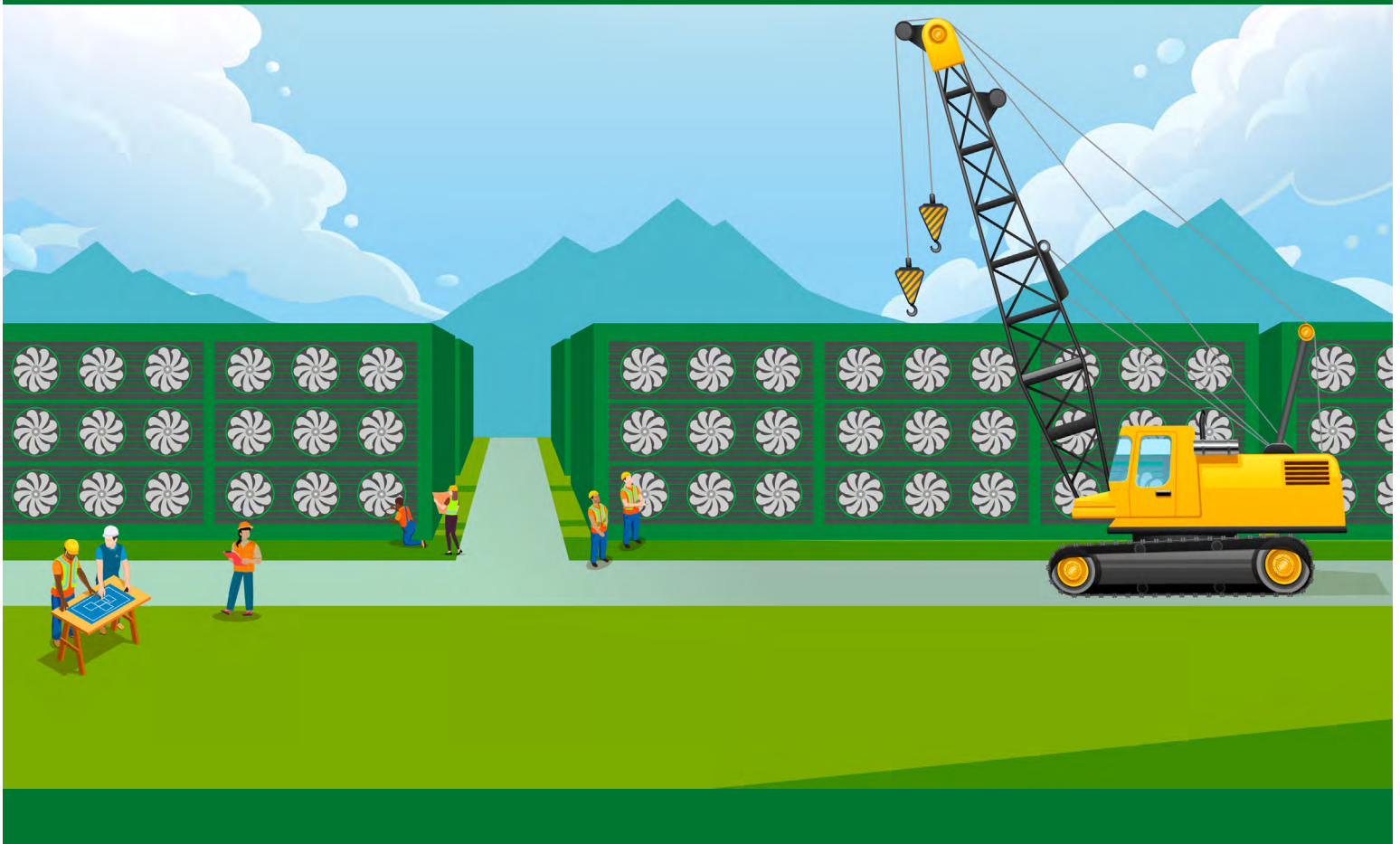




U.S. DEPARTMENT OF
ENERGY

Fossil Energy and
Carbon Management

Workshop Synthesis and Recommendations: Insights from the 2022 Carbon Interactive Workshop Series



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1. Introduction

Carbon management involves the capture, transportation, storage, and containment of carbon. While the components of carbon management have been in development for decades, it's still relatively unfamiliar — in a recent survey in the United States, only 19% of respondents stated that they had heard about carbon capture and storage before.¹

Where carbon management has come up, it tends to be highly debated, with many questions and concerns. Common questions, as documented by many peer-reviewed studies over the past two decades, include: What are the potential impacts on human health? On groundwater? What happens in the event of a leak? Will it cause earthquakes? How will communities have a say in whether or how it is implemented? Who is promoting the technology and why? Who is responsible if something goes wrong? How does this benefit our community or improve our way of life?^{2 3}

Concerns are not just about what happens on the project level, as previous U.S. Department of Energy (DOE)-supported research and public engagement with carbon capture and storage has shown. For example, a 2007 study of potential pilot sites for California's DOE-funded West Coast Regional Partnership (WESTCARB) in two areas of California found that communities saw risks not just as technical but social, relating to levels of community empowerment and the history of community-industry relations.⁴ An early collaborative study conducted in the same timeframe by DOE's Regional Carbon Sequestration Partnership (RCSP) examined five communities, finding that “In all cases, social factors, such as existing low socioeconomic status, desire for compensation, benefits to the community and past experience with government were of greater concern than concern about the risks of the technology itself.”⁵ In other words, it has long been understood that engagement is critical and that communities want not just trusted information on the risks and how they can be managed but greater involvement and decision-making power.

Many of these studies and early engagements took place when carbon capture, utilization, and storage (CCUS) was still something of a hypothetical future technology. Within the context of new legislation that spurs the development of many new projects, the need is clear for a deeper and more coordinated public and community engagement around carbon management.

The Bipartisan Infrastructure Law (BIL), signed into law in 2021, includes over \$12 billion in funding for projects related to carbon management. Over five years, DOE will award cost-share agreements to companies or other entities that apply. These investments are expected to create six carbon capture projects and several smaller-scale pilots, four direct air capture hubs, over 100 dedicated storage wells, and new carbon dioxide transportation infrastructure. The Inflation Reduction Act (IRA), passed in 2022, includes an enhancement to the [45Q federal tax credit](#) that incentivizes the private sector to build more carbon management projects. As the nation and states enact climate policy aimed at reaching climate targets, the fields of carbon capture and carbon removal are poised to grow. DOE and the Office of Fossil Energy and Carbon Management (FECM) recognize the pressing need to work with other U.S. Government agencies on meaningful, public and community engagement. Meaningful engagement, as described in [FECM's engagement framework](#), involves building relationships and having a two-way dialogue with mutual learning that shapes how projects are developed.

¹ Pianta Silvia, Adrian Rinscheid, and Elke U. Weber. “Carbon Capture and Storage in the United States: Perceptions, Preferences, and Lessons for Policy.” *Energy Policy*. Volume 151, April 2021. <https://www.sciencedirect.com/science/article/pii/S0301421521000185>.

² Lock, Simon J, Maria Lee, and Yvonne Rydin. “Nuclear Energy Sounded Wonderful 40 Years Ago: UK Citizens Views on CCS.” *Energy Policy* 66, Pages 428-435, March 2014. <https://www.sciencedirect.com/science/article/pii/S0301421513011312?via%3Dihub>.

³ Bradbury, Judith, Isha Ray, Tarla Peterson, Sarah Wade, Gabrielle Wong-Parodi, and Andrea Feldpausch. “The Role of Social Factors in Shaping Public Perceptions of CCS: Results of Multi-State Focus Group Interviews in the U.S.” *Energy Procedia* 1, no. 1, February 2009. <https://www.sciencedirect.com/science/article/pii/S1876610209009321>.

⁴ Wong-Parodi, Gabrielle, and Isha Ray. “Community Perceptions of Carbon Sequestration: Insights from California.” *Environmental Research Letters* 4, no. 3 (2009): 034002. <https://doi.org/10.1088/1748-9326/4/3/034002>.

⁵ Bradbury, Judith, Isha Ray, Tarla Peterson, Sarah Wade, Gabrielle Wong-Parodi, and Andrea Feldpausch. “The Role of Social Factors in Shaping Public Perceptions of CCS: Results of Multi-State Focus Group Interviews in the U.S.” *Energy Procedia* 1, no. 1, February 2009. <https://www.sciencedirect.com/science/article/pii/S1876610209009321>.

To help us do this better, in November and December 2022, DOE embarked with federal partners on a pilot program of interactive workshops on carbon management. The aims were:

- For DOE and other government agencies to learn about community priorities, concerns, and ideas related to carbon projects, including how community members would like to be involved in projects moving forward.
- For community members to learn about the potential carbon projects that might be a fit for their area, the rationale for these projects, and opportunities for public participation along the lifespan of a project.

The workshops included several presentations, question and answer (Q-and-A) sessions and facilitated discussion periods. The presenters, agenda and discussion period styles varied for each workshop and were tailored to each of the specific locations. Report outs from each workshop, including summaries of presentations, Q-and-A sessions, and community input gathered during a facilitated discussion, are included in Appendix A of this document. Appendix B contains the agendas for each of the workshops.



Figure 1. Map of carbon management interactive workshops held in November and December 2022.

These half-day workshops were held in Tulsa, Oklahoma; Corpus Christi, Texas; Richland (Tri-cities), Washington; and Pittsburgh, Pennsylvania, as shown in Figure 1. These places were chosen for being areas where the geology and conditions may be favorable for carbon management and for being areas that have had relatively little engagement efforts on the topic before. A virtual workshop was then held, which included break-out rooms for the four regions, with invitees including people unable to attend the in-person workshops. While these workshops were open to the public, invitations were extended to stakeholders from different stakeholder groups (community and environmental nonprofits, state and local government, local universities, labor and workforce development organizations, and Tribal government and organizations) with the aim of having a dialogue across the community.

This report offers an analysis of the community input to make suggestions for DOE, as well as for companies, academics, and community organizations who may be conducting engagement on carbon capture, utilization and storage (CCUS). It begins by examining the themes heard most frequently across the series of workshops — in terms of concerns, potential benefits, and engagement-related opportunities and challenges. Then, it looks at notable differences and makes recommendations for future engagement on carbon management.

2. What was similar across these workshops?

2.1 Potential benefits of carbon management

In each workshop, participants were asked about what they saw as potential benefits to their region or community from carbon management, and what actions or resources would be needed to make them real and accessible to all.

Quality jobs and workforce development

- At all the workshop events, participants identified the potential for an **influx of quality jobs/careers** linked to investment in CCUS projects. Participants described opportunities in the construction and operations sectors, as well as knowledge economy/technical jobs and opportunities with universities.
- Participants in Corpus Christi and Tulsa identified specific opportunities for **reinventing the workforce**. In this sense, workforce development and training strategies could take advantage of the existing expertise in the energy sector to both transition workers from the oil and gas sector and develop new carbon-focused opportunities.

Regional/local economic benefits

- Beyond jobs, participants wondered what structures were available for compensation, e.g., whether there might be “local impact fees” under local legislation (Pittsburgh).
- In Tulsa, participants suggested that the industry could draw in capital.

Complement investments in renewable energy

In Corpus Christi and Tulsa, some participants saw **the use of renewable energy to support/complement CCUS projects** as a benefit, especially given the amount of wind and solar resources available.

Becoming an example for the world

Across many of the workshops, participants discussed how investing in carbon management projects could establish a standard for the nation and world.

- In Tulsa and Corpus Christi, participants discussed how investment and development in carbon management would allow their region **to become a leader in carbon capture and storage**, potentially setting an example for the world.
- In some workshops, attendees discussed how investment in carbon management can contribute to improving community perceptions of the region. In Corpus Christi and Pittsburgh, participants discussed how carbon management projects could **raise awareness and demonstrate action to the area’s youth**.

Increasing US competitiveness

There was also some discussion of being able to produce **low-carbon goods** like fertilizers and cement and keeping jobs and low-carbon manufacturing in the United States rather than overseas. This was not a major theme but was briefly mentioned in most of the workshops.

Local, national, and global environmental benefits

In all the workshops, attendees discussed the potential environmental benefits of carbon management projects at multiple scales.

- In Tulsa and Corpus Christi, participants discussed the potential broader environmental benefits of carbon management, including the global collective benefit of decreasing carbon dioxide (CO₂) and helping the country meet climate goals.
- In all the workshops, attendees discussed the possibility of carbon management projects having a more localized environmental benefit. Participants in Richland discussed the potential for carbon management projects to support state climate goals and contribute to a net-zero community. In the other locations, participants asked whether carbon management projects could improve the air nearby and/or scrub other pollutants.

2.2 Concerns around carbon management

Participants raised concerns during the Q-and-A sessions following each presentation and were also specifically asked about concerns they had related to investment in carbon management during facilitated group discussions and/or during breakout group activities. In the case of smaller, interactive activities, comments were posted on a board and could be upvoted by subsequent groups, or upvoted after the event concluded.

Local environmental and health impacts

Attendees across the workshops had concerns related to the environmental impacts of CCUS projects in their communities and regions. Many of these concerns focused on the biophysical and geologic nature of project development.

- Participants in Tulsa and Richland identified concerns around **increased seismicity** and earthquakes linked with sequestration.
- In Tulsa and Corpus Christi, participants expressed concerns over **water quality and contamination issues** as a result of carbon sequestration.

