Exhibit to Agenda Item #2

Brief the Board regarding impacts of recent unprecedented storms and mitigation efforts to improve storm response and restoration.

Board Strategic Development Committee and Special SMUD Board of Directors Meeting
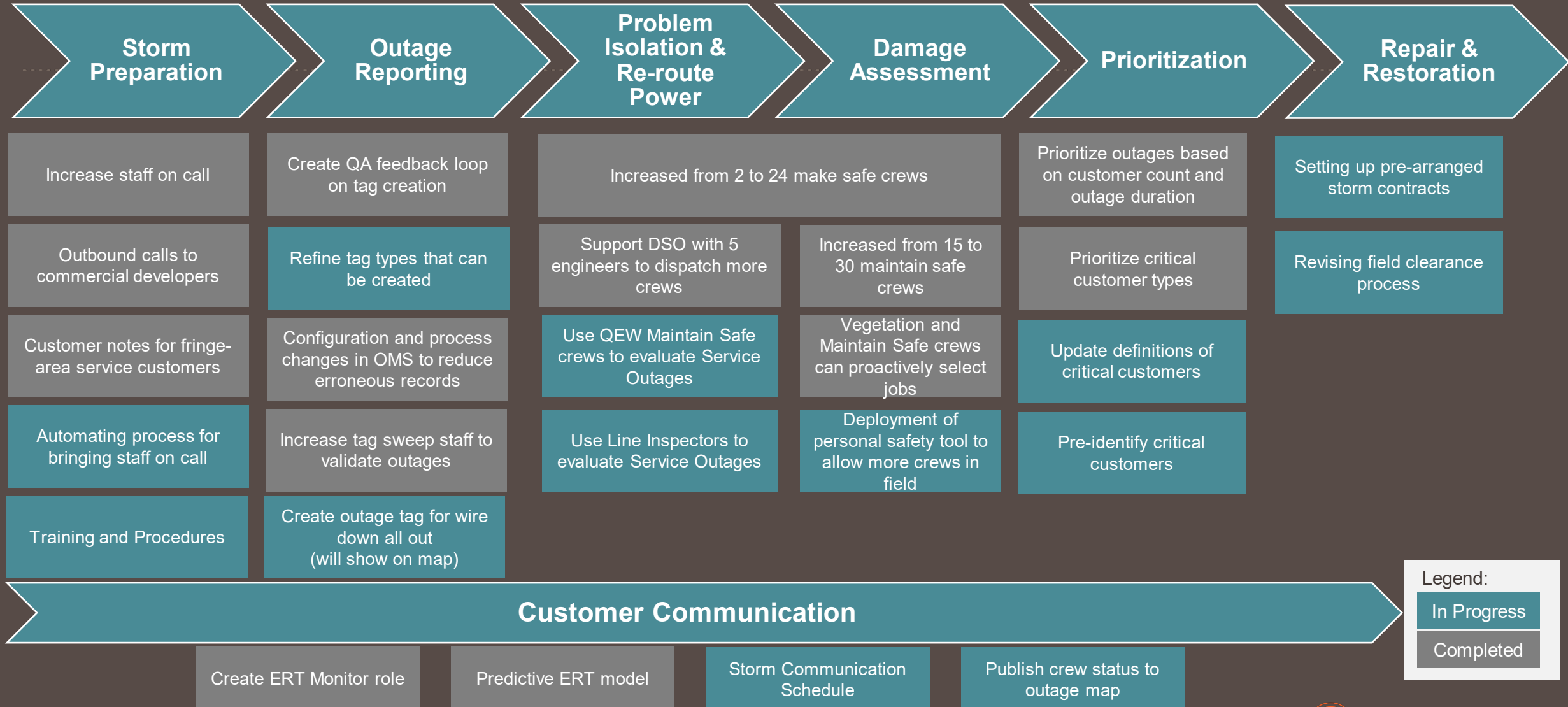
Tuesday, April 11, 2023, scheduled to begin at 6:00 p.m.

SMUD Headquarters Building, Auditorium

Powering forward.
Together.

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Storm Update

Agenda

- Emergency Operations Process Overview
- January 2023 Storms
  - Challenges
  - Overview
  - Response highlights
- Next Steps
- Resiliency

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Current Improvements

Storm Preparation	Outage Reporting	Problem Isolation & Re-route Power	Damage Assessment	Prioritization	Repair & Restoration

Storm Preparation	Outage Reporting	Problem Isolation & Re-route Power	Damage Assessment	Prioritization	Repair & Restoration
Increase staff on call	Create QA feedback loop on tag creation	Increased from 2 to 24 make safe crews		Prioritize outages based on customer count and outage duration	Setting up pre-arranged storm contracts
Outbound calls to commercial developers	Refine tag types that can be created	Support DSO with 5 engineers to dispatch more crews	Increased from 15 to 30 maintain safe crews	Prioritize critical customer types	Revising field clearance process
Customer notes for fringe-area service customers	Configuration and process changes in OMS to reduce erroneous records	Use QEW Maintain Safe crews to evaluate Service Outages	Vegetation and Maintain Safe crews can proactively select jobs	Update definitions of critical customers	
Automating process for bringing staff on call	Increase tag sweep staff to validate outages	Use Line Inspectors to evaluate Service Outages	Deployment of personal safety tool to allow more crews in field	Pre-identify critical customers	
Training and Procedures	Create outage tag for wire down all out (will show on map)				

