

# ATC/USGS Seismic Hazard User-Needs Workshop Pacific Gas and Electric - Gas and Electric Systems

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USGS – Menlo Park  
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# *Earthquake Risk Management California Requirements*

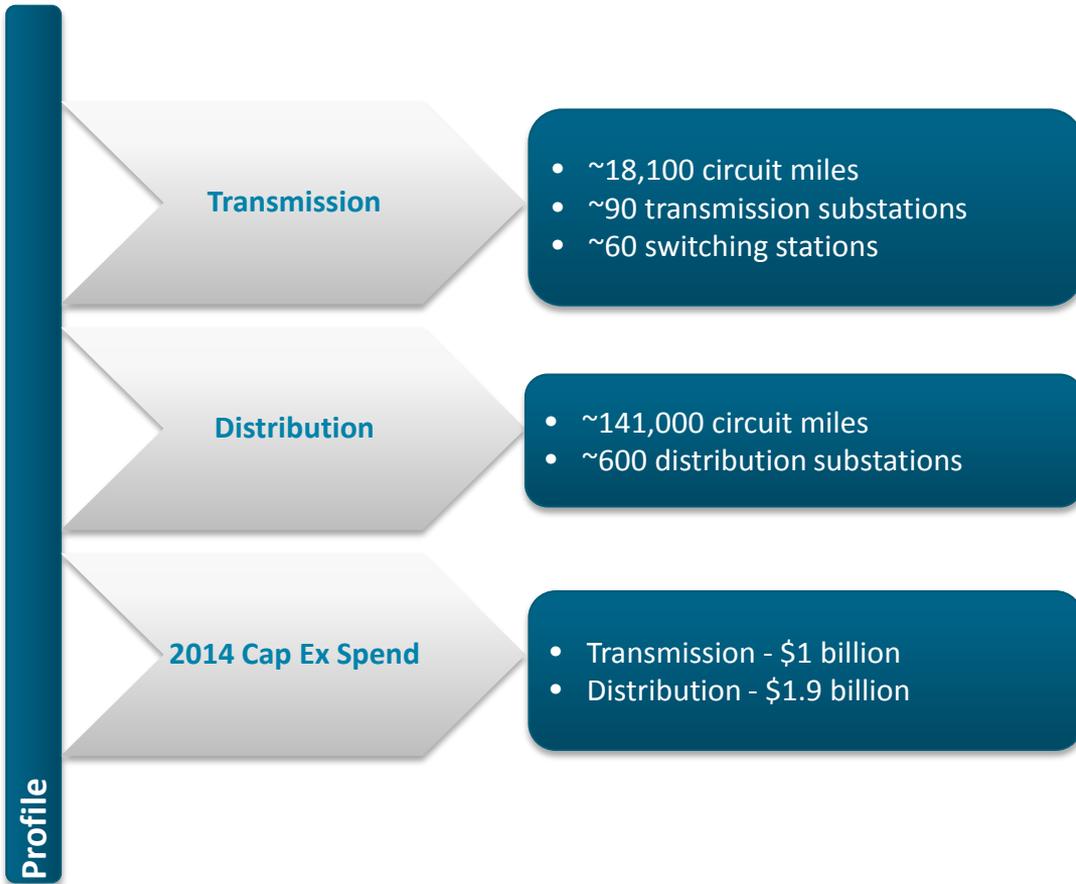
- **Policy to manage earthquake risks**
  - **Program to understand hazards and system vulnerabilities**
  - **Plan to implement risk mitigation options**
  - **Dedicated staff**
  - **Dedicated budget**
  - **Accountability**
- 
- *California Seismic Safety Commission/CPUC Safety Branch*

