Renewable Energy for Baton Rouge, LA

Mariana Lira

Katherine Davis

Sophia Pedroza

GAS GATORS INC.

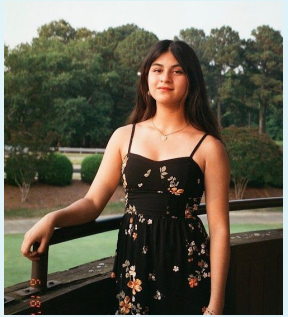
Our **Team**

Mariana Lira

Environmental Impact Lead

Katherine Davis

Energy Supply Lead

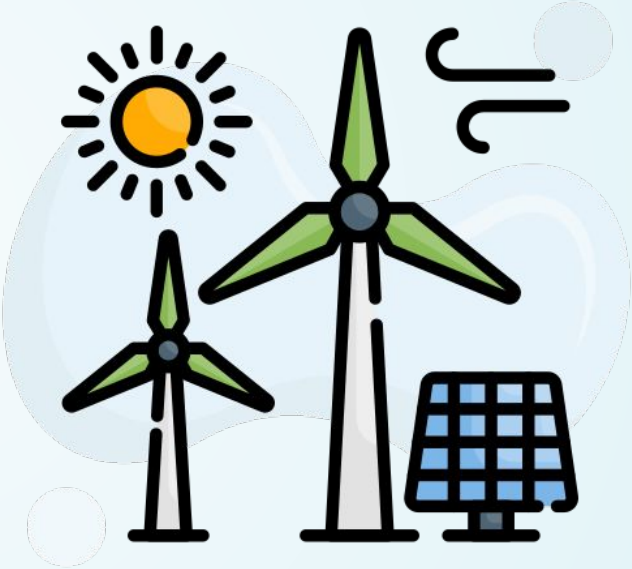


Sophia Pedroza

Storage Lead

Agenda

- Overview of Baton Rouge
- Energy supply
- Energy Storage
- Environmental Impacts & Mitigation
- Q&A