Customer Communication

Create ERT Monitor role	Predictive ERT model	Storm Communication Schedule	Publish crew status to outage map

Legend:
In Progress
Completed

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Emergency Operations Process

Purpose

- Ensure a coordinated response across SMUD during a significant event

Goal

- Maximize utilization of resources to safely and efficiently restore power
- Provide coordinated, timely and accurate information to drive decision-making
- Provide timely and accurate estimated restoration times to our customers

Triggers/Key Considerations

- Weather forecast - primary driver to mobilize resources and communicate to stakeholders ahead of weather event
- Distribution system status
- Other considerations

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Trigger for Emergency Operations - Weather Forecast

- Sustained wind speeds forecasted to exceed 30 mph

- Wind gusts forecasted to be at least 35 mph

- Ground saturation levels, expected rainfall
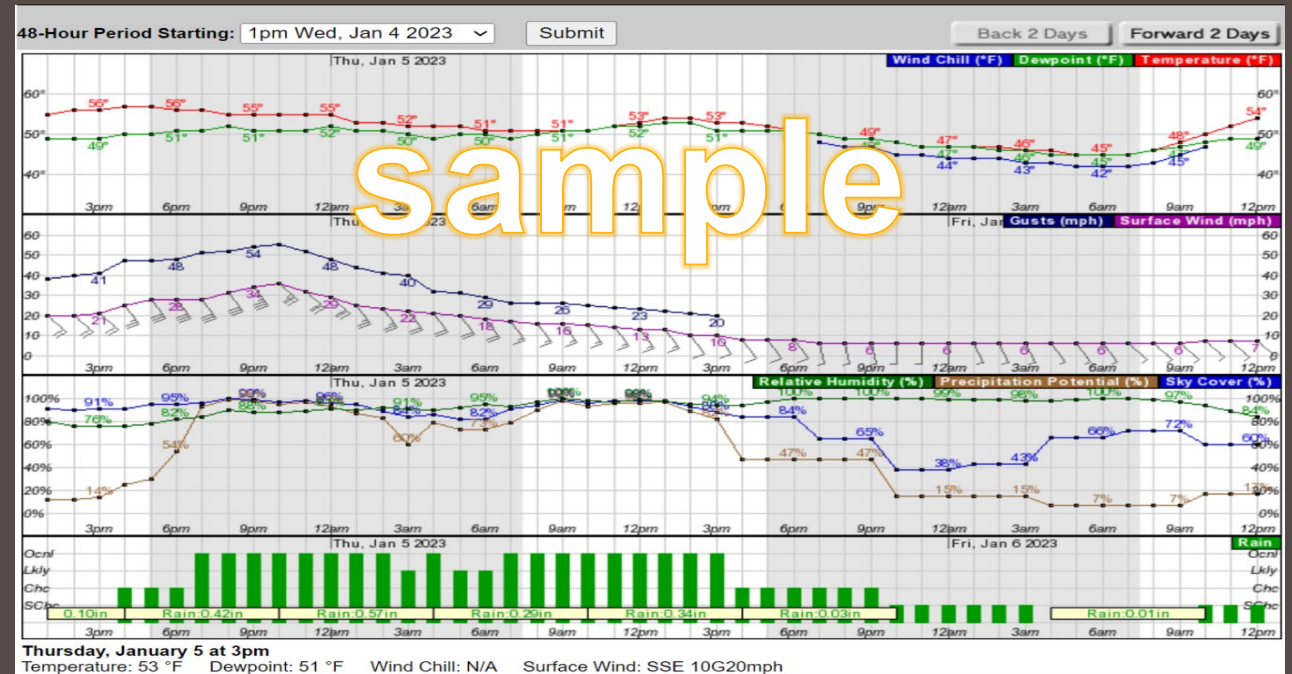
Trigger for Emergency Operations - Distribution System Status & Other Considerations

- When existing resources are not sufficient to respond to the size of emergency
  - *Need to mobilize additional resources*

