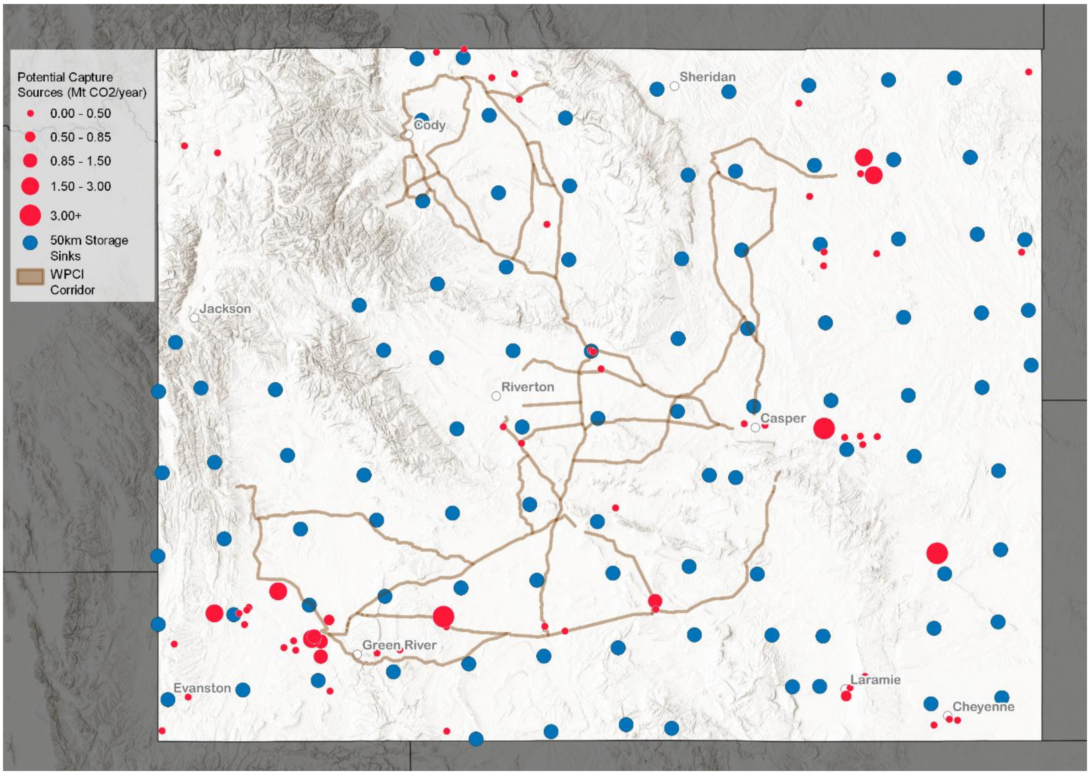
# BUSINESS CASE ANALYSIS: NO STRANDED ASSETS

## OVERVIEW

SimCCS$^{PRO}$, an optimization tool that creates regional network topology and corridors under multi-objective criteria, producing point-to-point pipeline financials (CAPEX/OPEX, pipeline diameters, and lengths of required pipeline, road, and railroad) for each source-to-sink configuration, was used to model pipelines could be employed to ensure all $CO_2$ in the state is captured for CCUS. Models were run both with and without giving preferential weights for following the WPCI right-of-way.




Map showing all potential emission sources, geologic storage locations, and the corridor footprint for the preferential WPCI routing surface.

## MODELING INPUTS

**Capture costs and volumes**

- Any facility with capturable $CO_2$ emissions.
- Capturable volume & costs derived from NETL models.

**Storage costs and potential**

- Aggregated to a 50km x 50km grid cell.
- Storage costs and potential derived from the $SCO_2T^{PRO}$ tool.