Is this the right place? The best place?

In addition to the biophysical and geologic concerns of CCUS development, many workshop attendees expressed concerns over the social and land use challenges associated with CCUS project placement and build out.

- Participants in Corpus Christi voiced concerns over potential land takings associated with CCUS projects, as well as projects **adding to the existing burden borne by disadvantaged communities**. In Pittsburgh, participants were concerned with the potential of **stranded assets** contributing to the burden of already distressed communities. Attendees in Tulsa expressed concerns over the **pore space ownership** related to the underground storage of carbon.

Safety, emergency response, and risk communication

In many of the workshops, attendees were concerned about the safety of CCUS development, including issues of risk communication, mitigation planning, and pipeline and well leaks.

- Participants in Corpus Christi, Pittsburgh, and Richland expressed concerns over pipeline safety. In all the workshops, attendees were concerned with the location and extent of pipeline networks. In Corpus Christi, participants expressed **safety concerns about pipeline placement** in populated areas particularly in already disadvantaged areas. Participants in Richland voiced concerns over the power dynamics that drive pipeline placement, discussing how wealthier communities often have more influence in siting decisions.
- In Richland and Corpus Christi, participants were concerned about how risk was being communicated to community members and how that risk was being understood. In addition, participants asked about who would be responsible for planning to mitigate risks.

Responsibility, monitoring, and liability

Attendees in all workshops expressed concerns about the regulatory and monitoring environment associated with carbon management.

- In all workshops, participants noted that the **current regulatory environment in their areas/states was either nonexistent or insufficient to handle CCUS development** and management. In Corpus Christi, participants expressed concern about the **pace of development** and how “pop up” entities could take advantage of tax incentives without the experience and knowledge to execute a safe, appropriate project. Attendees in Richland expressed specific concern over the regulation of interstate pipelines and barriers connected to wildlife.
- Participants in Tulsa and Pittsburgh discussed the lack of monitoring and enforcement related to CCUS development. In Tulsa, attendees asked about the length and type of monitoring needed to ensure that project developers were held accountable. In Pittsburgh, participants asked who would be responsible for catastrophic failure of a project and for how long would that liability be in effect.

Strength of institutions

In addition to concerns about the capacity of state and local institutions to regulate and monitor carbon management projects, participants in many workshops voiced concerns about the history of these institutions in failing to regulate, monitor, and enforce around major projects.

- Participants in Tulsa discussed **potential corruption of systems and people** in failure to regulate and provide transparent information. In Corpus Christi, attendees note a long track record of state agencies failing to monitor and enforce statutes related to energy development.

Equity

Across all workshops, attendees discussed broad issues of equity - the distribution of benefits and harms from potential CCUS projects, the cumulative impacts of previous investments in industry and energy, and the weight of historical injustice (e.g., procedural, distributive).

- In Richland, Corpus Christi, and Pittsburgh, participants asked who benefits financially from CCUS projects. The participants discussed whether investment in CCUS would benefit the general population or **reward polluters and promote continued fossil fuel extraction**.
- Attendees in Pittsburgh and Corpus Christi were concerned with the region's history of industrial and energy investment creating **disproportionate impacts on surrounding communities**. These participants discussed the legacy of stranded assets (energy, manufacturing, industrial) and how CCUS projects have the potential to continue this cycle.

Cost

Cost did not receive much discussion, but it did come up in various ways: in terms of tax breaks for projects/loss of local tax revenue; in terms of opportunity cost; and in terms of higher energy bills. Some participants simply wondered about the economics of the technology generally, i.e., the viability of the projects after government funding runs out for them.

Effectiveness of CCUS

In all the workshops, attendees asked questions about the effectiveness of carbon capture technology and the distributive nature of CCUS benefits.

- Participants expressed concern over whether CCUS technology is proven to deliver benefits as advertised and at the scale necessary to positively impact communities.
- **Life cycle analysis** was also discussed. This was both in terms of the embedded GHGs necessary to construct a project, as well as simply knowing if there would be a net positive in reduction of CO₂.

Trustworthiness of information

In many of the workshops, attendees expressed concerns about the sources, trustworthiness, and accessibility of information related to carbon management.

- Participants in Tulsa, Corpus Christi, and Pittsburgh noted concerns about **misinformation around CCUS technology** (both in support of and against carbon management technology). In addition, participants asked where and how to access information about existing and planned carbon management projects.

2.3 Engagement-related opportunities and issues around CCUS

In each workshop, participants were asked about strategies and resources that would enable more meaningful stakeholder and community engagement. While the workshops focused on engagement around CCUS, discussions often extended beyond carbon management to engagement around other energy and infrastructure investment.

Access to CCUS information

In many of the workshops, attendees discussed a need for more CCUS-focused information and opportunities for education around carbon management in order to allow stakeholders to participate in a more informed and meaningful way. These discussions covered accessing research, lessons learned and best practices, and examples of existing CCUS-related work.

- In Corpus Christi and Pittsburgh, participants introduced the idea of a **CCUS resource hub** where community members could access information on carbon management. These hubs could provide information that is tailored to local communities and provide opportunities to develop skills related to CCUS (analysis of data, mapping, outreach and engagement).
- Participants in Tulsa, Corpus Christi, and Pittsburgh expressed a need for **access to science-backed research** related to CCUS technology and development, including **access to raw data**.
- In all of the workshops, attendees discussed needing access to **lessons learned and best practices** related to various aspects of engagement and community planning. For example, participants in Corpus Christi discussed best practices on when and how to engage with respect to CCUS projects and in Tulsa, participants wanted to have access to **examples of community benefits agreements and Community Benefits Plans**.

Workforce development engagement

In all the workshops, attendees discussed the various types of stakeholders who needed to participate in the development of a CCUS project. Broader discussions on the inclusion and transparency of stakeholders were discussed within the following themes.

- Participants in Corpus Christi and Richland highlighted the need for **workforce development stakeholders to play a part in CCUS development**. In particular, Corpus Christi attendees discussed the role of end users in identifying job opportunities and working to create pathways to careers for non-traditional learners.

Local liaisons

Across all the workshop events, attendees emphasized that CCUS project partners needed to engage communities in their communities.

- In most of the workshop sites, participants described a **focus on place-based engagement** that was supported, facilitated, and organized by local liaisons. Participants in Tulsa and Corpus Christi discussed the need for a designated person or group to advocate on behalf of community members. In Pittsburgh, participants discussed **providing engagement training to trusted community organizations** so they can distribute information, advocate on behalf of community members, and build community capacity in relation to potential CCUS investment.

Communication, transparency, and results

In broader considerations around engagement, participants in every workshop discussed the need for improved communication, transparency around decision-making, and clear indications of how community feedback was incorporated into the project.

- Attendees in every workshop discussed the methods by which engagement occurs with an emphasis on **incorporating local context into the engagement process**. Participants emphasized the need for local partners to translate information around CCUS and how community groups are better situated to reach vulnerable populations. In this sense, project partners can provide support in this process by making information more accessible and available in multiple languages and formats, working with community organizations to clearly communicate messaging without jargon, and using resources to promote information in multiple outlets.
- However, participants noted that place-based engagement alone was not enough. CCUS project partners **needed to be transparent** about what groups they were engaging with and where their CCUS

information was coming from. Participants discussed increased transparency being key to making sure **all community members had a seat at the table** and was aware of important information.

- In line with increased transparency, participants in Corpus Christi, Richland, and Pittsburgh emphasized that community members and organizations needed to see **how and if their input was recorded**, and **how and to what degree community input was incorporated into projects**.

Community ownership

Workshop participants discussed how improved engagement processes could not only support greater community participation in decision-making but afford communities greater empowerment and ownership around carbon management.

- In Tulsa and Richland, participants emphasized that communities have the **right to self-determination** and that means “**making ‘no’ an acceptable decision.**”
- Attendees at all sites discussed the need for community members and organizations to be **more involved in the planning and policymaking process**. Participants in Pittsburgh noted that increased community ownership meant that communities had more power to **hold CCUS project partners accountable**. In some of these conversations, “ownership” implied not just conceptual ownership, but democratizing carbon management investments in industry and supporting community ownership of projects.

Supporting Tribal engagement

In Tulsa and Richland, participants described opportunities to **engage with Tribal communities** over the potential of carbon management investment.

Resources for engagement

In most of the workshops, attendees discussed the need for increased resources in order to facilitate greater and more diverse community participation in engagement events.

- Participants in Tulsa, Richland, and Pittsburgh discussed specific resources that would encourage and/or make attendance possible at engagement events like **providing food, transportation, and childcare**. Attendees also noted that meetings should have a **virtual component** to accommodate those that cannot participate in-person.
- Related to increased funding for engagement, attendees in Tulsa, Richland, and Pittsburgh emphasized the need for **funding for community groups that allow them to hire subject matter experts**. In addition, participants in Pittsburgh discussed providing stipends for communities so more people can be involved in carbon management project engagement and engagement in general.

3. Considering regional differences

Workshop participants communicated that local context matters when it comes to engagement in general and especially when it comes to matters of energy infrastructure investment. This series of place-based workshops illustrated the need to account for local histories, power dynamics, and decision-making processes when initiating engagement activities and developing relationships with regional stakeholders. Many of the workshop sites shared similar thoughts on a range of topics (workforce development, potential environmental impacts, meaningful engagement), but the way those items manifested and were discussed was different in each site.

In Tulsa, history played a major part in framing the discussions participants had around carbon management. Some participants touted the state’s “deep energy history” and its role as a leader in both fossil fuel and renewable energy development. These participants envisioned Oklahoma and the United States as becoming leaders in carbon management technology and using CCUS to mitigate fossil fuel harms while reaping the benefits of fossil fuel production (e.g., CCUS + hydrogen). Other participants discussed a history of top-down engagement and decision-making around energy investments that excluded some stakeholders from participating. The discussions on historical energy development led many participants to wonder about the seismological concerns of injecting

carbon underground, especially in places with a history of natural gas-induced earthquakes. In addition, participants discussed how Oklahoma’s unique settlement history creates land and pore ownership questions and legal and sociocultural concerns involving Tribal governments and communities.

In Corpus Christi, workshop participants emphasized the need for carbon management project developers and government partners to “engage communities in their communities.” Participants discussed the double-edged sword of living alongside energy infrastructure. Previous oil and gas development in the area created good-paying jobs, and some participants discussed the potential for investments in carbon management to follow a parallel path. However, participants also described how that same oil and gas development has disproportionately harmed the health and viability of certain communities. These conflicting outcomes have created distrust in historical engagement and governance processes that impact discussions around investment in carbon management.

In Richland (Tri-Cities), participants discussed carbon management in the context of the nearby Hanford Nuclear Site, concerns of impacts on agricultural and rural lands, strong regional investments in research and technology, and state goals focused on climate change. Some participants discussed carbon management supporting regional and statewide decarbonization efforts, while others expressed concerns about potential impacts on the natural environment. In particular, participants expressed concerns over the safety, regulation, and siting of pipelines in the area, as pipeline infrastructure is not common in the Tri-Cities region.

In Pittsburgh, a history of manufacturing and air and water quality violations, as well as more recent investment in natural gas, framed the workshop. Participants spoke about a socialized tendency to think one has to give up health protections for good jobs and a kind of “extraction post-traumatic stress disorder (PTSD)”. They spoke specifically about the concern that politicians are bought by industry in some places, which damages the ability to have conversations. Representatives from community groups, public health initiatives, and environmental justice communities contextualized a need for more inclusive and transparent engagement, information sharing, and decision-making around all energy investments. These comments were driven by the marginalization of stakeholders and communities in previous development and outreach efforts. In lieu of discussions of being excluded in engagement and decision-making processes, some participants emphasized a need for more guidance and clarity when it comes to project agreements (community benefits agreements, good neighbor agreements, etc.) – describing previous experiences with similar practices that proved faulty and producing a lack of accountability and recourse.

4. Discussion

4.1 Key Themes

The workshops surfaced several themes, including opportunities for further research and analysis, improved communication, and government-wide collaboration. Topic areas within each of these themes include air quality, pollution, emergency response, workforce development, and industrial decarbonization. In what follows, recommendations are made by opportunity area.

4.1.1 Research and analysis opportunities

- 1. Air quality.** Participants had questions both about point-source carbon capture and direct air capture in terms of added burdens as well as potential benefits. While CCS can have a measurable impact on improving air quality, the assessment of pollutants is an important design consideration DOE and relevant agencies are examining these topics, and new projects will allow for further data collection. Regulatory agencies can also play an important role in improving the data and reducing the impacts.
- 2. Pollution from solvents/sorbents involved in carbon capture.** This was an area that participants wanted to better understand. They would benefit from a short review paper on the state of the science. Current research has found that emissions of amine, nitrosamine and other air toxins are likely to be insignificant and identifies

control technologies that can be used to minimize any such emissions.⁶ However, data is limited and identifying the research gaps and what would be required to address them is a recommended first step identified in these workshops.