- Duration of event is anticipated to go beyond 12 hours

- Extensive inquiries expected from customers, media and/or governmental agencies
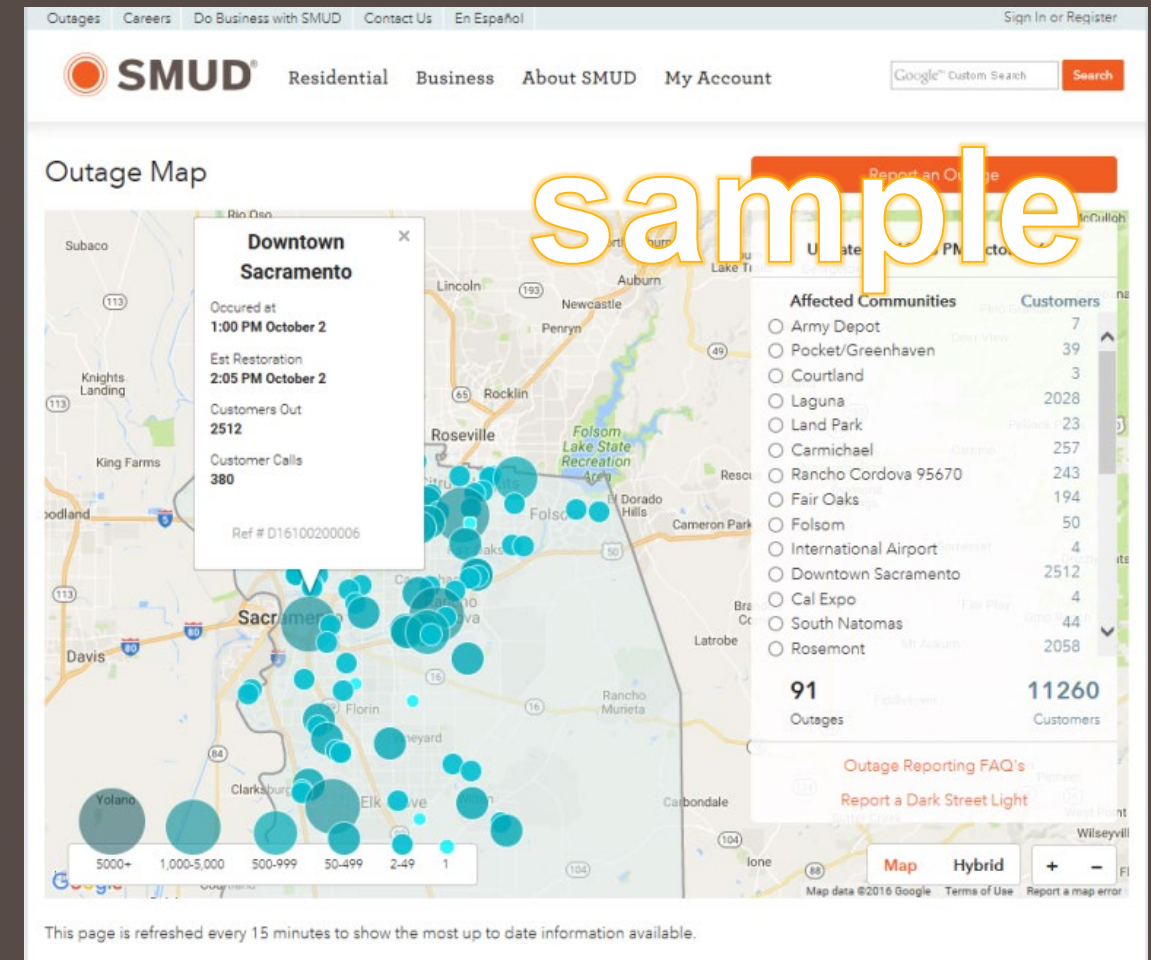
Pre-Storm Communication

Typically a day ahead, SMUD provides

- Update to the Board about expected conditions, staffing and resources to respond to event

- Communications to customers
  - News release
  - Social media
  - Smud.org alerts
  - Internal speaking points
  - Commercial account outreach
  - Automated calls, texts and emails
  - Interactive Voice Response (IVR)

Transition to Emergency Operations

1. Distribution System Operations (DSO) declares emergency operations

2. Call for additional support areas as needed
   - Emergency Operations Center (EOC)
   - Line & Substation Assets (including contractors)
   - Make Safe
   - Maintain Safe
   - Vegetation Management
   - Engineering support
   - Customer Care
   - IT
   - Corporate Communications
   - Government Affairs

3. Change standard Estimated Restoration Times (ERT)

4. Communications with customers and other stakeholders in real time based on field and operational conditions

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Current Response & Restoration Steps

What	Storm Preparation	Outage Reporting	Patrol, Damage Assessment, Isolation & Power Re-route	Prioritization	Repair work	Power Restoration
Who	Enterprise-wide	Various operating systems and channels	DSO, Troubleshooters, Make Safe, Maintain Safe, and Vegetation Mgmt. Teams	Distribution Operations	Veg. Mgmt. Crews, Lineworkers	DSO, Troubleshooters, Lineworkers

Customer Communication

* As many customers as possible are restored during power re-route

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January Storms

January 2023 Storms – Unprecedented Challenges

Number one challenge was **communicating timely and accurate estimated restoration times (ERT)** to our customers

- *Delays in providing ERT's*
- *ERT's changing*

Customers could not rely on the ERT's

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January 2023 Storms – Unprecedented Challenges

Weather Forecast missed New Years Eve storm

Extent of damage
- Over 2,300 outages across our service area
- 941 outages (40%) impacted single customers
- 1,000+ tree-related incidents, 1,250+ wire down incidents

Resources
- Needed significantly more damage assessors, repair crews and support staff

Technology
- Outage Management System (OMS)
  - System limitations
  - Data discrepancies
- Automated outbound customer communication platform down

