



LIGHT UP FLORIDA

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BACKGROUND INFORMATION



What are smart grids?

- Electrical grids that use digital technology to detect and react to changes
- Network of communications, controls, computers, automation, and AI
- Send electricity and information to/from users and utility

Why do we need smart grids?

- Restore electricity quicker than with human maintenance
- Route power where needed in real-time during disasters
- More efficient, reliable and secure than traditional grids

DESIGN PROCESS

Research

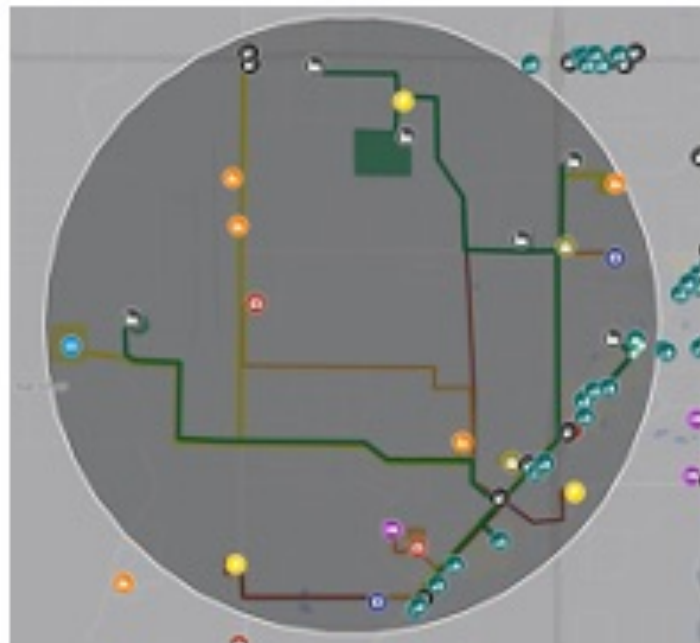
- Different kinds of users in our radius
- Power usage, daily/yearly cycles
- Prioritizing users

Prioritization of Power

- Required for Grid (energy/power station)
- Safety (hospitals, emergency services, senior living)
- Needs (wastewater treatment, grocery stores, gas stations, schools)
- Nonessential Users (manufacturing plants, fast food)



THE DESIGN



Power Distribution

- Power is routed on separate grids for each priority level
- Includes redundant connections in case of localized failures

Microgrid

- Includes at least 1 of each user type

Power cycles

- Day: needs (gas station, grocery stores, fast food)
- Night: nonessential (manufacturing)

JUSTIFICATION FOR THE DESIGN

Total Energy Usage

- All 10 MW are distributed to allow the minimum needed for all users.

Calculation

- The Power Load was calculated by dividing Source EUI 3.412, then 8760, and then multiply by average area.

Geographical Distribution

- Distribution lines follow streets and are grouped together allowing easier access
- Focused on transited streets which allow for a greater amount of users to receive power.

User Type	Power Load per Area (kbtu/ft ²)	Power Load per Area (kWh/ft ²)	Power Load per Area (kWyr/ft ²)	Average Load Area (ft ²)	Total Power Load (kWyr)
Schools	104.4	30.598	0.00349	86,000	300
Hospitals/ER/ Urgent Care	426.9	125.12	0.01428	50,000	714
Grocery Stores	444.0	130.13	0.01486	50,000	743
Senior Living Center	213.2	62.485	0.00713	58,000	414
Emergency Services (Fire/Police)	124.9	36.606	0.00418	10,000	42
Energy/Power Station	89.3	26.172	0.00299	40,000	120
Manufacturing	324.4812	95.1	0.010742	32000	344
Gas Station/Convenience Store	883.5	258.94	0.02956	4000	118
Fast Food Restaurants	886.4	259.79	0.02966	4,000	119
Wastewater Treatment	7.51	2.2011	0.00025127	25,000	6

REFERENCES

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- Energy Star
 - Energies Journal
 - Tennessee Valley Authority
 - Business Observer FL
 - California Department of Education
 - Business Energy Advisor
 - Usa Today