



The Carbon Utilization and Storage Partnership of the Western US

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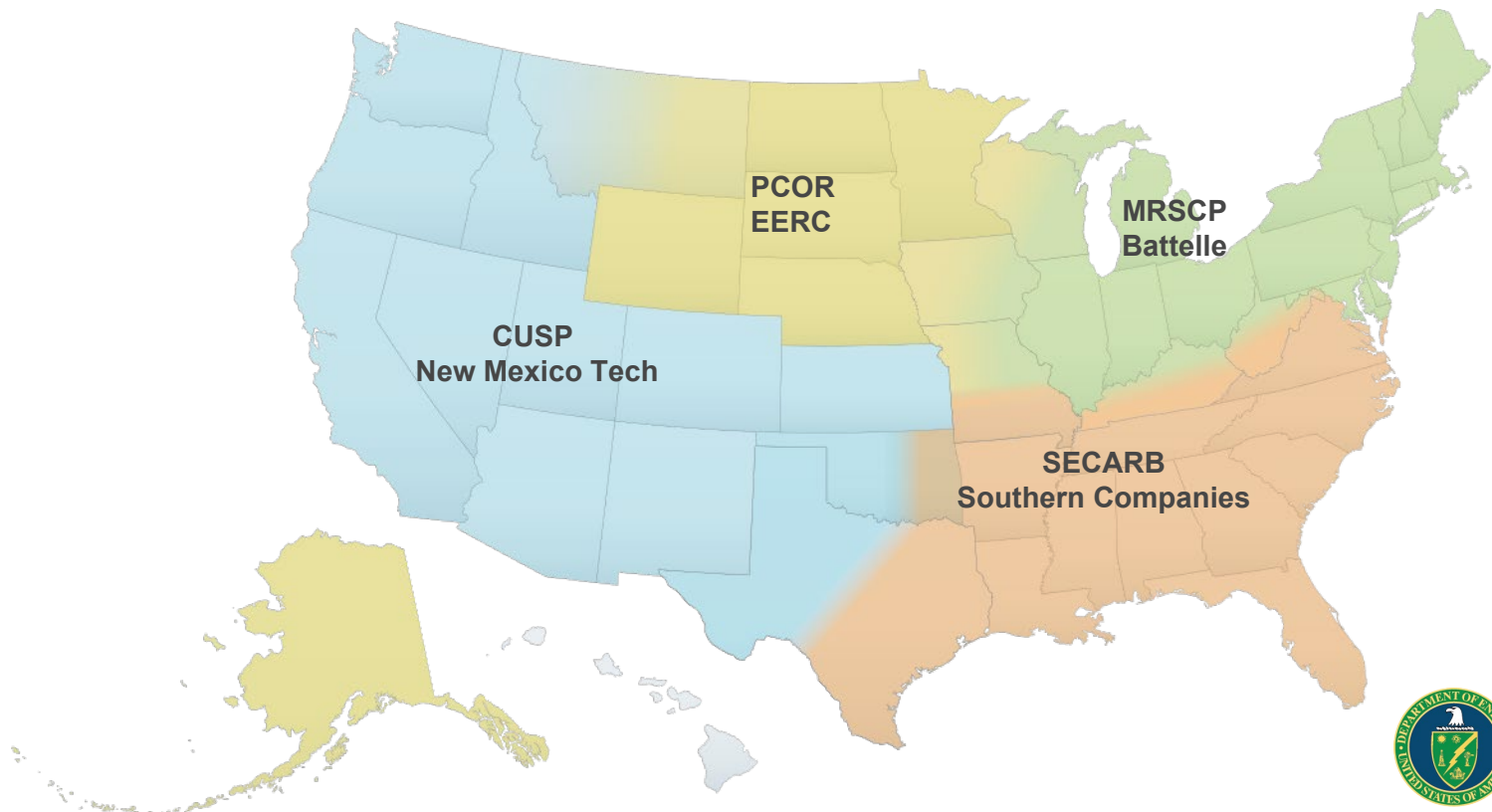
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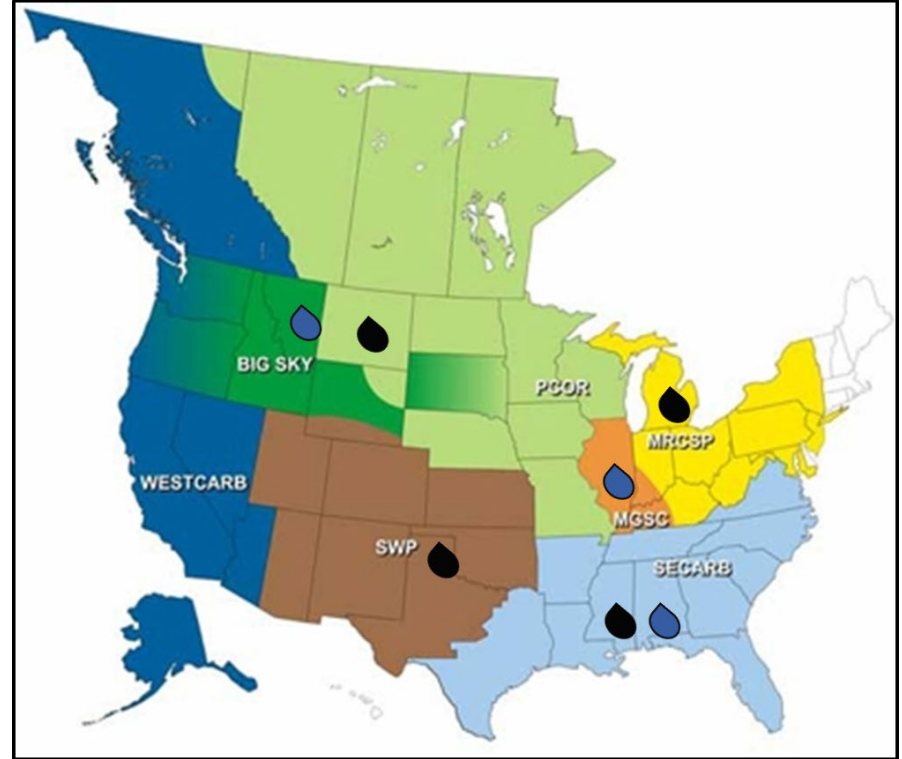
DOE Annual Carbon Meeting, August 20, 2023