Process
- Management of outages
- ERT's
- Work prioritization

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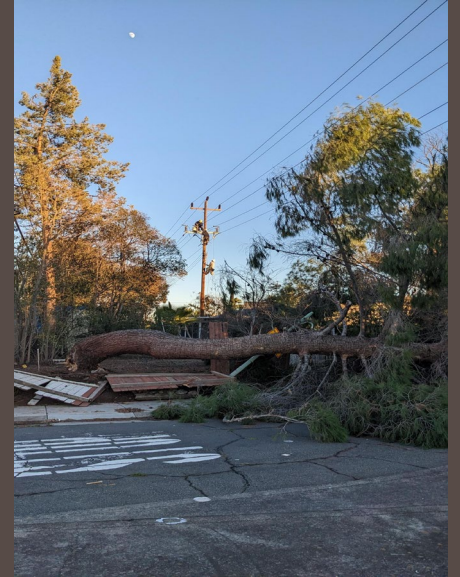
January 2023 Storms – Overview

	Dec. 31, 2022 – Jan. 1, 2023	Jan. 4, 2023	Jan. 7 – Jan. 8, 2023	Jan. 14, 2023
Sustained Wind (mph)	46	37	49	37
Wind Gust (mph)	59	51	64	56
Customers Impacted	257,459	37,947	287,999	43,834
% Customers Restored within 24 hours	94	99	89	100

- Emergency operations from New Year's Eve through January 16, 2023
- EOC activated for the full duration and worked in partnership with the County and State OES

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January 2023 Storms – Widespread Impacts
New Year's Eve – Jan. 16, 2023
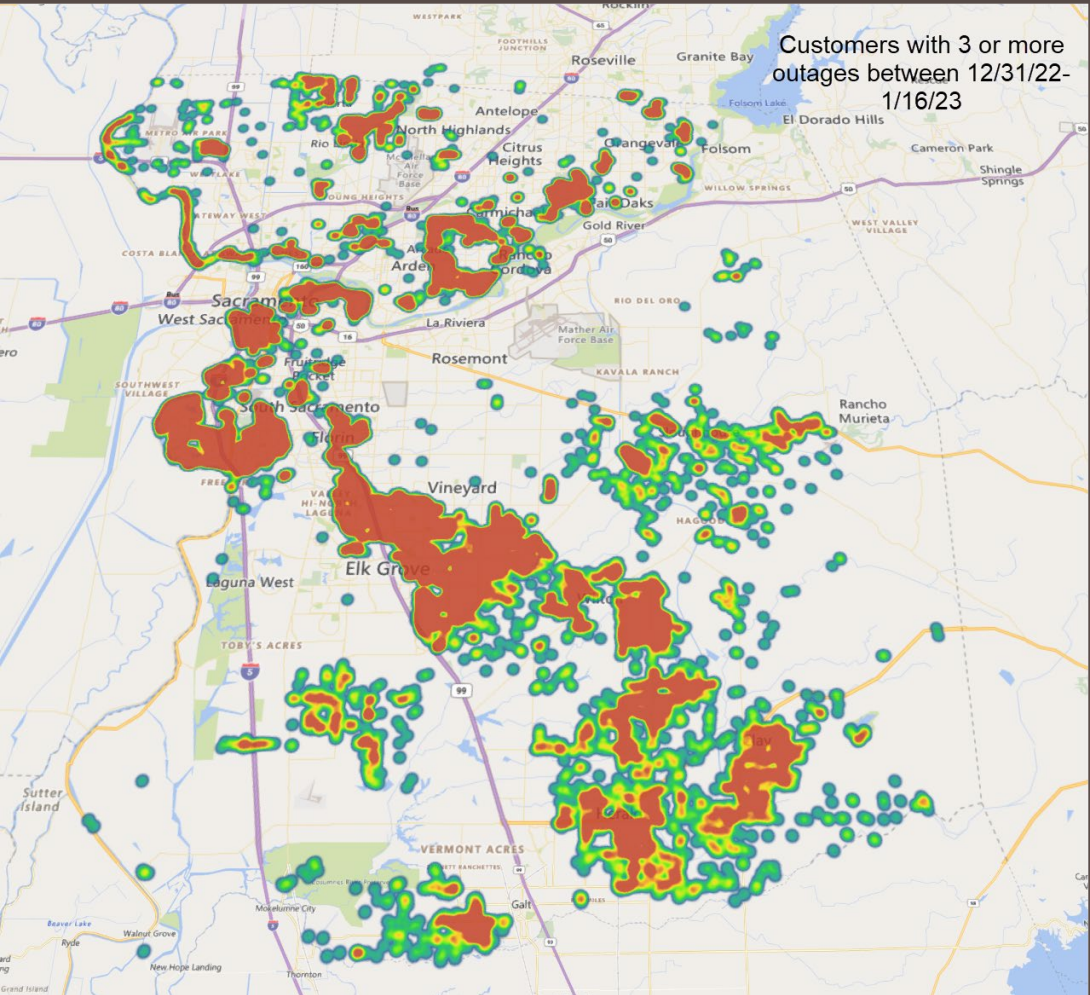
Number of customers with 3 or more outages

January 2023 Storms – Historical Comparison

Unprecedented string of storms caused the most significant damage to SMUD's system, ever.