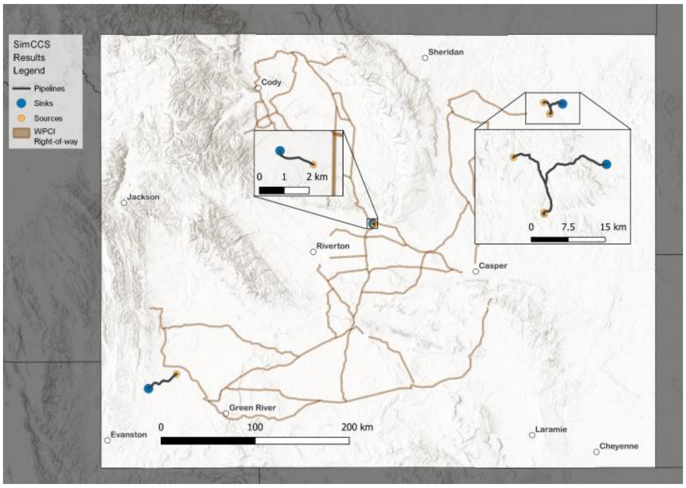
**Transportation Network**

- Default weights:
- Preferential WPCI right-of-way: routing surface is weighted so that it is more attractive to follow the pipeline corridor.

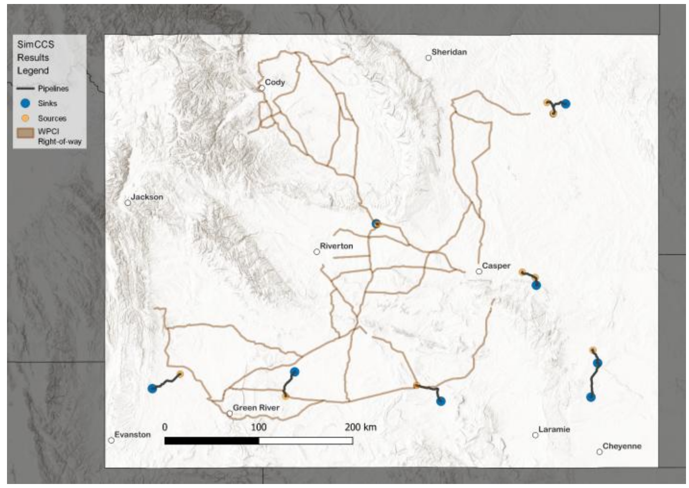
## KEY TAKEAWAYS

- ✓ Results when pipelines followed the WPCI corridor and follow the default routing surface were very similar for costs; at each capture interval, total unit costs were within one dollar of one another.
- ✓ The number of sources that were captured were different at the 50% and 75% intervals.
- ✓ The length of pipeline for the 50% and 75% scenarios were different, with more km of pipeline required when the WPCI was not followed.
- ✓ Capturing the last 25% of emissions was the largest increase in costs across all intervals, increasing by almost \$14/t$CO_2$.

