



Sustainable Village

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What is Sustainability?

Sustainability (*noun*)

- The ability to be maintained at a certain rate or level.
- The depletion or avoidance of natural resources in order to maintain an ecological balance.

Sustainability is the ability to meet the needs of today without compromising the needs of tomorrow.

What Will Our Village Feature?

- 38 tiny houses
- A community garden
- A park
- Community transportation
- Community shared bikes
- Community service and learning opportunities
- Sustainable amenities
- Solar panels

Community Served- All Individuals

- Inhabitants of different cultural backgrounds
 - Village is for the community and very welcoming of everyone outside of the community as well.
- We wanted to build this community to give the opportunity to anyone who wanted to be part of a well sustained area while also nourishing the environment.

Tiny homes are good resource for reducing climate change

Tiny homes are good in regards to climate change, tiny homes require less material to construct, meaning less resource extraction, processing, and transportation, all of which require energy that usually results in CO2 emissions. This also true for the possessions that many people fill their larger homes with and the materials used to create those items had to be extracted such as mining and lumber, then processed and manufactured, and then the finished product was transported from the factory to the store to their homes. Since tiny houses have less room, you buy fewer things, resulting in lower carbon emissions. It also takes less energy to heat or cool smaller spaces.

How will our sustainable village combat climate change?

Climate change is a global concern. Sustainable villages offers a solution to mitigate its effects. Sustainable villages are communities that are designed to be self-sufficient and environmentally friendly. They are built with the goal of reducing the carbon footprint and promoting a more sustainable lifestyle for residence. Our village includes organic farming and gardening practices. This promotes local food production, reduces transportation emissions, and minimizes the use of pesticides and fertilizers. Our sustainable village prioritizes water conservation by using rainwater harvesting and greywater recycling by doing this it helps to reduce water consumption and preserve freshwater supplies. Our sustainable village relies on solar this helps reduce greenhouse gas emissions.

Eco-friendly transportation within the village

Our village will adopt an eco-friendly bus system. Our village will use a solar-charged bus that is powered mainly by solar energy. Solar panels with photovoltaic cells are attached to the vehicle's roof. It converts the sun's energy directly into electric energy to be used by the engine. Our village will also have a community bike share program where residents can borrow bikes for transportation.



Inside Our Houses!



What is Solar Power?

Solar power is energy from the sun that is converted into thermal or electrical energy. Solar energy is the cleanest and most abundant renewable energy source available.



How Does Solar Power Get Used in Our village ?

In order to produce electricity using solar energy, sprinklers, lighting and other equipment we will use a solar panels. The panels collect photons that are within the sun's rays and it transform them into conduction electrons that carry an electric charge through a circuit to the in-line emitters or lights.

What Are Sustainable Greywater Systems?

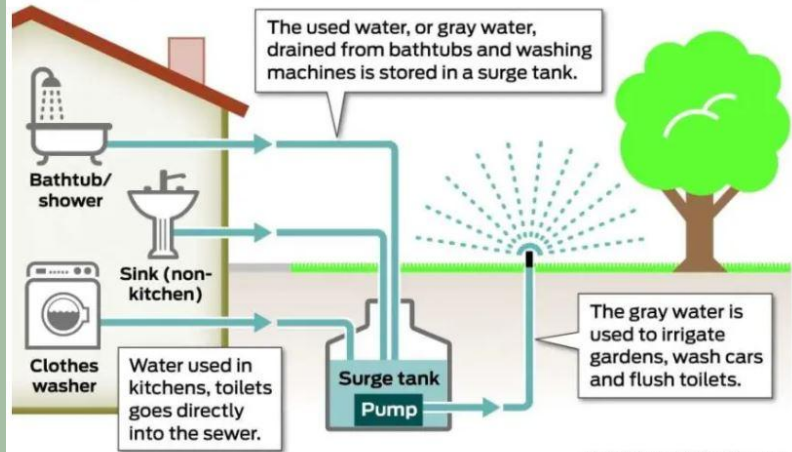
Greywater systems are efficient and is a sustainable system that reduces the amount of water and energy that is being used to irrigate landscapes. This also helps reduce the burden on the planet and the wastewater treatment facilities. Using greywater systems will be used to reduce water and sewer costs.

How will we use sustainable greywater systems?

The washer, shower, and sinks are all connected by one pipe so all the water runs off together down one pipe. At the end of the pipe there will be a 3-way valve. The 3-way valve allows the greywater to pass through and it then separates it from the black water. The grey water gets sent to a big holding tank, there is a holding tank for each house. From the neighborhood tanks it goes into a bigger tank at the garden where it gets treated and can then be used to irrigate both food and non food producing plants. The nutrients that are in the greywater such as phosphorus and nitrogen help provide an excellent food source for these plants.