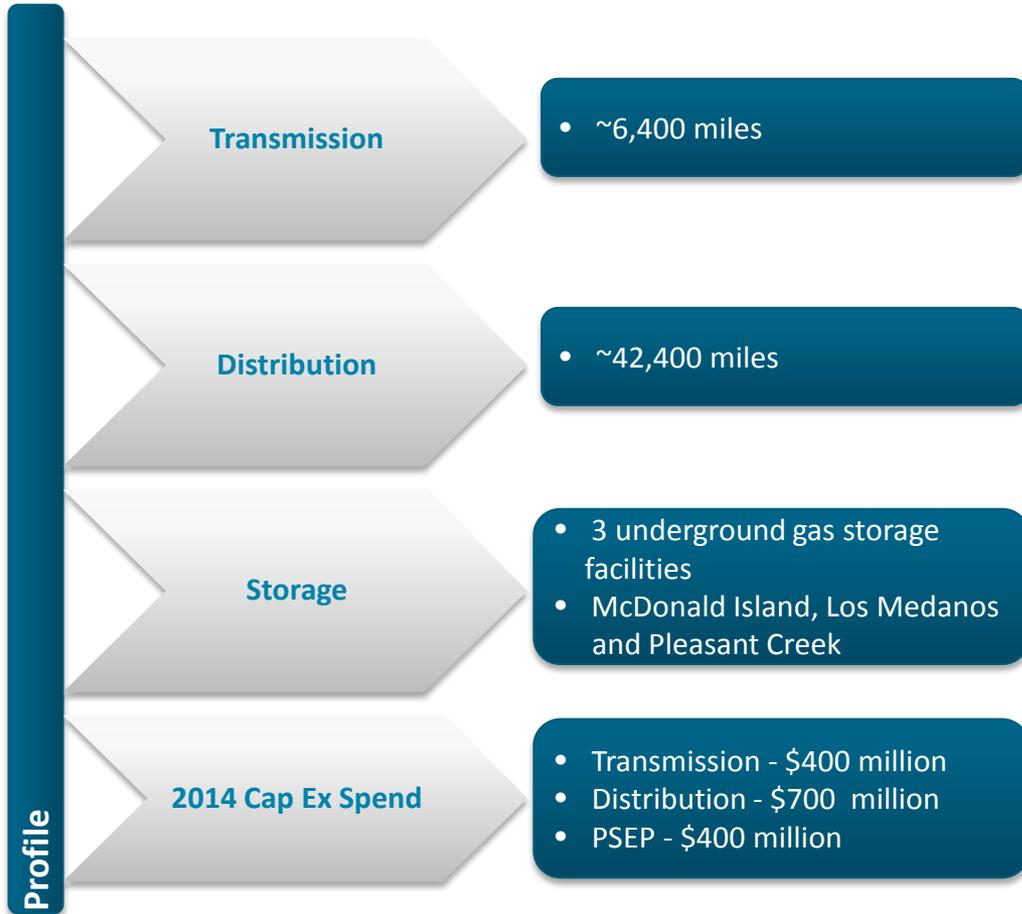
# About PG&E

**Pacific Gas & Electric Company, a subsidiary of PG&E Corporation, is one of the largest natural gas and electric utilities in the U.S.**

- ~22,000 employees provide gas and electric service to ~16 million people throughout a 70,000 square mile service area
- 5.2 million electric customer accounts
- 4.4 million natural gas customer accounts
- Electric generation (gas and hydro), gas storage, transmission and distribution









# Investing in Our Infrastructure

## Capital Expenditures 2014-2016



\* Range reflects recent regulatory decisions, current or planned regulatory filings, and historic spending patterns and includes ~\$400 million in 2015 and ~\$300 million in 2016 (\$689 million total) for estimated capital disallowed in April 9 final penalty decision.

<sup>(1)</sup> 2014 recorded capex includes ~\$400 million that has already been reserved for PSEP capital that exceeds authorized amounts.

*See the Safe Harbor Statements for factors that could cause actual results to differ materially from the guidance presented and underlying assumptions.*

# How Does PG&E Currently Use (or Not) Hazard Information from the USGS National Seismic Hazard Maps

## Buildings

- Pre - "maps" retrofits
  - Deterministic e.g. M7.8 San Andreas
  - Median for LS or IO, 1-sigma for CP
  
- Post - "maps" retrofits
  - ASCE 41 or other prescriptive methods
  - Advanced Seismic Assessment Guidelines
  
- New construction
  - California Building Code
  - Seismic Risk Categories II, III, IV