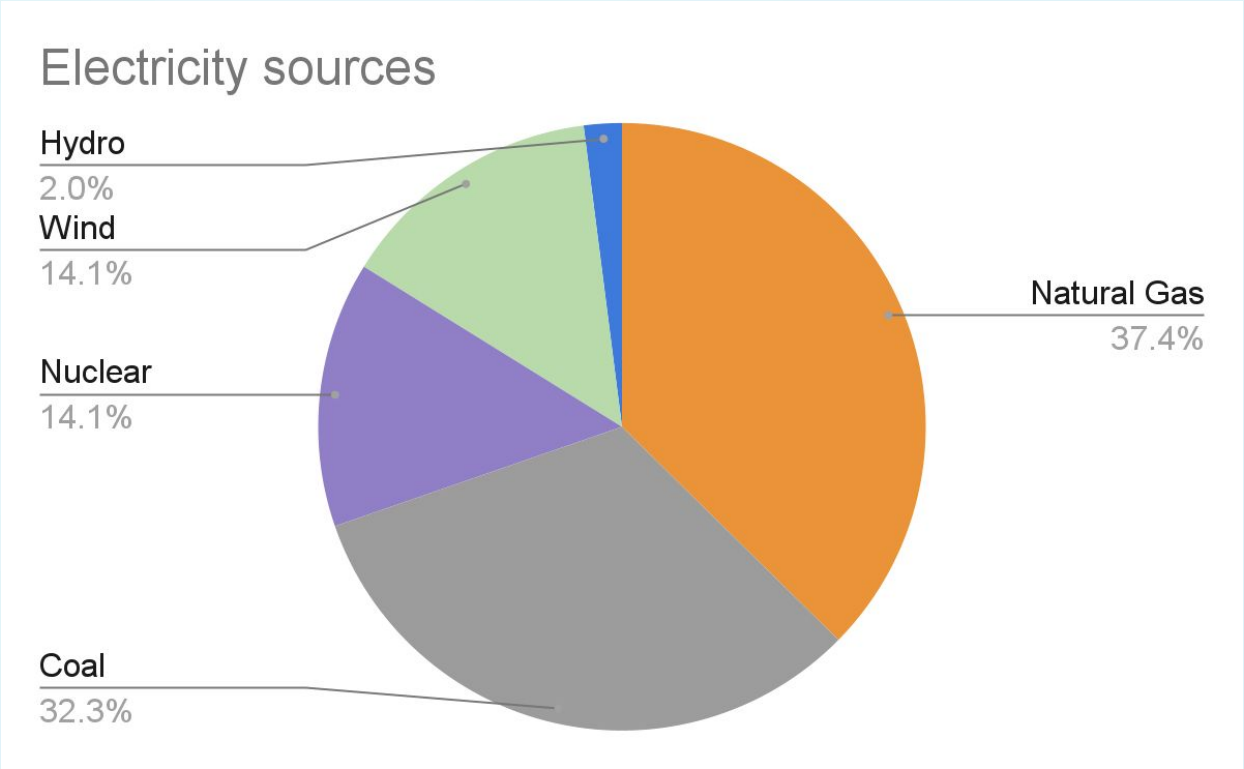


CITY OF BATON ROUGE
PARISH OF EAST BATON ROUGE

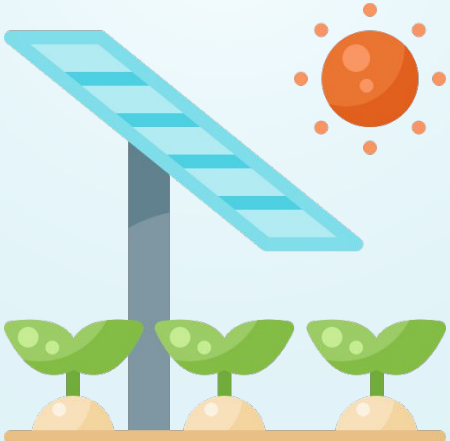
- Surrounded by a large amount of cropland
- Established on the banks of the Mississippi River

