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# Climate Adaptation at SoCalGas and SDG&E

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# Climate Adaptation – Risk Approach

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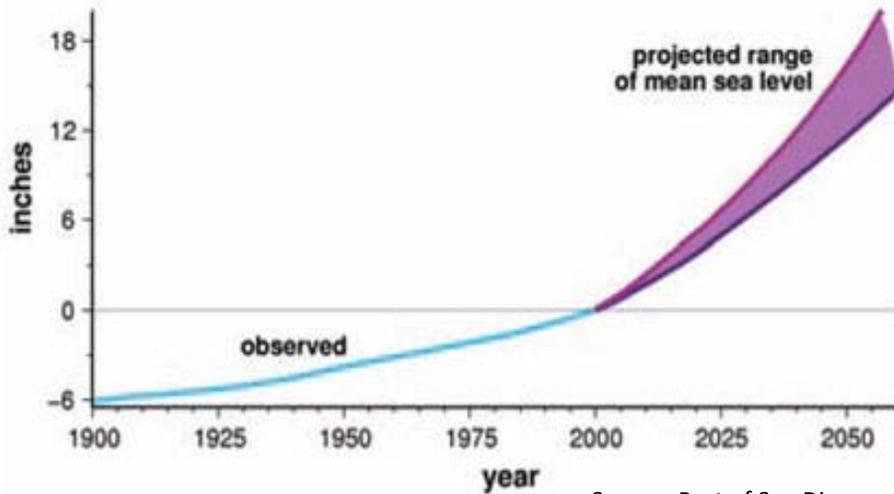
- Link between climate change and key enterprise risks.
  - Drought increases wildfire risk; sea level rise increases infrastructure integrity risk; extreme temperatures increase natural gas supply risk
- Risk Management:
  1. Identify risks through research and data collection
  2. Consider climate change in risk-informed decisions
    - Internal education efforts
    - SoCalGas natural gas system adaptation efforts
    - SDG&E South Bay Substation
  3. Share knowledge and collaborate with community partners, customers, and other stakeholders



# Risk Identification: Data Analysis Indicates Greater Frequency of High-Risk Events (Sea Level Rise & Flooding)

- Data indicates sea level rise is occurring and studies from the Port of San Diego project the trend to continue. (Source: Port of San Diego)

Projected sea level rise for San Diego County coastline over the next several decades



Source: Port of San Diego



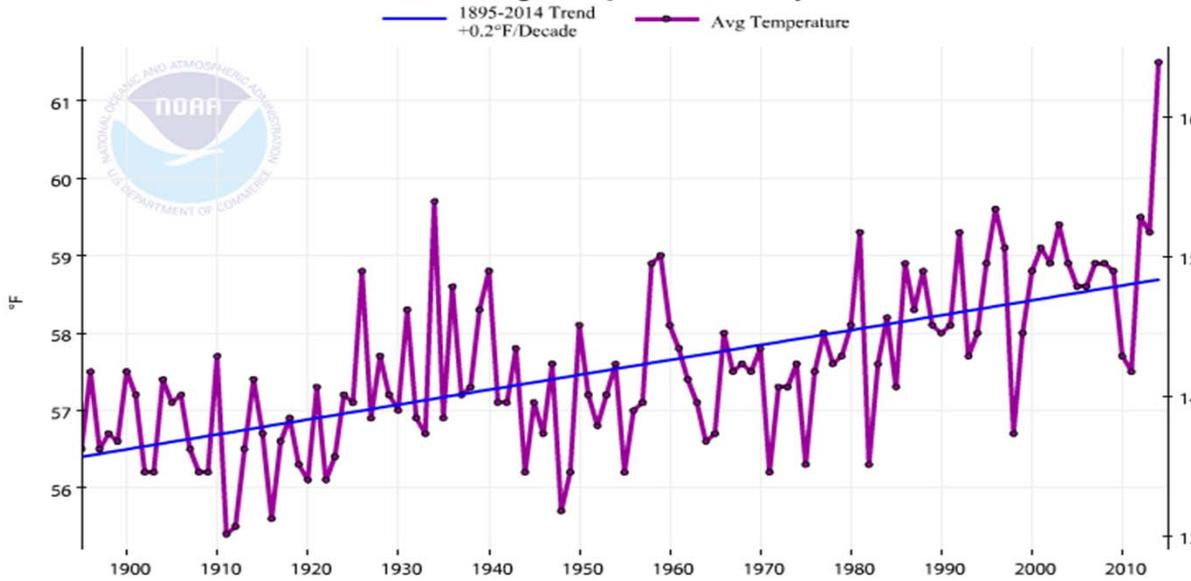
- More frequent high waves and rough surf will increase the potential for significant coastal damage. (Climate Collaboration Partners)