	Jan. 4-7, 2008	Jan. 26-30 2021	Dec. 31, 2022 – Jan. 16, 2023
Sustained Wind (mph)	58	50	49
Wind Gust (mph)	70	67	64
Customers Impacted	492,156	254,579	632,227
% Customers Restored within 24 hours	95%	93%	93%
# of Single Customer Outages	378	146	**941**
# of Wire-Down Events	320	501	**1,262**

Board Strategic Development Committee and Special SMUD Board of Directors Meeting   SMUD®

January 2023 Storms - Response

- Largest response effort in SMUD's history

- 24/7 emergency operations for 17 days

- Mobilized additional Make Safe, Maintain Safe, and Vegetation Management crews to conduct damage assessments

- Mobilized additional staff to support DSO and field operations

- Over 100 crews worked around the clock including 39 contract crews & mutual aid from other utilities– the most ever in SMUD's history

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Mutual Assistance - Thank You!

Customer Care and Communications

- Around the clock Contact Center support

- Commercial customer outreach

- Support provided to our most vulnerable customers

  - Partnered with Raley's and the Salvation Army to deliver essentials

Customer Care and Communications

Frequent messages were sent based upon field conditions:

- 32 separate outbound call campaign scripts
- 12 IVR messages
- 5 News releases
- Dozens of media interviews
- 150 Social media posts
- 21 different Web alerts
- Personal outreach to business customers and government stakeholders
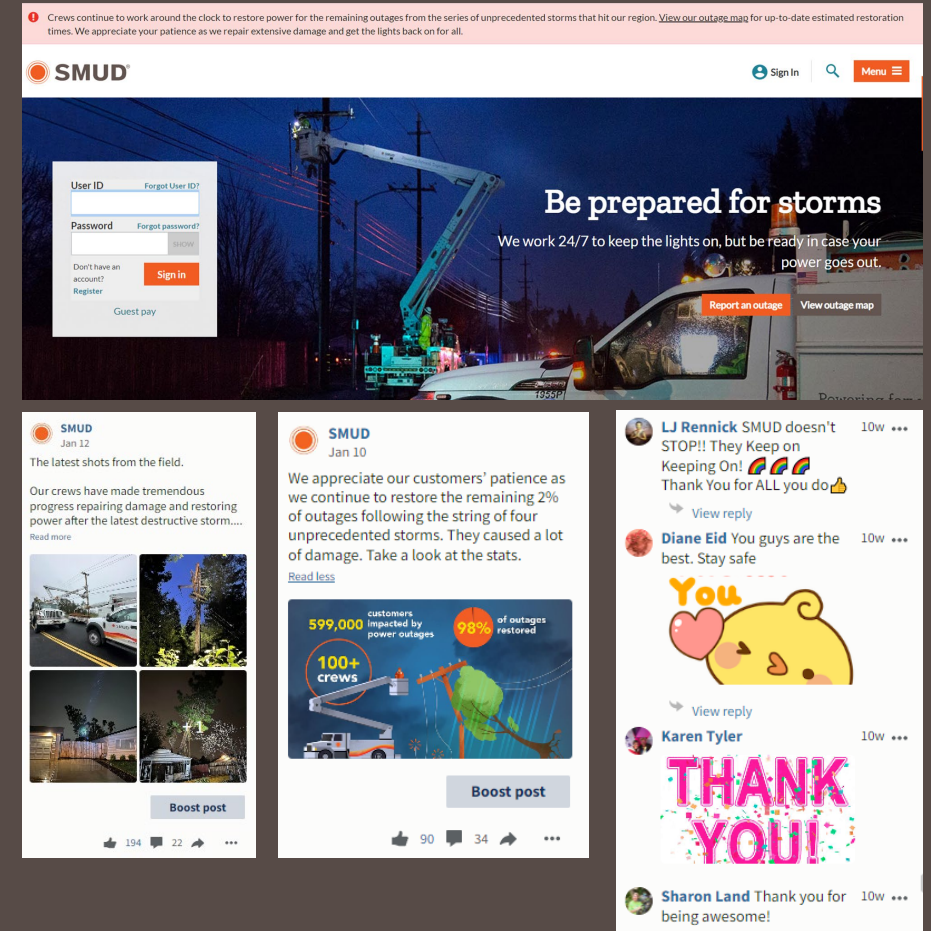
Emergency Operations – Improvement Areas

| Storm Preparation | Outage Reporting | Patrol, Damage Assessment, Isolation & Power Re-route | Prioritization | Repair work | Power Restoration |