Regional Initiatives to Accelerate CCUS Deployment (2019)



USA Case Studies for CCS (2003-2022)

- US Department of Energy Regional Carbon Sequestration Partnerships
 - Seven regional partnerships
 - Dozens of pilot projects
- Each partnership tasked with demonstrating injection of at least 1,000,000 metric tons of CO₂ as a final project
- Four projects demonstrated storage in conjunction with EOR
- Developed “best practices” for utilizing captured CO₂



Modified from <http://energy.gov/fe/science-innovation/carbon-capture-and-storage-research/regional-partnerships>



Who is the CUSP?

- Parts, or all, of three of the original RCSPs: SWP, WESTCARB, and Big Sky
- States represented - through a survey, a university, or a research institute: AZ, CA, CO, ID, KS, NM, NV, MT, OK, OR, TX, UT, WA
- National Laboratories - Los Alamos, Pacific Northwest, and Sandia
- Additional collaboration with Indiana University for technical support (SIMCCS)
- Industry engagement: Schlumberger, Bright Energy, EDP, and Enchant NM. Other states will be bringing in more interested parties

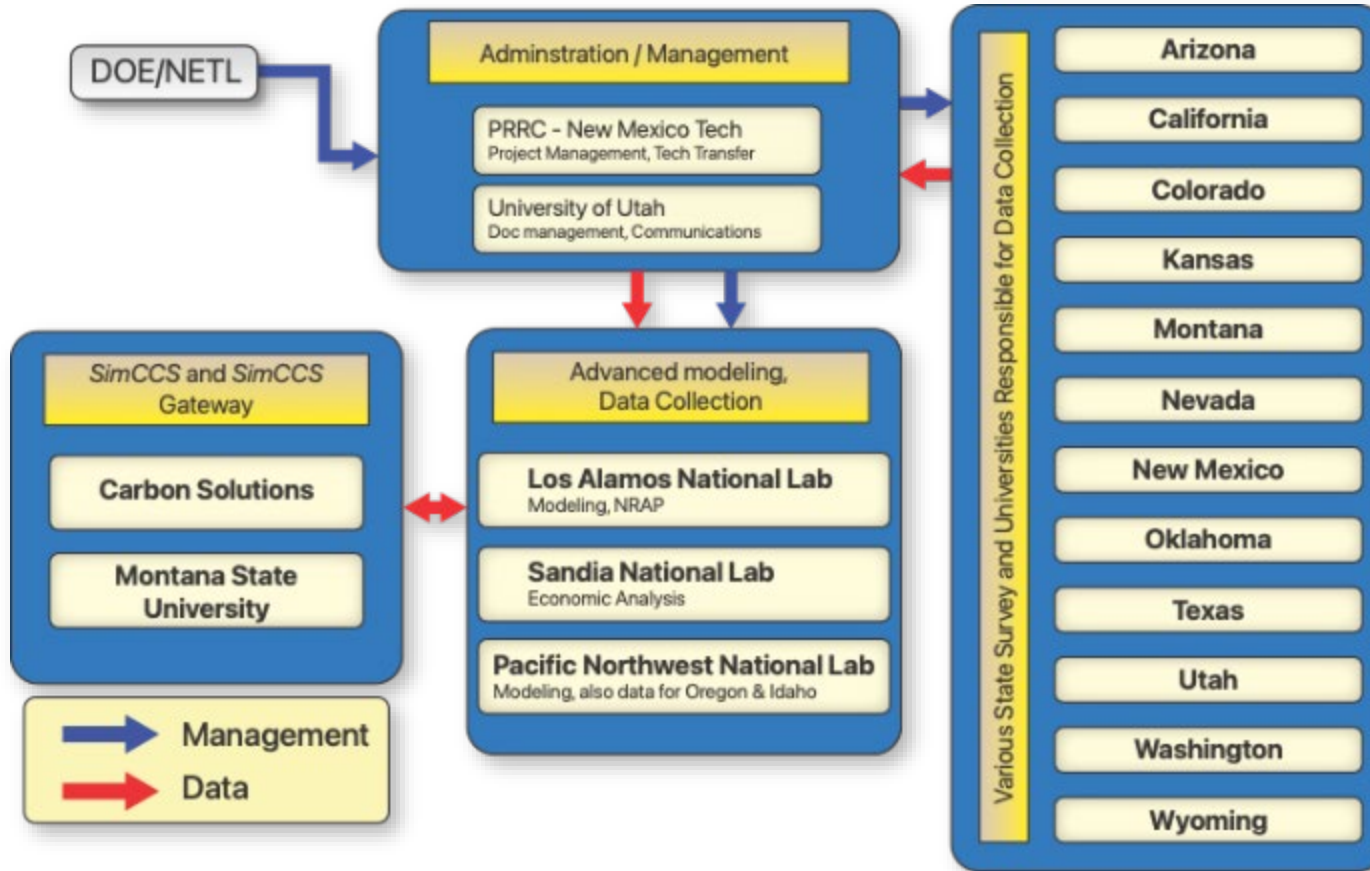


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- National Laboratories - Los Alamos, Pacific Northwest, and Sandia
