

Leon County Energy Sustainability

Team 306

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FAMU-FSU
COLLEGE OF ENGINEERING

EEL4911C

Senior Design 2020-2021

Instructors: Jerris Hooker and Oscar Chuy

Team Introductions

**Jacob
Moore**

**Samantha
Lafrance**

**Marwan
Kamleh**

**Sean
Fisher**

**Chris
Gibson**

**Major: EE
Role: Team
Lead**

**Major: CpE
Role: Secretary &
Co-Lead ECE**

**Major: EE
Role: Financial
Advisor**

**Major: EE
Role: Co-
Lead ECE**

**Major: EE
Role: Lead
ECE**

Sponsor

Shelby Green

Sustainability Analyst

Leon County Government

- Researches best practices in energy management and sustainability. Report recommendations for future policy considerations.
- Analyzes, models, and communicates facilities' energy performance and greenhouse gas emissions reductions.
- Creates web applications, visualizations, and models to articulate policy research and operations data. Developed the first public web application that maps all of the Florida localities with regulations on single-use plastics through R and MapboxGL JS.
- Scrapes and analyzes Tweets to gather citizens' opinions on local regulations. Information used to influence policy language.

Objective

- ❑ This project entails **Team 306** to analyze and engineer a creative pilot program that increases sustainability for Leon County's parks and facilities, potentially incorporate renewable generation, and promote sustainability to the community.

Project Background



Background: ISAP Goals

- In 2018, The Leon County Board of Commissioners enacted the Integrated Sustainability Action Plan (ISAP) with ambitions to reduce their Greenhouse Gas Emissions by 30% in 2030.
- Goals Include:
 - Reduce kWh usage by 2%/yr
 - Increase renewables 30% by 2030
 - Convert 75% of all county lights to LED
 - Ensuring sustainable design for all facilities by 2021

Background: Why Us?

- Meet goals with a creative approaches to:
 - Increase sustainability in County parks or facilities.
 - Promote sustainable initiatives and renewable generation to the public.
 - Provide an implementable plan of action

Project Scope



Project Scope: Market



- Any entity wishing to implement sustainability initiatives or that could benefit for greater renewable integration
 - Other Government Facilities
 - Commercial Facilities
 - National and State Parks
 - Private Communities

Project Scope: Assumptions



- Safety is priority in all that we do.
- Project Plan and all documentation will be reviewed and implemented by Leon County.
- Public Trust will be the guiding principle for all designs

Project Scope: Stakeholders

- COE Faculty: instructors, advisers, as well as reviewers
- Leon County Office of Sustainability
- Since it is their money, the taxpayers of Leon County are the most critical stakeholder.

Customer Needs



Customer Statement of Needs

| No. | Statement of Need | Source |
|-----|--|------------------|
| 1 | Must be creative | Cust. |
| 2 | Must promote self-sustainability | Cust. |
| 3 | Must promote renewable energy | Cust. |
| 4 | Must be implementable | Cust. |
| 5 | Must include a concise plan of action | Cust. |
| 6 | Must make use of Leon County facilities and parks | Cust. |
| 7 | Must adhere to all NEC requirements | NEC |
| 8 | Must adhere to all Electric Utility Interconnection Requirements | Electric Utility |
| 9 | Must conform to budgetary restrictions | Cust. |