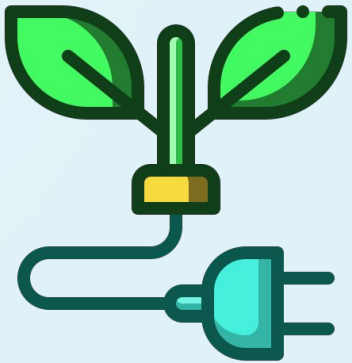
Baton Rouge's current energy

Current emissions: 534g of CO2 per kWh of electricity



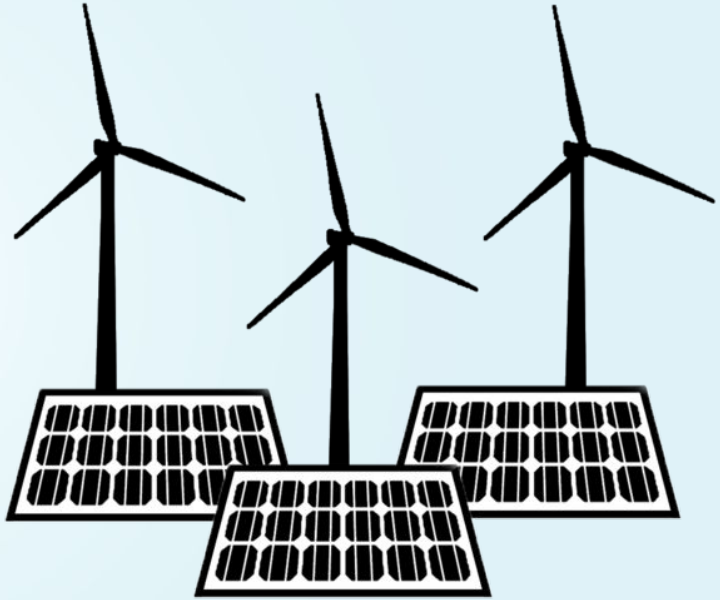
Energy supply





Energy Supply

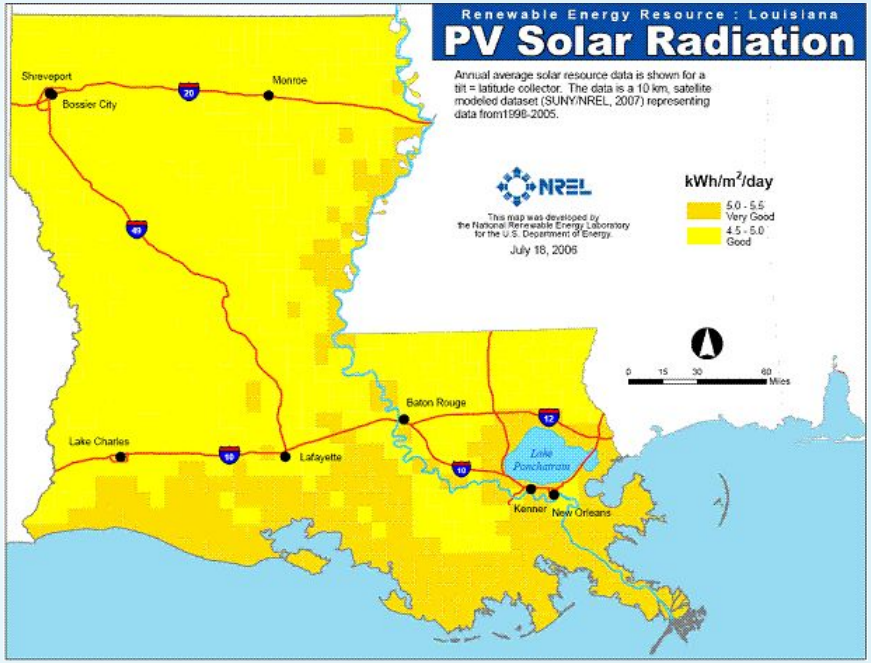
- **Solar**
- **Biomass**
- **Wind**
  - Evaluated Wind versus Geothermal




Google Earth

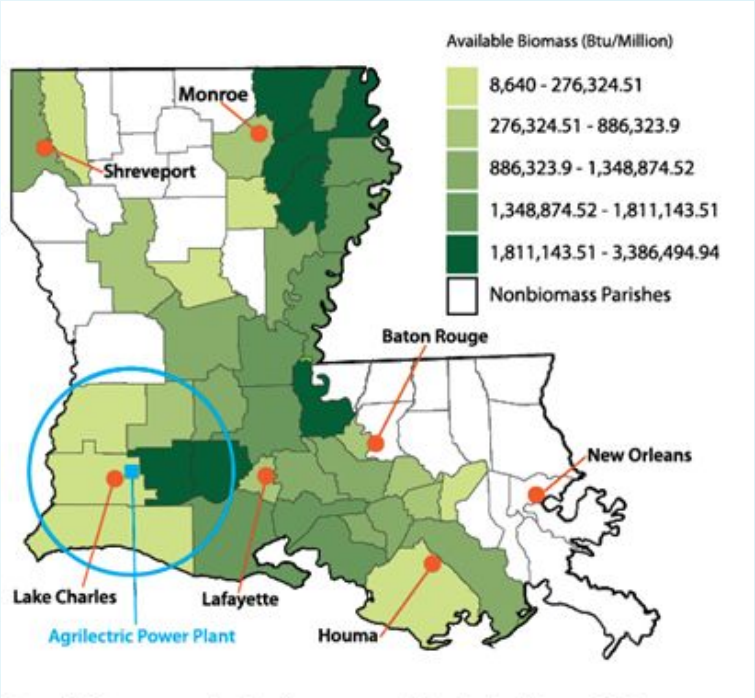
Solar

- 4.75 to 5.00 kWh/m2/day (moderate solar potential)
  - Fluctuates higher or lower with the season
- Majority of energy and power for our proposal
  - **51%**
- Region's weather patterns won't significantly affect the solar panels