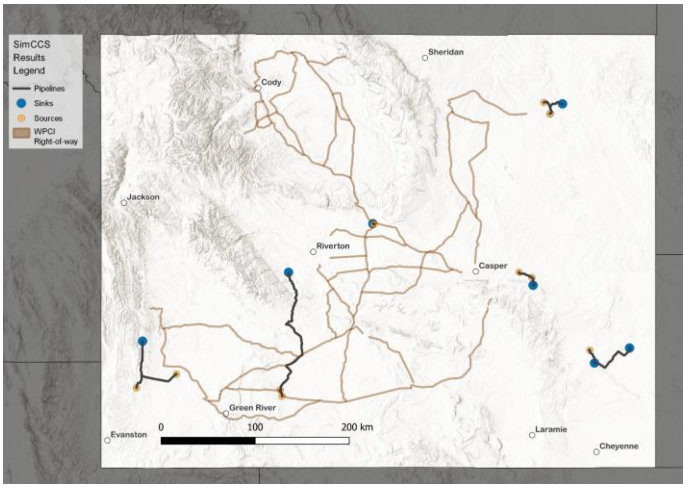
# NO STRANDED ASSETS: Default Routing



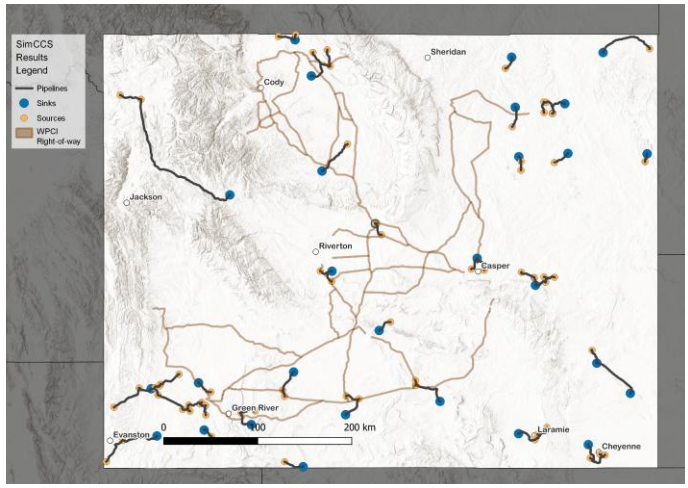

25% emissions captured




50% emissions captured




75% emissions captured

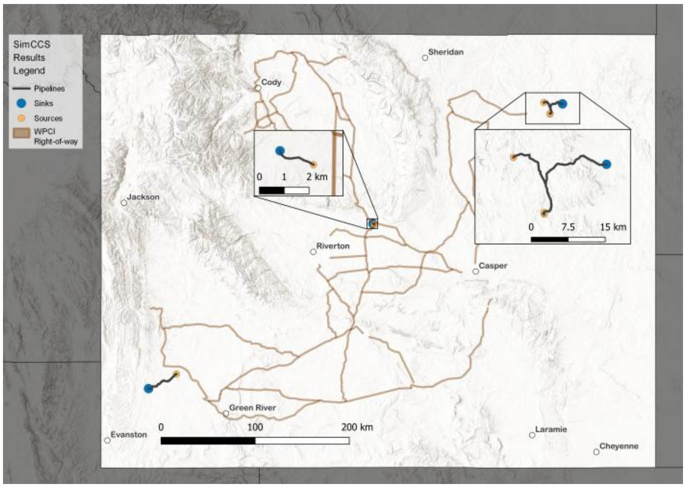



100% emissions captured

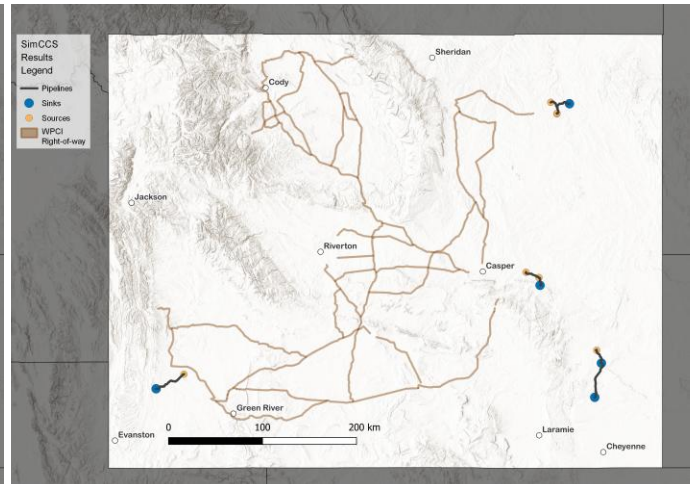
## RESULTS

| Variables | 25 % Emissions | 50 % Emissions | 75 % Emissions | 100 % Emissions |
|---|---|---|---|---|
| Number of Captured Sources | 5 | 12 | 13 | 72 |
| Number of Utilized Sinks | 3 | 8 | 7 | 29 |
| Length of Pipeline (km) | 75 | 234 | 404 | 1309 |
| Annual $CO_2$ Stored ($MtCO_2$/yr) | 10.0074 | 20.0194 | 30.0527 | 42.3983 |
| Capture Annual Cost ($M/yr) | 970.2 | 1961.65 | 3008.44 | 4627.7 |
| Total Transport Annual Cost ($M/yr) | 17.65 | 48.81 | 99.24 | 270.28 |
| Storage Annual Cost ($M/yr) | 82.46 | 169.3 | 237.12 | 408.25 |
| **Total Annual Cost ($M/yr)** | **1070.31** | **2179.77** | **3344.8** | **5306.23** |
| Capture Unit Cost ($/$tCO_2$) | 96.95 | 97.98 | 100.11 | 109.15 |
| Transport Unit Cost ($/$tCO_2$) | 1.76 | 2.44 | 3.3 | 6.37 |
| Storage Unit Cost ($/$tCO_2$) | 8.24 | 8.46 | 7.89 | 9.63 |
| **UnitCost ($/$tCO_2$)** | **106.95** | **108.88** | **111.3** | **125.15** |

