Odessa Disturbance 2:
June 4\textsuperscript{th}, 2022

IBRTF Meeting

June 10\textsuperscript{th}, 2022
Odessa Disturbance 2: Event Summary

- Event initiated by lightning arrester fault on 345 kV level in Odessa area
- Fault occurred on June 4\textsuperscript{th} at 12:59:25 PM
- Preliminary estimated loss of 2,519 MW of thermal and IRR generation
  - 1,666 MW of IRR generation loss from 14 solar facilities
  - 853 MW of thermal generation loss
- System Frequency declined to 59.706 Hz and recovered to 60 Hz in 1 min 20 sec
- 1,227 MW of RRS deployed
- 1,116 MW of Load Resources deployed
- Categorized as NERC Cat 3 event (gen loss > 2000 MW)
Real Time PMU Voltage

- Lowest recorded voltage of 0.714pu from PMU in Odessa area on 345 kV line
- Highest recorded voltage of 1.102pu from PMU in Del Rio area on 138 kV line
- Oscillations in Fort Stockton area
- Attempted reclose ~10 seconds later
- Waiting on fault details from TO
- Faults cleared in ~3 cycles
- Within VRT “No Tripping” zone in NOG 2.9.1
Real Time PMU Frequency

- Most PMUs lowest freq. of 59.7 Hz after LOG
- Single PMU near Laredo had lowest freq. of 59.62 Hz
- Couple other PMUs in South dipped below 59.7 Hz
- Local transient freq. seen as low 58.83 Hz and high as 60.26 Hz in Far West
- Protection settings should not be set on transient freq.
- Need to perform ringdown analysis on system modes
Thermal Generation Loss

• Loss of 3 CC units within 2 different facilities
  • 1\textsuperscript{st} facility near Odessa where lightning arrestor fault occurred had 2 CC units trip/reduce output
    – First CC generating \(\sim 333\) MW tripped off with line to POI
    – Second CC dropped \(\sim 210\) MW immediately and ran back remaining \(\sim 287\) MW over next 13 minutes
  • 2\textsuperscript{nd} facility near Rio Grande Valley
    – Tripped \(\sim 310\) MW
    – Root Cause unknown
• RFIs being sent to both facilities
Solar Generation Loss

• 14 facilities consisting of 19 units lost >10 MW
  – Total estimated generation loss of 1,666 MW vs. 1,112 MW in Odessa event 2021
  – Does not include generation that came back within 2 sec or fault clearing
• 9 of the 14 lost generation in Odessa event May 2021
  – 8 identified in NERC Odessa Disturbance report (10 total facilities identified in report)
  – Remaining 5 either in commissioning, offline, or rode through
## Solar Generation Loss

<table>
<thead>
<tr>
<th>Facility</th>
<th>Inverter OEM</th>
<th>MW Loss 2022</th>
<th>MW Loss 2021</th>
<th>Recovery time 2022</th>
<th>Recovery MW 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant A</td>
<td>OEM3</td>
<td>N/A</td>
<td>28</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Plant B</td>
<td>OEM1</td>
<td>133</td>
<td>150</td>
<td>8 min</td>
<td>Full</td>
</tr>
<tr>
<td>Plant C/D</td>
<td>OEM1</td>
<td>56</td>
<td>64</td>
<td>5 min</td>
<td>Full</td>
</tr>
<tr>
<td>Plant E*</td>
<td>OEM1</td>
<td>295</td>
<td>21</td>
<td>1 min</td>
<td>65%</td>
</tr>
<tr>
<td>Plant F</td>
<td>OEM3</td>
<td>47</td>
<td>48</td>
<td>6 min</td>
<td>90%</td>
</tr>
<tr>
<td>Plant G/H</td>
<td>OEM1</td>
<td>N/A</td>
<td>239</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Plant I/J</td>
<td>OEM1</td>
<td>196</td>
<td>205</td>
<td>13 min</td>
<td>Full</td>
</tr>
<tr>
<td>Plant K/L</td>
<td>OEM2</td>
<td>119</td>
<td>153</td>
<td>2 min</td>
<td>Full</td>
</tr>
<tr>
<td>Plant M</td>
<td>OEM2</td>
<td>121</td>
<td>147</td>
<td>1 min</td>
<td>Full</td>
</tr>
<tr>
<td>Plant N/O</td>
<td>OEM3</td>
<td>50</td>
<td>23</td>
<td>30 min</td>
<td>Full</td>
</tr>
<tr>
<td>Plant P</td>
<td>OEM1</td>
<td>259</td>
<td>N/A</td>
<td>2 min</td>
<td>90%</td>
</tr>
<tr>
<td>Plant Q</td>
<td>OEM2</td>
<td>94</td>
<td>N/A</td>
<td>8 min</td>
<td>30%</td>
</tr>
<tr>
<td>Plant R</td>
<td>OEM1</td>
<td>176</td>
<td>N/A</td>
<td>6 min</td>
<td>74%</td>
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<tr>
<td>Plant S</td>
<td>OEM2</td>
<td>104</td>
<td>N/A</td>
<td>Offline till Next Day</td>
<td>0%</td>
</tr>
<tr>
<td>Plant T</td>
<td>OEM2</td>
<td>6</td>
<td>N/A</td>
<td>5 min</td>
<td>Full</td>
</tr>
<tr>
<td>Plant U</td>
<td>OEM3</td>
<td>10</td>
<td>9</td>
<td>5 min</td>
<td>Full</td>
</tr>
</tbody>
</table>

*Plant E has additional unit from 2021*

**NERC Odessa Disturbance Report Table B.1**
MW Loss per Inverter Type

2022

- OEM1: 1116
- OEM2: 444
- OEM3: 108

2021

- OEM1: 679
- OEM2: 300
- OEM3: 109
Generation Loss with Fast Recovery

- Solar generation loss total does not include MWs recovered within 2 seconds (SCADA scan)
- SCADA not able to pick up lowest MW
- Have seen units fall to zero in high resolution data but very little loss seen in SCADA
- Possibly much greater loss than what we see in telemetry

*Plant N/O recorded as 50 MW loss*
Generation Loss with Fast Recovery

• Additional 4 facilities that had significant loss seen in SCADA with fast recovery
• Likely more but unable to see with SCADA only
• Requesting PMU data for all solar farms in the area
• Will calculate loss of all units within first couple seconds
• From SCADA alone, additional ~230 MW was lost in first 2 seconds
Next Steps

• 20 RFIs going out today
  – Due 6/24 @ 5PM – No extensions
  – Reasons for inverter trips / MW reduction
  – Protection and control function settings with setpoint and timing thresholds
  – Corrective actions since Odessa 1

• PMU/DFR data requests went out Tuesday
  – Due Wednesday, June 15th
  – All solar farms should have PMU data

• NERC Brief Report
Other Events

• March Panhandle Events
  – Collaborating with NERC/TRE to review high resolution data and meet with windfarms
  – ERCOT Final Report
  – NERC Event Report

• Smaller Solar Event on May 24th
  – Fault also in Odessa area; occurred at 7:30 PM
  – ~130 MW solar generation loss across 5 facilities
  – 3 facilities also reduced MW during June 4th event
  – Majority came from one facility that rode through June 4th event
  – Likely much larger event if occurred earlier
Questions?