

CUSP FOCUSED PROJECT

Regional-Scale Assessment of CO₂ Geological Storage in Sedimentary Basin Geothermal Reservoirs of Nevada

Collaboration between:

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And

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Carbon Solutions LLC



Carbon Solutions LLC

General Objectives of Project

- Perform a regional-scale assessment to fill a data gap of critical information related to Carbon Capture Utilization & Storage (CCUS) technologies to mitigate CO₂ emissions in Nevada.
- Develop an approach to regionally assess the potential that using geologic CO₂ storage in sedimentary basin geothermal reservoirs may have for increasing the states capability for CCUS.

CUSP-Specific Objectives

- Identify areas in Nevada that could be targeted for more detailed analyses either in individual basins or near traditional geothermal power plants for CO₂ Plume Geothermal (CPG) power generation.
- Apply approaches used in Nevada to regionally assess the favorability of CO₂ geological storage in other CUSP states with sedimentary basin geothermal resources.

Approach

Task 1: State-Wide Geologic Characterization

- The DRI team will create a 10-km grid resolution geospatial dataset of pertinent geologic and geothermal information to identify areas that are favorable for geologic CO₂ storage in sedimentary basin geothermal systems.

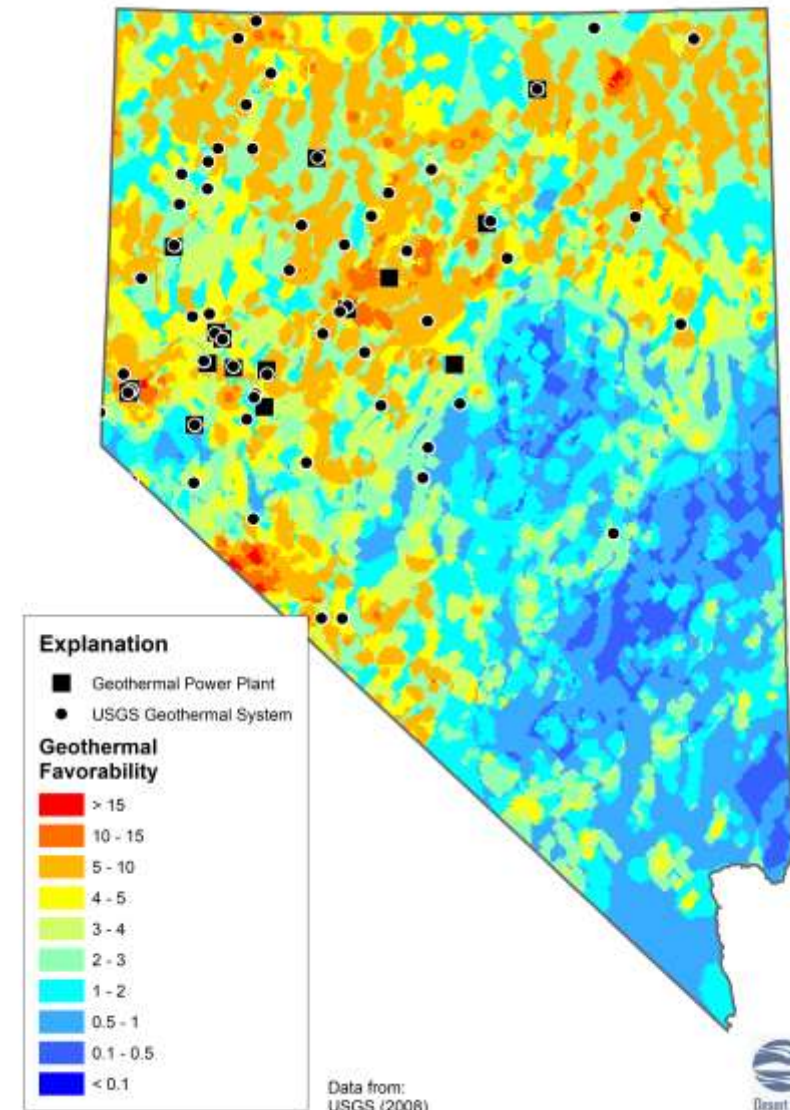
Task 2: CO₂ Plume Geothermal Assessment

- The Carbon Solutions team will use the model input data at 10-km grid scale to identify “hot spot” locations where CO₂ Plume Geothermal power plants could be deployed; and
- Estimate the power capacity and CO₂ storage at “hot spot” locations under different CO₂ policy combinations (e.g., Ogland-Hand et al., 2022).

