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CCS Pipeline Infrastructure Development in the Intermountain West

A *SimCCS* Case Study

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Regional Carbon Management Applicant Education Workshop
Salt Lake City, Utah

April 26, 2022

LA-UR-22-23780

Large-scale CCS deployment will require development of regional CCS infrastructure

- Regional CO_2 transport infrastructures connecting regional sources to geologic sinks is a critical need

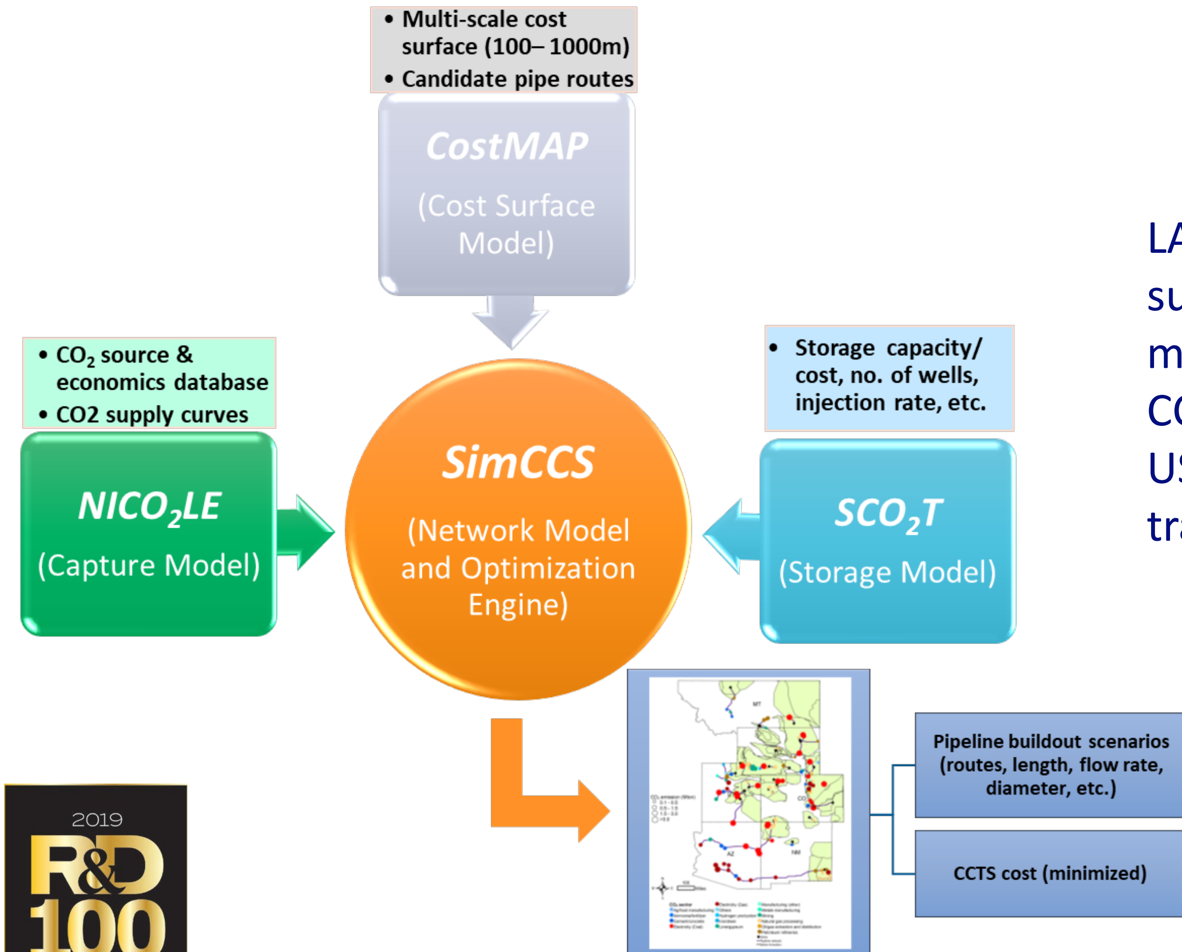
- CCS infrastructure is a long-term investment

- Strategic development of infrastructure could help address large number of sources and help save on costs