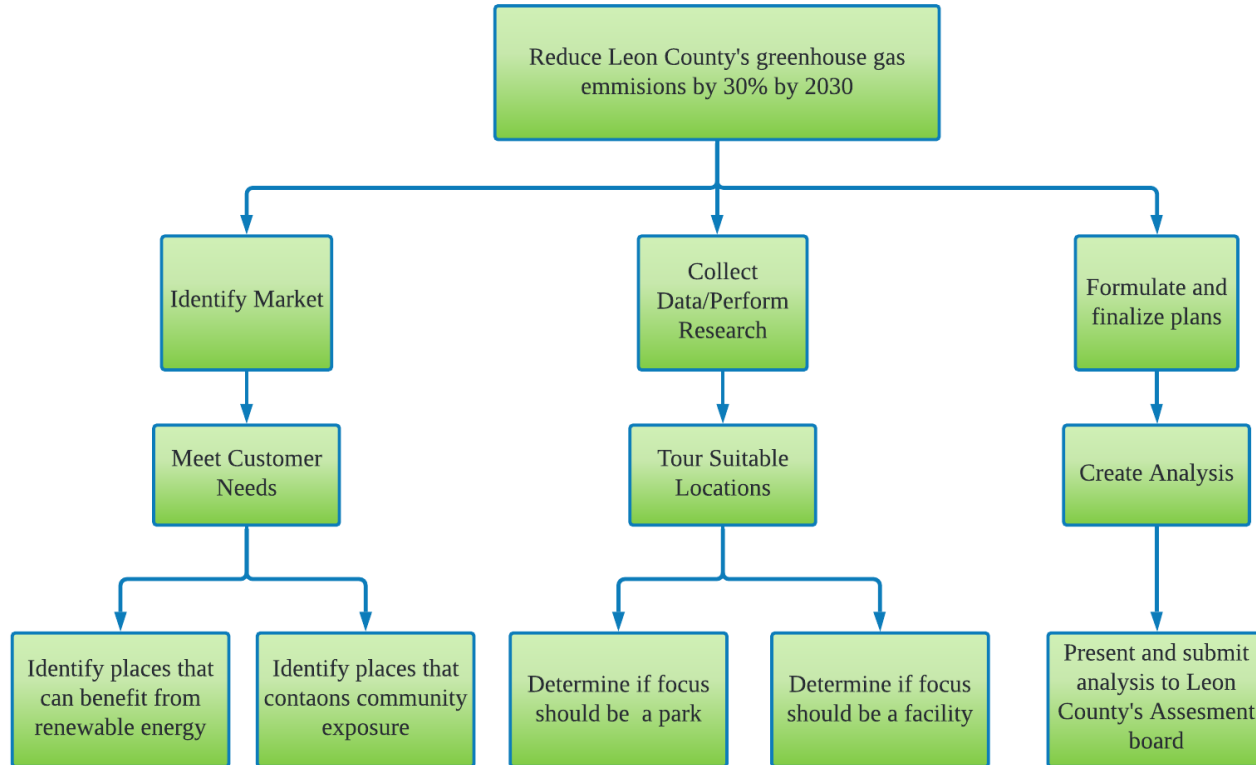
Interpreted Requirements

| No. | Interpreted Requirement | Corresponding Need |
|-----|--|--------------------|
| 1 | Will make use of Leon County facilities and parks | 6 |
| 2 | Will adhere to NEC standards | 7 |
| 3 | Will include approved Transfer Switch if utility connected | 8 |
| 4 | Total cost will be less than \$50,000 | 9 |
| 5 | Will use appropriate voltage outputs | 7, 8 |
| 6 | Will be able to power at least 20% of site's total load | 2, 3, 4 |
| 7 | Will include site analysis and selection justification | 5 |
| 8 | Will include economic feasibility analysis | 5 |
| 9 | Will include design plans with drawing package | 4, 5 |
| 10 | Will include load survey/analysis | 5 |
| 11 | Will include return on investment analysis | 5 |
| 12 | Will be designed to be viewable from site entrance | 1, 2, 3 |