Geothermal Setting

Northwestern Nevada has the highest geothermal favorability

- 18 operational geothermal plants
- Over 65 active geothermal systems that could be developed

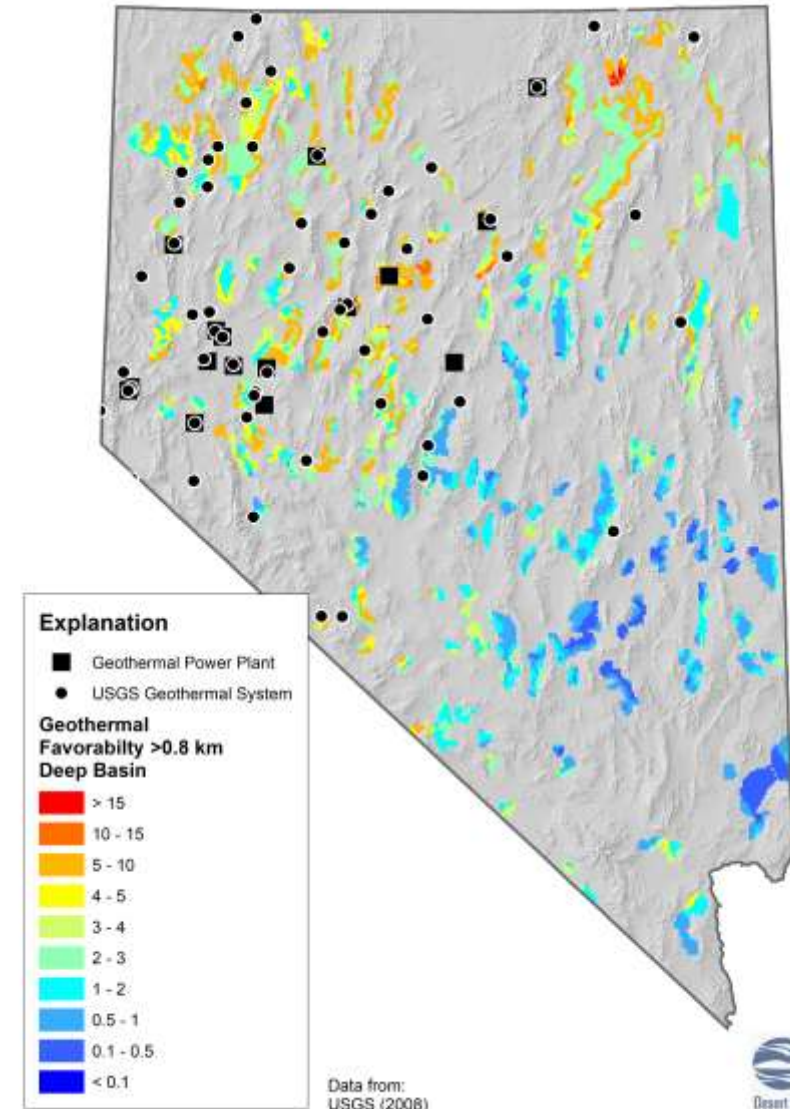


Task 1: Geologic Characterization

Analysis will be focused in sedimentary basins having depths >0.8 km to estimate saline aquifer geologic properties, including:

- Geothermal temperature gradient
- Porosity
- Permeability
- Net thickness
- Depth (i.e., pressure)

