Item #130957
April 2, 2015

Power 2020

A Plan to best meet GRU's obligation to the reliability of the bulk electric system (BES) of The State of Florida and best serve the needs of GRU's customers.

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Power 2020 will Consider:

- Seasonal, daily and hourly customer demand
- Future Regulatory (EPA, NERC) constraints
- GRU generation assets
- The GRU transmission system
- Current purchase power obligations (GREC)
- Current wholesale power & transmission contracts (COA, WP, SECI)
- Future power purchase/sale opportunities
- Distributed energy resources (DER)
- Demand side load management (DSM)
- Asset aggregation

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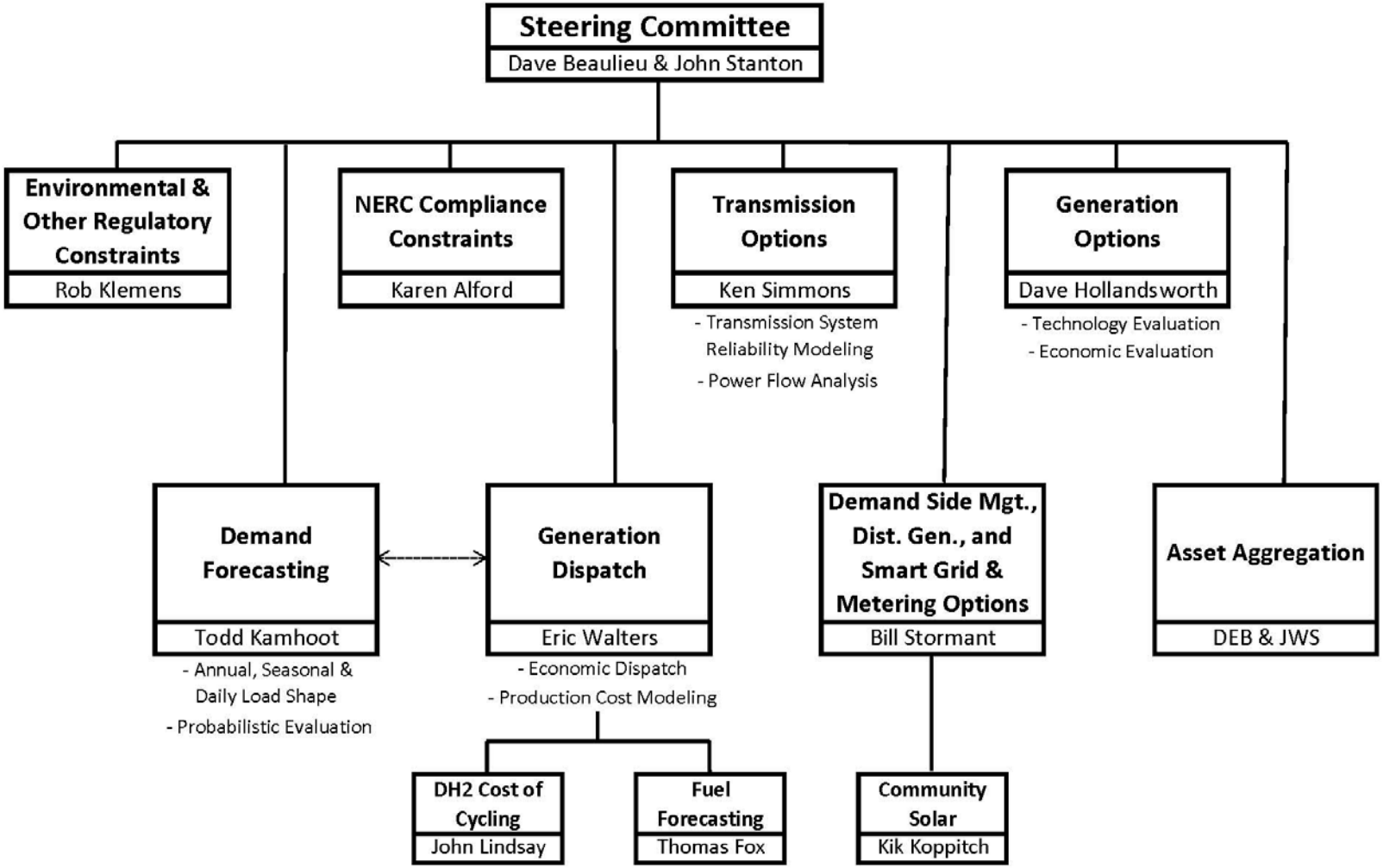
POWER 2020



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What is significant about 2020?

