Progress Energy Florida

Recent Hurricane History

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Distribution Asset Performance

Research in Electricity Infrastructure Hardening Workshop

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Discussion Topics

- 2004 Storm Season Impacts to PEF
  - A closer look at the numbers…

- Operational and Process Improvements
  - What has changed since 2004?

- Closing Information Gaps
  - Opportunities to improve performance…
2004 Storm Season Impacts
Storm Tracks

Legend
- Hurricane Track
- Category 3 - 5
- Category 1 - 2
- Tropical Storm
- Tropical Depression
- Subtropical Storm
- Subtropical Depression
- Extratropical Storm
- Tropical Low
- Tropical Disturbance
- Tropical Wave

- Water Feature
- Land Feature
# 2004 Storm Season Impacts
## Progress Energy Florida Summary

45 Days, 4 Hurricanes...23 Days of Restoration Activity

<table>
<thead>
<tr>
<th></th>
<th>Charley</th>
<th>Frances</th>
<th>Ivan</th>
<th>Jeanne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of landfall</td>
<td>Aug. 13</td>
<td>Sept. 5</td>
<td>Sept. 16</td>
<td>Sept. 26</td>
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<tr>
<td>Category at peak</td>
<td>Cat 4</td>
<td>Cat 2</td>
<td>Cat 3</td>
<td>Cat 3</td>
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<tr>
<td>Peak number of customers out</td>
<td>502,000</td>
<td>832,898</td>
<td>10,000</td>
<td>722,000</td>
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<tr>
<td>Substations out</td>
<td>83</td>
<td>105</td>
<td>3</td>
<td>86</td>
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<tr>
<td>Days of storm restoration</td>
<td>10 Days</td>
<td>7 Days</td>
<td>1 Day</td>
<td>5 Days</td>
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</table>
Operational and Process Improvements

- Key Activities and Improvements by PEF
  - Hurricane Lessons Learned Initiative
  - Revised Storm Plan and developed DSSOP
  - Increased pole replacements
  - Accelerated tree trimming in high risk areas
  - Strengthened coordination with local governments, contractors, and vendors
Operational and Process Improvements

- FPSC - “EIW Hardening”
  - 8-yr Pole Inspection
  - Integrated Vegetation Management
  - Implementation of a GIS System
  - Post Storm Data Collection and Analysis
  - Audit of Joint-Use-Pole Attachments
  - Review of Category 3 Construction Standards
  - Review of Undergrounding Electrical System
Closing Information Gaps

- Data Gathering and Analysis
  - Leveraging statistical and analytical abilities of Universities
  - Identify effects of normal and abnormal events on the system.

- Example: Determining true system impacts of high wind speeds with limited information
  - Data recorders are not always available in close proximity to electric infrastructure
  - Remote weather stations record incomplete data due to power outages and weather induced failures prior to peak wind