

“Two” Smart Grid Proposal

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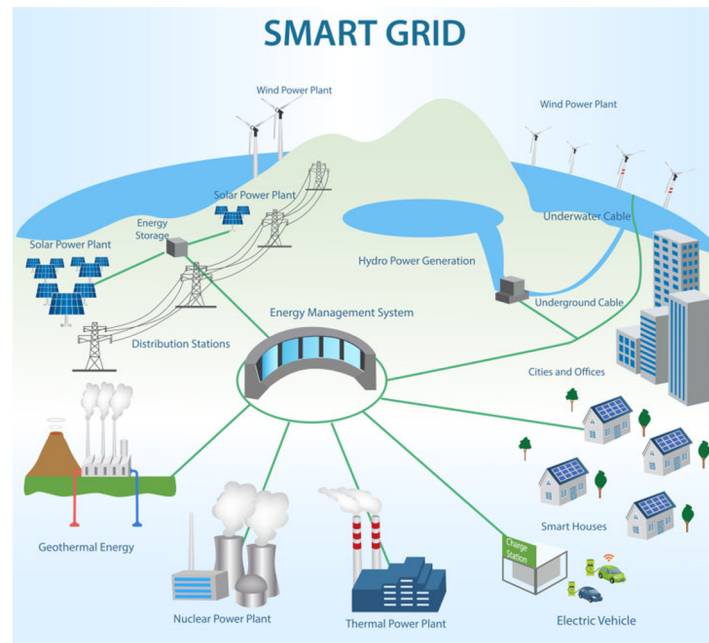


Background Information

What is a Smart Grid?

The smart grid is an innovation on the over century-old traditional power grid. This is an alternative design that is far more:

- Efficient
- Distributed
- Faster
- Technologically Advanced

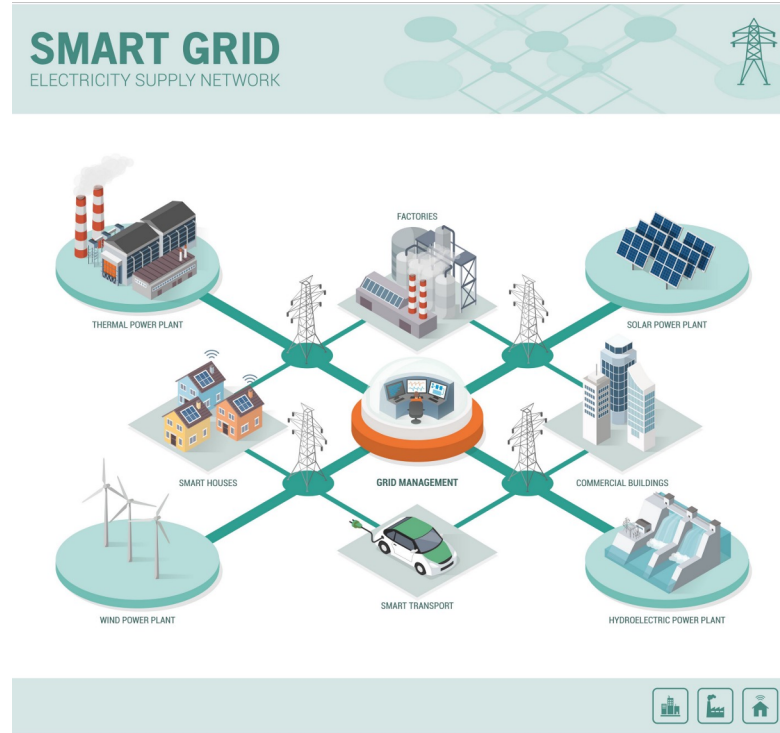


Smart Grid Graphic, retrieved from
https://www.123rf.com/profile_monicaodo

Why a Smart Grid?

Compared to a traditional grid, smart grids have:

- Better management and control of power consumption and faster outage report
- Integration of renewable and modern energy production and use
- Greater distribution of power with improved reliability
- Lower energy cost through utility simplification, downtime reduction, and superior efficiency