Customer Communication
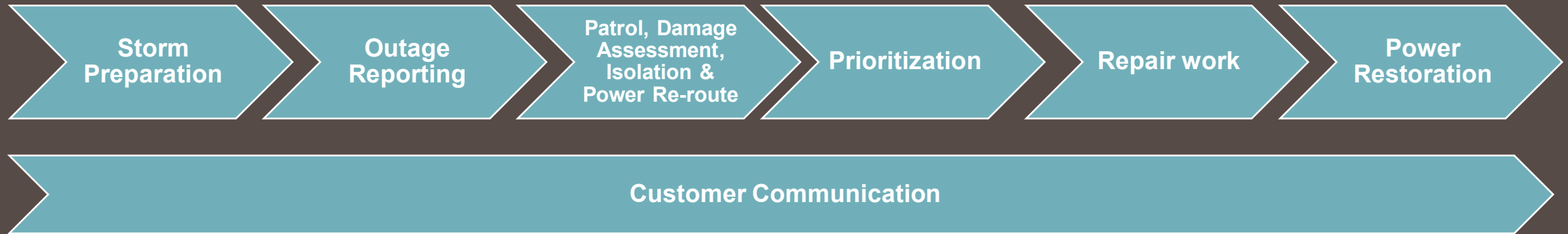
- Accuracy of outage data
- Accelerating damage assessments
- Method for calculating and communicating estimated restoration times (ERTs)
- Restoration priorities
- Central hub – status of outages and crews, across all assignments
- Customer communications

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Best Practices Benchmarking

Research - Technologies and Products & Services

Accelerate Damage Assessments

- Automated crew callout solutions

- Personal voltage detector

- Contract crews for damage assessment, vegetation management, and repair work

- Drone technology

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Emergency Operations – Current Improvements

Launched Enterprise-wide Team, with three current sub-teams

- Damage Assessments
  - Identified additional resources for Make Safe functions and damage assessments
  - Significantly expanded list of available workers for Maintain Safe functions
  - Streamlined tag creation and management
- Estimated Restoration Times (ERTs)
  - Created method for estimating longer-range ERTs based on workload and crew availability
  - Enhancing storm communications plan
- Restoration Prioritization
  - Defining categories of critical customers
  - Identifying specific customers
  - Designing data flow to manage critical customers during storm

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Current Improvements

Storm Preparation	Outage Reporting	Problem Isolation & Re-route Power	Damage Assessment	Prioritization	Repair & Restoration

Storm Preparation
- Increase staff on call
- Outbound calls to commercial developers
- Customer notes for fringe-area service customers
- Automating process for bringing staff on call
- Training and Procedures

Outage Reporting
- Create QA feedback loop on tag creation
- Refine tag types that can be created
- Configuration and process changes in OMS to reduce erroneous records
- Increase tag sweep staff to validate outages
- Create outage tag for wire down all out (will show on map)

Problem Isolation & Re-route Power
- Increased from 2 to 24 make safe crews
- Support DSO with 5 engineers to dispatch more crews
- Use QEW Maintain Safe crews to evaluate Service Outages
- Use Line Inspectors to evaluate Service Outages

Damage Assessment
- Increased from 15 to 30 maintain safe crews
- Vegetation and Maintain Safe crews can proactively select jobs
- Deployment of personal safety tool to allow more crews in field

Prioritization
- Prioritize outages based on customer count and outage duration
- Prioritize critical customer types
- Update definitions of critical customers
- Pre-identify critical customers

Repair & Restoration
- Setting up pre-arranged storm contracts
- Revising field clearance process

Customer Communication

- Create ERT Monitor role
- Predictive ERT model
- Storm Communication Schedule
- Publish crew status to outage map

Legend:
- In Progress
- Completed

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Current Improvements – Storm Preparation

| Storm Preparation | Outage Reporting | Problem Isolation & Re-route Power | Damage Assessment | Prioritization | Repair & Restoration |

Completed

- **Increased number of staff on call** – Troubleshooters, Dispatchers, Line Workers, Vegetation Management, Support Staff
- **Outbound calls to commercial customers** – Let them know processes for new services/upgrades may be disrupted
- **Customer Notes for Fringe Service Agreements** – Proactively identify customers whose outages require repair by third parties, to route their calls appropriately

In Progress

- **Use automated tools for on call staff notification** – Automate the calling of 100+ employees
- **Training and Procedures** – Revising training to increase pool of qualified storm workers; increasing scope of work each group can handle
- **Mock Storm** – Planning mock storm event in September/October to ensure staff and management get hands on experience on systems and procedures prior to storm season
- **Activation Levels** – Reviewing response levels for various storm sizes, and how activation level is communicated across the organization.

Customer Communication

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Current Improvements – Outage Reporting

Storm Preparation	Outage Reporting	Problem Isolation & Re-route Power	Damage Assessment	Prioritization	Repair & Restoration

Completed

- **QA Feedback Loop** – Improve quality and accuracy of outage event creation through continuous improvement and targeted training, with same-day feedback to respond to changing error types.
- **OMS Configuration and Process Changes** – changes resulted in fewer duplicate and erroneous records being created and increased system performance.
- **Increase Tag Sweep Staff** – Tag sweep staff validate outage information and help remotely detect the scope of an outage, allowing for faster damage assessment.

In Progress

- **Refine tag types –** Will reduce data entry errors and allow faster sorting and dispatching of tags to appropriate work groups.
- **Wire down outage tags** – Creating outage tags for these events will increase visibility in the outage map.

