



# Vision of the Future

**CPSG200**

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The slide features a light green background with a subtle pattern of small white dots. In the corners, there are stylized illustrations of various green plants and leaves. The top-left corner shows a large, dark green leaf with a lighter green vein. The top-right corner features a large, dark green leaf with a prominent vein and a smaller, lighter green leaf below it. The bottom-left corner has a large, dark green leaf with a prominent vein and a smaller, lighter green leaf above it. The bottom-right corner displays a large, dark green leaf with a prominent vein and two pink flowers with white centers and dark pink outlines.

# A Green World

Greenville North Carolina, 2070

# Global Conditions under SSP2

- Global Population: 9.46 Billion
- Global GDP: \$336.8 Trillion
- CO<sub>2</sub> Emissions: 65.3 GtCO<sub>2</sub>
- Global Mean Temperature: 2.67°C above pre-industrial average



# North Carolina Conditions under SSP2

- Summer temperature changes: 4°F
- Winter temperature changes: 5°F
- Annual temperature changes: 5°F
- Number of Days Below 32°F: 21
- Number of Days Above 95°F: 17
- Mortality Cost: \$10.1 Trillion
- Energy Cost: \$168 Billion
- Sea level rise: 0.33 m



# Location Effect on Housing Development



- The water level affected where we chose to build our development as we didn't want it to be underwater, it is also waterfront now!
- With an increase in energy costs, more efficient heating and cooling systems need to be implemented to reduce energy consumption.
- An increase in global GDP allowed are housing development to implement innovative designs due to the increased budget.
- Increase in global population meant we had to better utilize our space.

# Greenworld Housing Development

Greenville, NC



# Features Include:

- Green Roofs
- Solar Panels
- Alternative Energy Storage
- LED Lights
- Heat Pumps
- Electric Vehicles



# Green Roofs



- Our green roofs will help to capture and slow water runoff
- Each resident can choose between two options:
  - Basic roof: Has a grass carpet that covers the roof and requires little to no maintenance
  - Garden roof: Garden on the roof where you can grow what you choose, but requires more attention
- Both these options limit CO<sub>2</sub> emissions, and make our neighborhood beautiful!





## Green Roofs Cont.



- These roofs will absorb carbon dioxide from the atmosphere and release oxygen helping to reduce the amount of carbon dioxide in the air leading to climate change
- With these roofs covering between 45-60 billion square meters, roughly 25%-40% of the available space (Drawdown)
  - About 0.5-1 gigatons of carbon dioxide can be reduced from our emissions
  - Between roughly 300 and 550 billion dollars can be saved in operational costs

# Solar Panels

- Powers the neighborhood from a solar field
- Made from recycled solar panels
- Will be much cheaper than fossil fuels to maintain and utilize
- Makes utilities cheaper as well!

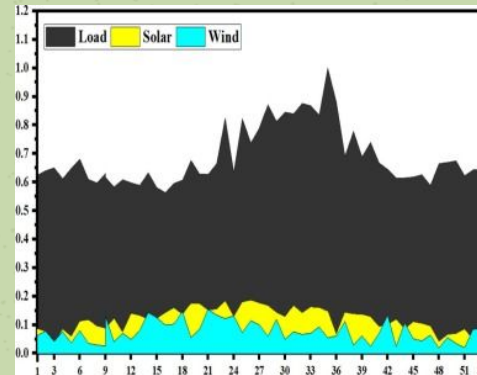
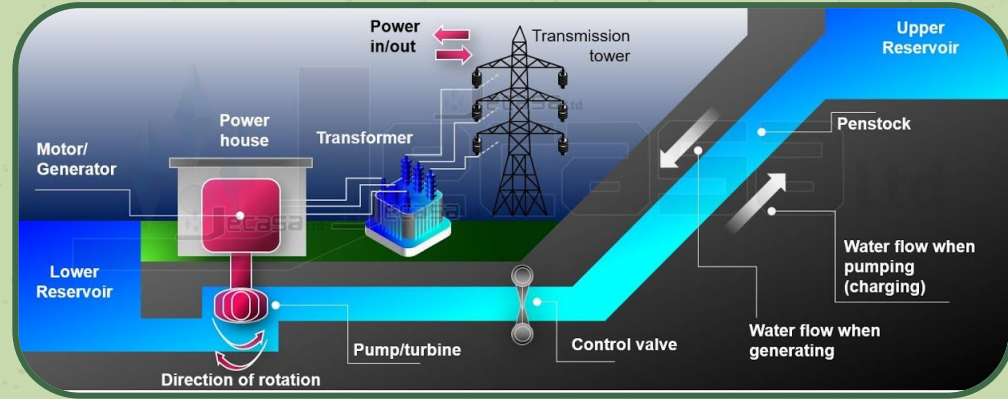


## Solar Panels Cont.

- We will be using second generation solar cells, or thin-film solar cells, in our solar fields which are more efficient than typical crystalline silicon solar panels seen on homes.
- If solar panels were to make their way into only 14% of the places they could be used, over 25 gigatons of carbon dioxide could be prevented from entering our atmosphere
- These solar panels could also save nearly \$10 trillion dollars in operational costs over their lifetime

# Alternative Energy Storage

- Renewable energy produce intermittent power
- State of the art Pumped Hydro Storage Solution
- Collects rainwater to act as medium
- 70% to 85% Efficiency



# Alternative Energy Storage cont.



- Pumped Hydro Storage uses water as a medium to transfer electrical energy into kinetic energy.
- Extra electric energy is used to pump water from a low elevation reservoir to a higher elevation reservoir.
- To use that potential energy you open a gate allowing the water to transfer from the higher elevation reservoir to the lower elevation reservoir.
- This will backdrive the pump, turning the pump into a generator and converting potential energy back into electricity.