- Parts of three of the original RCSPs: SWP, WESTCARB, and Big Sky
- **Has funded to date: 15 CCUS commercialization projects in the western US**
- **Have 10 additional projects wholly funded by industry**



Organization



CUSP – Data Objectives (Atlas)



- Focus on collecting, synthesizing, and using existing data sets.
- Data to be incorporated into analytical and optimization models to evaluate CCUS potential and readiness. Goals include:
 - Identifying best prospects for commercial CCUS
 - Quantifying potential economic impacts
 - Developing Readiness Indices (w/ SimCCS) to identify best areas for short-term, mid-term, and long-term CCUS projects
- State organizations assessing, updating, augmenting, and verifying data used in data analysis and modeling
 - Geological storage complexes (saline, stacked storage, ROZs)
 - CO₂ emission sources
 - Existing infrastructure
- Strong emphasis on technology transfer and outreach



CUSP – Project Support Objectives



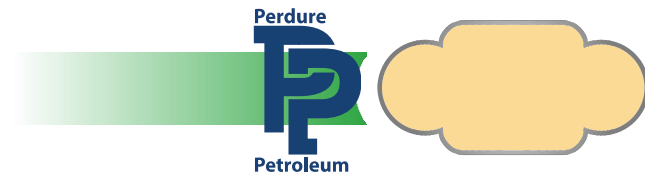
Each year since 2019, the CUSP has also sought to leverage experiences and resources in the region to assist in commercialization projects