- Infrastructure that effectively connects multiple CO_2 point sources with multiple geologic sinks assures long-term use

SimCCS: A model to integrate different parts of the CCS value chain

SimCCS can help determine optimal, regional network of CO_2 sources, CO_2 sinks and CO_2 transport infrastructure that meet desired CCS goals



LANL is utilizing *SimCCS* to support infrastructure modeling in three regional CCUS initiatives (CUSP, SECARB-USA, MRCI) and one energy transition initiative (I-WEST)

2019 R&D 100 WINNER

Publicly available @ https://simccs.lanl.gov/

Potential CCS infrastructure the Intermountain West region

- Assessment performed as part of LANL's DOE-funded I-WEST initiative

The I–WEST initiative is looking at equitable transition strategies for getting to carbon neutral

Objectives

- Develop a stakeholder-based roadmap to achieve carbon neutrality
- Build regional coalitions to deploy the roadmap

Place-based Approach

- Prioritize regional attributes and societal readiness first, and technologies second
- Explicitly consider non-technological aspects of region—policy landscape, revenue and jobs, workforce, equity, energy and environmental justice

Visit iwest.org for more detail and archived material from workshops or email iwest@lanl.gov

Multiple Technologies and Economies

- Carbon capture, utilization, and storage; clean hydrogen; bioenergy; and low-carbon electricity

Team

Los Alamos National Laboratory; U.S. Department of Energy; San Juan College; UNM; National Energy Technology Laboratory; Resources for the Future; ASU; UW School of Energy Resources; The University of Utah; Montana State University; New Mexico Tech; Colorado School of Mines

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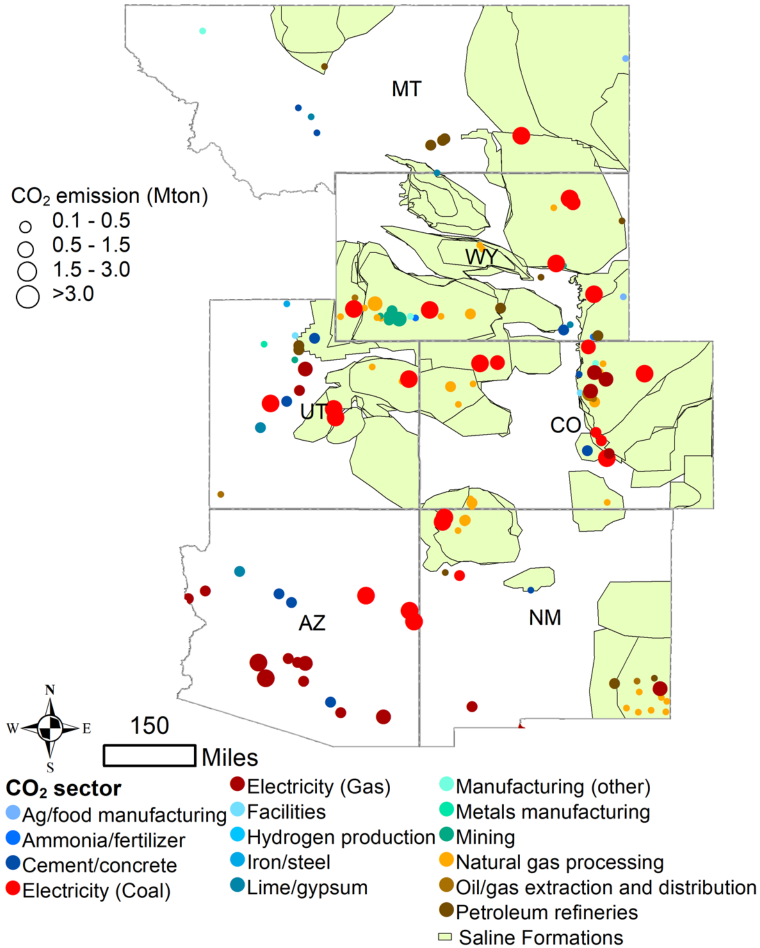
45Q eligible CO_2 point sources and saline storage opportunities in the Intermountain West region