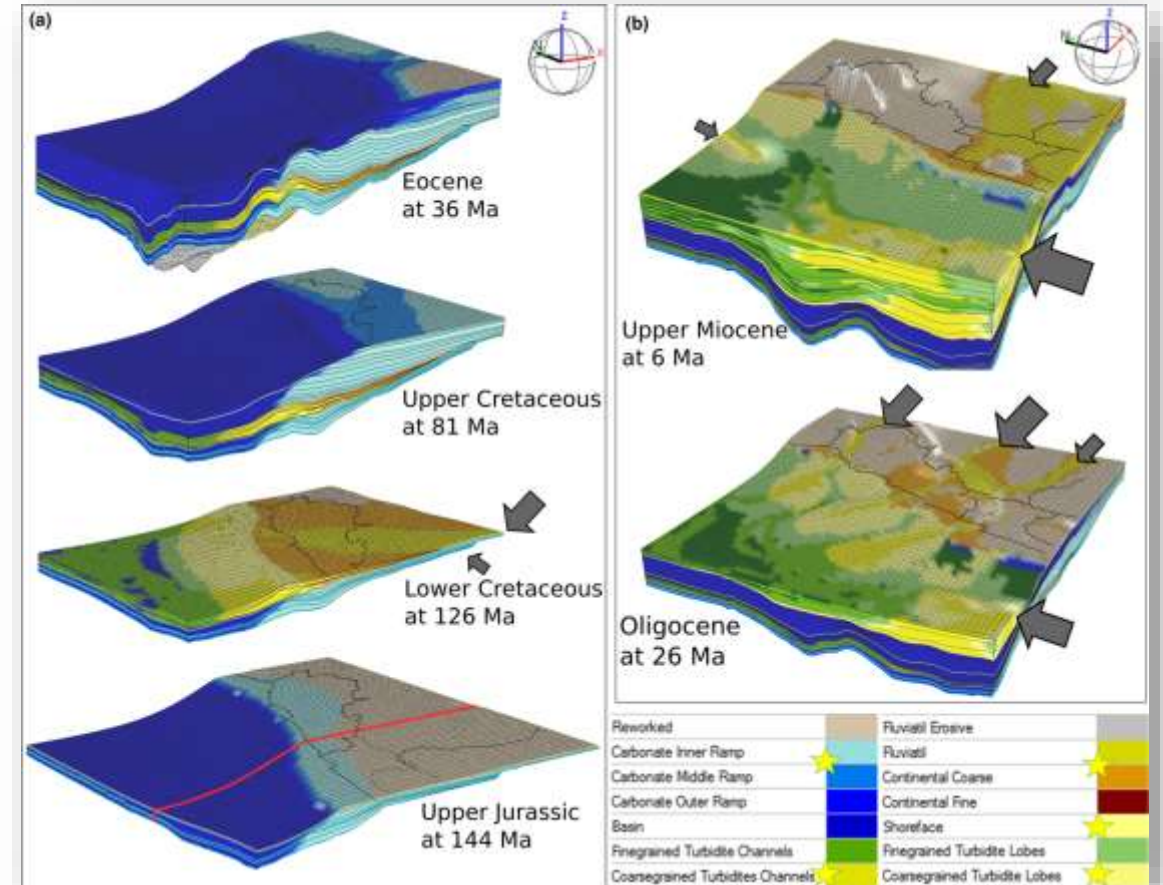
Geologic properties will be used by Carbon Solutions as input data for their modeling tools (e.g., SCO_2T & genGEO)



Task 1: Geologic Characterization

Stratigraphic forward modeling will be used to estimate stratigraphic architecture and geologic properties

- Physically-based numerical model
- Simulates sedimentary basin development
- Estimates lithological facies distribution (coarse- to fine-grained sediment)
- Useful approach for data poor regions