Customer Communication

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Current Improvements – Problem Isolation & Damage Assessment

| Storm Preparation | Outage Reporting | Problem Isolation & Re-route Power | Damage Assessment | Prioritization | Repair & Restoration |

Completed

- **Increase Make Safe Crews** – augment troubleshooter resources to isolate problems and re-route power, to minimize number of impacted customers. Breaking up line crews allows an increase from 2 crews to 24 Make Safe crews available at the start of storm.
- **Increase from 15 to 30 Maintain Safe Crews** – Increasing the dispatch and crew capacity allows for more rapid collection of data on damaged equipment, accelerating ERTs.
- **Support DSO with engineers** – Additional support offloads some task from DSO and allows DSO to direct more crews to isolate problems and re-route power.
- **Proactive job selection –** crews self-assigning their own work allows DSO to dispatch more crews.

In Progress

- **Service Outage Assessment** – Electrically trained maintain safe crews and line inspectors can be used to assess service outages, reducing workload for troubleshooters and make safe crews.

- **Deploy new safety tool –** Using additional safety technology that can detect presence of live wires increases safety of damage assessors who are not regularly deployed to the field.

Customer Communication

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Current Improvements - Prioritization

Storm Preparation	Outage Reporting	Problem Isolation & Re-route Power	Damage Assessment	Prioritization	Repair & Restoration

Restoration Priorities
1. Public and Employee Safety
2. Reliability of the SMUD's Transmission and Distribution System
3. Repair/replacement of system components that allows restoration to the largest number of customers, including essential and critical customers
4. Single customer outages

Customer Communication

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Current Improvements - Prioritization

Storm Preparation	Outage Reporting	Problem Isolation & Re-route Power	Damage Assessment	Prioritization	Repair & Restoration

Completed

- **Prioritize based on customer count and outage duration** – Developed algorithm that automatically sorts outages based on number of customers are out and how long they have been out. This replaces manual prioritization and job selection.
- **Prioritize critical customers** – Algorithm takes into account critical customer types (pumps, hospitals, schools, etc.) to ensure timely repairs and restoration.

In Progress

- **Pre-identify critical customers** – Collecting information on critical customers and storing it in our customer systems allows for automatic prioritization of critical customers, rather than relying on manual escalation. Manual escalation can still be used as needed during a storm.
- **Review and update critical customer categories** - A comprehensive review of critical customer categories ensures key services are maintained during a storm. New prioritization algorithm allows more precise prioritization.

Customer Communication

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Current Improvements – Repair & Restoration

Storm Preparation → Outage Reporting → Problem Isolation and Re-route Power → Damage Assessment → Prioritization → **Repair & Restoration**

Completed

- Improvements in other areas will improve crew readiness and data accuracy, improving restoration.

In Progress

- **Pre-arranged storm contracts** – Having pre-arranged contracts allows for faster response from contract crews at the time of a storm, and increases total pool of available resources.
- **Revising field clearance processes** – Allowing field crews to perform certain work with modified clearance procedures will increase speed of work and allow DSO to manage more crews.

Customer Communication

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Current Improvements – Customer Communication

| Storm Preparation | Outage Reporting | Problem Isolation & Re-route Power | Damage Assessment | Prioritization | Repair & Restoration |

Completed

- **ERT Monitor** – Putting dedicated staff to monitor ERTs helps ensure ERTs are accurate and not missed.
- **Predictive Model for ERTs –** Prior ERT model was based primarily on outage type. New ERT model takes into account customer prioritization, crew availability, and damage assessment information from field.

In Progress

- **Storm Communication Schedule** – Improving internal coordination will ensure customers have access to the best information SMUD has about their outage.
- **Crew Status on Outage Map** – Publishing the status of job assessment and crew assignment will provide customers with a better sense of the progress made, and the factors that could move the ERT.

Customer Communication

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Emergency Operations - Work to Date Customer Care & Communications

Continued implementation of the Customer Outage Communications Roadmap.
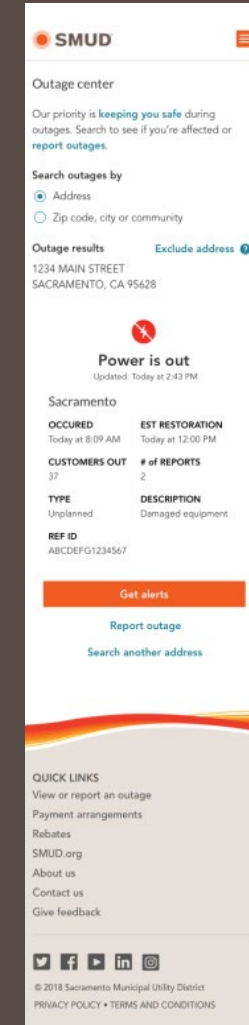
Enhancements completed since the January storms:

- Mobile app push notifications

- Digital Emergency Operations – notifies customers we are prioritizing outage related inquiries