- 202 45Q eligible point sources in the region: ~219.5 Mtons/yr total emissions
- Data source for CO_2 point sources: EPA GHGRP & eGRID (2021)
- 121 potential saline storage targets
- Data source for saline storage formations: NATCARB

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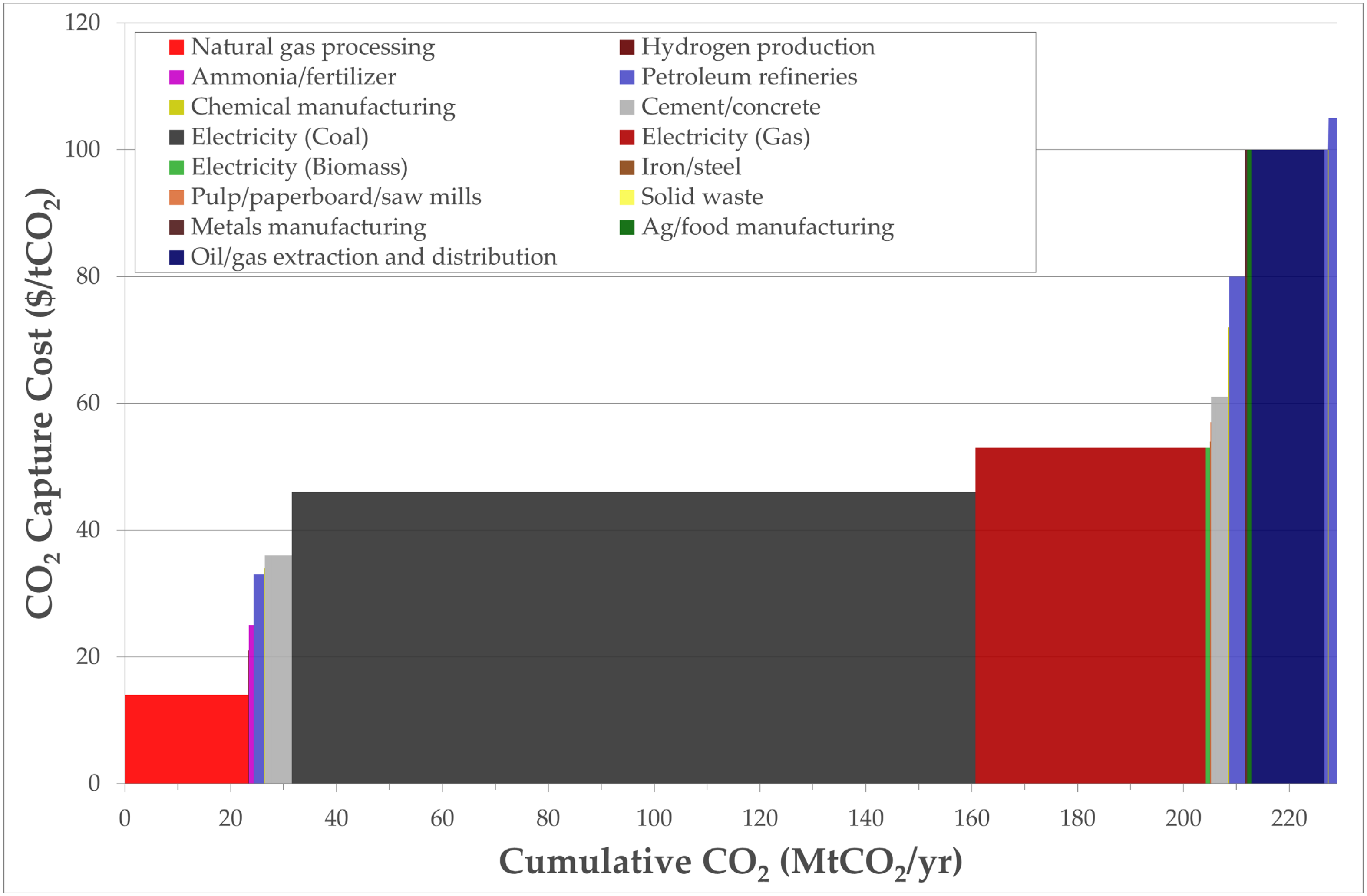
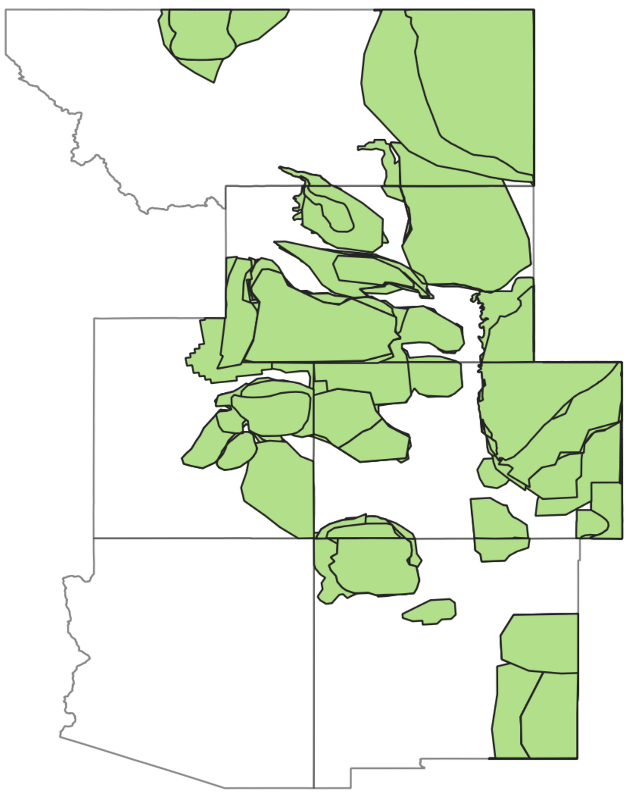
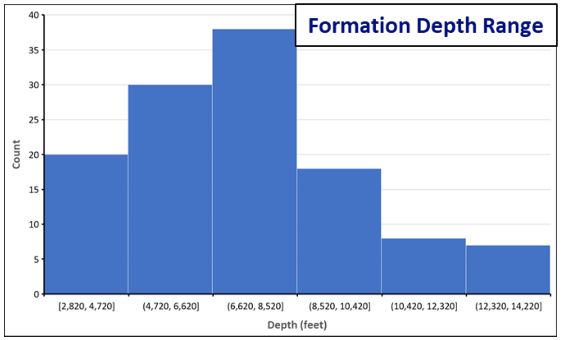
CO_2 supply curve – based on point source characteristics

