Welcome

Raynetta Curry Marshall
Chief Operating Officer
IRP Stakeholder Meeting Agenda – June 9

1) **Welcome & Introductions**
   Raynetta Curry Marshall, Chief Operating Officer, JEA

2) **Overview of System Operations Control Center**
   Garry Baker, Senior Director, Energy Operations, JEA

3) **March 10 Meeting Recap, May Stakeholders Report Discussion**
   Laura Schepis, Chief External Affairs Officer, JEA; Cantrece Jones, Black & Veatch Consultants

4) **New Resource Options**
   Brad Kushner, Paul Maxwell, Darren Bishop Black & Veatch Consultants

5) **Scenario Modeling and Sample Results**
   Brad Kushner, Black & Veatch Consultants

6) **Open Discussion and Next Steps**
   Laura Schepis, Chief External Affairs Officer, JEA
March Stakeholder Meeting Recap, May Stakeholders Report Discussion

Laura Schepis
Chief External Affairs Officer

Cantrece Jones
Black & Veatch Consultant
Capacity Expansion Planning

How do we best choose among the new resource side options and DSM measures to meet load growth, reliability standards and environmental constraints at the lowest cost to customers?

A very complex problem...

- Changing load, fuel, carbon and other forecasts with each Scenario
- Capacity changes due to retirements, new gas repowering, new intermittent renewables
- Capital and operating costs for existing and new resources and DSM measures

Customers’ Electric Demand and Resource Capacity Forecasts

FOR ILLUSTRATIVE PURPOSES ONLY
Stakeholder Feedback/Discussion

Questions

Stakeholder Insight

Report Overview
New Resource Options

Bradley Kushner, Paul Maxwell, Darren Bishop
Black & Veatch Consultants
New Resource Options – Renewables

Solar
- 75 MW Solar Array

Solar Plus Storage
- 75 MW Solar Array with 37.5 MW Battery Storage
- 75 MW Solar Array with 75 MW Battery Storage

Stand-Alone Storage
- 37.5 MW Battery Storage
- 75 MW Battery Storage

Biomass
- 50 MW Biomass
New Resource Options – Firming (Natural Gas)

Gas Turbine
- 91 MW 2x0 GE LM6000 PF SPRINT
- 111 MW 1x0 GE LMS100PA+
- 226 MW 1x0 GE 7FA.05
- 329 MW 1x0 GE 7HA.02

Reciprocating Engine
- 89 MW 5x0 Wartsila 18V50DF

Gas Turbine + Steam Turbine (Combined Cycle)
- 373 MW 1x1 GE 7FA.05
- 749 MW 2x1 GE 7FA.05
- 558 MW 1x1 GE 7HA.02
- 1119 MW 2x1 GE 7HA.02
- 1684 MW 3x1 GE 7HA.02
- 552 MW 1x1 GE 7HA.02 using Air Cooling instead of Water Cooling

Convert Existing Gas Turbine to Combined Cycle
- 318 MW Conversion of existing Gas Turbines at Greenland to 1x1 GE 7FA.05
- 638 MW Conversion of existing Gas Turbines at Greenland 2x1 GE 7FA.05
Future Technology Option – Hydrogen
Future Resource Options – Advanced Nuclear

Advanced Nuclear

- Relatively small-scale nuclear
- Technology in various stages of Nuclear Regulatory Commission licensing process
- Not yet commercially viable; anticipated to be available in 2035 timeframe

Small Modular Reactor

- 77 MW NUSCALE Power Module™
- 300 MW General Electric-Hitachi (GEH) BWRX-300
- 160 MW Holtec SMR-160
- NUSCALE currently projecting 2029 for first unit to be commercially operational
Potential Sites for Solar Resource Options
Florida Solar Potential

▪ Florida has good solar resource potential

▪ Strongest in mid-state and south

▪ Northern and panhandle areas are similar in strength to the rest of the southeast and some western U.S. areas

JEA Solar Generation

JEA already has eight solar sites in operation

- 1 - 12 MWs, 2010-2019
- One includes storage

Five new solar sites are under development

- 50 MW each
- JEA owns all the land and interconnects
Potential New Sites and Study Methodology

Scenario modeling results may call for significant amounts of new solar resource options

Deployment of 1,000 MW of new solar would require around 6,000 acres of land within and beyond the JEA service area*

We searched for sites for potential new solar resource options

- Used a GIS-based search tool for sites within Florida
- 22 different factors were evaluated (e.g. proximity to transmission, no wetlands, etc.)
- Scoring criteria were established for each factor
- Each site was scored based on how well it satisfies the criteria
- Scores were summed and sites were ranked by score