Smart Grid Graphic 2, retrieved from *Shutterstock*



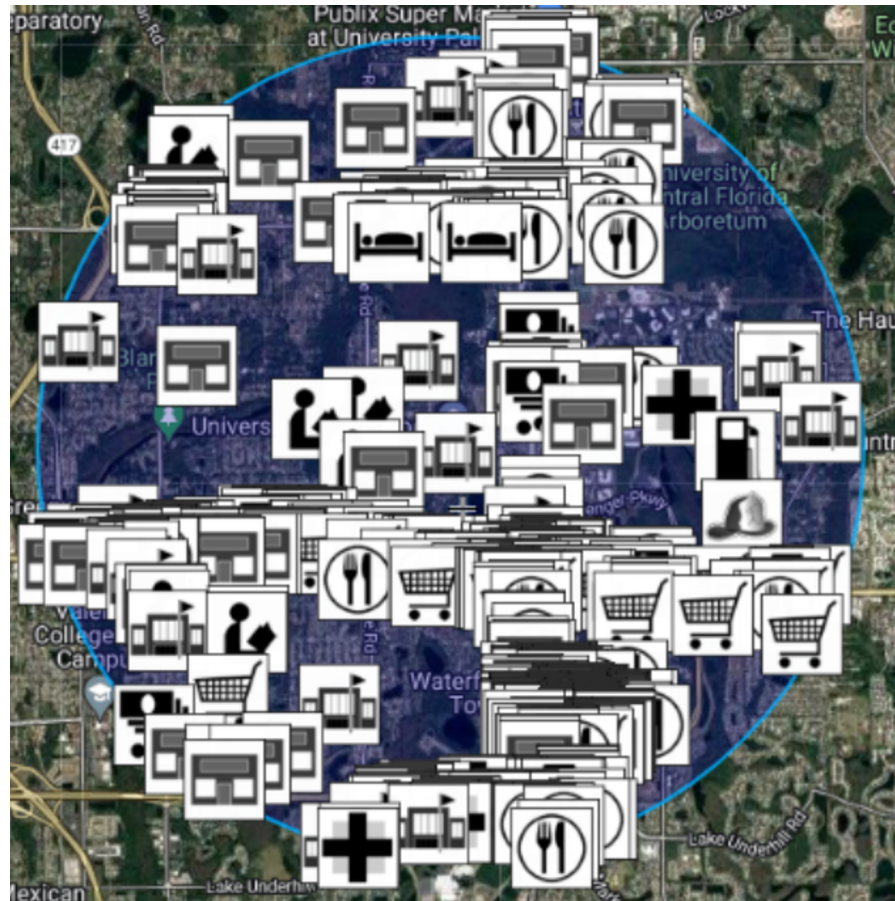
Design Process

Step 1: Mapping Radius and Users

The first step to our design process was to identify users of power in the 2.5-mile radius from University High.

Users Identified:

- Schools
- Hospitals/ERs
- Grocery Stores
- Senior Living Centers
- Restaurants
- Fire Stations
- Banks
- Miscellaneous Stores
- Police Stations
- Hotels
- Places of Worship
- Govt. Buildings



Step 2: Calculating Users' Power Usage

The second step was to estimate and calculate power usage for all users found and categorized within the area. This helped us consider who to place on the smart grid, considering usage and importance.

User Type	Source EUI (kBtu/ft ²)	Average Value of Source EUI (kWh/ft ²)	Power Load per Area (kW/ft ²)	Average Load Area (ft ²)	Total Power Load (kW)
Office (financial)	116.4	34.1	0.00389	63,463	245
Schools (K-12)	104.4	30.6	0.00349	74,519	260.1
Hospitals/ERs (urgent care)	145.8	42.7	0.00487	326,000	1587.6
Grocery Stores	444.0	130.1	0.01485	50,009	742.6
Restaurants (fast food)	886.4	259.7	0.02964	5,000	148.2
Fire Stations	124.9	36.6	0.00418	8,000	33.4
Banks	209.9	61.5	0.00702	4,066	28.5
Police Stations	124.9	36.6	0.00418	20,000	83.6
Hotels	146.7	43.0	0.00491	78,000	383
Senior Living	213.2	62.5	0.00713	57,774	411.9
Average Residential Home	118.1	34.6	0.00395	2200	8.7
Place of Worship	58.4	17.1	0.00195	17,000	33.2
Retail Store	120.0	35.2	0.00401	6,000	24.1
Supplies Store	240.0	70.4	0.00802	6,000	48.2
Gas Station With Convenience Store	592.6	173.6	0.01982	3,000	59.5
Post Office	96.9	28.4	0.00324	4,000	13.0

Power Load Table, retrieved from Activity_3_2

Step 3: Giving Priority

The third step required us to prioritize buildings for power restoration after a hypothetical outage scenario. We reserved highest priority to users that would have a significant impact on human lives, such as hospitals/ERs and first responders.

1. Hospitals/ERs
2. Fire Stations
3. Police Stations
4. Senior Living
5. Grocery Stores
6. Schools
7. Offices
8. Hotels
9. Banks
10. Restaurants