- 3. Regional industrial decarbonization under different scenarios.** Participants in Pittsburgh wanted to know about the usefulness of CCUS for steelmaking in a scenario where electric arc furnaces are increasingly available and whether CCUS would be an interim solution or a stranded investment. This request for further information suggests that participants would be interested in a regionally-based analysis on industrial decarbonization options and it would be invaluable to package and communicate this research to non-specialists. This recently published report is one example of analysis done on this topic.⁷
- 4. Workforce opportunities.** Workshop participants wanted a better understanding of the types of jobs that might be generated, the training required and training available, and how these jobs would be made accessible. There are some high-level analyses available from independent researchers⁸ so, it would also be useful for federal agencies to conduct and communicate this information, including regional analysis, in conjunction with DOE’s focus on clean energy jobs.
- 5. Community-based monitoring.** Participants brought up questions about air and water testing, including the idea of granting community-based organizations resources for this. DOE requires applicants of funding opportunity announcements (FOAs) to demonstrate how they will enable community participation in, and access to, monitoring. For example, applicants are required to highlight milestones for the project that describe the technical and communications resources of the project to track, monitor, and report project impacts, including how the surrounding communities will be able to access monitoring data. More information on what is required to be included in these applications can be found in *Creating a Community and Stakeholder Engagement Plan*. There is also a research aspect to participants’ questions in terms of learning more about what makes community-based monitoring programs successful.
- 6. Community benefits agreements.** Participants raised some of the following questions: Who benefits from community benefits agreements (CBAs)? When do they end up with unintended consequences, like pitting nonprofits against one another or draining resources in lawsuits? What are the key factors in success?

To foster equitable implementation of the Bipartisan Infrastructure Law (BIL), the DOE developed Community Benefits Plans (CBPs) requirements for FOAs. These plans work to ensure that projects support a clean and equitable energy economy across the country with the following criteria: meaningful community, stakeholder, and labor engagement; investment in America’s workforce; advancement of diversity, equity, inclusion, and accessibility; and contribution to a more equitable distribution of project benefits and impacts. To ensure these goals are met, the project awardees must outline and implement the following plans within the Community Benefits Plan: a Quality Jobs Plan; a Diversity, Equity, Inclusion, and Accessibility (DEIA) Plan; a Justice40 Initiative Plan; and Community, Labor, and Stakeholder Engagement Plan.

While there is a programmatic piece to CBPs — in terms of recognizing DOE FOA applicants who employ Workforce and Community Agreements — there is also a research aspect to this. DOE’s efforts associated with Community Benefits Plans represent a unique, large opportunity to learn more about how CBAs are working.

4.1.2 Communications opportunities

A consistent theme across the workshops was accessibility to clear, understandable information. In the virtual workshop, attendees were specifically asked about what mediums or forms of information are best for learning and keeping informed about carbon management. People emphasized the need to “train the trainer,” including education for media and journalists as well as professional development for teachers. Other forms were also

⁶ Rochelle, Gary. “Air Pollution Impacts of Amine Scrubbing for CO₂ Capture.” SSRN. Proceedings of the 16th Greenhouse Gas Control Technologies Conference (GHGT-16), November 21, 2022. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4281826#.

⁷ Moniz, Ernest, et al. “Turning CCS Projects in Heavy Industry & Power into Blue Chip Financial Investments.” Energy Future Initiative, February 2023. https://energyfuturesinitiative.org/wp-content/uploads/sites/2/2023/02/20230212-CCS-Final_Full-copy.pdf.

⁸ Larsen, John, Whitney Herndon, Galen Hiltbrand, and Ben King. “The Economic Benefits of Carbon Capture: Investment and Employment Estimates for the Contiguous United States.” Rhodium Group, April 20, 2021. <https://rhg.com/research/state-ccs/>.

mentioned: sessions hosted by local universities or educational institutions, short videos that are accessible to the public, public meetings and town hall meetings, and platforms like Twitter, Mastodon, and YouTube.

The feedback from participants summarized below illustrates a shared goal to disseminate information that is accessible and relevant to the public that spans languages, media, and levels of expertise.

1. **Multiple languages:** As larger projects advance; it would be advantageous for communities to have relevant information accessible in multiple languages.
2. **Multiple audience levels:** Participants suggested “packages of materials” that speak to different “audience types and projects” based on their levels of knowledge and expertise. As one respondent said, it would be helpful to have “a tiered approach to information sharing/learning materials so that stakeholders with different degrees of knowledge/expertise can find granular answers to questions.”
3. **Multiple media forms:** While DOE and other agencies produce multiple forms of media, such as videos and podcasts, participants indicated that they should continue to consider producing an array of media options that are widely accessible when it comes to information about carbon management.
4. **Simplicity:** “Prepare information for us as if our time cost you \$1000/hour,” advised one participant. In other words, while some people will want to take a deep dive into the data, many people would prefer to see initial materials that are prepared with the same type of care as a briefing for a very high-level official in terms of the economy of words and distilling main ideas.

There are particular products that will be valuable and probably not require new research or substantial analysis. These include:

1. An explainer on **life cycle analysis (LCA)**. Questions about whether a facility would provide a net benefit and about the embedded emissions in constructing the facility arose at several workshops. Obviously, each facility will have a different life cycle analysis, and these are technically complex. Nevertheless, participants demonstrated interest in seeing hypothetical, illustrative LCAs for different sorts of projects that would give people a sense of how the math works out.
2. An explainer of when carbon management projects can be **compatible with renewables**. Some workshop participants stated that CCUS or carbon dioxide removal (CDR) could work with wind and solar resources that the region was trying to further develop. People would be interested in learning more about when these resources work together and when they might compete (e.g., renewables for direct air capture (DAC) vs. green hydrogen production). There is a general need for knowledge about the energy system and how this one carbon management piece fits in with the bigger picture. When communicating on this topic, care should be given to avoid trying to “sell” CCUS over other technologies but rather explain it in the context of the portfolio of options.
3. Materials describing the **existing underground landscape**, including orphan wells/pre-existing wells and repurposing wells. Questions included whether caverns could be re-used, whether companies are planning to repurpose gas injection wells, how abandoned wells are identified, and “Is there consideration of the damage done from fracking in consideration of wells around? Because everything underground is communicating.” In other words, people need to understand how a CO₂ injection well interacts with what is already going on in the subsurface. There are probably many visual or textual ways to convey this, and focus groups could possibly be used to identify what is most effective. The availability of public information about existing infrastructure, including production and injection wells, is very important because many community advocates are deeply concerned about this aspect, given the histories of extraction in places where CCUS may take place.
4. A diagram with a general **timeline of a project**. There has been a clear and consistent request to better explain how these projects unfold, including the steps and timescales. As one participant asked, “If it’s a ten-year buildout, should we start getting our eight-year-old kids ready?” DOE has produced some existing materials, such as a [diagram](#) that explains the Carbon Storage Assurance Facility Enterprise (CarbonSAFE)

phases, that FECM could build upon to meaningfully inform and guide the public through the lifecycle of carbon management projects.⁹

4.1.3 Programmatic opportunities

There are some programmatic actions that federal and state governments (e.g., research and development funding, regulatory programs with permitting authority) could take to address some of the issues raised by community members. Examples include:

- **Require transparent data and analysis** in formats that could be designed for public access and legibility (e.g., project-level life cycle analysis).
- Specify **standard guidelines for operators to develop project websites** OR government agencies could collaborate on providing information on a project-by-project basis, particularly for government-funded projects.
- Communicate more clearly how **companies that currently do not adhere to environmental standards will be assessed with respect to government funding or permitting**. This was a specific request from some community members. Violations of environmental standards pose an overall project risk for all parties involved.
- Require more specific data about **emergency response**. Participants asked about assurances around an early warning system. For example, DOE funding opportunity announcements do include this and could be leveraged and built out, such as collecting data about existing emergency response capacities. This would equip program analysts to better understand any existing gaps and work with other agencies to strengthen capacity.
- Require further **baseline data collection** about air and water quality early in the process and also engage with community groups to collaborate on this. Some participants asked about baseline testing so they could better understand the impacts of carbon management projects.

4.1.4 Recommendations for a whole of government approach to carbon management

The workshops surfaced many questions that DOE is not equipped to answer on its own, which presents an opportunity for the DOE to collaborate with other relevant federal and state agencies in the following areas:

1. **Liability.** Who is responsible for long-term monitoring? What happens if something goes wrong, now or far in the future? People need a clear explanation of how this will be handled.
2. **The role of CCUS in the long-term climate strategy.** Government agencies must have clear and consistent messages of how CCUS fits into US and/or state climate strategies. At the federal level, this information can be extracted from documents like The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050,¹⁰ but there is not a clear and consistent message on it aimed at non-specialists.
3. **Pipeline safety.** In general, people want to understand what the government is doing after the pipeline failure in Satartia, Mississippi, to make sure something like that does not happen again. In response to the Mississippi incident, the Department of Transportation is updating its CO₂ pipeline safety standards and is funding studies to understand the impact of CO₂ pipeline releases and leaks. This concern demonstrates the need to communicate what is actively done to prevent and minimize the impacts of any future failures, beyond a list of safety considerations or things operators could do. This could include federal, state, or local government actions such as training of first responders/emergency response.

⁹ [Creating a Community and Stakeholder Engagement Plan 8.2.22.pdf \(energy.gov\)](#)

¹⁰ U.S. State Department, "The Long-Term Strategy of the United States – Pathways to Net-Zero Greenhouse Gas Emissions by 2050, November 2021. <https://newsroom.unfccc.int/documents/307878>

4.2 General recommendations for conducting engagement

During the virtual workshop, participants were specifically asked who is best positioned to carry out public and community engagement. Answers included: community leaders themselves, scientists, labor unions, environmental groups, teachers (who will need professional development), social media influencers, farmers and landowners, regulators, funders, state departments of education, technology developers from small and large companies, local nonprofits, and funded project positions to be staffed by community representatives. In addition, participants identified practices and resources that project developers and government partners could initiate and support to make engagement more inclusive, transparent, and ultimately, more effective.

- **Meet people in their communities.** Workshop participants emphasized the need for more place-based engagement that centered on local context and history. As planning for engagement begins, engagement teams need to be aware of the social, economic, political, and environmental dynamics of the area. This will ensure that key stakeholders and community groups are informed, event locations are accessible, and that event activities and discussions are framed in a way that makes the most sense for the community.
- **Build local relationships.** It is important to identify and work with a diverse set of local groups and gatekeepers to build trust, share information, and co-produce engagement that is locally tailored. Because engagement does not end after an event is concluded, establishing strong engagement relationships will help facilitate event feedback as well as the reporting of event outcomes.
- **Make sure everyone has a seat at the table.** Some communities have a history where certain voices have been excluded from participating in engagement and decision-making processes. It is important to realize that people access information in different ways, and extra attention should be paid to groups historically excluded from the engagement process. More inclusive outreach and invites are one piece of the challenge, but making sure engagement activities provide space and show value for all voices and perspectives is also essential. The engagement team needs to provide a clear explanation as to how participants' contributions will be recorded, utilized, and reported back to the group.
- **Provide access to reliable information.** Many of the carbon workshop participants expressed concerns about misinformation in general, sources of information being shared at engagement events, and the accessibility of research and raw data. Engagement teams should be prepared to share the metadata behind any research they use, try and use open-access research, clearly identify the sources of information, and explain to participants how they can access raw datasets. This information should be communicated in the outreach and planning phases, during the actual events, and in the event follow-up phase.
- **Provide resources to support inclusive engagement.** Many community members and groups face challenges in attending and fully participating in engagement activities. To the extent possible, engagement teams should consider providing, if allowable, food and refreshments, childcare, transportation for participants, and stipends for participating. If limited resources prevent community members from attending, engagement teams should be sensitive to the needs of the community and provide alternative meeting times, formats, and methods for attendance.

More resources on best practices for conducting engagement can be found at the following:

[BEST PRACTICES: Public Outreach and Engagement for Geologic Storage Projects](#)

National Energy Technology Laboratory

[Community Benefit Agreement \(CBA\) Toolkit](#)

U.S. Department of Energy, Office of Economic Impact and Diversity

[Engagement Resources](#)

U.S. Department of the Interior

[Fact Sheet: FECM Domestic Engagement Framework](#)

U.S. Department of Energy

[Fossil Energy and Carbon Management Domestic Engagement Framework: Engaging Communities, Stakeholders, and Tribes in Clean Energy Technologies](#)

U.S. Department of Energy

[Justice40 Initiative | Department of Energy \(with links to the Energy Justice Dashboard\)](#)

U.S. Department of Energy, Office of Economic Impact and Diversity

5. Conclusion: How to engage on carbon management today

Many people have thought about how to do community and public engagement on carbon management. When it comes to carbon capture and storage, there was a multistakeholder process to write the 2010 World Resources Institute Report *Guidelines for Community Engagement in Carbon Dioxide Capture, Transportation, and Storage Projects* and the 2017 update of NETL's *Best Practices: Public Outreach and Education for Geologic Storage Projects*. These resources also underscore that carrying out meaningful stakeholder engagement starts long before an actual engagement event and continues well after the event concludes. As DOE's manual [Best Practices: Public Outreach and Education for Geologic Storage Projects](#) states the most valuable lesson learned by the Regional Carbon Sequestration Partnerships "is that public outreach needs to be incorporated as an integral component of geologic storage project management—ideally starting at the time of project conceptualization/definition prior to site screening."