- Not so far out on the planning horizon that dealing with issues can be delayed
- Far enough out on the planning horizon that there is time for action
- GRU's current coal transportation contract runs out on December 31, 2019 and the "as delivered" cost of coal will increase
- EPA Existing Source Performance Standard (ESPS)/CO_2 Building Blocks #1 & #2 Compliance Year

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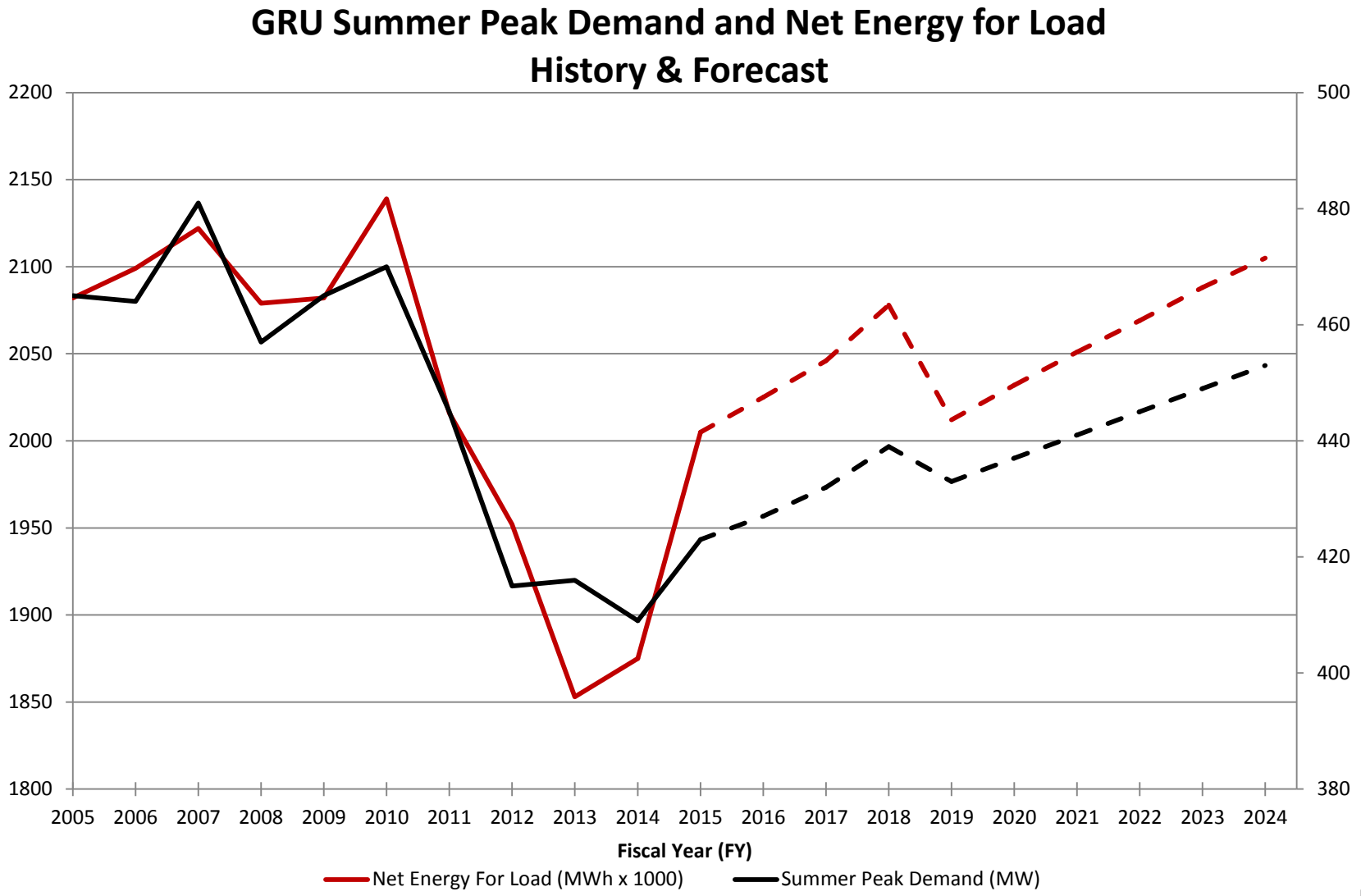
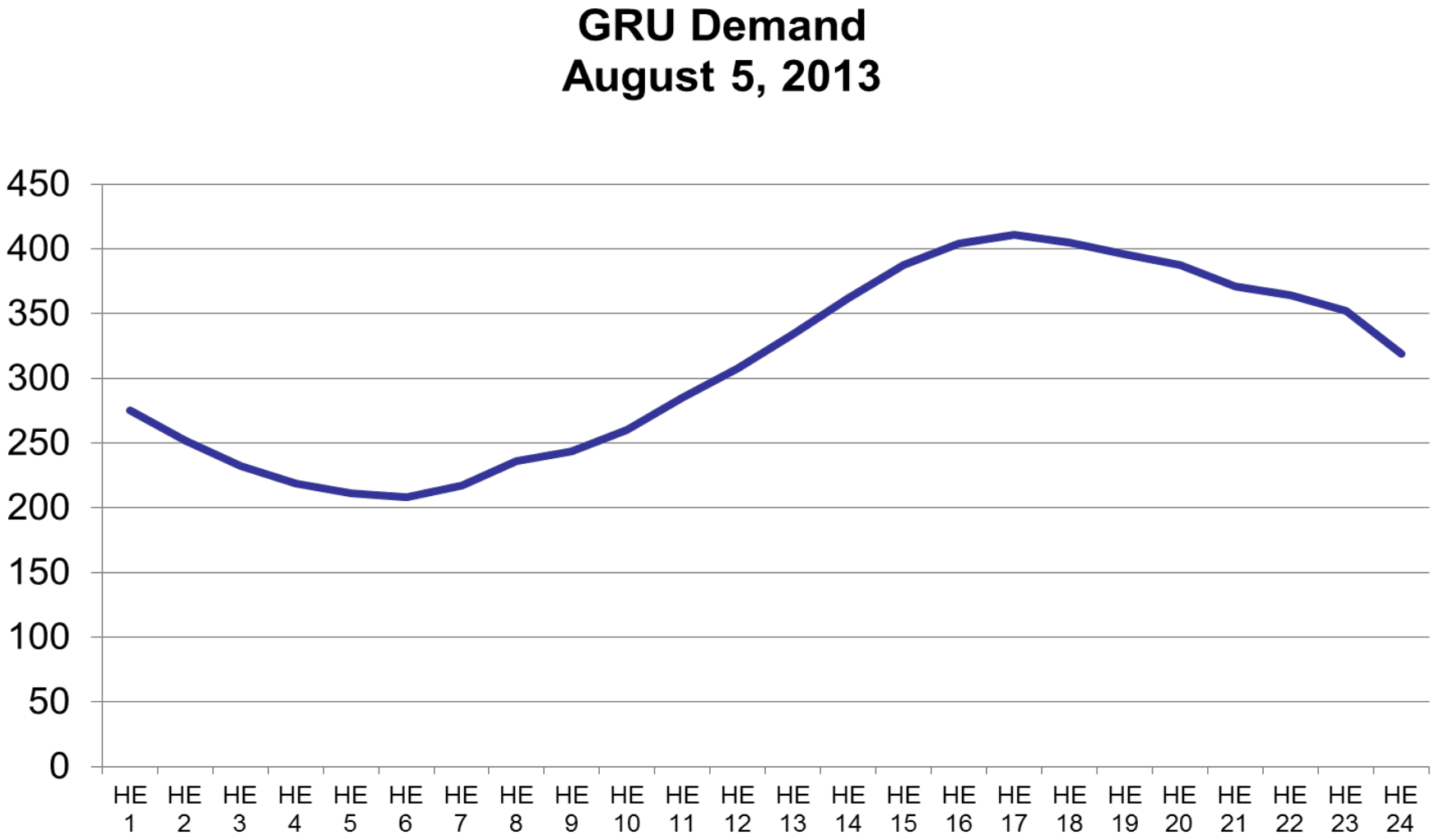
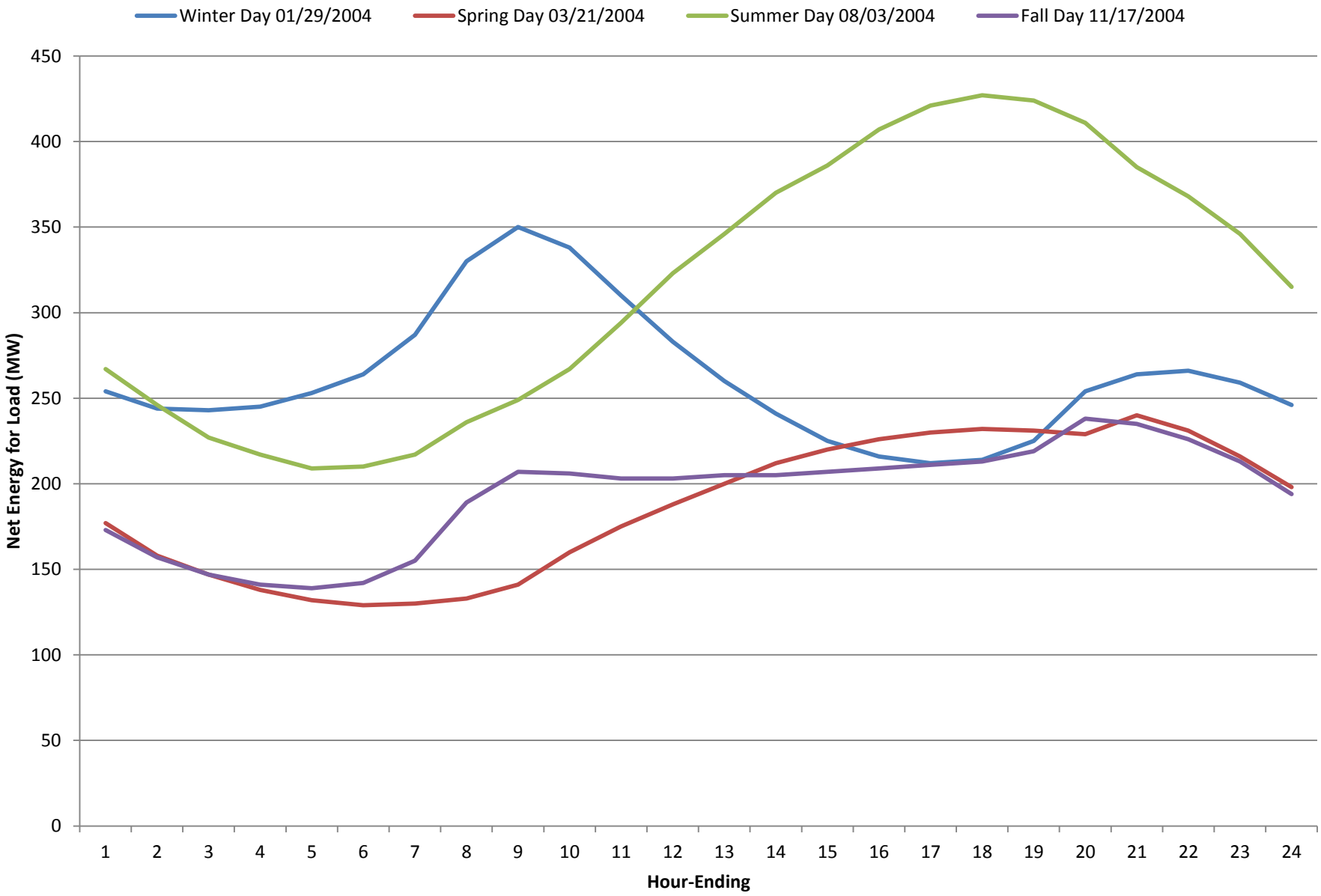
Current & Evolving Situation; Demand Characteristics