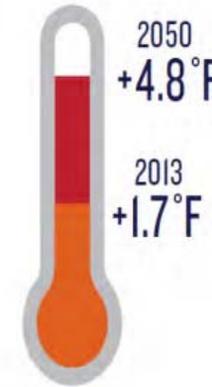
# Risk Identification: Data Analysis Indicates Greater Frequency of High-Risk Events (Large Climate Swings)



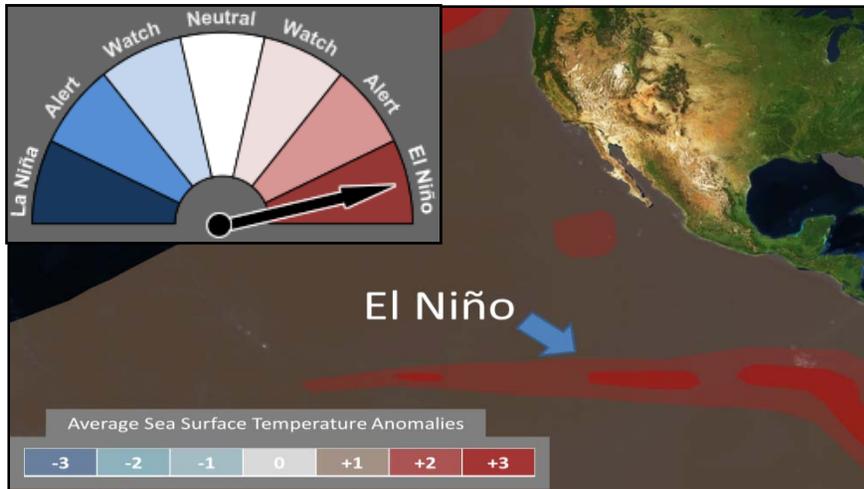
California, Average Temperature, January-December



ANNUAL AVERAGE TEMPERATURE IS INCREASING AND WILL CONTINUE TO INCREASE BETWEEN NOW AND 2050:



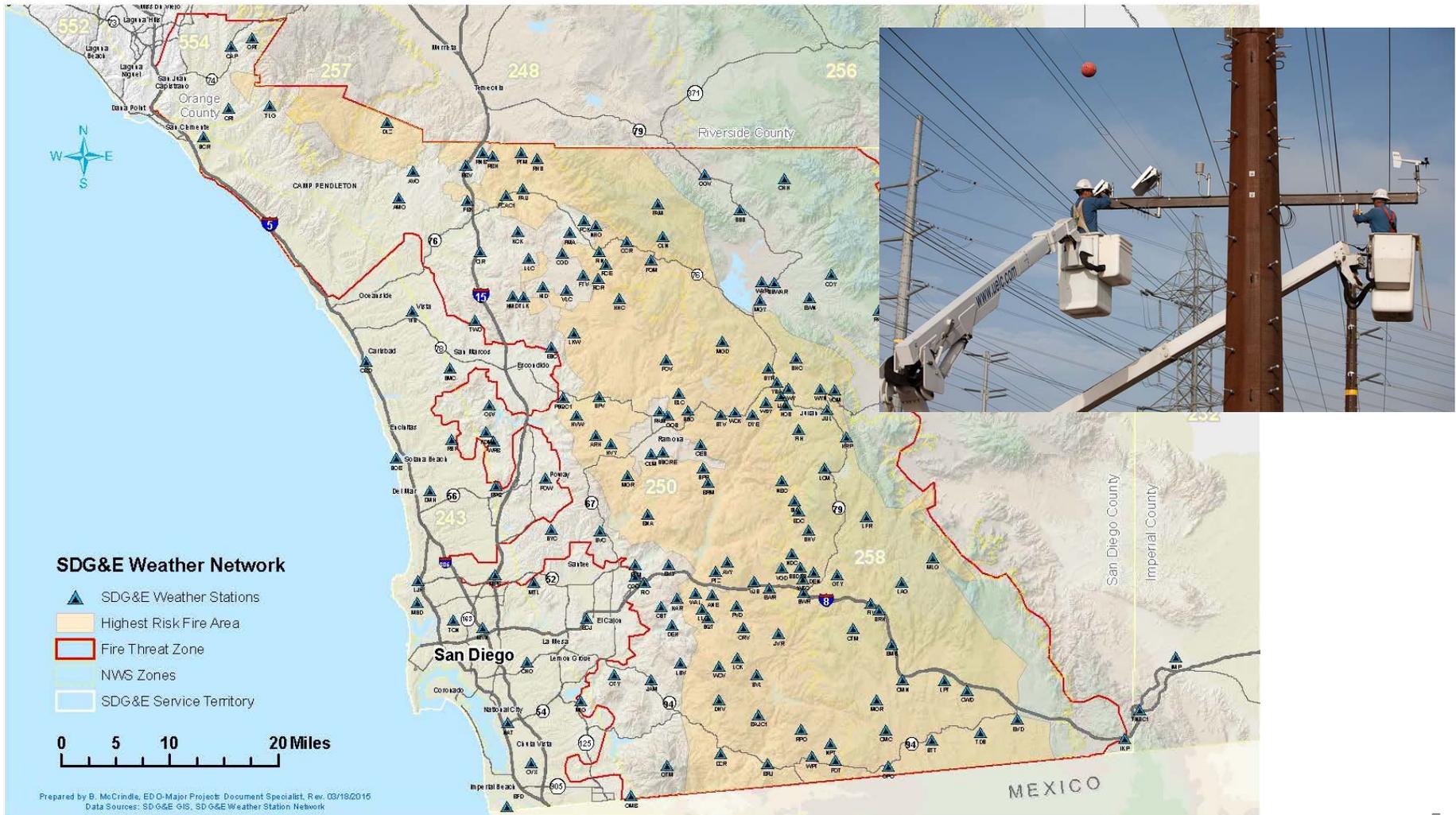
1985 BASELINE (HISTORICAL AVERAGE) (Source: Climate Education Partners)



- Rapidly increasing temperature trends are forecasted to continue, which increases demand for cooling. (Source: Climate Education Partners)
- Strength of current El Niño is indication of large climate swings continuing into the future. (SDG&E Meteorology)

# Data Collection and Analysis (Building Climate Data set)

170 weather stations and archived climate data enable measurement of climate change