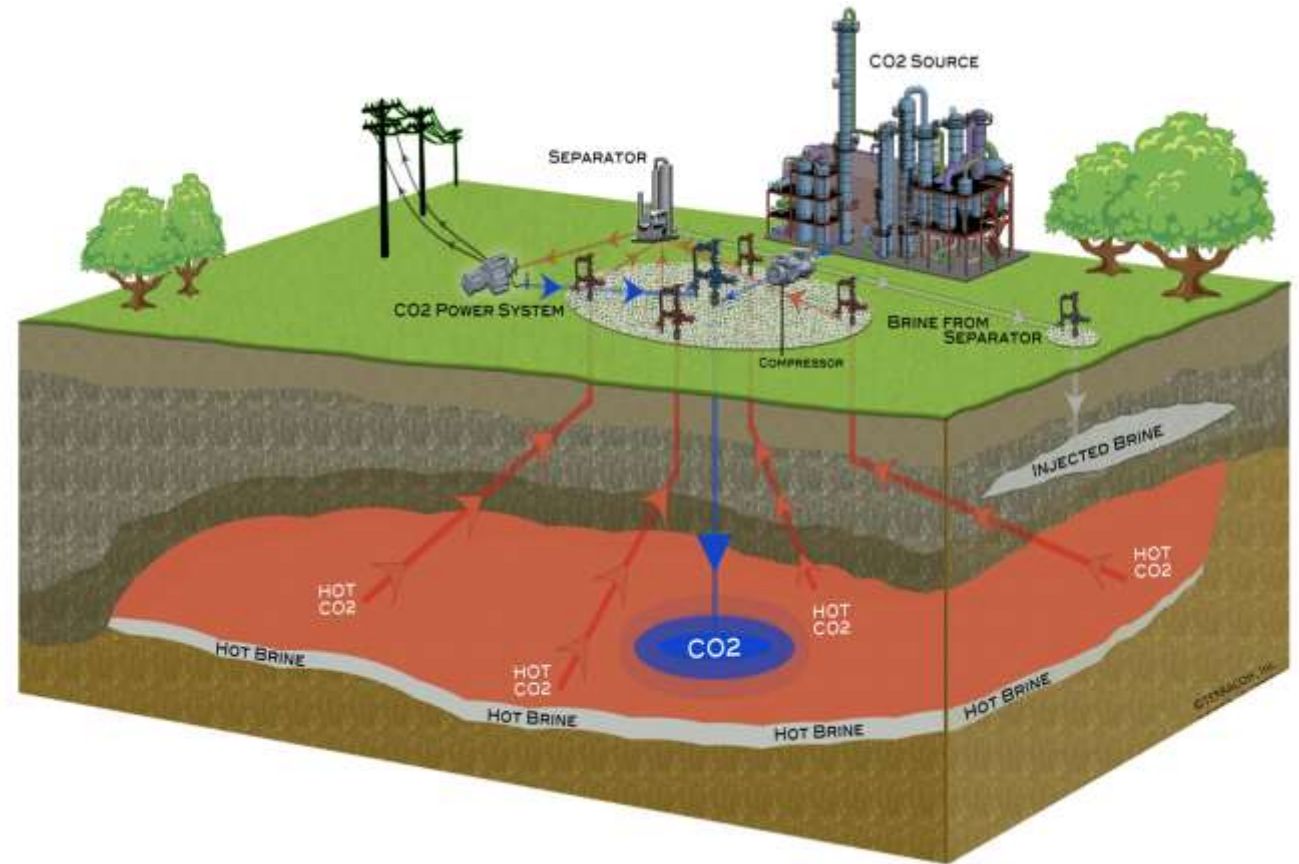


Barabasch et al. (2018)

Task 2: CO₂ Plume Geothermal Assessment

CPG power plants use gigatonne-levels of sequestered CO₂ to generate dispatchable and renewable electricity