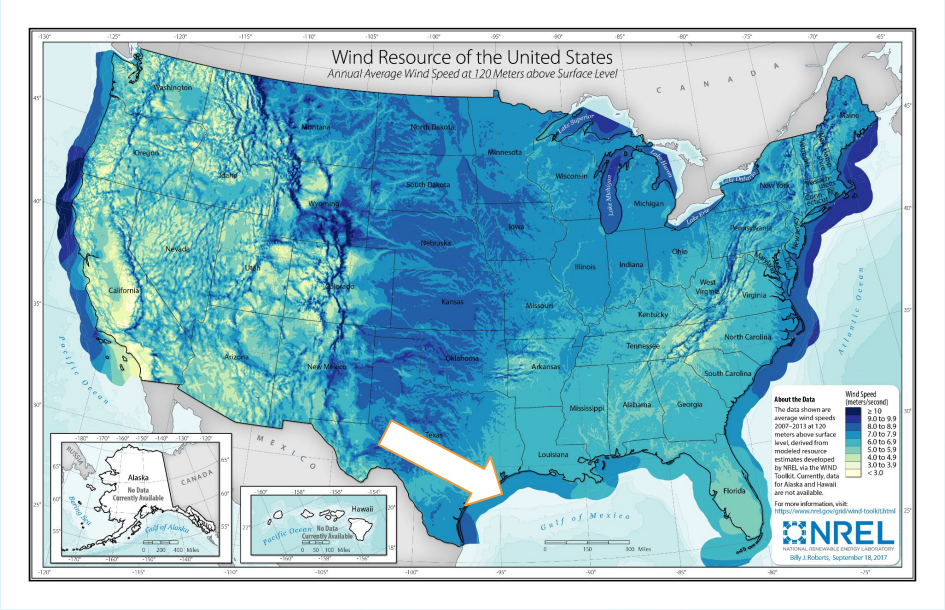


Biomass

- Surrounded by lots of agricultural land, High potential
  - Baton Rouge home to **200 MW** biomass power plant
- Take into account the environmental impacts if biopower isn't generated properly



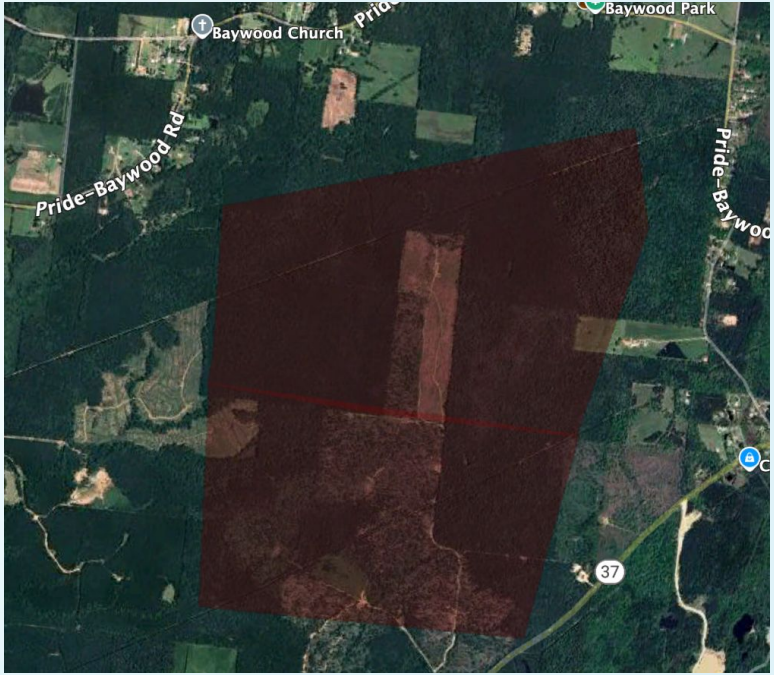
Wind



- Moderate Wind Speeds
  - 6-6.9 m/s @ 120 meter
  - Anything over 120 meters is unreasonable
- Placing in unused agricultural areas
  - Picked areas that wouldn't impact bird wildlife