The existing resources highlight many of the issues raised in the workshops in terms of building open lines of communication and trusted relationships. This brings up two areas of improvement that participants identified across the workshops: 1) the need for reimagined public engagement, e.g., how can we improve two-way engagement with communities; and 2) actualizing best practices, e.g., where the challenge is no longer to identify best practices but to put those existing principles into action.

In comparing the input from these workshops to earlier engagement literature, there were some new areas of emphasis. First, there was a clear focus on the management of the subsurface, and the risks of mismanagement of the subsurface, with many questions about how carbon storage would interact with existing wells. Much of the earlier engagement with carbon management took place before the shale boom. Post the mid-2010s is a different social context when it comes to anything underground. Many participants had become engaged with the topic through their experience with problems from oil and gas extraction, and so they had both expertise and concerns about the subsurface, leading to discussions that were more technical and more specific on the regulatory side.

Second, there were many discussions about misinformation and the quality of information out there. Earlier engagement on this topic took place before social media was widespread. The information landscape people have to navigate now is very different, with both a democratization of information but also selectively presented information. The opportunities for how to engage have also expanded. Government agencies have the potential role as providers of neutral, fact-based information and take full advantage of the new opportunities to engage.

Third, the context of carbon management now includes carbon removal, which brings up new questions and pathways toward decarbonization. Communities are seeking information on not just project-level or technology-specific risks but trying to figure out how these particular techniques fit into their overall visions of where they want to go in their energy future. This means that engagement is most effective when it is about more than just any specific technology. As Simon Lock and colleagues wrote in a study of CCUS engagement nearly a decade ago, "If the public, as is suggested here and elsewhere, do not feel that they have any say in high-level decisions about energy futures and are only consulted at a local level to manage the impact of decisions already made for them with respect to one technology, this starts any public participation process off on the wrong foot."¹¹

¹¹ Lock, Simon J, Maria Lee, and Yvonne Rydin. "Nuclear Energy Sounded Wonderful 40 Years Ago: UK Citizens Views on CCS." *Energy Policy* 66, Pages 428-435, March 2014. <https://www.sciencedirect.com/science/article/pii/S0301421513011312?via%3Dihub>.

Appendix A: Workshop Report-outs

Tulsa, Oklahoma

The workshop in Tulsa, Oklahoma, was a half-day event held on November 7, 2022. Fifty-two people were in attendance, including local community groups/members, Tribal members, academia, students, local and state government, the federal government, and non-profits/advocacy groups. The event began with a welcome from Suzanne Baker, Stakeholder Engagement Specialist from the Department of Energy, along with an overview of engagement and funding opportunities available through the Office of Clean Energy Demonstrations (OCED), which was followed by three sessions of speaker presentations, three Q-and-A periods, one interactive breakout group discussion, and one plenary discussion. Session I speakers introduced how carbon capture fits into the US climate and energy goals, an explanation of CCUS methods and technologies for site-specific and DAC applications, and the regional context of the local energy transition in Oklahoma, along with the first Q-and-A session. Next, session II speakers addressed the funding mechanisms, local CCUS capacity, community perceptions and agreements on project development of capture sites, and the phases of developing a project in Oklahoma, followed by a second Q-and-A period. Session III addressed the risk mitigation practices and safeguards used for CCUS project development, followed by a third and final Q-and-A period. Session IV was an interactive activity in which the group was sectioned into four diverse stakeholder groups (with equal representation of stakeholders within each group) for an activity. This activity included asking four questions, in which each group had approximately ten minutes to add their thoughts, concerns, and perspective to a flip chart board and then rotate to the other stations as a team, to add “upvote” stickers to existing ideas they liked from previous groups or add additional ideas to the board if they were not already present. The four discussion topics posed to the groups were the following:

- A. What might be the benefits of carbon capture or carbon removal projects in this region? What is needed to realize those benefits?
- B. What are the concerns for carbon capture or carbon removal projects in this region?
- C. What resources or support do communities need to be able to engage with these projects?
- D. What context or understanding do people need to know about the community and region before a project is sited in this area?

Session IV concluded where the plenary addressed the following questions together:

1. What questions or advice do you still have for the government agencies trying to regulate these activities?
2. What do you want governments to further understand about working with or in this community?
3. What additional resources would help you to engage in future projects or advocate for changes?
4. What was not addressed that still needs to be?

Session V followed with an opportunity for stakeholders and researchers to explore and discuss information through further Q-and-A and exhibits brought by the attendees, which were comprised of pamphlets, posters, and interactive table displays brought by fellow participants to encourage networking and continued discussion.

The event was wrapped up with statements from Suzanne Baker (DOE), thanking participants for attending.

Presentations

Introductions

Emmanuel Taylor, Senior Energy Consultant at Energetics

Emmanuel outlined the purpose of the workshop and intend outcome as a project through the DOE and federal partners to engage with communities to better understand concerns regarding CCS and DACS technologies as well as for community members to learn about potential carbon projects that may be a fit in the area and the corresponding opportunities for public participation in the lifespan of the project. Emmanuel broke down the layout of the sessions and activities for the day along with the expected conduct of all participants.

Session I: What kind of carbon projects, and why?**Kenneth Wagner, Director at the Hamm Institute for American Energy**

Kenneth introduced the current outlook of Oklahoma's energy future and the opportunities that could be attained through DAC within the state. Expanding on the viability of local DAC projects, Wagner provided insights into the permitting issues around injection wells and stated that while Class VI wells should be the target, state-permitted enhanced oil recovery (EOR) wells should provide immediate opportunity with the new IRA tax credit of \$60 per ton of CO₂ permanently stored.

Dr. Holly Buck, Management and Program Analyst at the Department of Energy

Holly presented on the purpose of carbon capture to meet the U.S. Climate and Energy Goals through reductions in environmental carbon dioxide. Buck utilized the example of a fertilizer plant in Enid, Oklahoma to demonstrate a prime use for CCUS locally.

Quincy Childs, Fellow at the Department of Energy

Quincy specified further the necessity of carbon removal technologies as a part of the framework for the emissions reduction pathways to achieve Net-Zero emissions in the U.S. Quincy showed a breakdown of the different carbon removal and storage methods, concluding with a comparison between Point Source and Direct Air Capture.

Ken McQueen, Oklahoma's Secretary of Energy and Environment

Sec. McQueen reminded participants that the petroleum industry has used carbon dioxide in enhanced oil recovery for over 40 years. This experience and its associated work force positions Oklahoma to be a leader in permanent carbon sequestration. With the revised incentives provided in the recent federal legislation, many of the prior projects with marginal economics are now viable. In support of this initiative, Oklahoma plans to pursue program authorization of the Underground Injection Control (UIC) Class VI wells from the Environmental Protection Agency (EPA), so that companies can sequester carbon through a state permit. This effort has the potential to contribute to the State's future economy and decarbonization efforts.

Q-and-A: Session

The Q-and-A that followed Session I focused on the following topics:

1. Scale of current DAC projects and how they will size up to the intended target values of capture hubs.
2. Whether the carbon captured accounts for the embodied carbon of the facility's construction.
3. The role of the Hamm Institute and other universities particularly in Oklahoma.
4. Current outlook of Class VI wells and the intention of speeding up permitting timelines through tool development in the EPA.

Session II: Would these projects fit here?**Michael Thompson, Management and Program Analyst at the Department of Energy**

Michael began by breaking down the \$12 billion allocation out of BIL to fund point source capture, DAC, carbon transport systems, and carbon dioxide utilization and storage projects, along with the requirement that applicants address project characteristics on environmental justice, quality jobs, DEIA, and community and stakeholder engagement. He also outlined the enhanced federal tax credits for point source and direct air capture and geologic storage.

Dr. Nicholas Hayman, Director of the Oklahoma Geological Survey and State Geologist of Oklahoma

Nicholas introduced CCS projects that have successfully worked at scale in oil and natural gas fields and have particularly well at scale in offshore projects. Oklahoma has a history of expertise in injection from enhanced oil recovery and management of the salt-water-disposal in the Arbuckle Formation which would only grow with the involvement of Oklahoma's institutions for further process innovation.

Traci Rodosta, Carbon Storage Program Director at the Department of Energy

Traci outlined the CCS value chain and information on how to begin identifying tools for regional project viability. Project phase timelines were included to provide insights into the steps needed to achieve storage projects as well as a breakdown of the National Environmental Policy Act (NEPA) process that would be needed for such projects.

William Lynn, Geologist from the Osage Minerals Council (OMC)

Lynn provided an overview of the Osage mineral estate in Osage, Oklahoma and the value of the IRA's tax credits provides incentives to investigate and plug leaking methane orphan wells as well as using captured carbon dioxide for EOR that would provide both new oil and gas production and carbon credit revenue streams. OMC is working to determine the permanent carrying capacity for sequestered carbon dioxide in the Osage Mineral Estate.

Dr. Hank Jenkins-Smith, Co-Director, Institute for Public Policy Research and Analysis at the University of Oklahoma

Hank provided local context on where Oklahomans' views on whether GHG emissions cause global climate change and the preferred sources of energy and future adoption 20 years out. Hank explained the value of a survey panel to track long-term and broad community feedback that might be limited through stakeholder engagement while still involving general learning, trust building, and adaptation over time.

Dr. Tom Mueller, Assistant Professor of Geography and Environment at the University of Oklahoma

Tom set the stage for what the Just Transition is and the value that Environmental and Energy Justice will play in defining how the transition can look through the use of Community Benefits Agreements (CBAs) with developers. Tom provided examples of successful CBAs that allowed for co-benefits between communities and energy developers.

Q-and-A: Session II

The Q-and-A that followed Session II focused on the following topics:

1. Risks around long-term usage and storage as well as areas without scientific consensus.
2. Defining clarity around the pore space ownership between the surface and mineral owners and the regulatory clarity that would be needed to add in Oklahoma.
3. Breaking down the differences in the class types for Class I-VI injection wells along with where to find more information about each type.
4. Water injection flow rates and seismic risk understanding.
5. Public perception of future grid mixes.
6. Dual process funding and oversight from DOE and EPA on project sites.

Session III: What can be done to mitigate project impacts?**Traci Rodosta, Carbon Storage Program Director at the Department of Energy**

Traci shared insights on the government's role in responsible research into risk mitigation for carbon capture projects. The DOE's National Risk Assessment Partnership as well as resources and engagement opportunities through FECM were demonstrated as accessible tools for stakeholders interested in researching the risk conditions of a project.

Vincent Holohan, Engineer, Engineering and Research Division, Department of Transportation, Pipeline and Hazardous Materials Safety Administration

Vincent began by introducing the Pipeline and Hazardous Materials Safety Administration and its work on carbon dioxide pipelines since 2001, including transparency around its largest incident since 2001. Vincent followed up with actions that have or will be taken around research and rulemaking pertaining to the expansion of the pipeline network and safeguarding development to minimize further risks.

Brandon Maples, Geologist at the Environmental Protection Agency Region 6

Brandon explained the regulatory protections of the Safe Drinking Water Act (SDWA) and the (UIC) programs and the protections for underground sources of drinking water (USDWs). Brandon broke down the testing, monitoring, safety, siting, and public participation requirements for the Class VI injection well construction process required by the EPA.

Q-and-A: Session III

The Q-and-A that followed Session II focused on the following topics:

1. Class VI well construction and where to find more information on the construction process.
2. Operator responsibilities around USDWs for projects so water quality testing does not fall on resource-constrained states.
3. Regulatory requirements for publicly available applications and water monitoring data reports. Possibilities for independent testing requirements
4. Clarification between demonstration vs commercial projects which will require robust stakeholder engagement and considerations for Justice40 as well.
5. Possibilities for local entities to conduct monitoring as a safeguard for the community.

Session IV: Interactive Discussion Activity

The interactive discussion was broken down into a group activity in which groups addressed questions A-D as mentioned above. Below are the questions and the respective responses for each.

A. What might be the benefits of carbon capture or carbon removal projects in this region? What is needed to realize those benefits?