*Assuming 6 acres per MW which is a common industry assumption
Study Results and Next Steps

Results
- Over 100 potential sites have been identified and ranked
- Spread across Duval and 23 other remote counties
- Each site is 450 acres to support 75MW
- Capacity vs. energy

Next Steps
- Investigate additional local sites
- Estimate transmission improvements, costs*, losses and construction timing to deliver energy to JEA
- Include costs, losses, timing in modeling for each Scenario

*New solar is in demand by numerous other utilities. This competition may result in increased land costs
Resource Options at Existing Sites
# Existing JEA Sites Being Considered for Development

St. Johns River Power Park (SJRPP)
Northside Generating Station (Northside)
Greenland Energy Center (GEC)

## Evaluation of Resource Options

<table>
<thead>
<tr>
<th>Available Site Space</th>
<th>Gas Fuel Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission Capacity</td>
<td>Economics</td>
</tr>
<tr>
<td>Environmental Impacts</td>
<td>Constructability</td>
</tr>
<tr>
<td>Grid Reliability</td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: Google Maps
Evaluation Results - SJRPP

SJRPP South (145 Acres)

Opportunities at SJRPP

145 Acres - SJRPP South
Existing transmission and distribution infrastructure in place

Firming Gas-Fired Options
Sufficient land area for all 11 options

Solar
Insufficient land area (requires ~450 acres for 75 MW)

Battery Storage
Sufficient land area (requires ~5 acres for 75 MW)

Biomass
Sufficient land area (requires ~43.5 acres for 50 MW)
### Evaluation Results – Northside Generating Station

**Northside West (31.9 Acres)**
- *Existing Unit 1 and Unit 2*

**Northside South (9.9 Acres)**

### Opportunities at Northside

<table>
<thead>
<tr>
<th>Option</th>
<th>Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>9.9 acres at NGS South</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>31.9 acres – NGS West</strong></td>
<td></td>
<td>Existing transmission and distribution infrastructure</td>
</tr>
<tr>
<td><strong>Solar</strong></td>
<td></td>
<td>Insufficient land area (requires ~450 acres for 75MW)</td>
</tr>
<tr>
<td><strong>Battery Storage</strong></td>
<td></td>
<td>Sufficient land area (requires ~5 acres for 75MW)</td>
</tr>
<tr>
<td><strong>Biomass</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northside South</td>
<td>Insufficient land area</td>
<td></td>
</tr>
<tr>
<td>Northside West</td>
<td>Insufficient land area</td>
<td></td>
</tr>
<tr>
<td><strong>Firming Gas-Fired Options</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northside South</td>
<td>Sufficient land area for the 5 smallest of 11 (peaking) options</td>
<td></td>
</tr>
<tr>
<td>Northside West</td>
<td>Sufficient land area (requires ~5 acres for 75 MW)</td>
<td></td>
</tr>
</tbody>
</table>
Opportunities at Greenland

28.1 acres – GEC East
Firming Options
Sufficient land area for all options

10.5 acres – GEC South
Existing transmission and distribution infrastructure
Battery Storage Options
Sufficient land area (requires ~5 acres for 75MW)

Solar Options
Insufficient land area (requires ~450 acres for 75MW)
Conversion/Upgrade
Sufficient land area for 2 of 2 resource options

Biomass
Insufficient land area
Scenario Modeling and Sample Results

Bradley Kushner
Black & Veatch Consultants
Forecast Peak Demand (MW) and Annual Energy Requirements (GWh)

Calendar Year

Peak Demand (MW)

Net Energy (GWh)

2022  23   24    25   26     27   28    29   30     31   32    33   34    35    36   37    38   39    40    41    42   43
44   45   46    47    48   49    50    51
The JEA electrical system is replicated within a PLEXOS database (a “Digital Twin”)

- Properties and behaviors of the current and future physical system are converted into a mathematical system
- An optimization is then performed on the mathematical system to identify which resource options should be implemented in which years and in which numbers to satisfy the demand at the lowest total overall capital and operating cost

Optimization is for both resources (capacity expansion) and operation (operating simulation)

Optimization of a scenario can take several hours or days to run
Capacity Expansion Plan Results

Results of the expansion plan for each Scenario will illustrate the annual additions (new resource options) and subtractions (existing resource retirements) to the JEA resource portfolio.
Open Discussion and Next Steps

Laura Schepis
Chief External Affairs Officer
What is Important to You?

- What would Stakeholders like to see at upcoming Stakeholder meetings?
- Is there anything related to the electric industry you’d like to learn more about?
- Can we improve this experience for you in any way?