Wind and Solar Farm Placement

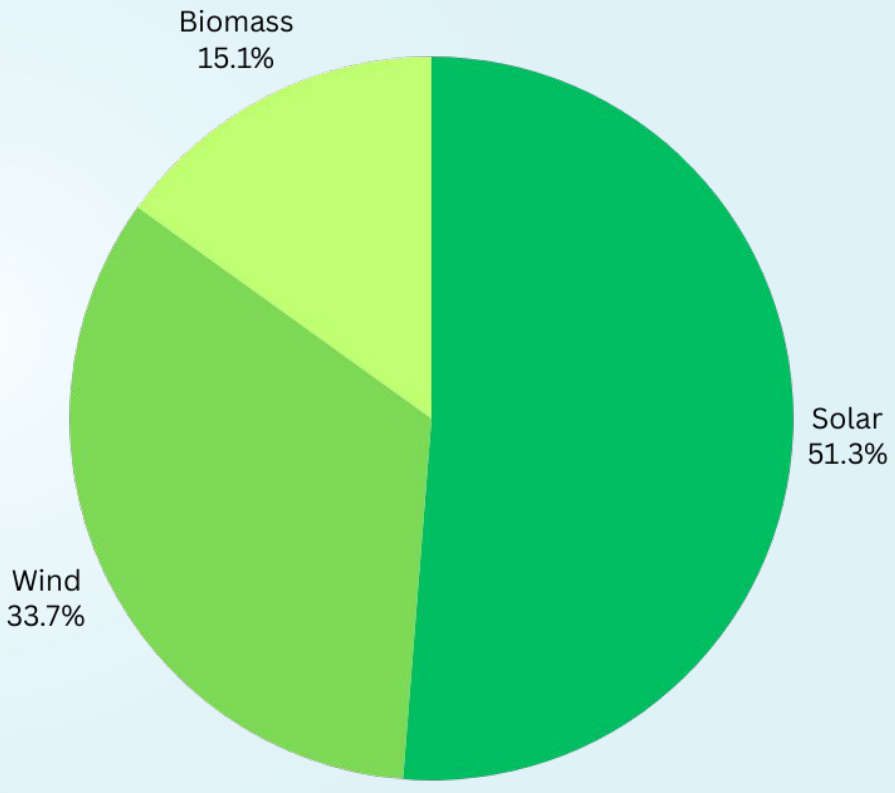
Wind



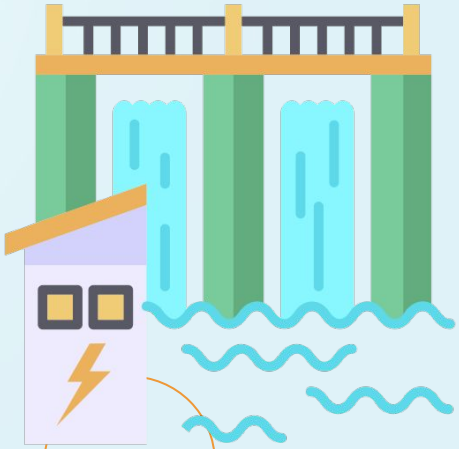
Solar

Renewable Production

- Annual Energy:
  - **Required:** ~5.2 million MWh,
    Projected: ~ 5.2 million MWh
- Power:
  - **Required:** ~700 MW,
    Projected: ~1,750 MW
- Weighted **LCOE: 0.0753 $/kWh**

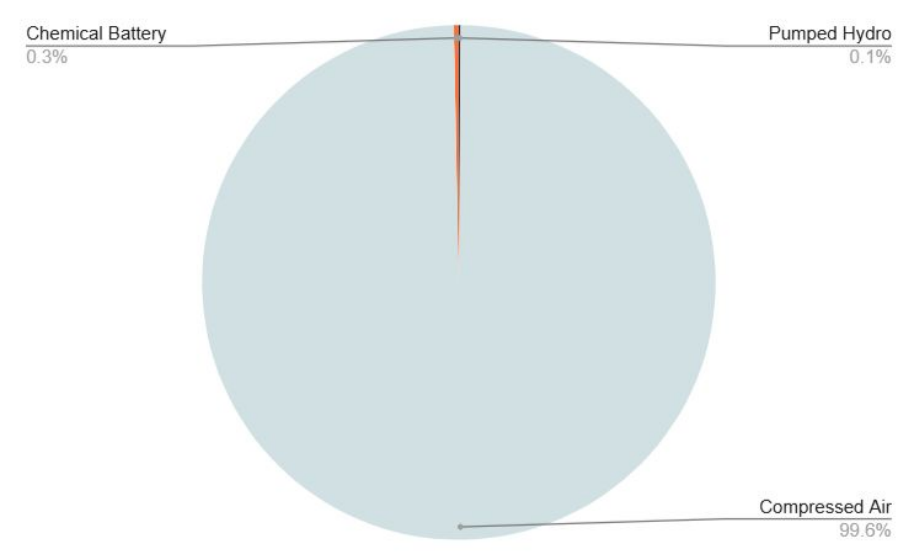


Energy storage



Storage Technologies

- Lithium Flow Battery
- Pumped Hydroelectric
- Compressed Air Storage in Salt Caverns




Google Earth

Flow Chemical Battery Storage

- Close agricultural land
- Lower risk of thermal event
- Improved function in warmer temperatures compared to Li
- Cost effective to increase scale
- Nearby fire station