- Changing Oklahoma's image to become a leader in CCS, later supporting other states
- Direct construction and operation jobs along with indirect tech and knowledge jobs as well as knowledge transfer benefits
- Incentives for the Oil & Gas sector to open their mind to embrace pathways to climate remediation. Draws in capital to project communities that improve future investment image of communities.
- Necessary for the hydrogen economy
- Global collective benefit of decreased CO₂
- Local research labs have opportunities to be a part of the data collection and analysis
- Benefits to society, the economy, and the environment
- Generation of local tax revenue
- Contributing to the discussions about the relationship between development and social justice
- Open conversations about Tribal community empowerment
- Remaining within EPA attainment and the economic benefits
- Leveraging local experience around the deep energy history
- Needing CCS and hydrogen for disadvantaged communities living near refineries and for transport
- Opportunities for zero-carbon refining
- Unlocks stranded energy assets in the grid through complementary techs

B. What are concerns for carbon capture or carbon removal projects in this region?

- Education that is unbiased, factual, and clearly defines project sustainability.
- Seismic risks from CCS
- Water quality of fresh water supply
- Conflicts around pore space ownership
- Assuring low impacts on local biodiversity
- Equity and community engagement to address local concerns

- Development of the regulatory environment to include audits, permits, and tax incentives
- Project feasibility to include costs and scaling
- Monitoring requirements
- Disinformation
- Siloed applications of technologies
- Corruption of systems through a lack of transparency

C. *What resources or support do communities need to be able to engage with these projects?*

- Education with possible forms of public meetings, research opportunities, and websites.
- Example CBAs and CBPs
- Multiple media types
 - Audio, print, etc.
 - For diverse individuals
 - Modular modes
- Mechanisms for spreading information.
 - Local newspapers
 - Local library
 - IDEA
 - Public schools
 - Food/ lunches
 - Churches/synagogues/mosques
 - Public advocate
 - Famous person
 - Providing ownership for community
- Transportation
- Funding
- Procedural local programming
- Materials packages

D. *What context or understanding do people need to know about the community and region before a project is sited in this area?*

- Respecting boundaries, from legal and respect perspective
- Environmental, social, and economic benefits
- How to promise longer-term investment in the context of boom-and-bust cycles
- Awareness of the history of the development of the oil and gas industry and minerals
- Learn who is not at the table
- Community experience, sense of history
- Demographic profile of communities in the area
- Defining granularity of area assessment for pore spaces
- Quality/ robustness of regulatory process to ensure socio-ecological benefit & safety
- Transparency of data monitoring and reporting

- Mechanisms for recourse if CBA is breached, accountability pathways for communities
- Dedicated community liaisons to drive procedural engagement
- Defining “People” = city authority/ entity? Company or federal agency or state
- Workforce development priorities and needs
- Community differences and area nuances
- Information access is IMPORTANT
- Ongoing/proposed development and implementation
- Progress of local impacts and the need for ongoing engagement
- Pore space surface rights and conflicts around property owner rights
- Training for first responders, related professions
- Oklahoma’s unique settlement history and impacts on estate ownership

Session V: Plenary Discussion

Time did not permit for the plenary discussion, so Session V was removed from the agenda to accommodate for the extended Q-and-A and networking session.

Conclusion

The event was wrapped up with statements from Suzanne Baker (DOE), thanking participants for attending and opening the room as an opportunity for stakeholders and researchers to explore and discuss information through further Q-and-A and exhibits brought by the attendees which was comprised of pamphlets, posters, and interactive table displays brought by fellow participants to encourage networking and continued discussion.

Corpus Christi, Texas

The workshop in Corpus Christi, Texas, was a half-day event held on November 10, 2022. Sixty-six people were in attendance, including local community groups/members, academia, students, local and state government, federal government, and non-profits/advocacy groups. The event began with a welcome from Harte Research Institute (HRI), followed by three sessions of speaker presentations, Q-and-A periods after each session, and two sets of discussions. Session I speakers introduced the context of the workshop by discussing local social and environmental priorities, as well as the global and national context for carbon projects. Next, session II speakers addressed the technology of CCUS and carbon transport, as well as the Justice 40 initiative, and concerns about regulating the technology, referencing historic oil and gas well failures in Texas. After session II was the first discussion period, in which the large group discussed concerns/challenges and benefits regarding carbon capture or carbon removal projects in this region. Ideas were captured on index cards and pinned onto discussion boards. Session III followed, and speakers addressed the government's role in research and regulation of carbon management projects. After session III was the second discussion period, where ideas about community involvement in these potential projects were discussed as a large group, captured on index cards, and pinned to a discussion board. The event was wrapped up with statements from FECM as well as from HRI, thanking participants for attending. Outside of the event room, pamphlets and posters brought by attendees (e.g., community groups/members, researchers, federal and state officials) were displayed to share with fellow participants, encouraging networking and continued discussion.

Presentations

Introductions

Dr. Katya Wowk, Chair for Community Resilience at HRI

Katya discussed HRI's belief that people are part of the environment as well as a part of the solution, and that stakeholder, partner, and community engagement are all crucial components of implementing Science-Driven Solutions™ and the Regional Resilience Partnership (RRP) of the Coastal Bend, which takes a technical, data-driven approach to integrate community engagement in the decision-making process. Furthermore, Katya highlighted HRI's recent initiative to engage communities, the Coastal Bend Community Equity Dialogues, which is a network of local, state, and national partners working to enhance a community-led, cooperative planning process to ensure inclusive and sustainable management of South Texas environments and economies.

Suzanne Baker, Stakeholder Engagement Specialist at DOE's Office of Clean Energy Demonstrations (OCED)

Suzanne welcomed the participants and thanked them for taking the time to spend at the workshop. She then presented a slide and discussed engagement and funding opportunities that OCED is involved in, including hydrogen, carbon capture, and the industrial emissions demonstration portfolio.

Walt Zalis, Program Director at Energetics

Walt discussed the workshop purpose, stating that the event series offers DOE and other state and federal government agencies an opportunity to hear and learn from communities about their specific priorities, concerns, and ideas related to carbon projects, as well as if/how community members would like to be involved in projects moving forward. Another goal of the meeting is to provide an opportunity for community members to learn about CCUS/CDR and what the federal agencies are doing to mitigate impacts and risks.

Session I: Introducing the Context

Dr. Amie West, Assistant Research Scientist at HRI

Amie began her presentation by emphasizing the economic vitality and ecological fragility of the Coastal Bend and HRI's creation of a Coastal Bend Ecosystem Health Report Card which evaluates the status of coastal ecosystems and resources. The Report Card analysis showed that populations of some species are suffering and that there are undesirable consequences affecting sensitive habitats. Amie noted that additional research is needed to identify the links between environment, industry, economy, and quality of life, that the impacts of climate change on people and ecosystems should be planned for, and that equitable decision-making should be promoted.

Dr. Holly Buck, Management and Program Analyst at the Department of Energy

Holly presented on the purpose of carbon capture to meet the US Climate and Energy Goals through reductions in environmental carbon dioxide. Buck utilized the example of a fertilizer plant in Enid, Oklahoma to demonstrate a prime use for CCUS locally.

Quincy Childs, Fellow at the Department of Energy

Quincy specified further the necessity of carbon removal technologies as a part of the framework for the emissions reduction pathways to achieve Net-Zero emissions in the US. A breakdown of the different carbon removal and storage methods, concluding with a comparison between Point Source and Direct Air Capture.

Dr. Jim Klein, President of the Coastal Bend Sierra Club

Jim began by explaining the composition of the local Sierra club's membership and its reach of nearly 19 counties around Corpus Christi and expressed the reservations held by some of the constituents around CCS and treating it as a response to climate change. Jim expressed concerns about the usage of water for hydrogen production, past cases of unsuccessful CCS projects and the real experiences of climate change in their communities today.

Q-and-A: Session I

The Q-and-A that followed Session I focused on the following topics:

1. Scale of the impact of CCUS on emissions targets and pathways to Net Zero.
2. Efficacy of forest carbon storage vs. CCUS costs.
3. Cumulative approaches to environmental restoration and CCUS.

Session II – Would these projects fit here?**Michael Thompson, Management and Program Analyst at the Department of Energy**

Michael began by breaking down the \$12 billion allocation out of BIL to fund point source capture, DAC, carbon transport systems, and carbon dioxide utilization and storage projects, along with the requirement that applicants address project characteristics on environmental justice, quality jobs, DEIA, and community and stakeholder engagement. Thompson outlined the enhanced federal tax credits for point source and direct air capture and geologic storage.

Dr. Tip Meckel, Senior Research Scientist at the Gulf Coast Carbon Center

Tip broke down the components of CCS projects to better illustrate what carbon management could look like for carbon-intensive industries and the expertise demonstrated in the over 50 years of experience in enhanced oil recovery utilizing CO₂. Tip provided insights on the existing working groups and monitoring that has been used for EOR and how similar monitoring mechanisms can be used for CCS. Tip emphasized the safe storage opportunities that exist at large-scale in the nearby offshore portion of the Gulf of Mexico.

Sarah Leung, Carbon Transport Program Manager at Department of Energy

Sarah outlined the CCS value chain and information on how to begin identifying tools for regional project viability. Project phase timelines were included to provide insights into the steps needed to achieve storage projects as well as a breakdown of the NEPA process that would be needed for such projects.

Sonrisa Lucero, Special Advisor for Stakeholder Engagement, Office of Economic Impact and Diversity, Department of Energy

Sonrisa provided an overview of the Justice40 Initiative implications of any demonstration project including the requirements for a Community Benefits Plan (CBP) from the application stage. The four priorities of any CBP were outlined; working with a disadvantaged community, equitable access to wealth-building opportunities, creation of good-paying jobs to attract and retain skilled talent and establishing meaningful engagement with the community and labor partners.

Virginia Palacios, Executive Director at the Commission Shift

Virginia outlined the growing number of well leaks, seismic events, and blowouts related to the Railroad Commission's failures to properly monitor Class II injection wells and unplugged oil, gas, and injection wells in Texas. Virginia called for attention to the risks of carbon dioxide and ammonia infrastructure to communities, and the lack of monitoring and rule enforcement for existing 70-year-old oil and gas infrastructure. She called for the improved and authentic public engagement requirements and programs to meaningfully inform the public about the risks of CCUS infrastructure projects.

Q-and-A: Session II

The Q-and-A that followed Session II focused on the following topics:

1. Requiring agencies to be more transparent with the data collection on contamination sites.
2. Standards for offshore site monitoring.
3. Direct interaction with communities rather than just schools in the area.
4. Current capabilities of carbon capture programs.
5. Determination of Justice40 communities.
6. Community safeguards and accountability methods for faulty storage sites.
7. Specifications on pressure monitoring and injection depths.

Discussion I: Concerns and Benefits

The facilitation team setup pin boards and provided index cards for participants to write their responses and pin them to the associated topics. The first discussion asked participants to identify known and assumed concerns and benefits and were given the opportunity to speak more to their note. The written components have been provided below.

Concerns

- What is the true CO₂ retention time?
- Who is responsible for the mitigation plan?
- Removal can be done anywhere; locate them where is most efficient and least risky.
- That may not be in the Coastal Bend
- How do we have this conversation without addressing the main sources of CO₂ and other gases?
- Safety (locations)
- Impact to community
- Knowledge for community, town halls
- Is there a list of projects?
- If we don't know where, it is hard to address concerns
- Simple education community awareness
- Community misinformation about CCS technology, risks and benefits; we need not only information but education and holistic one.
- Increased pollution from carbon capture technology + solvents/sorbents
- Decades long monitoring of wells
- Industry expansion
- Lack of regulatory oversight by RRC

- “Pop-up” entities cashing in on Q45 with no experience/ knowledge
- Leakage of carbon from wells and pipeline (caustic nature of carbon) and the interstate nature of the control
- Chapter 313 school tax abatements (excessive)
- Risks outweigh the CO₂ emission reductions
- Lack of notice, party status in the permitting
- Land taking/eminent domain
- Justice 40 administration
- Fund this using profits from those who previously benefitted; don’t add to the tragedy of the commons
- Environmental repercussions
- Impact on disadvantaged areas
- That these projects don’t happen or happen fast enough because we don’t get the community conversation right
- Additional infrastructure and associated challenges in already stressed, disadvantaged communities
- Economics and viability past having only government funding
- Economics with only government funding
- Private industry support
- How can we be sure that the sequester project will actually reduce the CO₂ in the atmosphere? Since you create CO₂ in the process (creating ammonia or fossil fuel production) and then need energy to sequester the CO₂ which also creates CO₂. Add on possible leakage. Is there a net positive in reduction of the CO₂?
- Extends life of oil and gas
- No benefits to general population; production tax credits to polluters, the industry that caused problem benefitting.
- Track records of weak governance
- Leaks, ruptures, safety, emergency response
- Pipeline safety especially through/near inhabited areas
- Proper/effective long-term oversight management
- Health risks of sorbents, solvents, ammonia
- Water use and water contamination
- Infrastructure/ pipelines in populated areas
- Surface and sub-surface leaks, damage to environment, and oversight of facilities
- Safety concerns – leaks, safety of local residents, destruction of habitat to create CCS plants
- Potential environmental impacts

Benefits

- CO₂ emissions captured and not emitted into air
- Opportunity for our community to be part of the global transition that we all need.
- Need good process and economics
- We will be able to look our kids in the eyes and say we tried.

- Benefit to climate goals, a first step in reversing climate change and helping the country meet climate strategy pathway
- Reduce GHG
- Reduced energy burden on DAC
- Economic diversity
- Need: human capital development
- Jobs and sustainable economic system
- Take advantage of assets and capability re-skilled to CCS that is called to be double of the size of the oil and gas industry
- Economic growth
- Job creation
- Financial resources
- Community engagement control
- New type of industry to replace oil and gas – requires vision and honest about future of oil and gas.
- Job growth, platform for public involvement
- Pathway to reinvention of our workforce
- Federal offshore CCS
- Revenue with gulf coast
- Land and water conservation fund
- Coastal restoration, hurricane protection
- Coastal political subdivisions
- Offshore: no potential impact on protected drinking water (USDW)
- Technology
- Operations – best practice
- Example to the world (like O&G industry and LNG industry)
- Keeping jobs and low carbon manufacturing in the USA instead of overseas in areas with less responsible regulations
- Economic development in underserved community
- Engage stakeholders
- Maybe scrub other air pollutants – requires collecting data
- Leadership in low-carbon technology development
- Corpus as a leader in doing this the right way
- Permanent school fund revenue
- District level support of local elementary schools
- This is energy demanding and intensive and we have a lot of solar and wind available
- TX has the right geology for these projects

- Someday it could be possible to develop a sequester device that can be retrofitted to vehicles on the road today, then the device is discharged into a well
- Reduces emissions
- Decarbonizes a heavy industry
- Cost of carbon

Session III: What can be done to mitigate project impacts?