Current & Evolving Situation; Demand Characteristics



Seasonal Load Shapes



Current & Evolving Situation; Generation

(in GRU Service Territory; GRU + GREC + DER)

- GRU installed capacity
  - Long in N
  - Short in N-1
- DH 2 required to perform intermediate service
  - Deep load cycling
  - Seasonal cold standby (CSB)
    - Gas -vs- coal price dependent
- EPA ESPS/ CO_2 Emissions from Power Plants
  - Potential Off/On Cycling of DH 2
  - Potential Significant Decrease in DH 2 Capacity Factor

Current & Evolving Situation; Generation

(in GRU Service Territory; GRU + GREC + DER)

- Increasing intermittent distributed generation (solar) that is non-coincident with peak load
- Replacement of DH1 capacity & regulation
  - 50 MW new generation
    - Combustion Turbine (CT)
    - Reciprocating Internal Composition Engine (RICE)
  - Purchase Power

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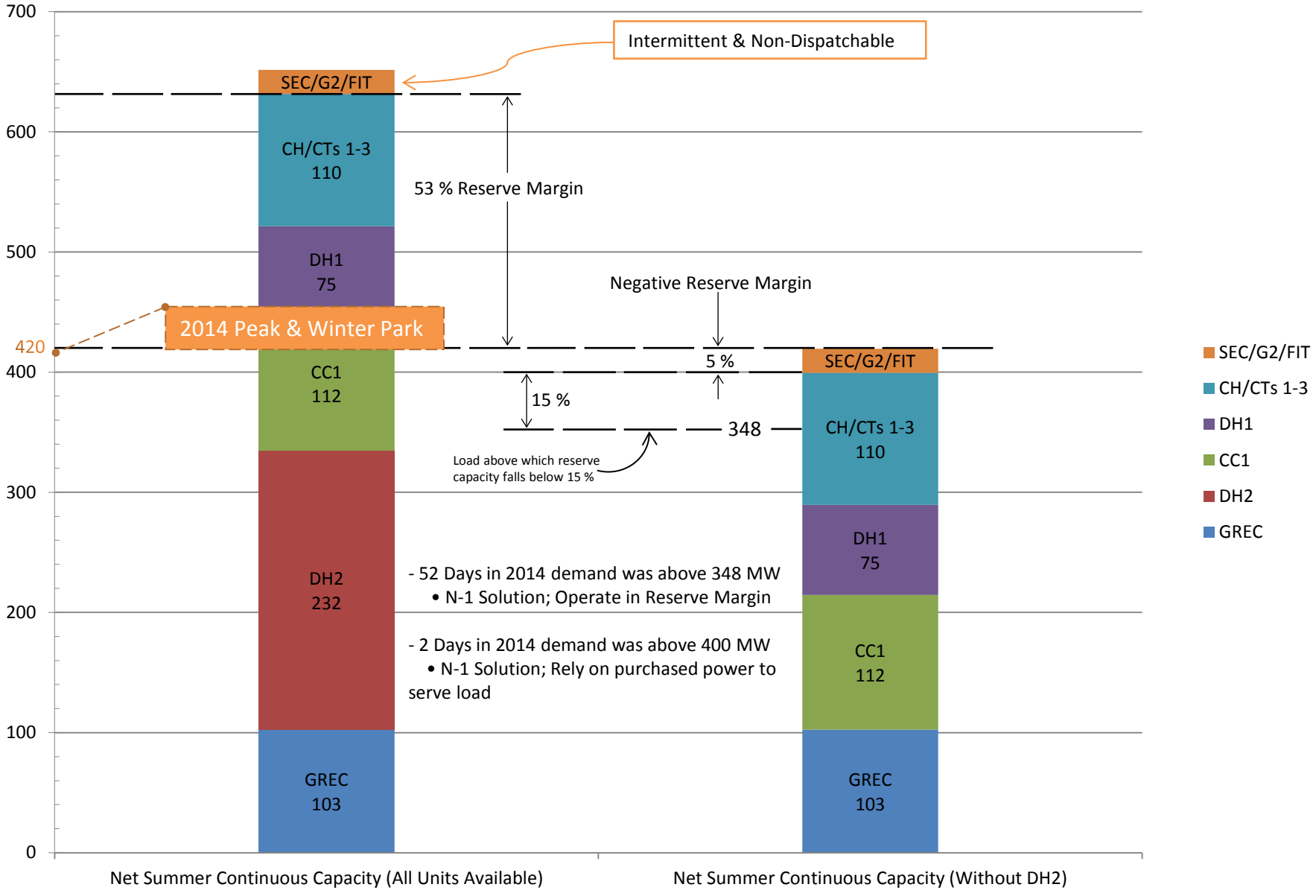
Current & Evolving Situation; Generation

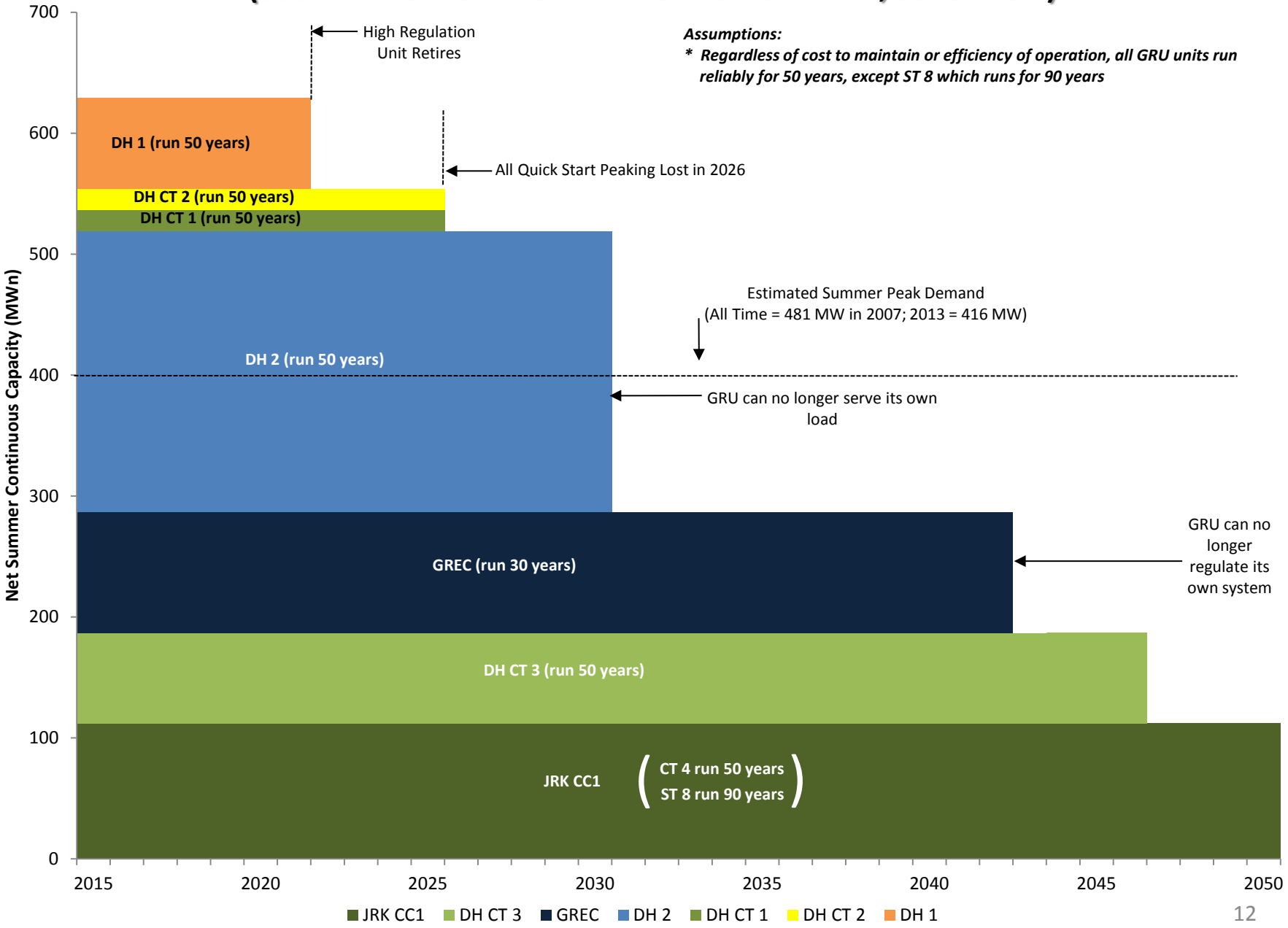
Plant / Unit	Primary Fuel		Net Summer Capability (MW)
GREC	Waste Wood		102.5
J R Kelly Combine Cycle 1	Natural Gas		112.0
Deerhaven Generating Station ST 2	Coal		232.0
		Base Capacity	**446.5**
Deerhaven Generating Station ST 1	Natural Gas		75.0
		Intermediate Capacity	
Deerhaven Generating Station CT 3	Natural Gas		75.0
			150.0
Deerhaven Generating Station CT 1	Natural Gas		17.5
Deerhaven Generating Station CT 2	Natural Gas		17.5
		Peaking Capacity	**35.0**
South Energy Center	Natural Gas		4.1
		Total Capacity	**635.6**