2020 Funds allocated to CUSP from DOE were set aside to jumpstart 45Q ready projects in the region

- Farnsworth EOR project conversion to storage focus – **Perdure Petroleum** – In Conjunction with SWP team
- Provide support for MRV planning at CarbonSAFE III San Juan Project – **Enchant Energy** – In conjunction with CarbonSafe San Juan team
- Red Hills and Metropolis separation facilities, Permian basin – **Lucid Energy**



2020 Case Study – Capture Point



- Capture Point operates the Farnsworth Unit, a CO₂ Enhanced Oil Recovery field in Ochiltree County, Texas
- The Farnsworth Unit has been injecting anthropogenic CO₂ from the Agrium fertilizer plant at Borger, Texas and the Arkalon ethanol plant at Liberal, Kansas
- They plan to continue CO₂ EOR operations in the western half of the Farnsworth Unit, with likely expanding focus on storage
- MRV plan for the Farnsworth Unit relies heavily on the work conducted by the Southwest Carbon Partnership, one of the NETL Regional Carbon Sequestration Partnerships



2020 Case Study – San Juan CarbonSafe



- Development of a storage complex in San Juan County, New Mexico can accelerate the deployment of CCS/Hydrogen technology at the Escalante Power Station
- Tallgrass plans to retrofit the Escalante Generating Station, near Grants New Mexico with SMR hydrogen conversion and CO₂ capture technology and store more than 1.5 MMT/yr CO₂
- Project has a recently completed stratigraphic test well; EPA UIC Class VI permits have been submitted to EPA by Tallgrass



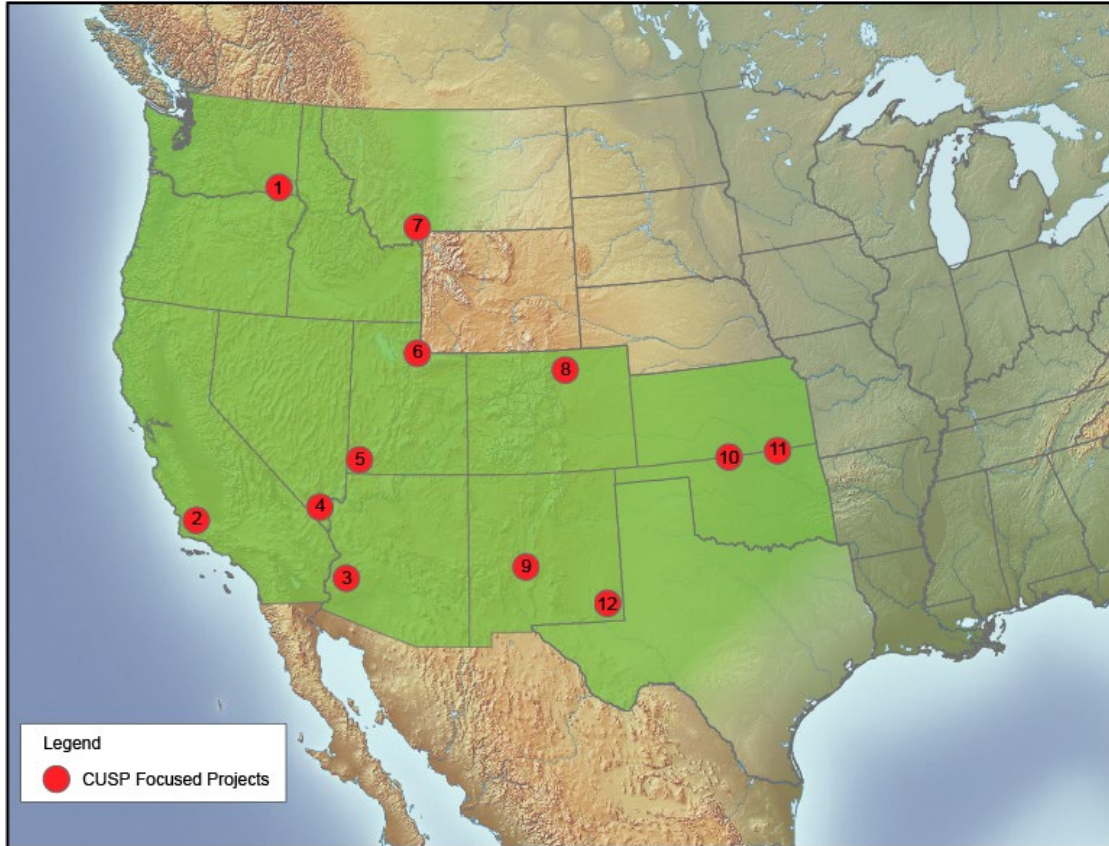
2020 Case Study – Targa (Lucid Energy)



