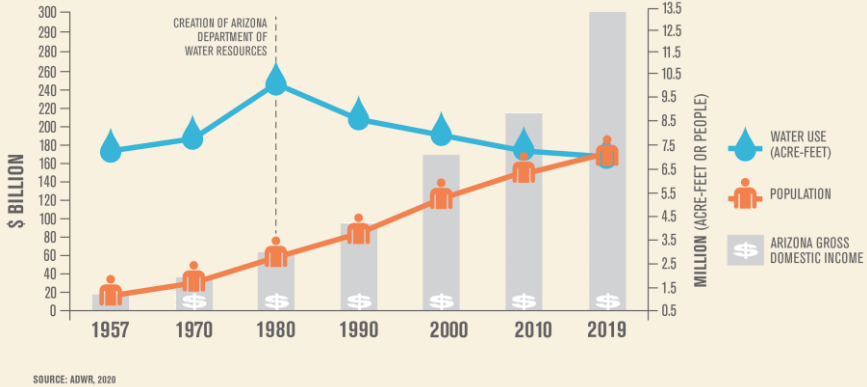
In Az a tree grow up to 2 to 10 years, to be a mature tree, depending on different factors (High, temp, humidity)

1 tree per house
100 houses = 100 trees
100 trees = 10,000 gl water / year
10,000 g water = 47,000,000 L Hydrogen (1 g water = 4700 L)

Within most urban areas of the state a 100-year water supply must be proven before land can be developed







SCIENTIFIC PROCESSES

In this project, we identify 2 scientific processes:

1. Organic food decomposition:

- Anaerobic (without oxygen):

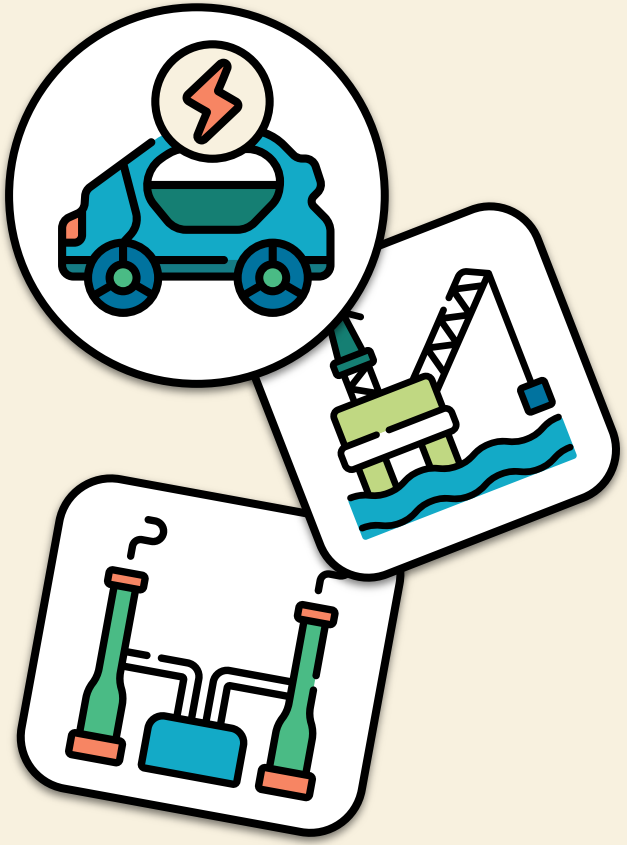
Putrefaction or fermentation is an intensive reduction of organic matter with biological reactions that breaks drown by the action of living organisms, in this part of methane and carbon dioxide are liberated and due to oxidation some strong odors usually appear.

