



Pathway to 100% Renewable Energy

Item #180284
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What Does 100% Renewable Energy Mean?

- Zero CO₂ Emissions?
- Minimize CO₂ Emissions?
- Florida Renewable (Solar/Biomass)?
- Can we meet requirements through green grid purchases?

We need to discuss.

Where is GRU Today?

Presently 27% Renewable Energy

	Capacity	Production 2018	Percent Production	Capacity Factor
Solar	26	45,552	2%	20%
DHR	102	521,242	25%	58%
Kelly	110	437,684	21%	45%
DH-1	76	179,485	9%	27%
DH-2	228	706,837	34%	35%
Grid	450	205,791	10%	-
Total	-	2,096,591	100%	-

2018 CO₂ Emissions

	Production 2018	Tons of CO ₂	Percentage of Production	Tons per MW
Solar	45,552	0*	0*	0*
DHR	521,242	0*	0*	0*
Kelly	437,684	218,842	20%	0.5
DH-1	179,485	128,152	12%	0.714
DH-2	706,837	641,101	58%	0.95
Grid	205,791	118,330	11%	0.575
Total	2,096,591	1,106,425	100%	-

*Classified as a zero emitter

GRU's System Requirements

Flexible system requirements (90 to 440 MWs)

	Off Peak	On Peak
Winter	200	410
Spring	120	250
Summer	200	440
Fall	120	250

As a balancing authority we need 41 MWs of reserve

Compatible Technology Today

- Solar
- Battery
- Fuel Cells
- Biomass
- Waste to Energy
- Demand Side Management
 - Air Conditioners
 - LED Lights
 - Thermal Insulation

Technology Excluded

- Wind
- Tidal
- Geothermal
- Pumped Storage
- Hydro Storage
- Nuclear
- Inertia Storage
- Thermal Storage



Operational Challenges

- How to incorporate energy storage
 - today's technology provides few options for Florida.
- How to solve dusk to dawn energy consumption (42% of annual consumption).
- How to deal with weather transients.
- How to mitigate balancing authority reserve requirements of 41 MWHrs.
- Proven Technologies
 - No technology vs. Cutting Edge vs. Bleeding Edge

Financial Challenges

- Battery Technology is expensive as backup to solar from dusk to dawn for ~\$800 million.
- The technical solutions are chunky, not linear.
- Natural gas is still cheap and projected as such for planning horizon.
- Remaining asset life of existing generation fleet (stranded costs).
- Current debt levels.

Energy Storage

- The key to long-term success of fossil free energy generation is Energy Storage.
- Today's options are limited by physics and financial constraints.
- The best option today is for batteries or fuel cells utilizing electrolysis and physical gas storage.
- Other known methods are not feasible in Gainesville.

Recommended Action

- Complete an area control error (ACE) study to determine transmission system solar tolerance.
- Analyze conversion of DH2 to gas
 - Possible 136,000 tons of CO₂ reduction
- Research available battery technology.
- Update Integrated Resource Plan (IRP) for future generating asset requirements (TEA Involvement).

Questions?