Note: All time Peak Load was 484 mw, served in 2007


700
600
500
420
400
300
200
100
0
Intermittent & Non-Dispatchable
SEC/G2/FIT
CH/CTs 1-3
110
DH1
75
CC1
112
DH2
232
GREC
103
53 % Reserve Margin
2014 Peak & Winter Park
Negative Reserve Margin
5 %
15 %
348
Load above which reserve capacity falls below 15 %
- 52 Days in 2014 demand was above 348 MW
• N-1 Solution; Operate in Reserve Margin
- 2 Days in 2014 demand was above 400 MW
• N-1 Solution; Rely on purchased power to serve load
SEC/G2/FIT
CH/CTs 1-3
110
DH1
75
CC1
112
GREC
103
Net Summer Continuous Capacity (All Units Available)
Net Summer Continuous Capacity (Without DH2)
SEC/G2/FIT
CH/CTs 1-3
DH1
CC1
DH2
GREC

GRU's Current Generation Plan

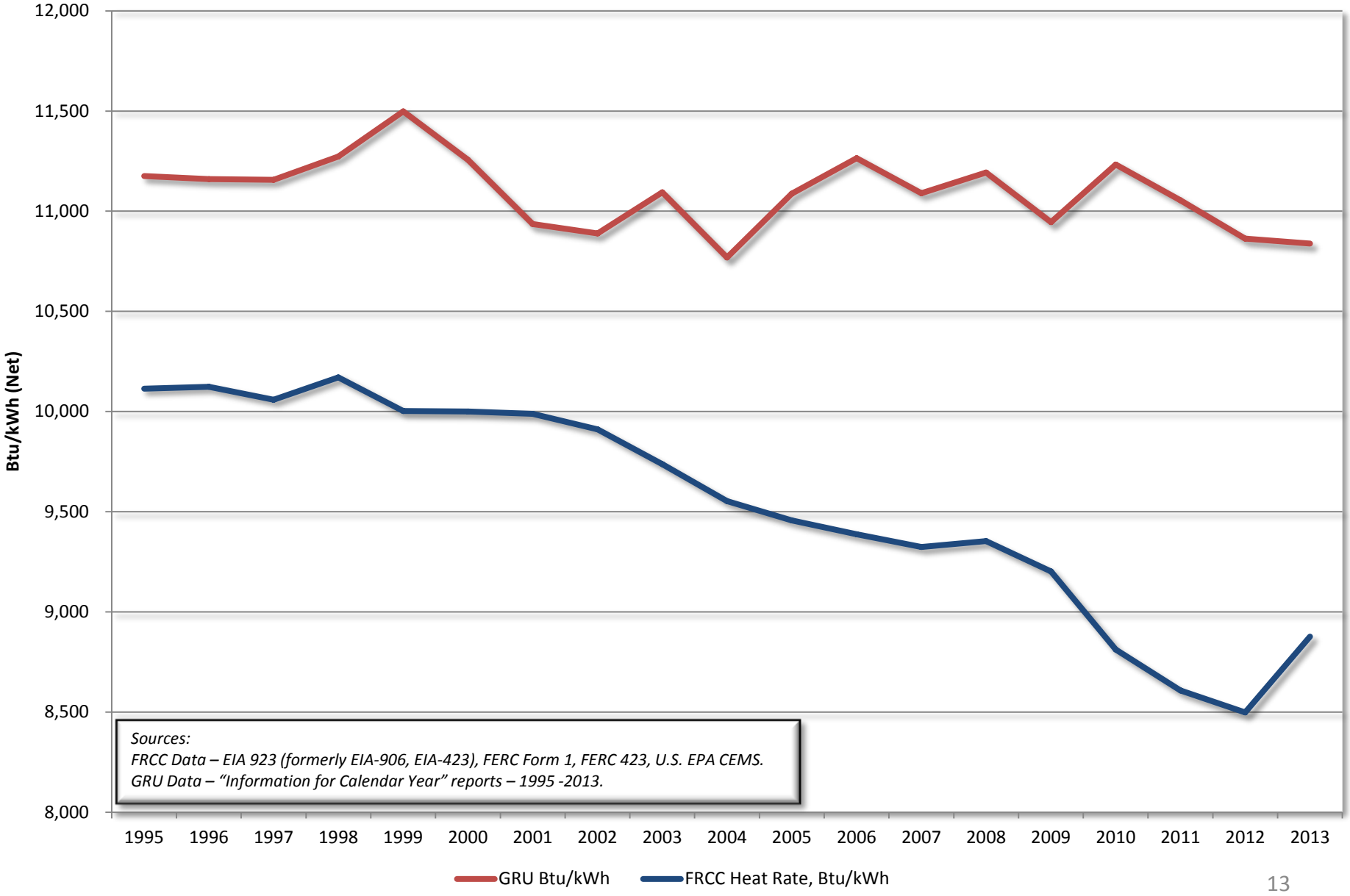
(as submitted to FPSC in the Ten Year Site Plan, Schedule A)