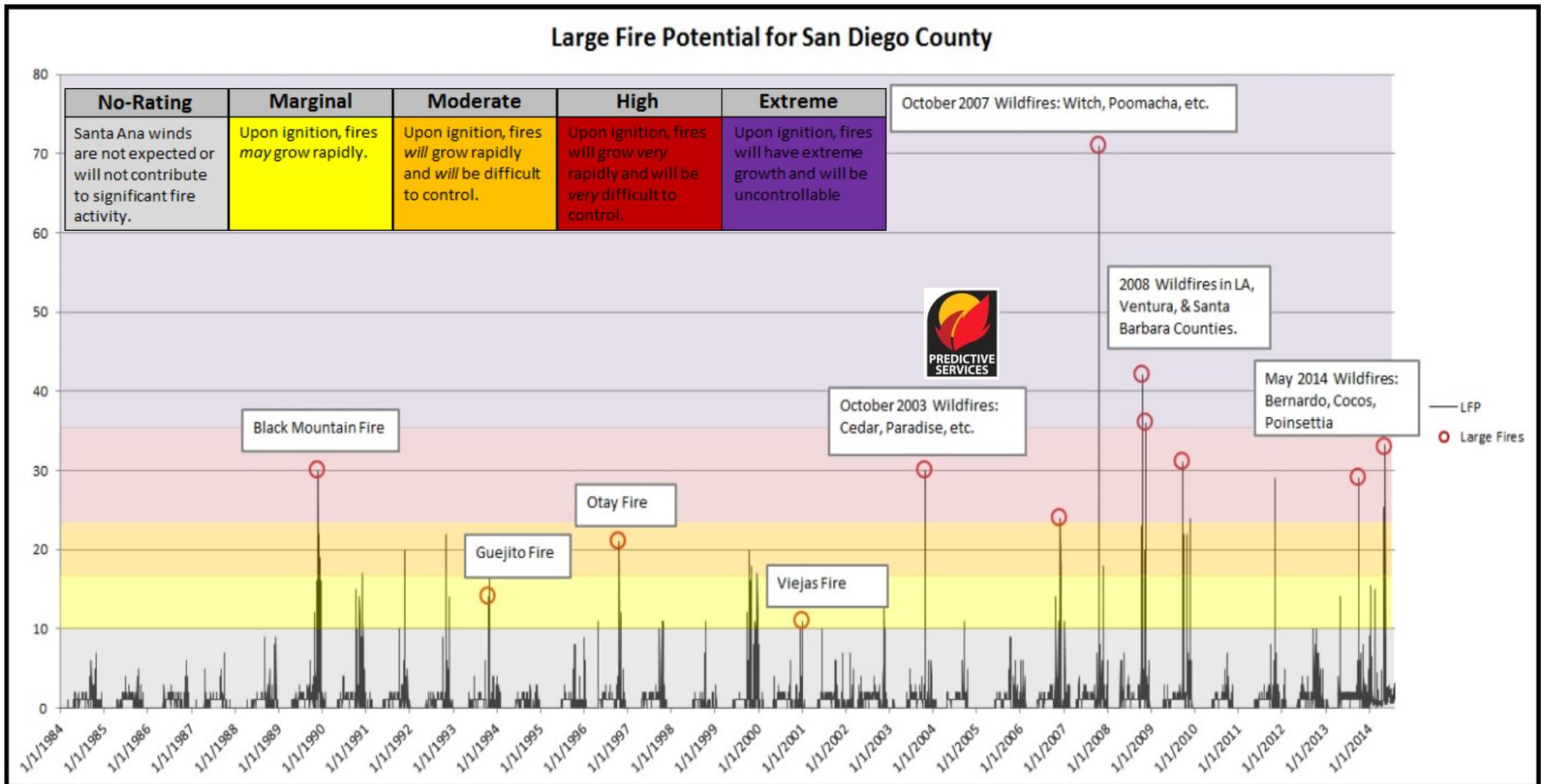




# Risk Identification: Data Analysis Indicates Greater Frequency of High-Risk Events (Drought & Fire Risk)



- Higher probability of drought years in the future, and large fire occurrences increase during drought years (Source: Climate Education Partners)



# Santa Ana Wildfire Threat Index

- **Categorizes Santa Ana winds based on fire potential, from No Rating to Extreme**
- **Used for utility system operational decisions**
  - Protocols
  - Internal fire crews
- **Responders resource planning**
- **Science being integrated back into the community**
  - Fire Agencies
  - General Public
- **Serves as a model for future collaboration and adaptation tools**



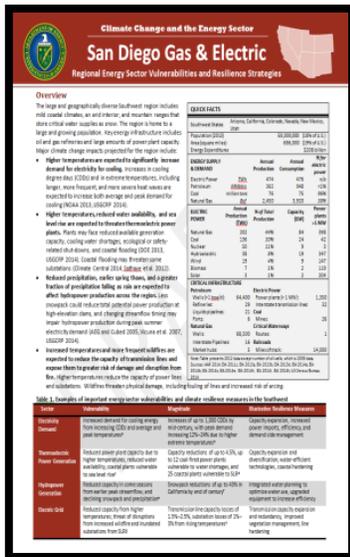


## CEC Sea Level Rise Grant Request

- Models sea level rise and maps to assets

## SDG&E Climate Vulnerability Report

- Provides info to determine threats to system



## Climate Advisory Group Cross Internal Team

- Advances company wide resilience strategies

# Adaptation Solutions—Natural Gas Systems

## Early Warning, Monitoring and Remediation Options are Key

- **Detection Sensors & Monitoring Technologies**
  - Strain gauges
  - Satellites
- **Impacts and Remediation for Landslides**
  - **Landslides may cause excessive compression or bending stress to cause pipes to yield or fail.**
  - **Remediation Options:**
    - improving drainage systems
    - Installing **Tie back**, Geo-Fab, retaining wall, and/or riprap/vegetation systems
    - Relocating pipeline below the slide plane

