CNP’s Grid Modernization Journey

- Advanced Metering System 2009 - 2012
- Customer Vision Platform 2012
- Analytics/Situational Awareness 2012
- Intelligent Grid 2011-2014
- Advanced Distribution Management System 2012-2015
- Mobile Workforce Enablement 2014
- Asset Management - In Progress

To Do:
Intelligent Energy Future
- Reliable, resilient
- Affordable, customer choice
- Integrate DER
- Safe, secure

Backup Data Center
Leak Detection
Mobile Data

PROPRIETARY AND CONFIDENTIAL INFORMATION
COMPONENTS OF OUR ADVANCED METERING SYSTEM (AMS)

Combined with back office computer systems and integration, our AMS provides:

- Daily register reads
- Daily 15 minute interval reads
- Remote connect / disconnect / on-demand reads
- Access to data via Smart Meter Texas portal
ADVANCED METERING SYSTEM BENEFITS

• Remote meter reads, service connection/disconnection
  – $20-25 million in consumer savings annually from eliminated fees
  – 19,450,211 remote service orders
    • 1,945,021 gallons of fuel saved
    • 17,523 tons CO₂ emissions avoided

• Energy efficiency and savings
  – Biggest Energy Saver winners reduced 36-50%, 332 in ‘13 averaged 3%
  – 50-70% getting data from SMT, IHDs, REP emails changed usage behavior

• New products and services
  – > 700,000 Texans on time-of-use rates (free nights & weekends) or peak-time rebates
    (source = ERCOT)
  – 3,453 Houstonians and 6,213 Texans get near-real-time data from In-Home Displays

• Power Alert Service
  – 1,242,411 CNP customers get outage alerts by email/text/phone

• 75% of surveyed consumers viewed CNP’s smart grid favorably
  – Only 5% viewed it unfavorably
Customer Feedback

• “Bravo, CenterPoint. Bravo. From start to finish, we were kept informed without having to listen to a second of hold music. The notice also included a link to an interactive map of current outages in the city. Remarkable.” – *Houston Press blog*

• “Love that @EnergyInsights is now emailing me when the power is out at home. And just received email that the power has been restored.” – *Troy on Twitter*

• “Thanks to @CNPalerts for the useful SMS and email updates on my neighborhood's power outage. Good to know technology used for good!” – *Everard on Twitter*

Survey results

• 92% ease of registration/use
• 93% timely restoration alert
• 92% satisfaction

• 1.24 million consumers enrolled for alerts via email/phone/text
• > 15 million messages sent
  - registration messages,
  - outage and restoration messages,
  - status updates.
• Up to 95% call deflection rate
### INTELLIGENT GRID (IG) COMPONENTS

#### BENEFITS 2011 – OCT 2019

<table>
<thead>
<tr>
<th></th>
<th>Distribution Automation</th>
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<tbody>
<tr>
<td>Outage Events</td>
<td>2,857</td>
</tr>
<tr>
<td>Customer Outage Minutes Avoided by Automation</td>
<td>324 million</td>
</tr>
<tr>
<td>Sustained Customer Outages Avoided</td>
<td>&gt;1,667,000</td>
</tr>
<tr>
<td>Average Reliability Improvement using IG</td>
<td>23.4%</td>
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While construction to date covers about 25 percent of CenterPoint Energy’s service area, automation improvements benefit consumers in the entire system.
HURRICANE HARVEY – A RECORD-BREAKING STORM

• After making landfall as a Category 4 storm near Port Aransas, Texas, Hurricane Harvey stalled, impacting south Texas, southeast Texas and Louisiana for days

• Maximum sustained winds were 130 mph winds at landfall

• 51.88 inches of rainfall in southeast Texas, breaking the single-storm record of 48 inches set in 1978 and more than 10-year annual average

• More than 42,000 lightning strikes across electric service territory

• Harvey spawned tornadoes in southeast Texas, Louisiana, Alabama, Mississippi, Tennessee and North Carolina
HARVEY BY THE NUMBERS
ELECTRIC OPERATIONS RESPONSE

• 293 total electric circuits locked out and 4,494 total electric fuses out
• 8 substations out of service and 9 substations inaccessible due to high water
• More than 2,200 employees plus 1,500 contractors & mutual assistance personnel from 7 states
• 308 SAIDI minutes with 1.2 million customers impacted
• 755 million total minutes out over 10 days
The Smart Grid, including distribution automation devices such as intelligent grid switches, allowed us to quickly isolate problems on our grid and restore service to customers through those devices.

- Operated more than 250 of these devices during the event impacting more than 140,000 customers
- Were able to avoid almost 41 million outage minutes for our customers
- 16.71 SAIDI minutes saved due to automation

AMS meters increased efficiency during the storm

- Executed 45,000 orders remotely at 97% performance
- Billed 700,000 accounts with actual readings at 98.9% performance
- Executed remote turn off/on for safety reasons

Use of real-time analytics to assess, monitor and resolve cases

- Aided in developing better situational awareness
- Allowed us to correlate weather and flooding information with outages, providing operations with critical decision-making tools