- Targa operates acid gas treating and disposal facilities at its Red Hills gas processing plant complex and Dagger Draw processing plants in Lea and Eddy County, New Mexico, respectively
- The Red Hills facility compresses and injects H₂S and CO₂ concentrations in the raw sour gas it receives into the facility
- Roughly 50% of Lucid's CO₂ emissions are from vented CO₂ resulting from Amine Treating
- Capturing, sequestering and storage of vented CO₂ is the most economic option to capture 45Q tax credits and impact Lucid's carbon footprint
- In the process of drilling a 2nd well, with 4 additional wells in planning stage (CUSP affiliated projects)



CUSP 2021 Focus Projects



2021 DOE allocated funds were used to select 12 additional focus projects, selected by the management team, from 26 internally generated proposals

- Most projects have industry partners and have timelines of 1-3 years
- Includes a unique study for injection into basalts
- Includes bench scale work on the use of CO₂ as Geothermal working fluid
- Includes development of regional Storage Hubs

2021 Industry Partners

- Industry engagement
 - Lucid Energy
 - Enchant Energy
 - Oxy Low Carbon Ventures
 - Sentinel Peak Resources
 - Perdure Petroleum
 - Suncor Energy
 - ONEOK
 - Utah Iron LLC
 - NGL Energy Partners
 - Carbon America
 - Schlumberger
- And other interests...



2022 Congressional Funds



For 2022, Congressionally allocated funds were not given directly to the Regional Initiatives, rather DOE released a RFP to attract projects

The DOE asked that funded projects under that RFP be related to Regional Initiative objectives

- CUSP members responded by writing proposals
- Teaming by CUSP members added strength when building project teams by drawing on expertise from other areas of the CUSP
- Proposers had existing focus projects that could be expanded
- Proposers had support, including letters, from CUSP management

Five Projects funded to CUSP members (\$8 Million)



CUSP Related Industry Projects



CUSP team members can provide regional and state level expertise to Industry sponsored projects, and have expanded their footprints regionally

- Those teams also can access specific expertise from other areas in the region
- Currently CUSP members are directly engaged with industry in:
- 2 hydrogen projects
- 5 Midstream company projects
- 1 EOR/Storage company
- CUSP management is also engaged with Stockton LEAP which is helping to study the applicability of storage projects near Oakland California