- Outage text and e-mail alerts now sent 24 hours a day

- Outage details now shared in Interactive Voice Response (IVR) to mirror MyAccount experience (outage cause as an example)
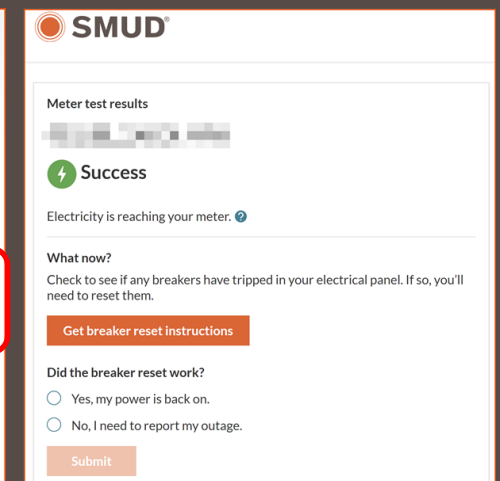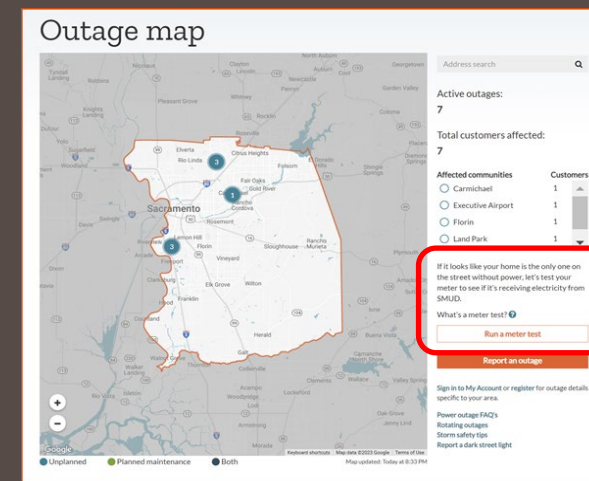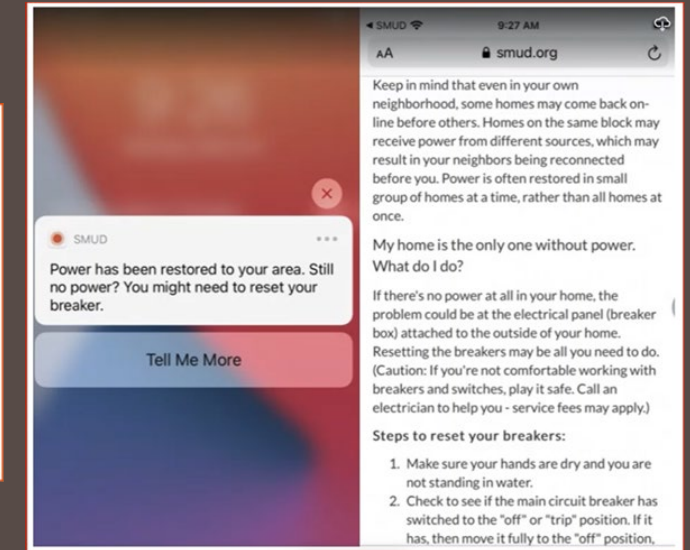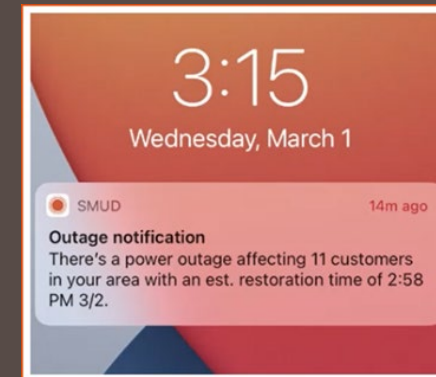
Emergency Operations – In Progress
Customer Care & Communications

- Make it easier for customers to sign-up for and maintain outage communication preferences

- Two-way texting for outage reporting and updates

- Unauthenticated address search on outage map – to see if power is out at a particular address

- Outage map user experience design improvements

- Improve claims process

- Crew status

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New Outage Management System (OMS)

Improved Customer Experience:

- Advanced Estimated Restoration Time (ERT) features and functionality
- Availability of meaningful data for better job and crew status visibility and customer communications
- Deliver dashboards and improved reporting
- Transparency & collaboration

Operational Excellence & Efficiencies:

- Attachments via mobile app (e.g. photos of storm damage)
- Enhanced Advanced Meter Infrastructure (AMI) integration for verifying customer restoration
- Ability to assign multiple jobs to the same multiple set of crews
- Support planned outages to allow for pro-active communications

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Resiliency Considerations

Continue Robust Vegetation Management

- Pruning
- Targeted Tree removals
- Targeted Tree replacement

Distributed Energy Resources – Batteries

Targeted Undergrounding

- ~ 10,700 miles of lines: ~ 6,900 miles (64%) underground, ~3,800 miles overhead
- ~ 144,000 poles
- > $7.6 billion to underground 3,800 miles of overhead lines (> $2 million/mile)
- Impacts to affected property owners (e.g: convert existing electrical panel to take underground service; provide space on property for above ground equipment)
- Does not eliminate all outages (e.g. flooding, damage from excavations)

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Questions?