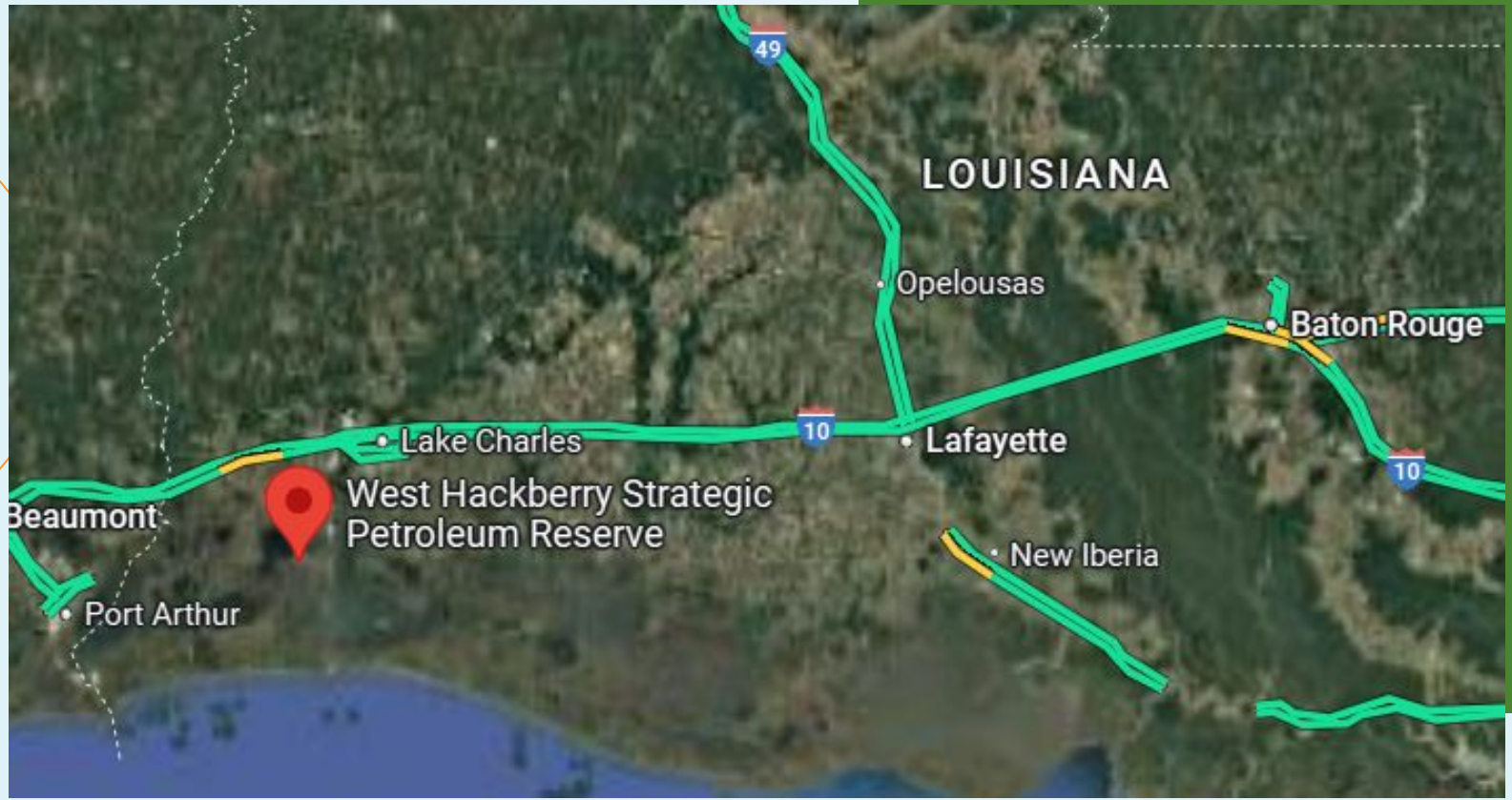
Google Earth Pro

Pumped Hydropower Storage

Google Earth Pro

- Mississippi River as water source
- Closed Loop System to mitigate environmental concerns
- Potential dam to increase elevation and capacity
- New power lines would need to be constructed to connect the proposed sites to the grid.