The CUSP Has Impact in the Region



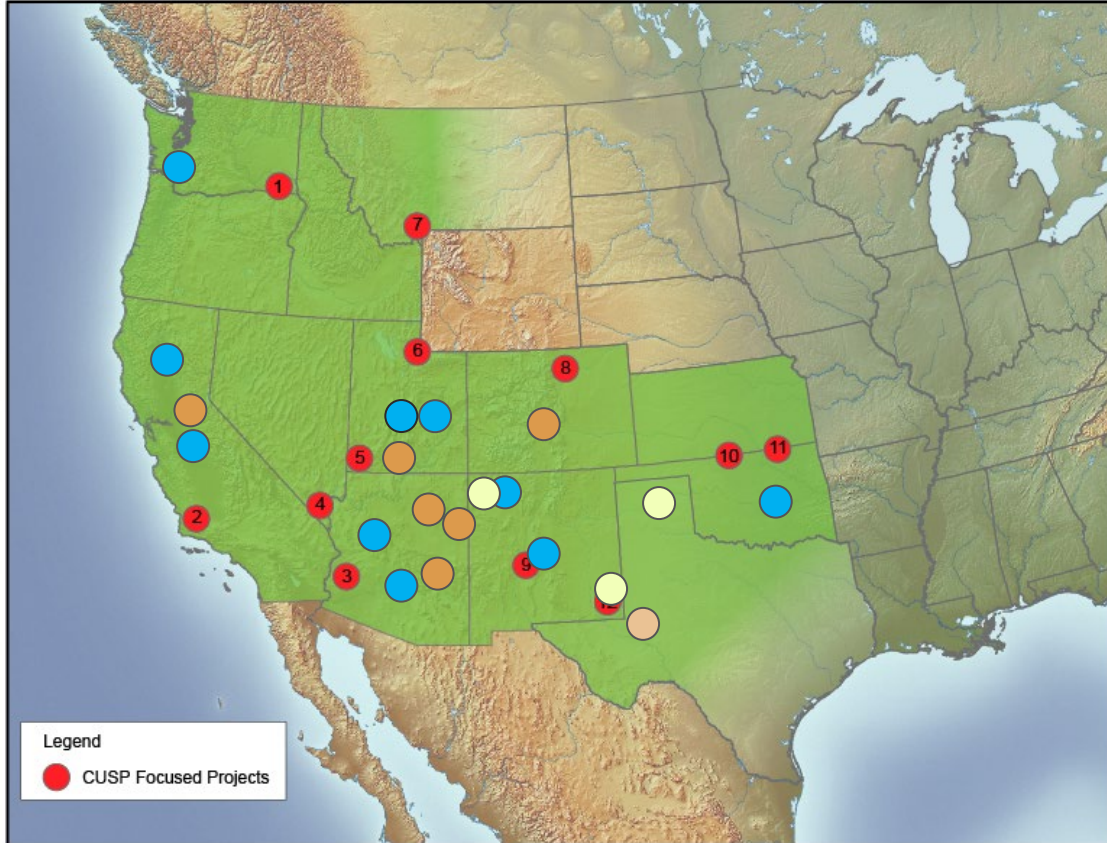
- CUSP has directly funded 15 Focus projects
- CUSP members have teamed to write numerous federal/state proposals
 - 9 funded 2023 to date
 - 10 pending proposals
- CUSP members have teamed to support 8 wholly industry funded projects

CUSP members involved in 42 total projects/pending applications!

- **32 Already funded!**



CUSP 2023 Regional Footprint



Current footprint of CUSP related projects

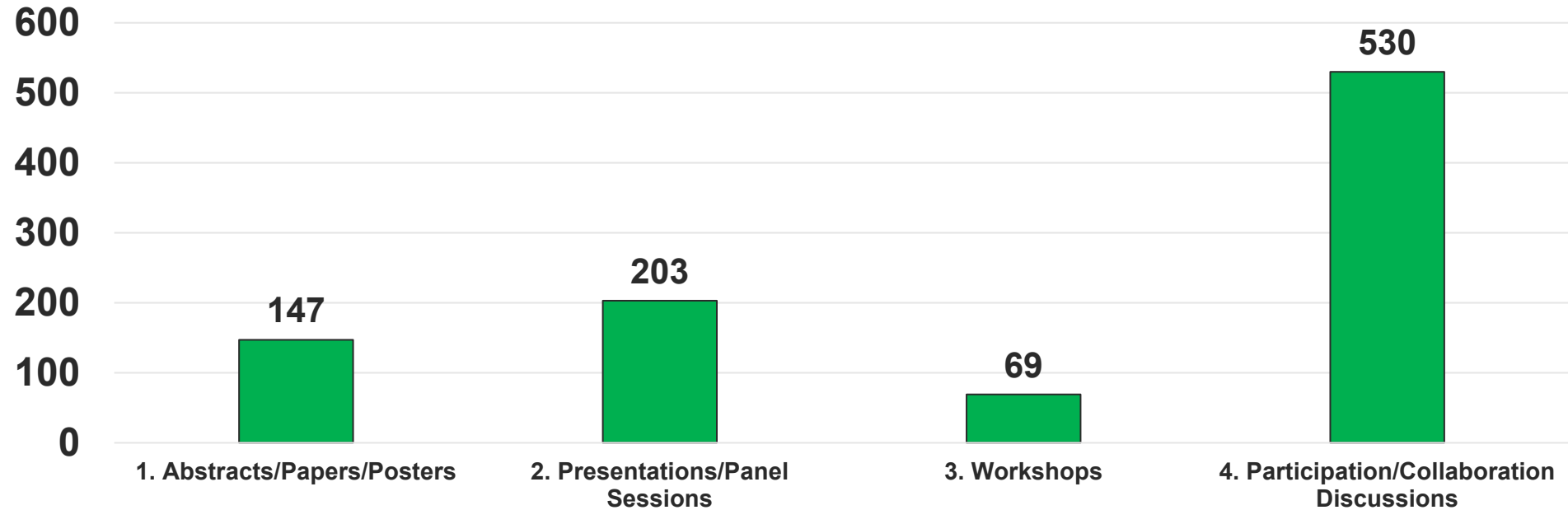
- 2020 – 3 Projects CUSP funded
- 2021 – 12 Projects CUSP funded
- 2022-2023 – Associated projects Funded
- 2023 – Associated projects pending
- Includes development of regional Storage Hubs