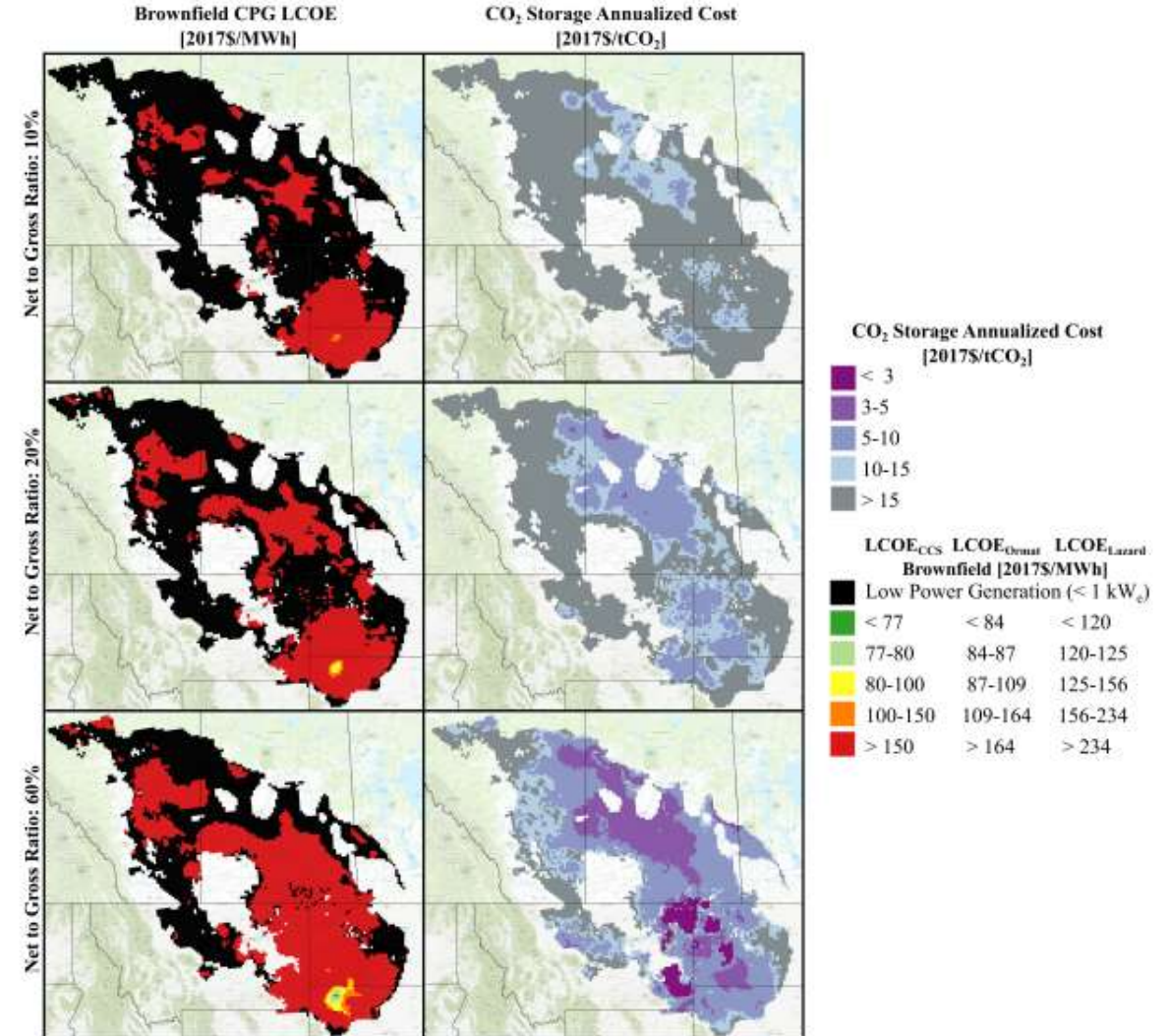
- Most effective in saline aquifers with high transmissivity in deep sedimentary basins



Task 2: CO₂ Plume Geothermal Assessment

Updated SCO₂T-pro software will be use to:

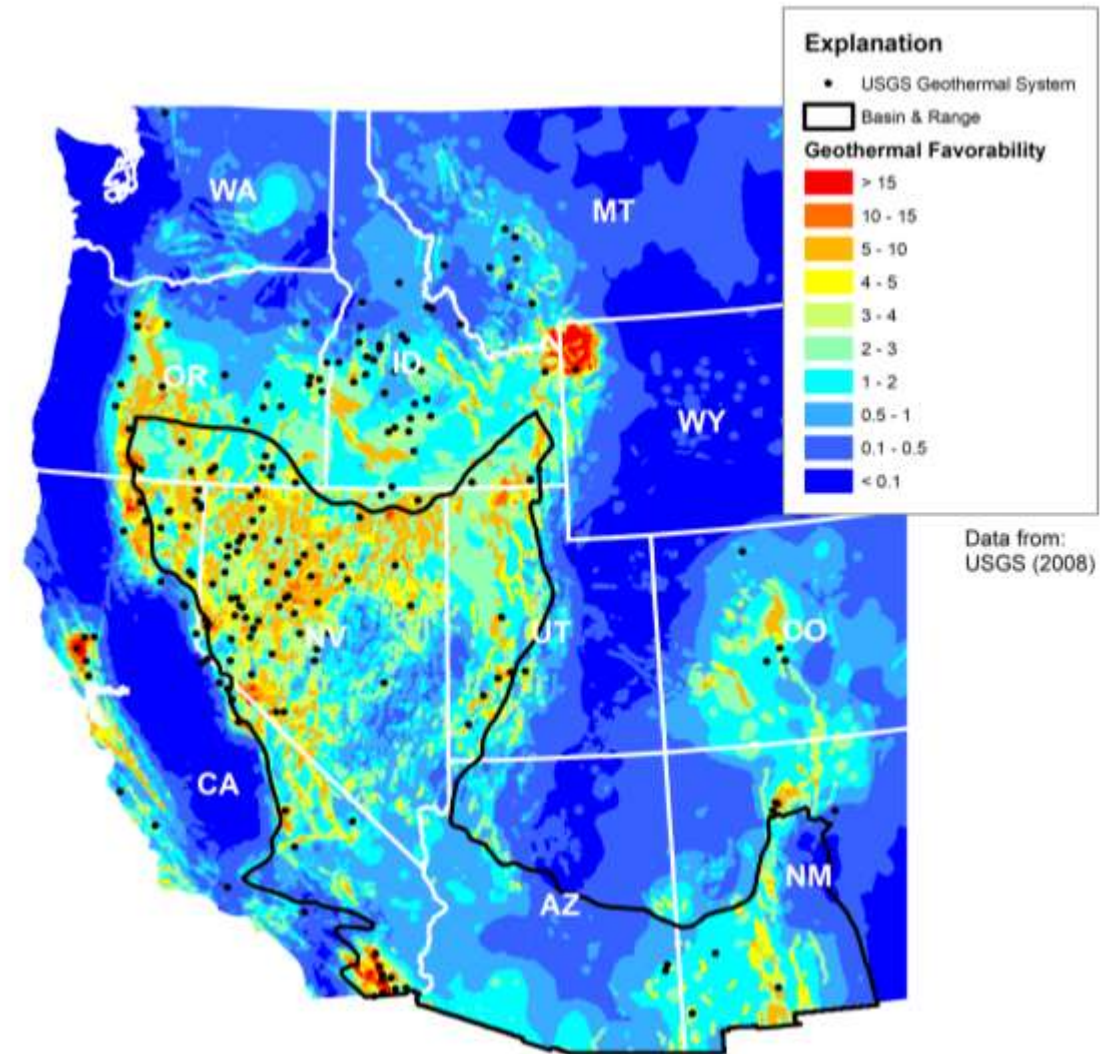
- Screen sites for CPG power generation
- Estimate power capacity and cost of CPG power generation
- Estimate geologic CO₂ storage at CPG sites



Ogland-Hand, J.D., Adams, B.M., Bennett, J.A., Middleton, R.S., **2022**. A geospatial cost comparison of CO₂ plume geothermal (CPG) power and geologic CO₂ storage. *Frontiers in Energy Research*. 10:855120.

Summary: Goals of Focused Project

- Regionally assess the potential of using CO₂ Plume Geothermal power plants as an alternative CCUS technology in Nevada
- Provide an approach that could be used to assess other CUSP states with sedimentary basin geothermal resources
- Project duration 1-year



Questions?