West Hackberry Salt Dome

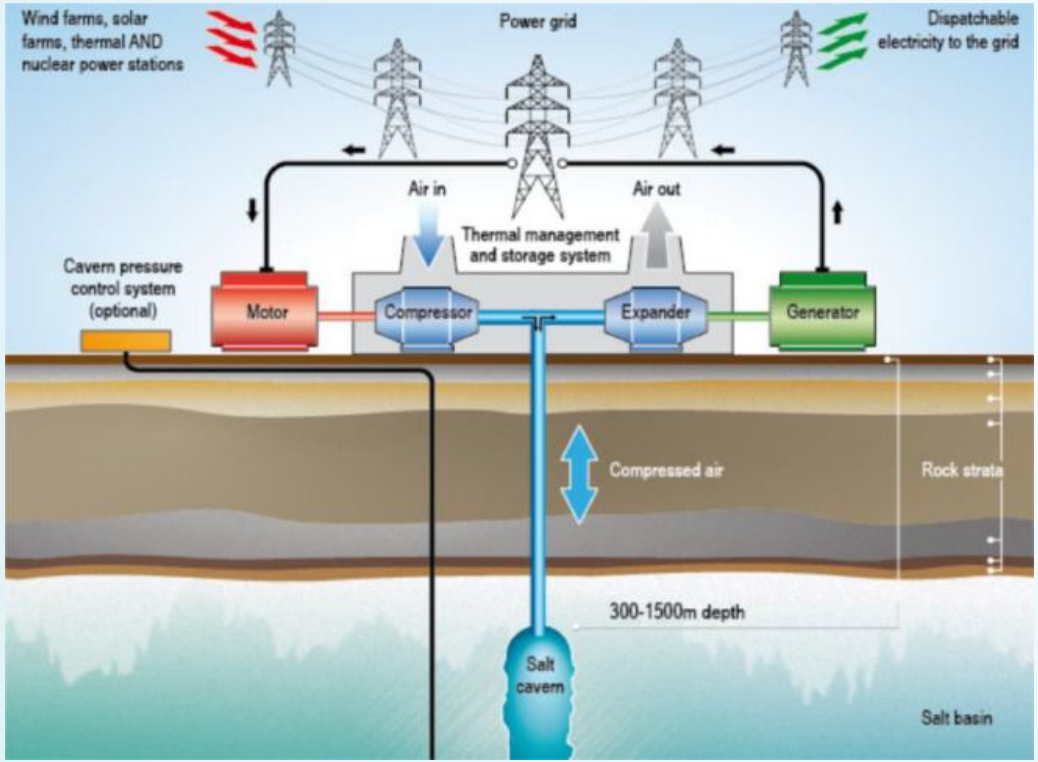


Google Earth Pro

West Hackberry Strategic Petroleum Reserve

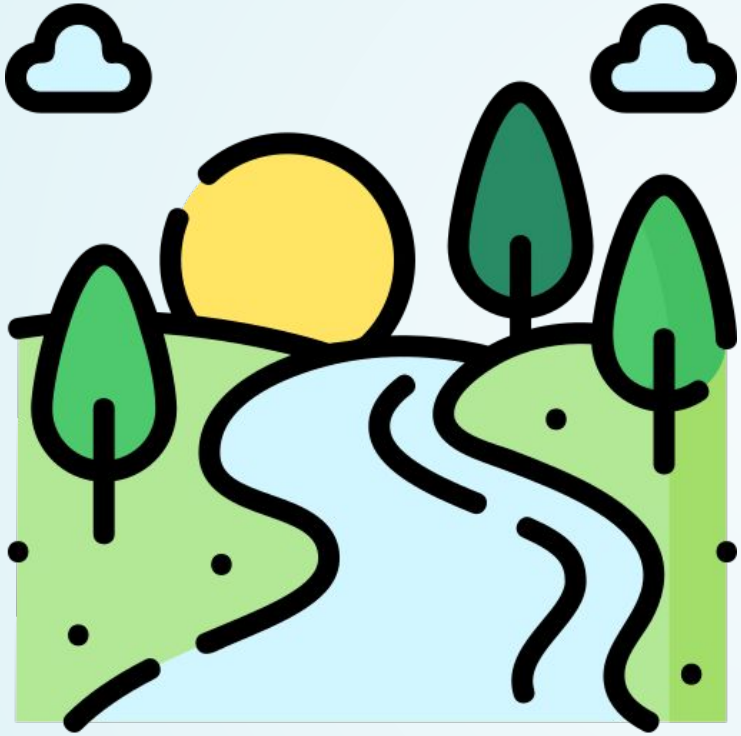
- Existing electric infrastructure
- Currently salt caverns are used for emergency crude oil and compressed natural gas storage as part of Strategic Petroleum Reserve

Compressed Air Storage



Mechanical Energy Storage Technologies, 2021

- Theoretical potential to transition to compressed air storage
- Adiabatic system with thermal salt