Sarah Leung, Carbon Transport Program Manager at Department of Energy

Sarah shared insights on the government's role in responsible research into risk mitigation for carbon capture projects. The DOE's National Risk Assessment Partnership as well as resources and engagement opportunities through FECM were demonstrated as accessible tools for stakeholders interested in researching the risk conditions of a project.

Steve Nanney, Department of Transportation, Pipeline and Hazardous Materials Safety Administration

Steve began by introducing the Pipeline and Hazardous Materials Safety Administration and its work on carbon dioxide pipelines since 2001, including transparency around its largest incident since 2001. Steve followed up with actions that have or will be taken around research and rulemaking pertaining to the expansion of the pipeline network and safeguarding development to minimize further risks.

Brandon Maples, Geologist, Environmental Protection Agency Region 6

Brandon explained the regulatory protections of the Safe Drinking Water Act (SDWA) and the Underground Injection Control (UIC) programs and the protections for underground sources of drinking water (USDWs). Brandon broke down the testing, monitoring, safety, siting, and public participation requirements for the Class VI injection well construction process required by the EPA.

Lisa Grant, P.E., Senior Technical Advisor, Office of Offshore Regulatory Programs, Bureau of Safety and Environmental Enforcement (BSEE) and Mike Celata, Gulf of Mexico Regional Director, Bureau of Ocean Energy and Management (BOEM)

Lisa and Mike provided insights on the joint efforts between BOEM and BSEE to establish rulemaking under the Bipartisan Infrastructure Law. Experts from both bureaus are addressing topics from financial, economic, safety, and environmental considerations to the qualification of wells, operating conditions, assessing risks, monitoring, reporting, and decommissioning of project sites.

Q-and-A: Session III

The Q-and-A that followed Session I focused on the following topics:

- Utilization of existing wells to start Class VI wells.
- Regulation differences between Class I-VI wells.
- Surveillance realities and how to modify plans around active monitoring.
- Considerations of local regulators to incorporate public involvement.
- LCA calculations for lifelong emissions sequestered to justify project rollout.

Discussion II: Community Involvement

In a similar fashion to the first discussion session, participants were now asked: "If and how the community wants to be involved? If so, how do they envision successfully being involved and what might they need?" The collected responses can be seen below.

Meaningful involvement is reaching all communities and showing them how their comments impacted the decisions. ALL comments should be shown and not summarized.

- Make a summary of meetings in a language that is easy to understand, with no jargon.
- Non-biased, multi-lingual information
- More sessions like this one as we continue to move through the process.
- Simple and accessible Q&A sessions
- Because of potential energy demand, we need to build more renewable power along with CCUS.
- Demonstrate technical and economic feasibility
- Get involved in policy making
- Open dialogue with industry, local community and regulators.
- Create local liaison
- With university, community, industry mix strong need for development
- Contact list – community; experts
- Get informed with science-based data
- Create a CCS local cluster for the community and skills development on CCS
- Accessible water quality monitoring with background info
- Engage communities IN their communities
- Strong public and stakeholder involvement/listening and education
- Specific ideas of when/how to engage in process – like tips.
- End users must discuss the job opportunities and make commitments to create pathways to career for non-traditional learners.
- No Chapter 313 school tax abatements.

Conclusion

The event was wrapped up with statements from Walt Zilas, thanking participants for attending and opening the room as an opportunity for stakeholders and researchers to explore and discuss information through further Q-and-A and exhibits brought by the attendees which was comprised of pamphlets, posters, and interactive table displays brought by fellow participants to encourage networking and continued discussion.

Richland (Tri-Cities), Washington

The workshop in Richland (Tri-Cities), Washington, was a half-day event held on November 30, 2022. Thirty-seven people were in attendance, including local community groups/members, Tribal members, academia, students, local and state government, federal government, and non-profits/advocacy groups. The event began with a welcome from Casie Davidson, Principal Research Scientist and Portfolio Manager at Pacific Northwest National Laboratory (PNNL), followed by three sessions of speaker presentations, two Q-and-A periods, and two sets of discussions. Session I speakers introduced the context of the workshop by discussing local social and environmental priorities, as well as how the energy transition is unfolding in the Tri-Cities region. Next, session II speakers addressed the technology of CCUS and carbon transport with regional and local geographical context, and the phases of developing a project. After session II was the first discussion period, in which the group was sectioned into four diverse stakeholder groups (with equal representation of stakeholders within each group), for an activity. This activity included asking four questions, in which each group had approximately ten minutes to add their thoughts, concerns, and perspective to a flip chart board, and then rotate to the other stations as a team, to add “upvote” stickers to existing ideas they liked from previous groups or add additional ideas to the board if they were not already present. The four discussion topics posed to the groups were the following:

- A. What might be the benefits of carbon capture or carbon removal projects in this region? What is needed to realize those benefits?
- B. What are concerns for carbon capture or carbon removal projects in this region?
- C. What resources or support do communities need to be able to engage with these projects?
- D. What context or understanding do people need to know about the community and region before a project is sited in this area?

Session III followed, and speakers addressed the government’s role in research and regulation of carbon management projects. After session III was the second discussion period, where the plenary group addressed the following question together: “What questions, advice, and/or preferences do you have for the government in the process of rolling out the funding for these projects?” The event was wrapped up with statements from Casie Davidson (PNNL), thanking participants for attending. Outside of the event room, pamphlets, posters, and interactive table displays brought by attendees (e.g., community groups/ members, researchers, federal and state officials) were exhibited to share with fellow participants, encouraging networking and continued discussion.

Presentations

Introduction: Key terms in carbon capture and carbon removal

Michael Thompson and Adam Wong, Office of FECM, DOE

This presentation focused on the regional and national context of climate change, the nation’s net-zero by 2050 target, and pathways to get to net zero. Point-source carbon capture (PSC) and direct air capture (DAC) were noted as two different tools to lower emissions, both of which need dedicated geologic storage.

Session I: Introducing the context

Steve Ghan, Climate Scientist, Citizens’ Climate Lobby

Steve presented data showing that mountain snow is threatened by global warming, and that future snow projections are much lower than historic levels, which will affect water levels. This is particularly an issue in the western states. Steve emphasized that removal as well as emissions reduction can play important roles in mitigating warming. He stressed that regional water shortage concerns should be considered in CCUS and CDR policies and actions, and trade-offs between climate mitigation benefits and water resources/ CCUS water demands should be evaluated.

Karl Dye, President/CEO, TRIDEC

Karl's presentation highlighted some work that TRIDEC is partnered on to prepare a front-end engineering design study to build a DAC and convert CO₂ next to an existing fertilizer plant. In this work, CO₂ is converted into formic acid, which is used as a liquid hydrogen carrier and can then be used to generate power.

Dr. Jillian Cadwell, Research Associate and Adjunct Professor of Civil Engineering at Washington State University Tri-Cities, Co-Chair of Million Women Mentors Washington

Jillian highlighted her involvement and engagement with regional workforce development, discussing the multiple pathways and entry points to workforce, and how there is a need for "Career-Connected Learning" at all education levels. To reach underserved populations, Jillian recommended building relationships, networking with community stakeholders, and defining community benefits.

Clint Whitney, Energy Services Director, City of Richland

Clint discussed the Horn Rapids Solar, Storage, and Training (HRSST) project with 20 acres of solar for 3.2 Megawatts (MW) and 1MW of battery energy storage. The project is a partnership with International Brotherhood of Electrical Workers Local 77, Energy Northwest, PNNL, Tucci Energy, Potelco, City of Richland, and Washington State Department of Commerce. Clint also discussed the benefits and challenges associated with the project particularly constructed during COVID-19.

Q-and-A: Session I

The Q-and-A that followed Session I focused on the following topics:

1. Currently the local grid is limited, renewables need to be brought to it, and due to low-capacity factors, wind and solar need to be overbuilt.
2. The city of Richland is considering distributed storage and demand response components are being evaluated. Smart thermostats are a key component.
3. Washington legislation will affect internal combustion engines to encourage a greater uptake of electric cars.
4. The Scout Energy Wind Turbine project.
5. Industry should go into the classroom with students to promote that there are job opportunities, that there is job security, and to excite students to pursue opportunities. Relationship building and mentorship is significant for these students.
6. Minerals used to create renewable energy are on or adjacent to Tribal land. How can industry make sure they are not repeating the same mistakes of the fossil fuel industry, and make sure that the Tribal communities are centered and uplifted.
7. Generated waste is a small quantity, and it is currently in dry storage. There are future opportunities for recycling to provide fuel due to its energy density.
8. Consumers are not paying the full price of the products that they purchase; costs of negative externalities should be applied at the extraction point, and revenues given to the people impacted by the products.

Session II**Michael Thompson, Management and Program Analyst at the Department of Energy**

Michael began by breaking down the \$12 billion allocation out of BIL to fund point source capture, DAC, carbon transport systems, and carbon dioxide utilization and storage projects, along with the requirement that applicants address project characteristics on environmental justice, quality jobs, DEIA, and community and stakeholder engagement. Thompson outlined the enhanced federal tax credits for point source and direct air capture and geologic storage.

Casie Davidson, Principal Research Scientist and Portfolio Manager at PNNL

Casie highlighted that while the Pacific Northwest lacks the oil and gas geology and infrastructure that drove early development of CCUS in the midcontinent, the region's unique basalt geology and energy mix are attracting significant attention from clean tech developers interested in pursuing opportunities based on recent legislation.

PNNL stewards a broad portfolio of deep decarbonization research across a range of technologies for CO₂ capture and conversion and provides S&T leadership in basalt CO₂ mineralization storage including the first-ever demonstration of supercritical CO₂ injection at Wallula, WA.

John Litynski, Director of Carbon Transport and Storage, U.S. DOE

John outlined the CCS value chain and information on how to begin identifying tools for regional project viability. Project phase timelines were included to provide insights into the steps needed to achieve storage projects as well as a breakdown of the NEPA process that would be needed for such projects.

Q-and-A: Session II

The Q-and-A session that followed session II focused on the following topics:

1. Every site has different characterizations, so a site characterization study is done to better understand the capacity, etc.
2. How do we develop this infrastructure more quickly.
3. Will this technology enable more fossil fuels, how can we ensure that we continue to transition away from fossil fuels. It is critical to build this infrastructure as the transition is occurring.

Discussion I – Breakout Groups

The interactive discussion was broken down into a group activity in which groups addressed questions A-D as mentioned above. Below are the questions and the respective responses for each.

A. *What might be the benefits of carbon capture or carbon removal projects in this region? What is needed to realize those benefits?*

- Money, jobs, workforce
- Public health: reducing wildfires, biomass reduction of pollutants, air quality improvement
 - Potential social benefits
- Potential for a net zero community
- Clean generation
- Eco development, resilience, diversifying
- Quality of life (AQ, WQ, Life-work balance)
- Awareness of real cost
- Public awareness and buy-in
- Whole life cycle analysis of carbon impact
- Tribal awareness and buy in
- What do communities WANT out of the opportunity?
- Reduction of conflicts of other resources, i.e., water
- Meet state climate goals
- Source of carbon offsets (credits)
- Low carbon fertilizers
- Low carbon cements
- Community perception increase (better)

- Federal funding and private funding
- Prioritization of natural systems
- Subsurface data (strat wells/ seismic)
- Permitting speed and expertise at EPA
- Slowed rate of hydraulic regime
 - Hydroelectric change viability
- New market incentives

B. What are concerns for carbon capture or carbon removal projects in this region?

- Groundwater contamination, availability
- Pipeline safety concerns
- Who benefits financially?
- Electrical demand – energy sourcing
- Carbon capture “tangibility”
- Do we have CO₂ sources here, bringing CO₂ here for storage
- Will polluting industries move to town?
- Seismicity
- Impacts to cultural resources
- Who is impacted by these technologies – concerns about inequity
- Are we building a more damaging infrastructure/machine for CDR?
- Projects may not transition from government money
- Are you introducing things at scale that damage the ocean ecosystem
- Pipelines not a norm in PNW
- Will it make a difference globally
- What are the local tangible benefits/negative impacts
- Pipeline reg making, costs for permitting in first of a kind
- Opposition to all pipelines – political
- Will this disrupt agriculture economies/systems?
- Workforce development – temporary bump? Possibly permanent?
- Pipeline location favors people with ability to speak up in communities/wealthy
- How is public outreach done? Who does it? To whom?
- Causing competitive disadvantage to the region/industry
- Economic dislocation – fossil fuel industry workers
- How to assure public re: safety concerns?
- Policy sway to ocean CDR
- Hydrogen car vs. EVs

- Interstate pipeline regulation
- PHMSA
- Future unknowns
- Impacts of construction of projects
- Project footprint/ land use issues
- Disincentive to conservation/ emissions reductions “alternative”
- Can’t get it soon enough
- Wildlife regulation barriers
- Treaty rights/tribal access
- Prevent abduction/traffic from workforce without accountability; MMIW
- Regulatory barriers

