

# Performance Based Earthquake Engineering and Assessment Tool for Gas Storage and Transmission Systems

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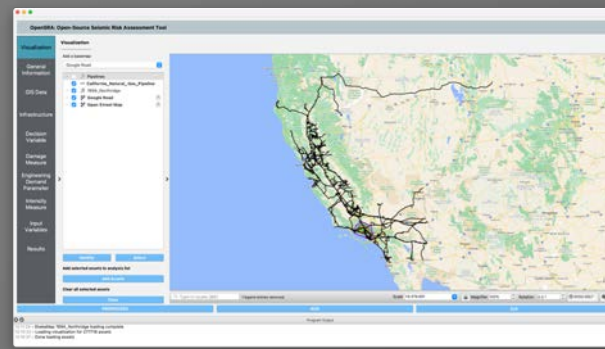
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# Project Description

- Funded by the California Energy Commission (CEC) – 2020 to 2022 (end of this year)
- Principal Investigators:
  - Jonathan Bray (UCB), Norman Abrahamson (UCB), Jennie Watson-Lamprey (Slate)
- Goal:
  - Develop a quantitative seismic risk methodology using probabilistic data to evaluate and manage the seismic risk for natural gas storage and pipeline systems.
- Deliverables:
  - Updated models and methods for seismic risk assessment
    - PEER reports
  - An open-source software that will be easy to use by regulators and utility owners
    - Program, source code, user manual
  - User workshop





## Natural gas infrastructure:

- Near-surface (pipelines, surface storage and wellheads)
- Subsurface (wells and reservoir caprocks)

### 1. Method for efficient risk calculation

### 2. Guidance on technology available for monitoring and data gathering

Assess performance of infrastructure (probability of rupture, leakage)

#### Demands/Hazards:

- Strong shaking
- Liquefaction-induced deformation
- Landslide deformation
- Fault rupture and displacement

#### Component and System Response:

- Strains
- Moments
- Rotations



# Project Teams



## Hazards

### Liquefaction and Landsliding

- University of California, Berkeley (UCB)
- Dr. Thomas O'Rourke
- Lettis Consultants International, Inc. (LCI)

### Fault Displacement Hazard

- Lettis Consultants International, Inc. (LCI)

## System Fragility

### Fragility of Buried Pipelines

- University of California, Berkeley (UCB)

### Fragility of Wells and Caprocks

- Lawrence Berkeley National Laboratory (LBNL)

### Fragility of Above Ground Systems and Components

- University of California, San Diego (UCSD)
- University of Nevada, Reno (UNR)

## Other Objectives

### Monitoring Technology

- University of California, Berkeley (UCB)

### OpenSRA Development

- Slate Geotechnical Consultants, Inc. (Slate)
- NHERI SimCenter

### Efficient Risk Calculation

- University of California, Berkeley (UCB)

## General

### Project Management

- Slate Geotechnical Consultants, Inc. (Slate)

### Outreach and Upkeep

- Pacific Earthquake Engineering Research Center (PEER)