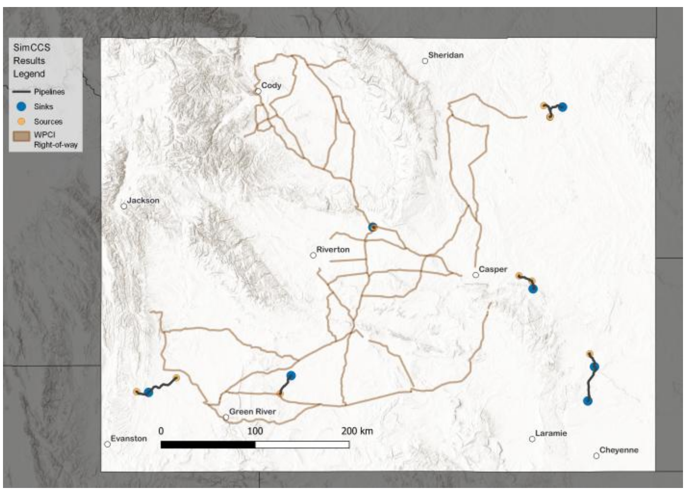
# NO STRANDED ASSETS: Preferential WPCI Routing



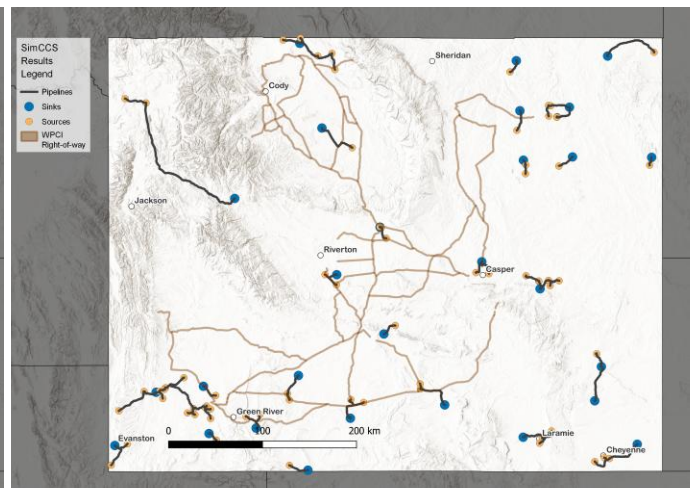

25% emissions captured, WPCI




50% emissions captured, WPCI




75% emissions captured, WPCI




100% emissions captured, WPCI

## RESULTS

| Variables | 25 % Emissions WPCI | 50 % Emissions WPCI | 75 % Emissions WPCI | 100 % Emissions WPCI |
|---|---|---|---|---|
| Number of Captured Sources | 5 | 7 | 12 | 72 |
| Number of Utilized Sinks | 3 | 5 | 7 | 28 |
| Length of Pipeline (km) | 75 | 159 | 201 | 1290 |
| Annual $CO_2$ Stored ($MtCO_2$/yr) | 10.0074 | 20.0841 | 30.0203 | 42.3983 |
| Capture Annual Cost ($M/yr) | 970.2 | 1979.3 | 3005.21 | 4627.7 |
| Total Transport Annual Cost ($M/yr) | 17.92 | 35.51 | 46.57 | 265.8 |
| Storage Annual Cost ($M/yr) | 82.46 | 168.75 | 285.33 | 409.62 |
| **Total Annual Cost ($M/yr)** | **1070.58** | **2183.56** | **3337.11** | **5303.13** |
| Capture Unit Cost ($/t$CO_2$) | 96.95 | 98.55 | 100.11 | 109.15 |
| Transport Unit Cost ($/t$CO_2$) | 1.79 | 1.77 | 1.55 | 6.27 |
| Storage Unit Cost ($/t$CO_2$) | 8.24 | 8.4 | 9.5 | 9.66 |
| **UnitCost ($/t$CO_2$)** | **106.98** | **108.72** | **111.16** | **125.08** |