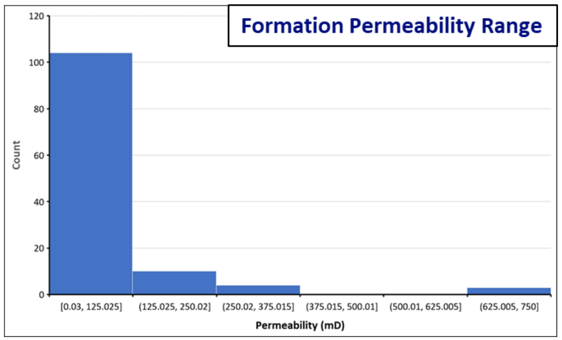


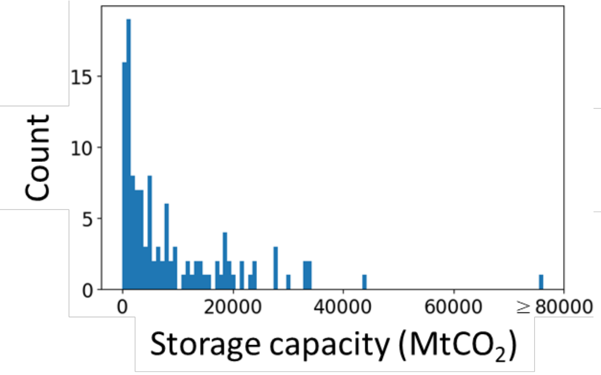
121 potential saline storage targets in the region with varying characteristics