# How Does PG&E Currently Use (or Not) Hazard Information from the USGS National Seismic Hazard Maps

## High Voltage Electric Equipment

- **New Equipment**

- IEEE 693 Standard
- High, Medium, and Low Hazard Zones
- Use Hazard Maps to determine which bin

- **Anchorage Retrofits**

- California Building Code



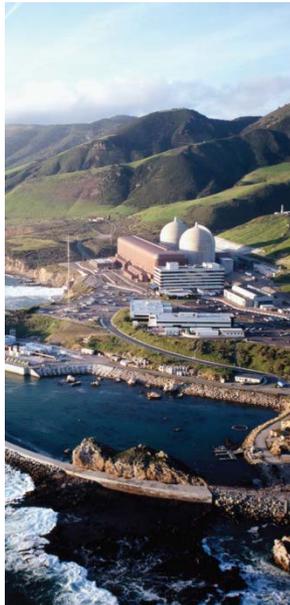
# How Does PG&E Currently Use (or Not) Hazard Information from the USGS National Seismic Hazard Maps

## Dams



- **Currently Deterministic**
  - DSOD and FERC establish criteria
  - Median for low slip rate faults
  - 1-sigma for high slip rate faults
  
- **Future PSHA Framework**
  - PG&E fault file
  - SSC and GMC logic tree models
  - Uncertainty is included

# How Does PG&E Currently Use (or Not) Hazard Information from the USGS National Seismic Hazard Maps



## Other Generation

- **Nuclear**
  - Recent Seismic Hazard Re-evaluation use a PSHA using an updated SSC and GMC as inputs
  - Current Licensing Basis is a M7.5 Hosgri earthquake, 84<sup>th</sup> percentile ground motions
  - 10,000-year return period ground motions
  
- **New Fossil Power Plants**
  - California Building Code



# Ideas for Future Development of Hazard Mapping

## • Geo-Hazards

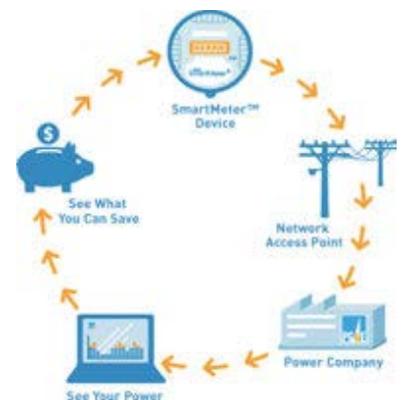
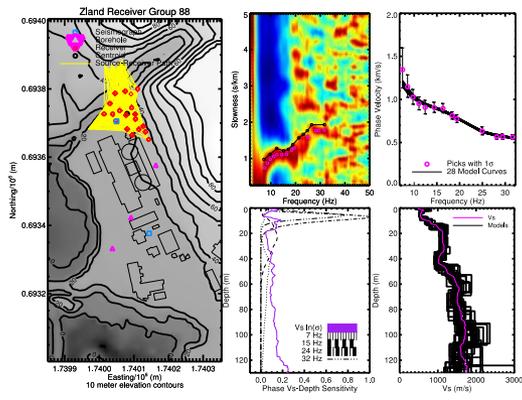
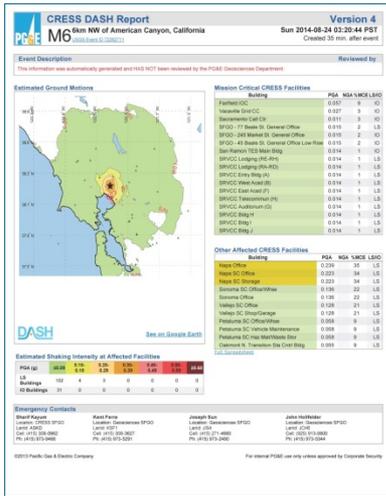
- Probabilistic fault displacement
- Probabilistic landslide displacement
- Liquefaction hazards – lateral spread contours

## • Path Effects

- Site specific factors
- Denser array of sensors

## • Scenario Earthquakes

- More EQ scenario ShakeMaps
- Geo-Hazard scenario maps



# Thank You