Priority Table, retrieved from Activity_4_2



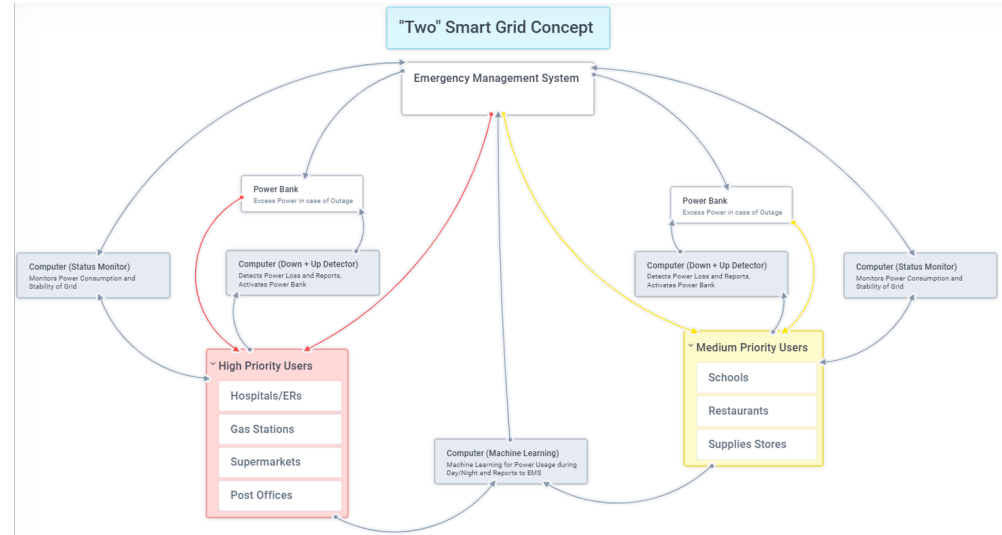
The Design

The “Two” Smart Grid Concept and Why?

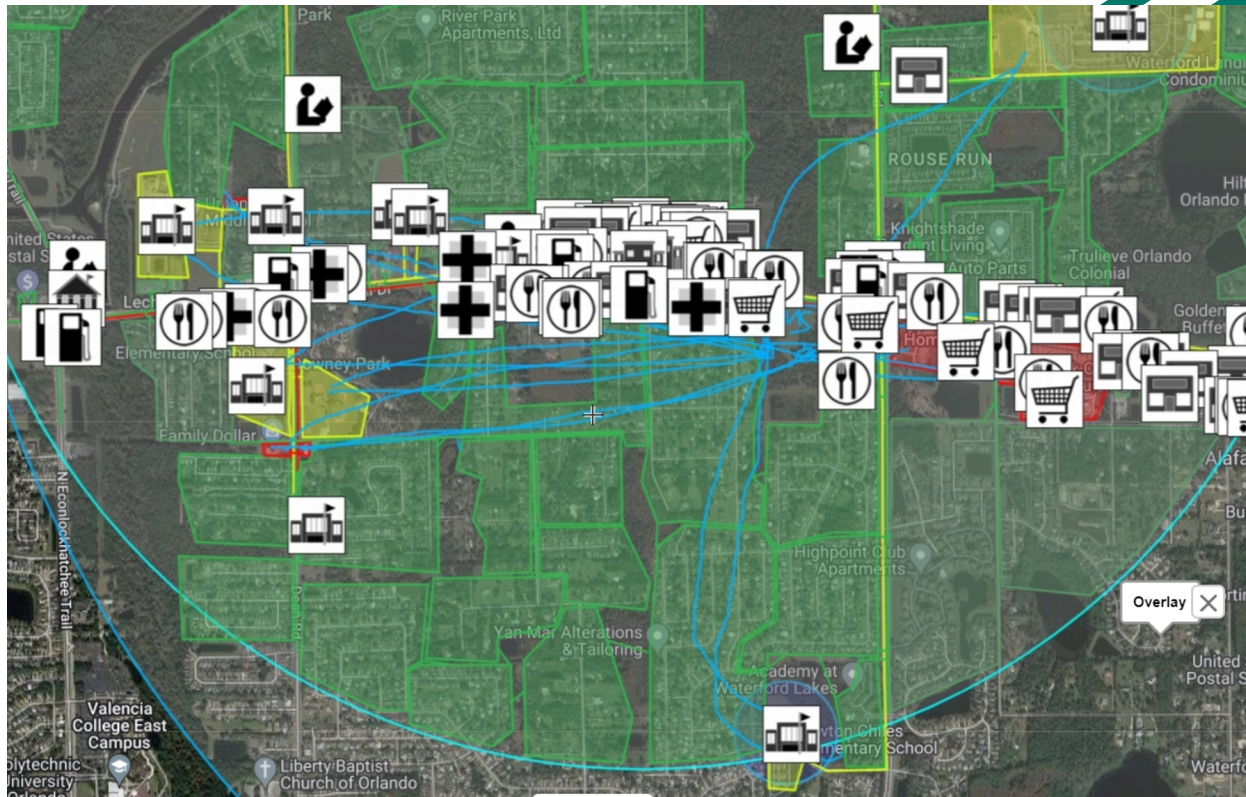
Our smart grid design is made dedicated to our top two categories of priority levels - high priority (red) and medium priority (yellow).

Features include:

- Power banks in case of outage
- Down + Up detectors to toggle power banks
- Machine learning for day/night power usage
- Status monitors for power consumption and grid stability



“Two” Smart Grid Final Concept, recreated with Plectica using Activity_5_2



Scribble Map Design, retrieved from Activity_5_2

References

[Activity 1: Background Reading - PTC \(ufl.edu\)](#)

- https://smartgrid.gov/the_smart_grid/smart_grid.html
- <https://medium.com/sjei/smart-grids-updating-the-traditional-grid-7979bed47761#:~:text=The%20traditional%20power%20grid%20moves,of%20energy%20into%20the%20grid.>
- <https://www.sciencedirect.com/science/article/pii/S1040619020301561>
- https://www.eei.org/issuesandpolicy/electricreliability/mutualassistance/Documents/MA_101FINAL.pdf
- <https://www.protocolreviews.com/how-power-restored-after-storm-order/>
- Our Brains



Thank You!
Questions?

