



Economic and Social Trade-offs in CO₂ Storage Location Choices: Estimating Willingness-to-Pay for Offshore, Nearshore, and Onshore CCS

Carbon capture and storage (CCS) deployment has accelerated significantly in recent years, with an increasing number of projects and a growing range of potential storage locations, including offshore, nearshore, and onshore. From a commercial perspective, onshore storage is often regarded as the most cost-effective option because of lower transportation, operation, and maintenance costs. However, previous research consistently finds higher public acceptance of offshore and nearshore storage than of onshore alternatives. To date, these differences have primarily been measured by acceptance levels, thereby limiting their integration into economic assessments of storage location choices.

Using a discrete choice experiment with 1,361 respondents, we estimate willingness to pay (WTP) for CCS deployment across two offshore, two nearshore, and five onshore potential storage sites. The results reveal substantial differences in public preferences across storage locations. Average WTP ranges from €49 to €63 per ton of CO₂ stored offshore. For nearshore locations, WTP ranges from –€21 to €13 per ton, while all estimated WTP values for onshore storage are negative, ranging from –€168 to –€71 per ton of CO₂.

These findings suggest that while onshore CCS may minimise private costs, it may impose substantial social costs that should be considered in evaluations of economically efficient storage strategies. Furthermore, preferences are sensitive to the scale of CCS deployment.

Approximately half of the respondents were presented with a scenario involving the capture and storage of 5 million tons of CO₂ annually, while the remaining respondents evaluated a 10 million tons scenario. WTP estimates are significantly higher under the 10 million tons scenario, with respondents expressing positive WTP for nearshore storage. In contrast, nearshore storage yields negative WTP estimates under the 5 million tons scenario.

Overall, the results demonstrate the importance of incorporating social preferences into CCS planning and cost-benefit assessments, as public valuations may substantially alter the relative attractiveness of alternative storage locations.