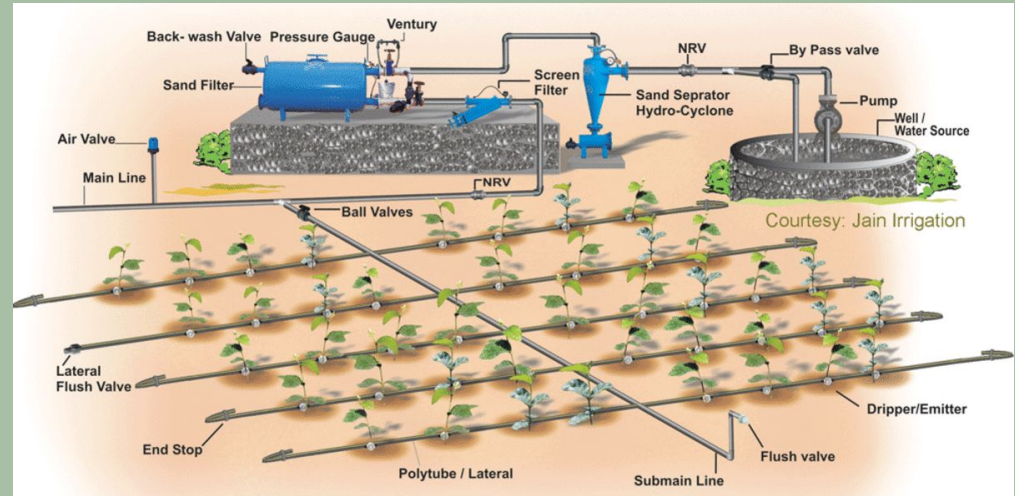
Greywater System & The Garden

How gray water systems work



Todd Trumbull / The Chronicle

Photo Credit: SFGate



Pricing and Cost of Living

Monthly Amenity Fee	Average Gas/Electric	Trash Collection	Average Insurance
\$200	\$70.00	\$20.00	\$70.00
Average Sewer	Average Water	Average Development District Assessment <i>(bond + maintenance + fire)</i>	Average Taxes
\$25.00	\$20.00	\$100.00	\$150.00
			TOTAL: \$655.00

Cut the Cost Act

In our sustainable village we have implemented the "Cut the Cost" Act which allows members of our village to participate in community service and earn community service hours in order to lower their cost of living price. In order for a member to participate they must complete a minimum of one hour per month before the billing cycle. Each hour that a member completes will receive \$10.00 off of their monthly bill. In order to receive credit for the hours you complete you must meet with a community coordinator beforehand and after. All data will be collected and stored in a virtual database.

Example: If I complete 5 hours of community service then I will receive \$50 off of my total cost of living bill. $\$655.00 - \$50.00 = \$605$

Course Content

Ch. 6 - Conservation of Energy

- Using a Giant Tesla Battery(Ion battery).
- Using solar panels and use them as energy source for the conservation.
- In a regular house could use an estimate of 30,000 Watts per day
- Village of 38 houses will be using 1,111,500 watts per day round up to 1 Million watts
- The battery mega pack fully-assembled with a 3 megawatt hours of storage and a 1.5 MW of inverter capacity.
- Allow the village to run on only one Megapack fully-assembled battery. Enough to provide energy for all the homes and enough if there ever was a power outage.

Table 6.1
Power consumption of household appliances while the appliance is turned on and consuming electric energy

Appliance	Power (W)
Cooking range	12,000
Clothes dryer	5,000
Water heater	4,500
Air conditioner, window	1,600
Microwave oven	1,400
Dishwasher (incl. hot water)	1,200
Toaster	1,200
Hair dryer	1,000
Refrigerator, frostless	600
Refrigerator, not frostless	300
TV, color	350
Stereo set	100



Course Content

Chapter 7- Second Law of Thermodynamics

- The amount of energy produced by the solar panels will have less damage globally and will allow the temperature to be cooler.
- For the tiny housed there will be less heat allowing entropy to lower within the community.
- Using only one source of transportation to the city for essentials.

Table 7.1
Heat engine efficiencies. Typical temperatures, best possible efficiencies, and actual efficiencies.

Engine type	$T_{in}(^{\circ}C)$	$T_{ex}(^{\circ}C)$	Efficiency (%)	
			Best possible	Actual
Transportation				
Gasoline automobile/truck	700	340	37	20
Diesel auto/truck/locomotive	900	340	48	30
Steam locomotive	180	100	20	10
Steam-electric power plants				
Fossil fuel	550	40	60	40
Nuclear fuel	350	40	50	35
Solar powered	225	40	40	30
Ocean-thermal (solar)	25	5	7	???

Technology Used

- 3D printing machinery and program
- Hot glue gun
- Google Drive
- Google Slides
- Google Docs
- Tiny trees
- Grass mat
- Different types of glue to create a pond
- Tiny summer garden vegetables
- Rulers
- Mini flower assortments
- Scissors
- Popsicle sticks
- Mini Lights

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