# Alternative Energy Storage cont.



- Pumped Hydro Storage allows for energy storage without the use of precious raw materials.
- Pumped Hydro Storage doesn't solve every problem as optimization of renewable energy resources is required to reduce the amount of energy that has to be stored. (refer to graph above)
- "Since solar and wind energy are currently the least expensive forms of generation, it is necessary to minimize electricity input from other sources and reduce the amount of energy storage in PHS, as it is currently more expensive" (Ba-abbad, M. A.)

# LED Lights



- LED bulbs use 90% less energy than incandescent bulbs for the same amount of light
- LED bulbs can be powered by small solar cells to replace kerosene lamps that release fumes and greenhouse gases
- They cost us less money so they cost you less money in utilities!
- They improve the aesthetic!



## LED Lights Cont.



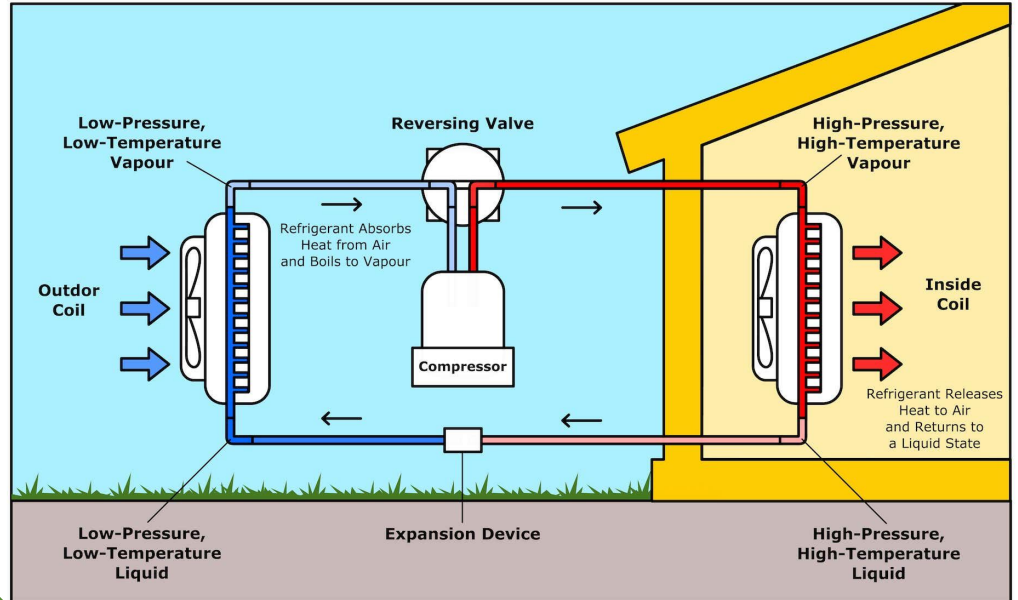
- “As LEDs replace less-efficient lighting, 14.45–15.69 gigatons of carbon dioxide equivalent emissions could be avoided in residences and commercial buildings”
- “LEDs reduce electricity consumption and air-conditioning loads”
- They last longer as well compared to incandescent and fluorescent light bulbs
- With 90% of the Residential Sector using LEDs by 2070, it’s predicted that 15.69 gigatons of carbon dioxide will be saved overall as well as a \$2.16 trillion cost to save \$4.47 trillion in its lifetime (Drawdown)



# Heat Pumps

- CO<sub>2</sub> powered
- Air-to-air
- Complements solar panels
- Included in every home
- No additional utility payments<sup>1</sup>
- Minimal global warming potential<sup>2</sup>

## Air Source Heat Pumps Heating Cycle



<sup>1</sup> Utility payments for electricity notwithstanding

<sup>2</sup> Assuming electricity comes from renewable sources

# Heat Pumps Cont.

- Maximizing efficiency in the heating and cooling of buildings around the globe would reduce 30-40% of energy consumption
- Heat pumps transfer heat from a cold area to a hotter one
- In summer, it takes heat from inside and brings it out, and in the winter it does the opposite
- By 2070, the demand for heat pumps would increase from 2.9 to 4.3, which would save 9.05 gigatons of emissions and avoids \$2.43 trillion in lifetime operating costs



# 2070 MINI Electric Hardtop



- 4.15 mi/kWH (140 mpg equivalent)
- Chargepoint® swappable battery
- 5.6× more efficient than electrofuel ICE equivalent<sup>1</sup>
- Included with home purchase



<sup>1</sup> Source: [Climate Action Tracker](#)

## 2070 MINI Electric Hardtop Cont.



- Electric vehicles use a more energy-efficient electric motor and have high-capacity batteries that can be charged from the electric grid.
- By 2070, electric car adoption will reach 16.58 trillion passenger kilometers, resulting in 9.76 gigatons of emissions avoided and lifetime net operational savings will be \$15.54 trillion (Drawdown).
- We recycle our batteries once the cars battery dies so that there is no waste.
- We also source our resources from sustainable and environmentally-friendly companies.

# Join the Move to a Better Greener Future Greenworld

- State of the Art Facilities
- Sustainable Practices
- And a community that CARES about our FUTURE!

If any of this interests you give us a call at 555-01-GREEN!



# Bibliography



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