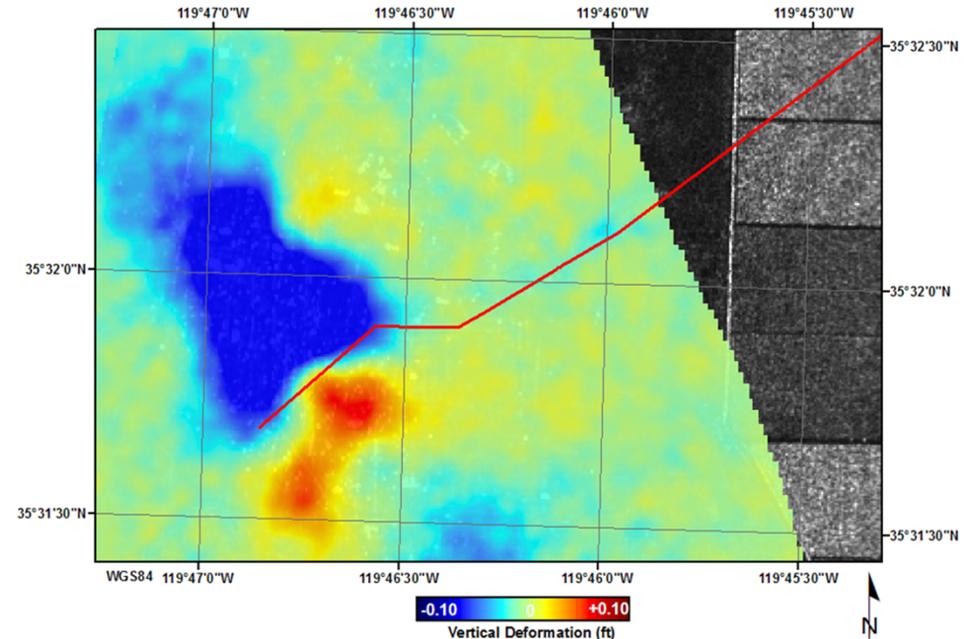


Example landslide tieback system



# Pipeline Geohazard Risk Reduction Early Warning & Monitoring Using Radar Satellites

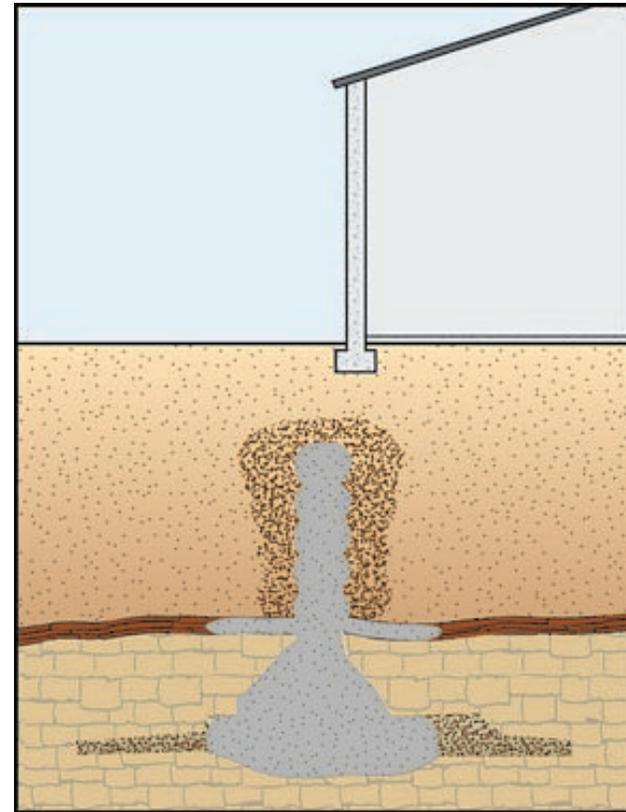
- **Industry champion of satellite technology** applications for pipeline geohazard detection and monitoring
- **Applications:** ground subsidence and asset security monitoring, route planning
- **Offers Early detection** of potential outside force threats throughout pipeline lifecycle
- **Monitors Ground Surface Changes** after extreme weather events
- **Provides broad area assessment** following major earthquakes