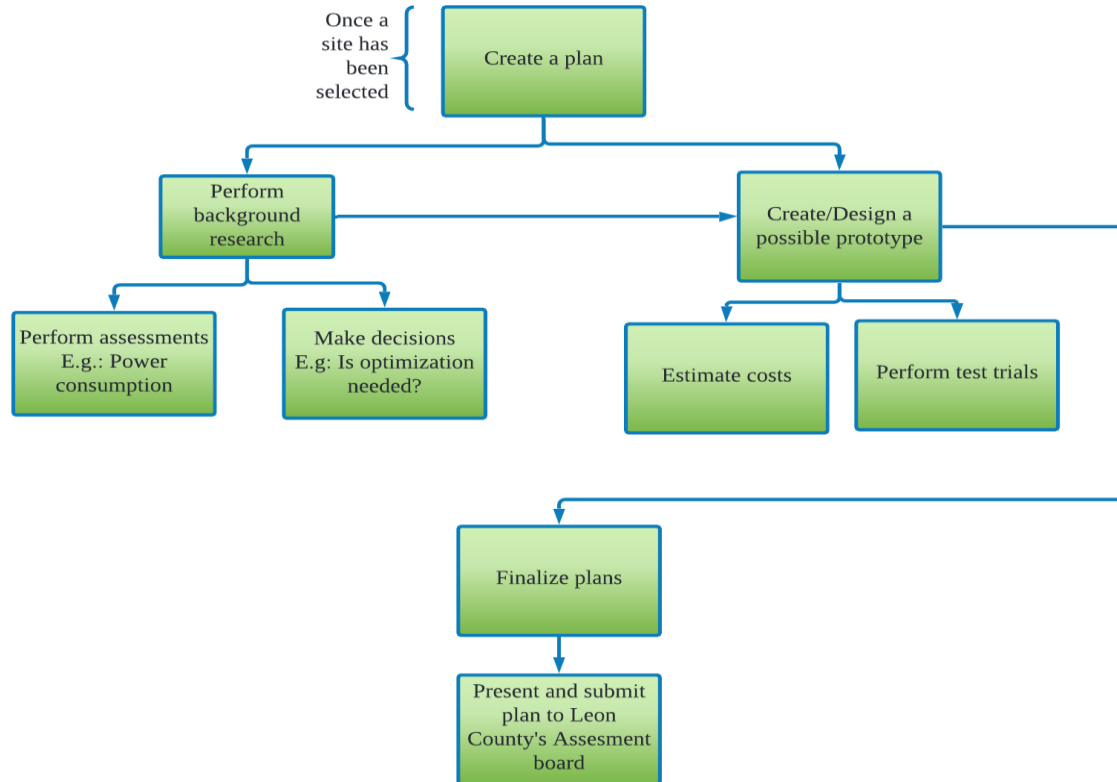
Functional Decomposition



Functional Decomposition: Function Tree



Functional Decomposition: Function Tree



Functional Decomposition: Modules

| Module: | Plans for selected site |
|---------|--|
| Inputs: | Relating Information and External Resources |
| Tasks: | <ul style="list-style-type: none">• Get information from Leon County<ul style="list-style-type: none">• Touring sites• Receiving documentation• Do background research<ul style="list-style-type: none">• Perform Assessments<ul style="list-style-type: none">• Consider Optimizations• Power Consumption/Absorption• Power system additions/subtractions• Finalize Plans<ul style="list-style-type: none">• Submit & Present plan to Leon County's Assessment board |
| Output: | Finalized Plan |

Functional Decomposition: Modules Cont.

| Module: | Possible Prototype |
|---------|--|
| Inputs: | Relating Information and External Resources |
| Output: | Small Solar Hookup |
| Tasks: | <ul style="list-style-type: none">• Conduct Background Research• Estimate costs• Finalize Plans<ul style="list-style-type: none">• Submit & Present plan to Leon County's Assessment board |

Five Most Important Points from this Lecture

1. Our goal is not to lower Leon County's GHG emissions by 30%, but to assist in that number.
2. Our project is not the conventional ECE Senior Design Project.
3. Public Trust is exceptionally crucial to how we design.
4. We want to take away from this project a greater understanding of implementing renewables.
5. We want to create something the public will enjoy to see and use

References

- Leon County Integrated Sustainability Action Plan: <https://cms.leoncountyfl.gov/Portals/7/docs/isap.pdf?ver=2020-02-10-165917-717>
- National Renewable Energy Laboratory: <https://www.nrel.gov/>

Questions?