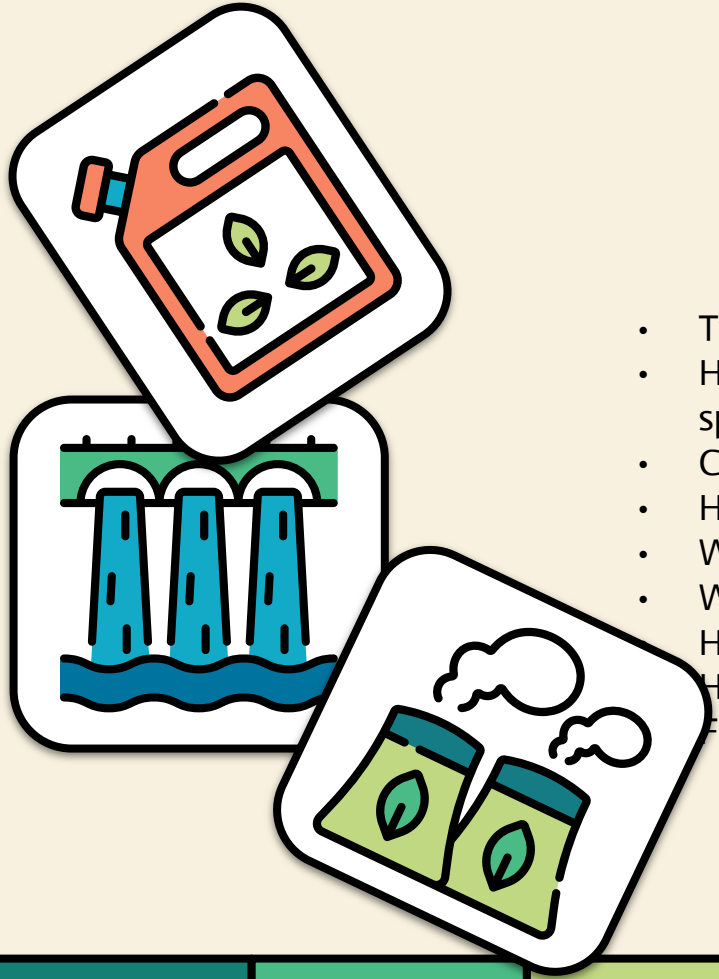
- Aerobic (with oxygen):

Aerobic decomposition is most common in nature using carbon as a source of energy and recycling nitrogen from dead cells. Aerobic oxidation produces no odor and so the efficiency of decomposition requires aeration and microbial activity.

2. Water Hydrolysis

Involves splitting water into hydrogen and oxygen with the help of electricity. When the direct current is past through the water, oxygen appears at the positive anode, while hydrogen is released from the negative cathodes, A PEF (Proton Exchange membrane) is recommended to extract hydrogen from pure water because the membrane provides the necessary particle transport between anodes and cathodes





WHAT DO WE LEARNED AND WHAT WE HAVE ACCOMPLISHED

Learned:

- Types of organic waste useful for a composter
- How to build a composter (compost layers, composter rules and specifications, cares, and cycle time)
- Chemical reactions in a composter (anaerobic &aerobic)
- Hydrological cycle
- What is hydrogen and how we can get it
- Water hydrolysis
- Hydrogen uses
- Hydrogen for electricity generation
- Fuel cells for transportation industry

Accomplished:

- Proposal project for high school students & families

HOW IT WILL HELP THE COMMUNITY?

In this case, we focused in Arizona so one of our goals is to plant more trees with our compost and make Arizona a greener place. The trees would give the community more oxygen, and more water and it would make the city look better.

LONG-TERM RESULTS

Our long-term results are to get more houses with compost and trees in their garden or yard, not only on houses, but also on trees in the city in general, and recycling the organic food waste of each house.

HOW IT WILL HELP THE COMMUNITY AND LONG-TERM RESULTS

RESULTS AND OBSERVATIONS

- It is necessary for an awareness campaign to share the responsibility of water catchment, this is hard work between home, school, and government.
- This awareness campaign includes a family conference, a multi-disciplinary project at school, and a rewarding program from the state or city government.
- This proposed project is medium and long-term because of the time for the composter and the time to grow a tree but the action we do today will be reflected in the future
- If families do a successful composter once, they could continue composting as a green habit for a better world
- Hydrogen energy could be 100% green when the electricity needed for hydrolysis comes from renewable sources like solar energy and wind power.
- At this time we don't have accurate results because the compost takes time to develop, and the tree also takes time to grow but we are still in the progress of achieving it.

RESOURCES

HYDROGEN INFORMATION

https://www.energy.gov/eere/articles/hydrogen-clean-flexible-energy-carrier#:~:text=Hydrogen%20is%20an%20energy%20carrier,electricity%2C%20or%20power%20and%20heat.
By Susanita Satyapal

https://www.arizonawaterfacts.com/water-your-facts

https://www.physlink.com/Education/Askexperts/ae367.cfm

https://www.treehugger.com/process-of-using-water-by-trees-1343505#:~:text=An%20average%20maturing%20tree%20under%20optimal%20conditions%20can,transpired%20to%20the%20mass%20of%20dry%20matter%20produced.

SLIDES DESIGN

https://slidesgo.com/theme/sustainability-consulting-toolkit#search-energy&position-18&results-112&rs=search