Assumptions:

* ***Regardless of cost to maintain or efficiency of operation, all GRU units run reliably for 50 years, except ST 8 which runs for 90 years***

GRU Net Heat Rate vs. FRCC Net Heat Rate
1995-2013



Current & Evolving Situation; Transmission

- Three GRU ties with Duke, one with FPL
- Option to serve load with imported power
  - Existing ties will not reliably support serving load solely by imported power
    - Above 375 MW load, loss of one tie would overload GRU and FPL or Duke
    - Currently must have GRU generation

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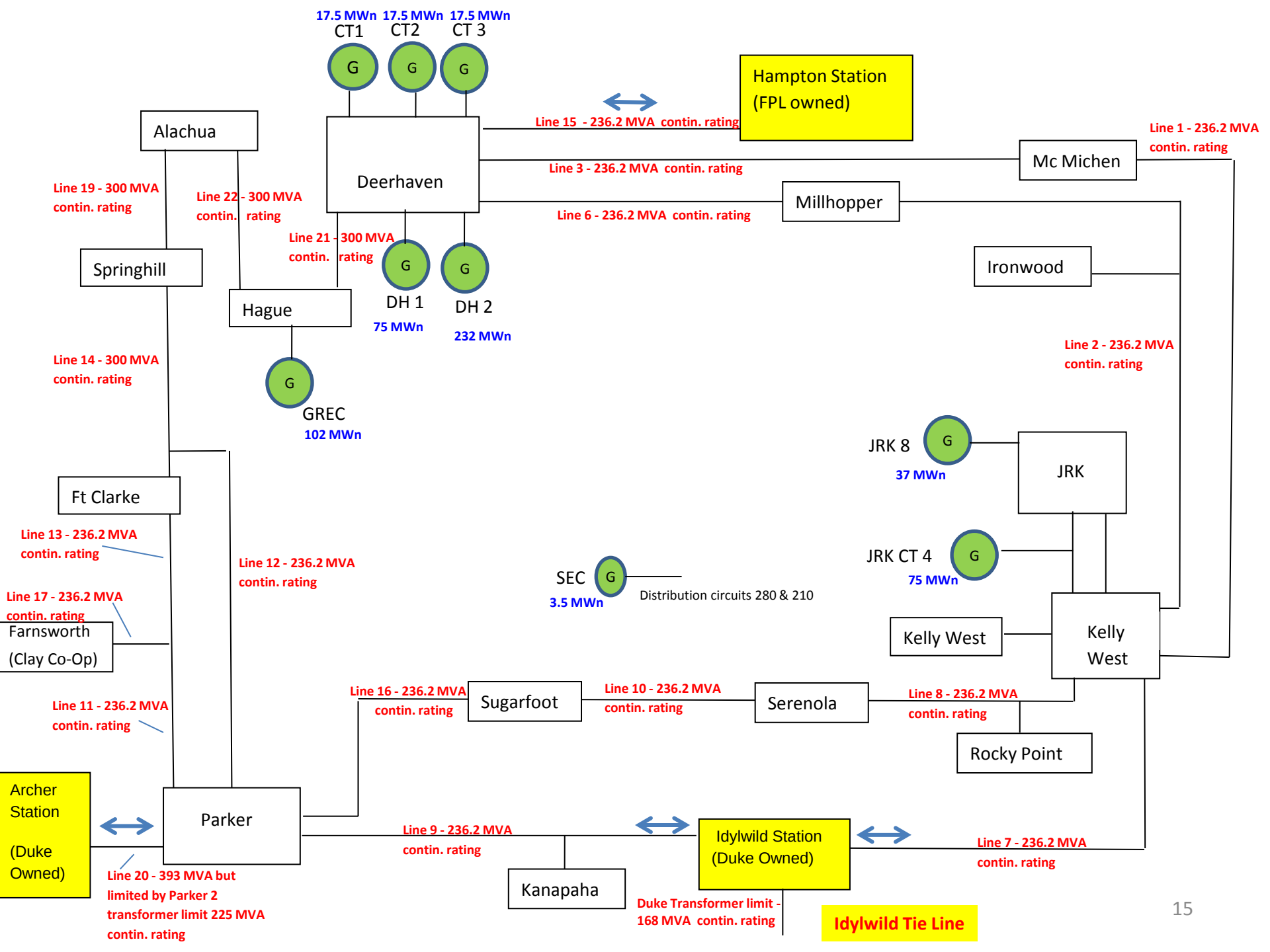
17.5 MWn
CT1
17.5 MWn
CT2
17.5 MWn
CT 3
G
G
G
Hampton Station
(FPL owned)
Line 15 - 236.2 MVA contin. rating
Alachua
Deerhaven
Line 1 - 236.2 MVA
contin. rating
Mc Michen
Line 3 - 236.2 MVA contin. rating
Line 19 - 300 MVA
contin. rating
Line 22 - 300 MVA
contin. rating
Millhopper
Line 6 - 236.2 MVA contin. rating
Line 21 - 300 MVA
contin. rating
Springhill
Ironwood
G
G
DH 1
75 MWn
DH 2
232 MWn
Hague
Line 2 - 236.2 MVA
contin. rating
Line 14 - 300 MVA
contin. rating
G
GREC
102 MWn
JRK 8
G
37 MWn
JRK
Ft Clarke
Line 13 - 236.2 MVA
contin. rating
Line 12 - 236.2 MVA
contin. rating
JRK CT 4
G
75 MWn
SEC
G
3.5 MWn
Distribution circuits 280 & 210
Line 17 - 236.2 MVA
contin. rating
Farnsworth
(Clay Co-Op)
Kelly West
Kelly
West
Line 16 - 236.2 MVA
contin. rating
Sugarfoot
Line 10 - 236.2 MVA
contin. rating
Serenola
Line 8 - 236.2 MVA
contin. rating
Line 11 - 236.2 MVA
contin. rating
Rocky Point
Archer
Station
(Duke
Owned)
Parker
Line 9 - 236.2 MVA
contin. rating
Idylwild Station
(Duke Owned)
Line 7 - 236.2 MVA
contin. rating
Line 20 - 393 MVA but
limited by Parker 2
transformer limit 225 MVA
contin. rating
Kanapaha
Duke Transformer limit -
168 MVA contin. rating
Idylwild Tie Line