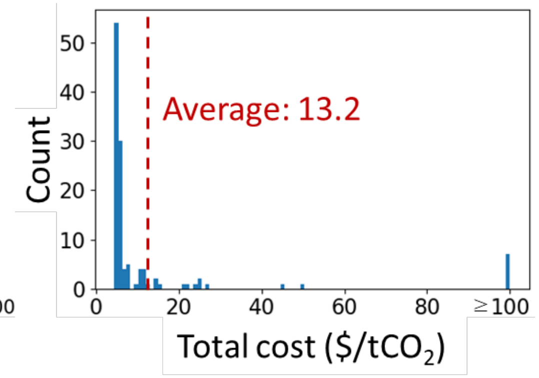


Saline formations in the I-WEST region







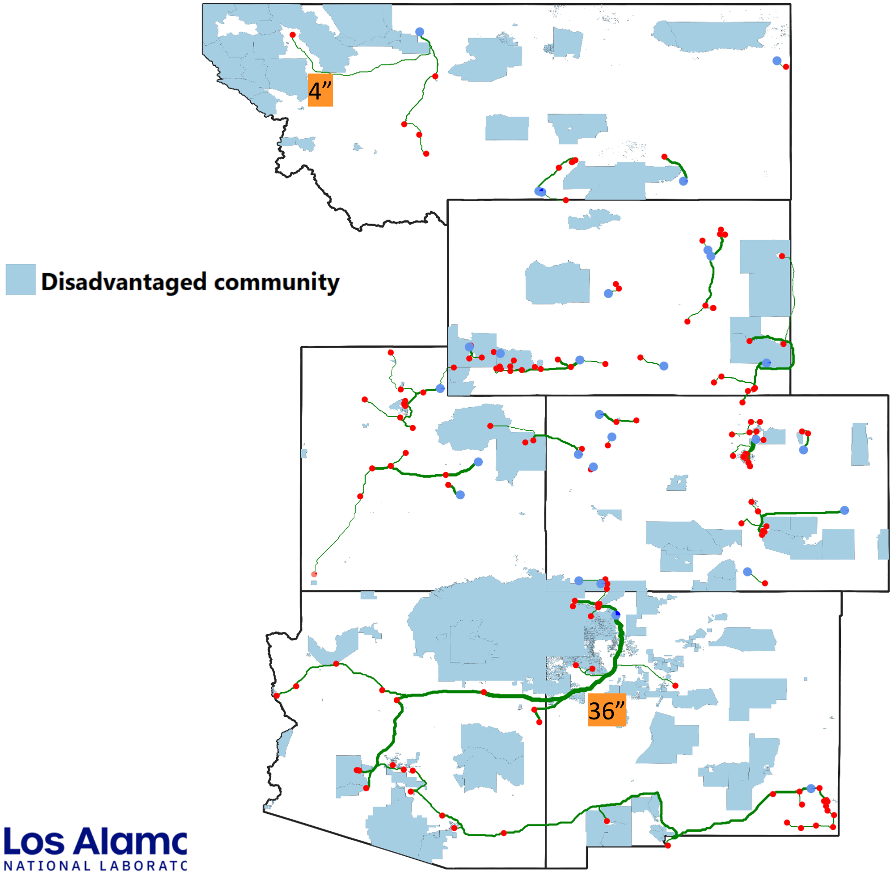


- Total estimated saline storage capacity: ~1079 GTons
- Sufficient to store ~220 MTons/yr for ~4900 yrs

Potential regional deployment of CCS connecting all sources with suitable sinks

Scenario 1: Capture all 45Q eligible emissions, pipelines avoid disadvantaged communities

- Only saline storage
- 45Q tax credits: $50/ton



- Pipeline length: 7667.7 km
- Pipeline size: 4” – 36”
- Net cost: $3.29/ton

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Potential regional deployment of CCS connecting all sources with suitable sinks

Scenario 2: Phased CCS infrastructure build-out

- Incremental CO_2 capture to meet net-zero emissions by 2050
- 45Q tax credits: $50/ton

Disadva

Disadvantage

Conclusions

- Deployment of large-scale CCS will require large-scale regional infrastructure:
  - Capture CO_2 from multiple sources and transport it to multiple sinks
- Strategic investments in developing regional CO_2 transportation infrastructure can facilitate timely & efficient large-scale CCS deployment:
  - Phased build-out can encourage regional deployment
- Development of effective & efficient CCS infrastructure requires taking into consideration characteristics of point sources (for capture), region (for transport) & sinks (for storage)

Thank you!

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