Impacts & Mitigation

Important species around your city

West Indian Manatee

Threatened

Gulf Sturgeon

Threatened

Tricolored Bat

Endangered

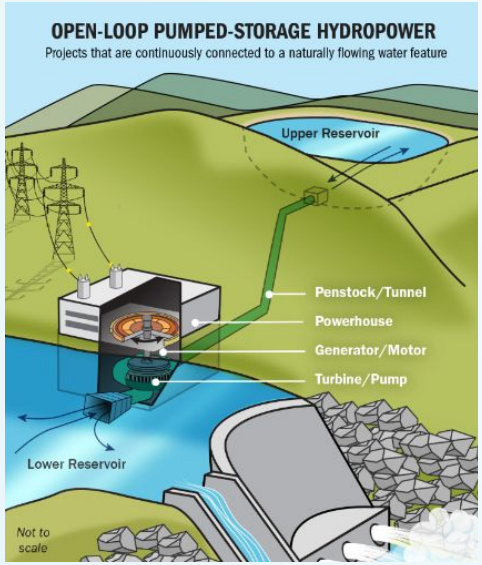
Red Cockaded Woodpecker

Endangered

Possible impacts

Pumped Hydro Storage Facility

- Disruptive to migratory fish
- Requires clearing land
- Can negatively impact estuaries downstream

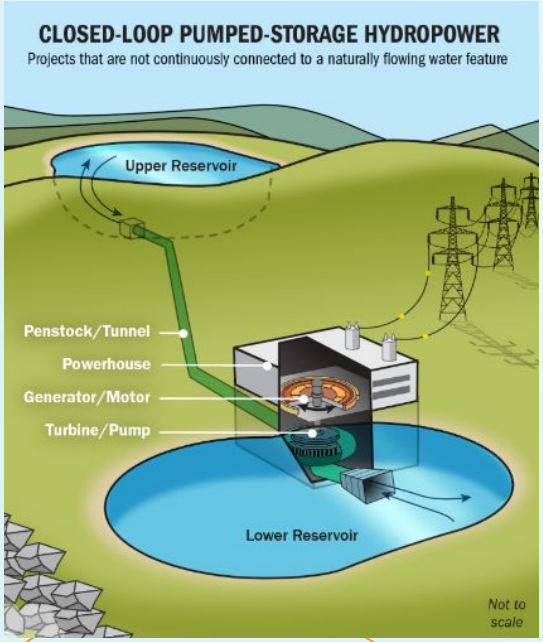


Wind turbines

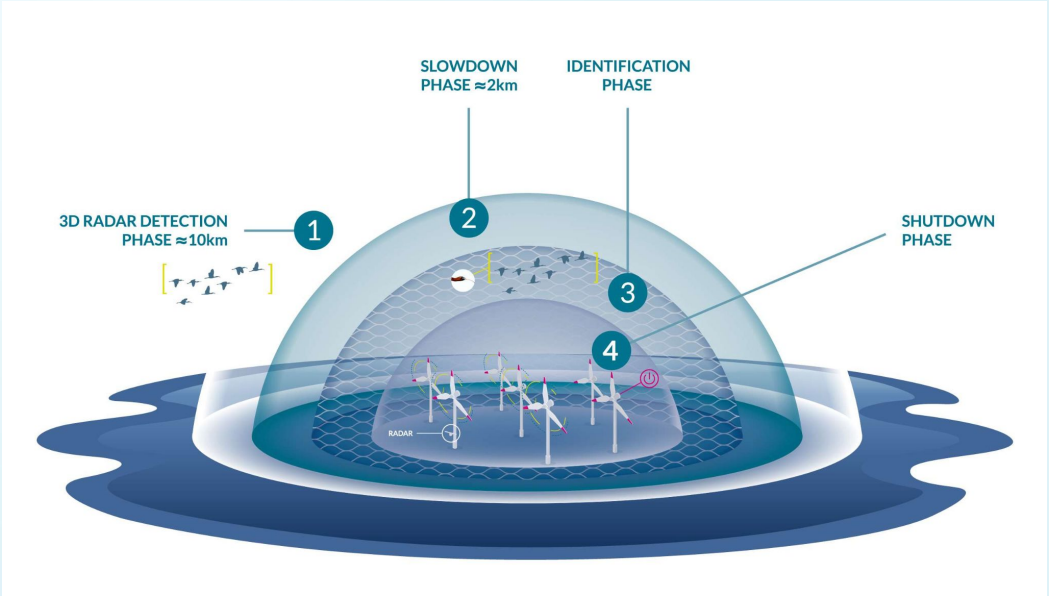
- Birds and bats can collide with blades and tower
- Requires a lot of land (habitat loss)

Mitigation

- Updated PHS location
- Change to closed-loop system



- Monitor bird and bat activity
- Afforestation
- Integrate wind and solar with crops



Thank you!

Q&A