# Adaptation Solutions—Natural Gas Systems

## Other Climate Change Impacts & Remediation Options

- **Flash Flood**-may damage aboveground structures or expose buried pipes, causing corrosion
  - Alter/create channel/drainage path
  - Use protective structural wall and/or retention pond
  - Bury deeper
- **Subsidence**-may cause excessive stresses from loss of support beneath pipeline
  - Known areas of subsidence (mines, landfills, etc.) can be grout filled
  - Underground water management to mitigate earth erosion under pipeline



Graphic of grout filling void due to subsidence



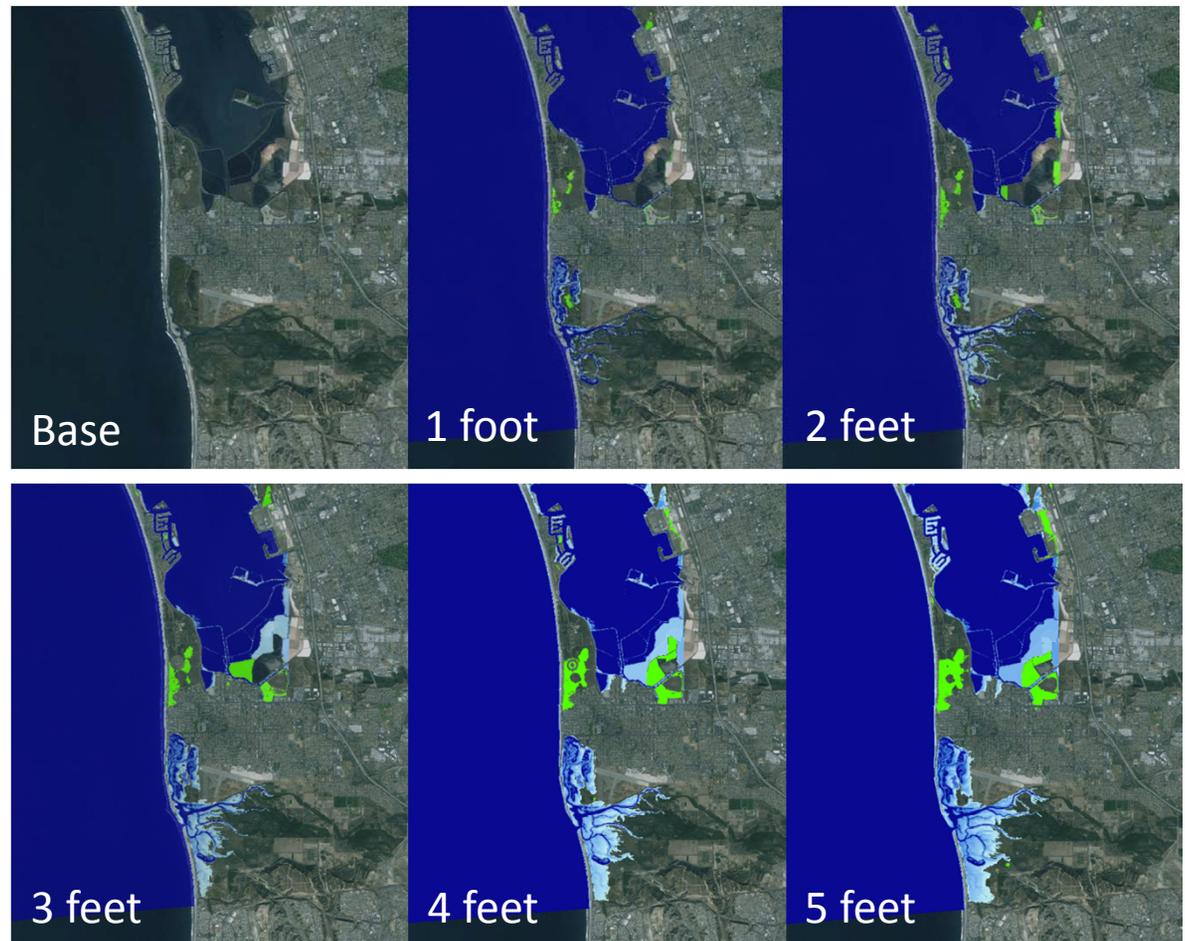
# Climate Adaptation at South Bay Substation

## Designed for aggressive forecast of sea level rise

- Site graded to an elevation of 16 to 21 feet above mean sea level
- If the most aggressive predictions of sea level rise are realized (4.6 feet), South Bay Substation would still be 4 feet above the projected sea level in 2100

**This project is currently leveraging recycled water to be drought adaptive**

**Serves as a model for future construction projects**



➤ Images Above: <http://toolkit.climate.gov>

Projections of 1-5 foot sea level rise near Imperial Beach.