Current & Evolving Situation; Transmission

- Transmission Upgrade(s) Evaluation
  - Modeled with GREC only
    - Upgrades identified
  - Model with (A) GREC + 35MW & (B) GREC + 85MW
    - Additional upgrades required?
- Determine cost of upgrades
- Determine required upgrades to FPL and/or Duke Systems & cost to GRU

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Current & Evolving Situation; Distributed Energy Resources (DER)

- Solar generation in GRU's service territory will continue to increase
  - Intermittency requires quicker system generation response to follow load
- Expectation that other forms of DER will enter the mix
  - Fuel cells? …Wind?
- Micro Grids
- Potential for mutually beneficial operation of standby generation

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Current & Evolving Situation; Demand Side Management (DSM)

- DSM is a net negative air emissions alternative to generation
  - It can be a low cost alternative in meeting reserve calls
  - Requires customer participation
- GRU has no active DSM
  - DSM is a "Building Block" in the ESPS/CO_2
- Smart Grid/Smart Metering

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Current & Evolving Situation; Asset Aggregation

- Discussions with two entities about dispatch of combined fleet
  - Preliminary modeling indicates potential cost reduction
  - Transmission issues
  - Stranded asset issues

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The Big Questions:

- What will be the size & shape of the demand?
  - High growth of customer base?
  - Low consumption per customer?
  - High addition of solar generation?
  - High addition of other DER?
- How does GRU best meet the size & shape of the demand?
  - Solution (Gen, TX, DSM, etc.) optimization
  - Impact of EPA Regulation

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