C. *What resources or support do communities need to be able to engage with these projects?*

- Clear communication of the risks and potential impacts, non-technical
- Early engagement and multiple languages
- Project-funded community engagement group
- Accountability
- Benefit to community both short and long-term
- Child-care at engagement, timing of event, multiple options, digital and social media
- Taking into account cultural holidays, food
- Education campaign/communications
- Training/grant writer and resources to support it
- Plan to engage the most vulnerable
- Free prior and informed consent
- Regulatory and legal experts
- Self-determination
- Clean energy generation
- Different modes of accessibility to events, and free
- Workforce development
- Going to the community
- Well-rounded list of concerns
- Project POC for community, project is receptive to concerns and takes action/ follows through
- List of asks
- Transition plan for after the project is completed
- Plan to mitigate impacts and compensate those impacted (not always money)

D. *What context or understanding do people need to know about the community and region before a project is sited in this area?*

- Tribal

- Overall understanding/transparency of projects; give people the positives and the negatives; share information and get different groups talking rather than being in silos
- Not a crutch for Fossil Fuel use continuing and dollars away from renewable energy projects
- Economic benefits for job market and STEM
- Water
- Indigenous knowledge and leadership, including from the Tribal community and not just the Tribal Government
- Existing energy resources and constraints (regional energy/ grid constraints already exist here; is there any excess that could be used for DACs, etc.?)
- Lessons learned from other clean energy development projects like wind (should learn from past mistakes of other projects that have come to the region and discuss, not make same mistakes twice)
- Relevancy to local area/to our backyard – both good and bad
- “Why does it matter?”/ “So what?”/ “Why should we care?”
- Cultural – bones (e.g., archaeology, mammoth bones), burial sites, water
- Hanford Legacy – trust/distrust
- Getting to net zero as a community as a goal
- Large scientific infrastructure, built on Hanford legacy, community may receive these ideas; there is a large scientific industry and R&D here
- Market and policy factors that prevent implementation
- Hazardous areas (earthquakes)
- Credit/ prioritization of natural systems
- Political views (county differences)
 - How do you start resolving these divides, building a bridge? Through information sharing and open conversations about these projects
- Plan, explain, and communicate benefits for agricultural industry sectors
- Regulatory climate is challenging

Session III

John Litynski, Director of Carbon Transport and Storage, U.S. DOE

John shared insights on the government’s role in responsible research into risk mitigation for carbon capture projects. The DOE’s National Risk Assessment Partnership as well as resources and engagement opportunities through FECM were demonstrated as accessible tools for stakeholders interested in researching the risk conditions of a project.

Karen Gentile, Community Liaison, Department of Transportation, Pipeline and Hazardous Materials Safety Administration

Karen began by introducing the Pipeline and Hazardous Materials Safety Administration and its work on carbon dioxide pipelines since 2001, including transparency around its largest incident since 2001. Karen followed up with actions that have or will be taken around research and rulemaking pertaining to the expansion of the pipeline network and safeguarding development to minimize further risks.

Sharon Newman, Physical Scientist, Environmental Protection Agency

Sharon explained the regulatory protections of the SDWA and the UIC programs and the protections for underground sources of drinking water (USDWs). Sharon broke down the testing, monitoring, safety, siting, and public participation requirements for the Class VI injection well construction process required by the EPA.

Q-and-A: Session III

No Q-and-A took place after Session III due to time constraints.

Discussion II – Plenary Discussion

The final discussion of the day was structured as a plenary discussion to address the question, “What questions, advice, and/or preferences do you have for the government in the process of rolling out the funding for these projects?” Participants either answered the question posed, asked additional questions, or made comments. Below is a summary of what was discussed.

- A participant asked if the wells for CCUS are “so deep” for safety reasons or physical reasons (e.g., does it only mineralize if it’s under pressure at that depth). The response was that CO₂ is stored at the depth needed to keep it under pressure. Since it is in supercritical form, it needs rock on top. It is stored far below the drinking water levels, but there is no minimum depth required by code (keeping drinking water resources protected is a primary focus); at the depth of CCUS, the water is really salty.
- Hanford will soon be operating a vitrification plant to process and stabilize radioactive and chemical waste stored at the Hanford Site. The process of vitrification takes 50–60 years and it produces carbon emissions. Participants were curious if something could be done in collaboration to capture the CO₂ emitted by the plant. Generally, it was noted that it is important to be aware of the current projects going on in the area.
- One participant voiced that they thought it would be helpful for the region to be defined as a CDR hub with enhanced mineral weathering, biomass gasification, etc. present. A broader vision for this region would attract innovative companies and result in the region becoming an innovation hub.
- There was concern that regulators will try to find “all of the answers” prior to acting, and that sometimes we need to move forward without knowing where/what all the problems will be.
- One participant stated a desire for clarity around the “off-ramp” of projects, specifically how projects will replace funding once DOE funding is used up. It was noted that there would be an increased level of commitment if this was clearer.
- It was stated that having some certainty in long-term incentives (e.g., price on carbon) is important for de-risking.
- It was suggested that there could be technical assistance grants for communities to hire consultants related to pipelines.

One of the more interactive discussions during this period was on the topic of making community engagement events more accessible and reducing barriers for attendance, like reimbursing attendees for their time and travel, particularly for projects that are funded by DOE. It was stated that project performers want to invite community stakeholders to events, and that unlike laboratories and universities, community organizations don’t have resources to be able to pay for travel costs or people’s time to engage. As a result, it has been difficult to justify inviting stakeholders to attend events when they must do so out of their own pocket, especially when the people sending the invitations are getting paid for their time and reimbursed for their travel. It is believed that grants, workshop agreements, travel stipends, etc. would go far in enabling participants to attend without having to spend their own money or sacrifice vacation time to attend. Understanding the mechanisms by which DOE would allow providing coverage for local stakeholder resource/advisory groups to attend would help project proponents build meaningful, funded engagement for community benefits scoping efforts. More local meetings in communities that don’t require people to take off work to attend and that provide resources to address barriers like transportation and childcare, would help build important connections and show value to the people who will be neighbors to these projects,

including the community members that are most vulnerable. “Identifying mechanisms that allow DOE funds to cover these types of services would be huge.”

The response was that hopefully some funding could be allowed to address those needs, but a timeline was unclear, and the idea would be further considered by DOE. It was suggested that there is an opportunity for DOE, EPA, or others to fund development for a local nonprofit focused on community engagement. The DOE Communities Local Energy Action Program ([LEAP](#)) Pilot was briefly mentioned.

Conclusion

The event concluded with the event organizers thanking attendees for traveling to the event, and for participating in the conversations and activities throughout the day. Some participants brought posters, pamphlets, or tabletop interactive displays, which were explored by some attendees after the event.

Pittsburgh, Pennsylvania

The workshop in Pittsburgh was a half-day event held on December 8th, 2022. Fifty people were in attendance, including local community groups/members, local and state government, the federal government, and non-profits/advocacy groups. The event began with a welcome from Dr. Holly Buck, Management and Program Analyst from the Department of Energy, outlining the event goals submitted by the event registrants which was followed by three sessions of speaker presentations, three Q-and-A periods, one interactive breakout group discussion, and one plenary discussion. Session I speakers began by introducing the local social and environmental priorities with presentations from local community members followed by how carbon capture fits into the US climate and energy goals, an explanation of CCUS methods and technologies site-specific and DAC applications, and global contexts for carbon projects along with the first Q-and-A session. Next, Session II speakers addressed the surge behind carbon capture and removal projects in the area of development and outlined the phases of that development and the requirements surrounding the Justice40 parameters of any demonstration project application and the second Q-and-A session. Session III was an interactive activity in which the group was sectioned into four diverse stakeholder groups (with equal representation of stakeholders within each group) for an activity. This activity included asking four questions in which each group had approximately ten minutes to add their thoughts, concerns, and perspective to a flip chart board, and then rotate to the other stations as a team. The new group then added “upvote” stickers to existing ideas they liked from previous groups or add additional ideas to the board if they were not already present. The four discussion topics posed to the groups were the following:

- A. What might be the benefits of carbon capture or carbon removal projects in this region? What is needed to realize those benefits?
- B. What are concerns for carbon capture or carbon removal projects in this region?
- C. What resources or support do communities need to be able to engage with these projects?
- D. What context or understanding do people need to know about the community and region before a project is sited in this area?

Session IV addressed the risk mitigation practices and safeguards used for CCUS project development followed by a third and final Q-and-A period.

Session V concluded where the plenary addressed the following questions together:

1. What questions or advice do you still have for the government agencies trying to regulate these activities?
2. What do you want governments to further understand about working with or in this community?
3. What additional resources would help you to engage in future projects, or advocate for changes?
4. What was not addressed that still needs to be?

Session V ended with an opportunity for stakeholders and researchers to explore and discuss information through further Q-and-A and exhibits brought by the attendees which were comprised of pamphlets, posters, and interactive table displays brought by fellow participants to encourage networking and continued discussion.

The event was wrapped up with statements from Dr. Holly Buck thanking participants for attending.

Presentations

Introductions

Walt Zalis, Program Director, Energetics

Walt outlined the purpose of the workshop and intended outcome as a project through the DOE and federal partners to engage with communities to better understand concerns regarding CCS and DACS technologies as well as for community members to learn about potential carbon projects that may be a fit in the area and the corresponding opportunities for public participation in the lifespan of the project. Walt concluded with the layout of the sessions and activities for the day along with the expected conduct of all participants.

Session I: Introducing the Context

Edith Abeyta, North Braddock Residents For Our Future

Edith recounted her experiences as a local member of the North Braddock Residents For Our Future, a volunteer organization that has worked to prevent frack well development at sites in her community, as well as a member of the community at large. Edith helped frame both the intentions of this workshop as well as how to best improve the parameters of future engagement with communities to ensure they are accessible to the largest amount possible of local stakeholders. Edith looked to the importance of not just imagining an ideal future but rather to imagine the steps necessary to get there.

Dr. Matt Mehalik, Executive Director at the Breathe Project

Matt began by recognizing the toxic legacy that exists in Pittsburgh as a result of local steel production in Mon Valley after continued broken promises by U.S. Steel to address air pollution and investment in operating facilities. Matt continued by identifying the failures of regional leadership and provided alternative pathways to begin addressing pollution associated with steel production with renewable generation, arc furnaces, and green hydrogen that would begin to address the pollution (particles, HAPs, and VOCs) in the industrial communities of Mon Valley and the Greater Pittsburgh.

Dr. Holly Buck, Management and Program Analyst at the Department of Energy

Holly presented on the purpose of carbon capture to meet the U.S. Climate and Energy Goals through reductions in environmental carbon dioxide. Buck utilized the example of a fertilizer plant in Enid, Oklahoma to demonstrate a prime use for CCUS locally.

Dr. Evvan Morton, AAAS Science and Technology Policy Fellow at the Department of Energy

Evvan specified further the necessity of carbon removal technologies as a part of the framework for the emissions reduction pathways to achieve Net-Zero emissions in the United States. A breakdown of the different carbon removal and storage methods, concluding with a comparison between Point Source and Direct Air Capture.

Simone H. Stewart, Industrial Policy Specialist, Climate and Energy Policy, National Wildlife Federation

Simone provided insights on the historic concerns when it comes to responsible carbon management, responsibility of the fossil fuel industry, lack of public engagement and education, the lack of clear success criteria, a lack of clear definitions, and the usage of CCS to maintain business-as-usual conditions. Having identified these gaps, it's critical to address these in the demonstration phase prior to the commercialization of CCS projects which will require collaboration with organizations.

Q-and-A: Session I

The Q-and-A that followed Session I focused on the following topics:

1. Viability of carbon capture in coal seams.
2. Life cycle assessments on fracking waste.
3. Certainty of permanence of the storage sites after 20 years.

Session II: What kinds of projects might be built?

Adam Wong, Director for Strategic Engagement, Office of Fossil Energy Carbon Management, Department of Energy

Adam began by breaking down the \$12 billion allocation out of BIL to fund point source capture, DAC, carbon transport systems, and carbon dioxide utilization and storage projects, along with the requirement that applicants address project characteristics on environmental justice, quality jobs, DEIA, and community and stakeholder engagement. Adam outlined the enhanced federal tax credits for point source and direct air capture and geologic storage along with the engagement and funding opportunities with the Office of Clean Energy Demonstrations.

Dr. Neeraj Gupta, Technical Director at Battelle

Neeraj included an overview of the commercialization of CCUS and a roadmap for the phases of development of a CCS project. Monitoring and measurement mechanisms were shown along with an example of what a monitoring plan would look like for baseline, active injection, and post-injection stages of a project as well as the criteria necessary to be met for an injection site to be successfully closed.

Dan Hancu, Carbon Capture Program Manager and Darin Damiani, Carbon Storage Program Director, Department of Energy

Dan and Darin outlined the CCS research development timeline and information on how to begin identifying tools for regional project viability. Project phase timelines were included to provide insights into the steps needed to achieve storage projects as well as a breakdown of the NEPA process that would be needed for such projects.

Sonrisa Lucero, Special Advisor for Stakeholder Engagement, Office of Economic Impact and Diversity, Department of Energy

Sonrisa provided an overview of the Justice40 Initiative implications of any demonstration project including the requirements for a Community Benefits Plan (CBP) from the application stage. The four priorities of any CBP were outlined: working with a disadvantaged community, equitable access to wealth-building opportunities, creation of good-paying jobs to attract and retain skilled talent and establishing meaningful engagement with the community and labor partners.