# Knowledge Sharing and Collaboration with Agencies & Community Stakeholders



- SoCalGas conducts regular outreach to first responders for general emergency planning, including climate related natural disasters.
- Through the Energy Resource Center, SoCalGas offers training and workshops to address issues such as water conservation and equipment efficiency.
- SDG&E works with 53 first responder agencies including American Red Cross, 2-1-1 San Diego, San Diego Fire Chiefs' Association and The Burn Institute to support disaster preparedness.





# Knowledge Sharing and Collaboration with Agencies & Community Stakeholders (Cont'd)



SDG&E is an initial member of the DOE's **Partnership for Energy Sector Climate Resilience**.

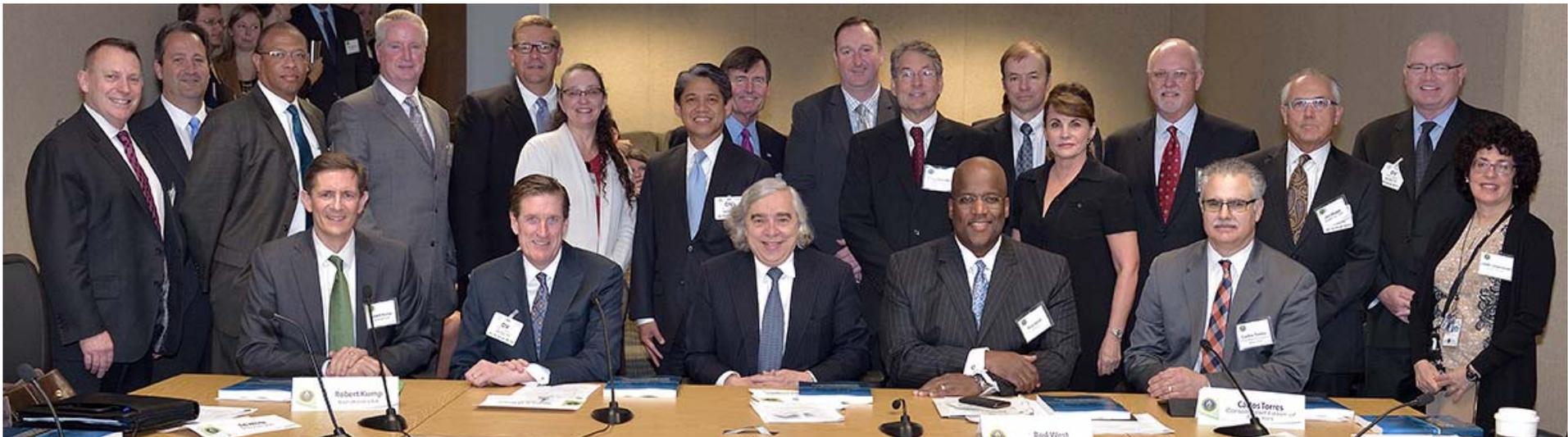
Member of a sea level rise focused network for public agencies that serve the San Diego region



SDG&E hosted climate adaptation seminars educating regional leaders on current initiatives

U.S. Department Of Energy, SDG&E Partner To Improve Resiliency Of Nation's Electric Grid

Recommend 0





# Additional Research and Changes Needed



- Work with DOE, CEC and NOAA to develop maps focusing on climate projections such as sea level rise, flood elevations, drought, and heat projections to support design standards.
- Funding to conduct a cost-benefit analysis for climate adaptation investments (e.g., estimating benefits from resilience investments, non-climate co-benefits, and costs of inaction)
- Development of appropriate metrics (e.g., for damage, performance, blue sky versus extreme event)
- Resilience design standards, either related to technical information (e.g. sea level rise projections, flood elevations) or equipment performance standards.
- Expanded use of recycled water through changes in regulation