CUSP Outreach and Engagement



CUSP - TOTAL



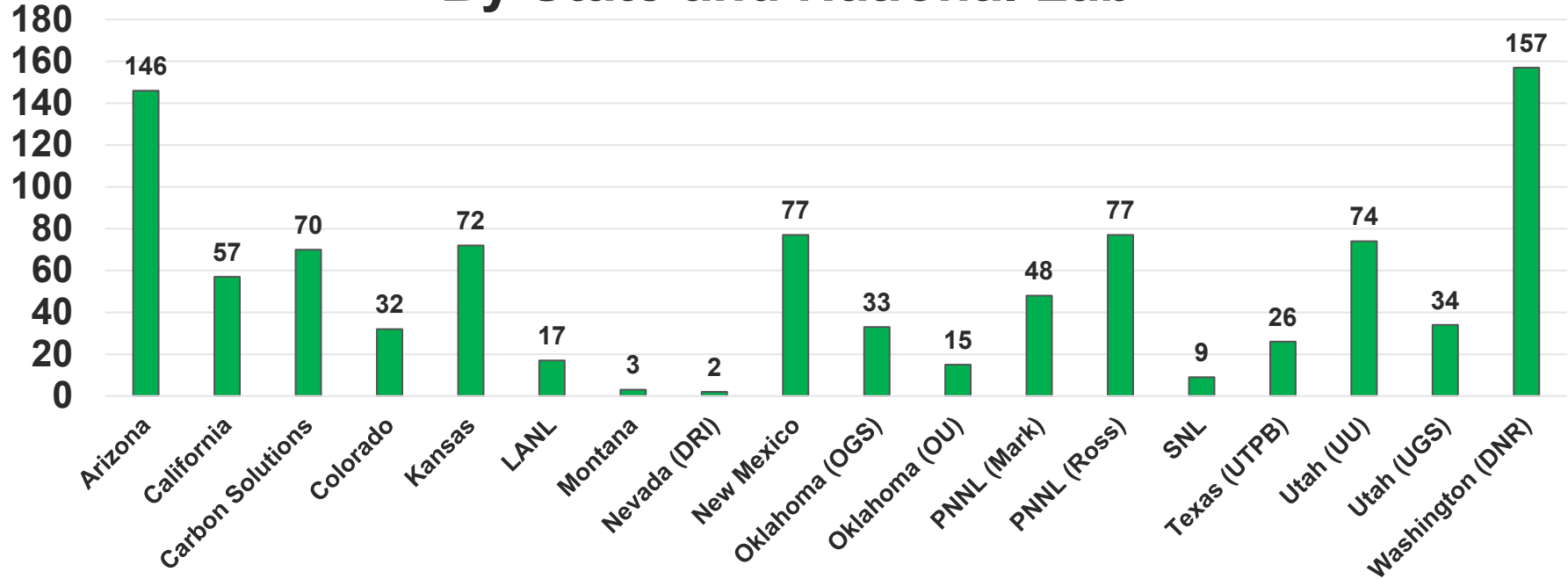
At Least 949 Stakeholder Interactions



CUSP High Regional Participation



By State and National Lab



CUSP Take-Aways

- The CUSP has databases of useful information necessary to create robust geologic models, flow models, and economic studies
- Has access to Intelligent computer applications and National Lab products which can optimize connecting sources and sinks, and long range development and economic analyses of projects
- Has experience in generating CO₂ storage models, MRV applications, and in engaging with stakeholders
 - **Built a team specifically for permitting Class VI and MRV's region wide**
- The CUSP is actively seeking opportunities to help companies access 45Q and has built regional expertise to address local issues