Q-and-A: Session II

The Q-and-A that followed Session II focused on the following topics:

1. Concerns around the use of captured CO₂ for further EOR which would be addressed with the requirement of an LCA conducted by the applicant.
2. Clarity on the assistance from DOE providing applicants with pathways for the creation of CBPs and Community Benefits Agreements. This included concerns about how CBAs will be enforced.

Session III: Interactive Discussion

The interactive discussion was broken down into a group activity in which groups addressed questions A-D as mentioned above. Below are the questions and the respective responses for each.

A. What are concerns for carbon capture or carbon removal projects in this region?

- Unknowns about the environmental health impacts of CCS, CCUS, and hydrogen
- In the event of a catastrophic failure, who is responsible? For how long?
- Future health impacts
- Pennsylvania does not have an EJ statute on the books
- Pennsylvania does not have primacy
- If they apply and receive it, is there capacity at the state level to handle this?
- Will history repeat itself?
- Are the same groups who caused the problems, going to continue to benefit in the carbon capture process?
- Community not having a say in project development
- Unproven technology
- Where is information about CCS coming from? Can that info be trusted? Is it accessible?
- What is going to happen when carbon is injected in the ground? Interaction with existing wells?
- There is no monitoring/regulations/enforcement

- Stranded assets that burden communities long into the future
- Cumulative burden across health, socio-economic
- At what scale does this need to happen
- Infrastructure built out across the life of the project
- Overall safety concerns – from construction through operation
- Does CCS justify the continuation of fossil fuel extraction? Does it encourage fossil fuel growth?
- Concerns over the accessibility of info on health impacts
- Timeline to implementation is rushed
- Parasitic load of CCS projects regionally and globally
- Exorbitant costs of projects will be borne by the people
 - What is the opportunity cost of investment in CCS?
 - Implementing CCS will raise our utility bills (not just costs for subsidies, etc.)
- Investing resources in tech that doesn't address the climate crisis
- The use of gas to power new projects increases the burden on communities, which will increase fracking, increasing pollution
- Community benefits agreements don't work
 - Not everyone benefits
 - Lawsuits
 - Pits non-profits against each other

B. What might be the benefits of carbon capture or carbon removal projects in this region? What is needed to realize those benefits?

- Theoretically it could improve air quality
 - Increased monitoring and regulation, enforcement at local, state, and national. Including enforcement of existing regulations
 - Not awarding to companies that currently do not adhere to air quality
 - Addressing economic, environmental, and health impacts
 - Making sure technology will work as promised
- Demonstration of mitigating climate change
- Making sure that communities are involved in decisions
- Possibly new jobs (careers) to region
 - Project labor agreements
 - Local hire agreements
 - Job training programs (ahead of time/preparation)
 - Hold accountable
 - Reduce barriers to hiring
- Region has hard to decarbonize industries
 - Evaluate with lifecycle of Project
- Launch RE (zero-carb?) to power the equipment
- How does this relate to electric-arc furnaces?
 - Is it interim solution or will it be stranded investment
- How can we democratize the industry to provide the other benefits communities need?

- Spurring convos to think about energy future and consider the past/legacy
 - For industry too
 - Social license to operate
- Raises awareness of clean energy action
- Creating new voices in the movement/issues; more educated
- Redefining engagement
- More inclusive engagement
- Framing benefits as coming from CCS is insulting and inaccurate – the benefits listed are not tied to CCUS; could also come from wind/solar
- Community ownership
 - Funding stream for community groups
- Good demonstration for kids
- Can be bridge between urban and rural
 - MPP-C Neighborhood Planning Program (NPP)
- Improved quality of life
 - Environmental and career benefits bring more people
- We need:
 - Communication of metrics
 - Establish the metrics
 - Standardization of metrics

C. What resources or support do communities need to be able to engage with these projects?

- Provide stipends for the community to participate in conversations. Need to be cognizant of their situation.
- Assurance of an early warning system in case something goes wrong
- Community EJ organizations that are trusted to help to distribute the info in a digestible way Train those organizations, build community
 - These groups need funding for experts
- Access to information
 - Presented in a transparent way
 - Language used
 - Ease of access to info
- Fine-based community for funding, (pay to pollute?)
- Access to voices
- Access to multiple sources of info/planning/perspectives
- Public information officer
- Attendance/engagement
 - Conscious of community
 - Transportation
 - Virtual
 - Timing
 - Childcare

- Food
- Ensure existing community groups
- Proactive to reaching out/not relying on the community to come out
- Involved in site/planning
 - Front-end community engagement
- Access to lessons learned
 - Access to the state of existing projects
- Data. Solid science
- Accountability – how can the community hold this company accountable
- Guarantee community input valued
- Evidence
- Community input is taken/incorporated
- What is access? Website, social media, town hall
- Common language, make it understandable for the layperson
- DOE needs to adopt the ideas presented by DOE today in terms of engagement principles
- Expanded definition of what is community
- Emergency response resources
- Evolution(?) points built in – GING(?)
- Break down resource hubs, and make them manageable and bite-sized
- Process to remove layers of burden
 - Industrial zoning?
- Resource hubs for communities to access information (e.g., EPA TCTAC)
- True engagement of actual participants(?)
- Background on various methodologies (like an LCA); who verifies? How?
- Do not reward past program “offenders”
- Understanding resources locally. Some organizations can better amplify specific info on a personal level and refer to other resources
- Verified middle ground info sources → less of an agenda
- Baseline testing – need more monitoring of air quality

D. What context or understanding do people need to know about the community and region before a project is sited in this area?

- History of industrial sources/pollution, extraction, and operators with a history of violation and risks – pipeline operators (e.g., Falcon – contractors did not have experience with that material – safety risks). People will want to know about the track record of companies. Do they have a proven record with this tech?
- Local representative, trusted, that can break this down into bite-sized pieces and explain siting – people in the neighborhoods, esp. with DACs

- People used to extraction and getting the monetary benefits, people will want to know: do I get compensated? Local impact fees – go to municipalities (Act 13) – goes to grant programs – e.g. well plugging, playgrounds, used for monetary benefit. Companies do donations and foundations.
- Site-specific conditions – have community members share their knowledge
- 2010: like the wild west of fracking, there were a lot of bad actors, and the state wasn't ready regulatory-wise. People will want to see that the state is ready since Harrisburg was late to the game before.
- Very localized community development corporations
- Event needs to be in places where the capture might occur. SW-10 county region, incl. more rural
- Economic benefits from past extraction have been boom/bust and not necessarily deliver – need a different model than what was used in the past (this building an example)
- Who is enforcing the benefits and how are they measurable? Is this a sustainable business?
- Legacy of labor can be a psychological hurdle – 4-5 generations of families working in the industry. Ancestral belief – has to be a change in the narrative. People will associate the smell of pollution with a livelihood – but it doesn't have to be that way.
- What future jobs do we want?
- These projects can't stand alone – they have to make sense for where the community wants to go (e.g., transport, recycling).
- Are there real jobs?
- Community needs to know true life cycle impacts
- Understand where these benefits currently go – do we want to preserve that?
- Pennsylvania has the constitutional right to clean air and water that is not being observed (Art I sec. 27)
- Legacy of hurt – people dealing with dirty air and water – proposing something that could bring further harm is unwise
- Redlining and racism (historic and current)
- Structure of Mon Valley, how boroughs are in competition for scarce resources and how that affects things – local government
- Geographic (topography, weather patterns, geology) structure; how pollution settles. Ex: soil in Pennsylvania, how it has periods of wet/dry – Texas company didn't grasp
- Tendency, over decades, to think one has to give up health protections for good jobs – like extraction PTSD accepting this as a value – like you're supposed to sacrifice your body for your job
- New generation: that doesn't work at all – there's both – people in this region are very smart, organized, have been down this road before, straight talkers, don't sugarcoat, people will push back
- What vision do the residents have for their community?
- Too often the politicians are bought by industry. Ex: finding a place to meet in Clairton. The ability to have conversations with community members is challenged. Money trumps everything with politicians. A lot of fear that comes with that – risk of being ostracized. A long legacy of that. These are wounds that need to be healed for progress.
- Long-term, what does it mean? (In terms of jobs, benefits, environmental impacts)
- Allegheny Conference – dominated by industry shift to an economic development agency, no longer looking for community strategies
- Monitoring could help in enforcement and community thinking that the industry will do what it claims

Session IV: What can be done to mitigate project impacts?**Karen Gentile, Community Liaison, Department of Transportation, Pipeline and Hazardous Materials Safety Administration**

Karen began by introducing the Pipeline and Hazardous Materials Safety Administration and its work on carbon dioxide pipelines since 2001, including transparency around its largest incident since 2001. Karen followed up with actions that have or will be taken around research and rulemaking pertaining to the expansion of the pipeline network and safeguarding development to minimize further risks.

Kevin Rowsey, Senior Permitting Specialist, Environmental Protection Agency Region 3

Kevin explained the regulatory protections of the SDWA and the UIC programs and the protections for underground sources of drinking water (USDWs). Kevin broke down the testing, monitoring, safety, siting, and public participation requirements for the Class VI injection well construction process required by the EPA.

Q-and-A: Session III

The Q-and-A that followed Session II focused on the following topics:

1. Region-specific viability for storage sites.
2. The viability of using existing Class II sites for CCS.
3. With the banning of Class VI wells, is radioactive testing being discussed?
4. Safety concerns pertaining to fracking near injection sites.
5. Reutilization of caverns for storage.
6. Identification of abandoned wells.
7. Lessons learned by PHMSA from incidents.
8. EPA primacy status of Pennsylvania and West Virginia.
9. Allocations for an emergency fund out of federal assistance.
10. How feedback will be implemented into the process.
11. Encouraging applicants to democratize.
12. Federal accountability for protections for the community.
13. Beginning transparent lines of communication now.

Session V: Plenary Discussion

Time did not permit for the plenary discussion, so Session V was removed from the agenda to accommodate for the extended Q-and-A and networking session.

Conclusion

The event was wrapped up with statements from Dr. Holly Buck (DOE), thanking participants for attending and opening the room as an opportunity for stakeholders and researchers to explore and discuss information through further Q-and-A and exhibits brought by the attendees which was comprised of pamphlets, posters, and interactive table displays brought by fellow participants to encourage networking and continued discussion.

Virtual Event

The virtual workshop was a half-day event held on December 15th, 2022. Fifty-four people attended, including local community groups/members of proposed community project sites, academia, students, local and state government, the federal government, and non-profits/advocacy groups. The event began with a welcome from Walt Zalis, Program Director at Energetics, and an introduction to the previous workshops, followed by a session of speaker presentations, a Q-and-A period, a reflection of the previous regional workshops, and a regional breakout discussion. Session I speakers introduced how carbon capture fits into the U.S. climate and energy goals and an explanation of CCUS methods and technologies for site-specific and DAC applications with the first Q-and-A session. Next, session II speakers addressed the funding mechanisms, local CCUS capacity, community perceptions and agreements on project development of capture sites, and the phases of developing a project in Oklahoma, followed by a second Q-and-A period. Session III addressed the risk mitigation practices and safeguards used for CCUS project development, followed by a third and final Q-and-A period. Session III was an interactive activity in which the group was sectioned into four diverse stakeholder groups into four regional groups (Mid-Continent, Gulf Coast, Mid-Atlantic/Northeast, and Western U.S.) for an activity. This activity included asking five questions. Each group had approximately ten minutes to add their thoughts, concerns, and perspective to a virtual Jamboard and then have the discussion leaders summarize the answers at the end. The five discussion topics posed to the groups were the following:

1. Imagine it's 20 years in the future. Let's assume that your region has done an effective job of addressing issues of climate change, economic inequality, etc. What are concerns for carbon capture or carbon removal projects in this region? What's going on, in terms of climate, energy, and/or society? What are some key elements of this livable future?
2. If there are carbon capture and storage or carbon removal projects in this future, what sorts of projects are these, and what are the characteristics that make them good projects? Should be included. (For example, good projects could be ones that deliver community benefits, quality jobs, community-based monitoring of impacts, etc.)
3. Who made your ideal vision of the future happen? What did they do? Who do you think is best positioned to carry out public and community engagement?
4. What skills and resources do they need to make it successful?
5. We have heard that in addition to meaningful two-way engagement, people also want clear information.

The event was wrapped up with statements from Walt Zalis, thanking participants for attending.

Presentations

Introductions

Walt Zalis, Program Director at Energetics

Walt outlined the purpose of the workshop and intended outcome as a project through the DOE and federal partners to engage with communities to understand better the concerns regarding CCS and DACS technologies as well as for community members to learn about potential carbon projects that may be a fit in the area and the corresponding opportunities for public participation in the lifespan of the project. Walt concluded with the layout of the sessions and activities for the day, along with the expected conduct of all participants.

Session I: Invited Speakers

Dr. Holly Buck, Management and Program Analyst at the Department of Energy

Holly presented the purpose of carbon capture to meet the U.S. Climate and Energy Goals through reductions in environmental carbon dioxide. Holly broke down the allocations for CCUS in both the BIL and IRA bills for government-funded demonstrations and tax credits for captured carbon.

Matt Antes, Management and Program Analyst at the Department of Energy

Matt specified further the necessity of carbon removal technologies as a part of the framework for the emissions reduction pathways to achieve Net-Zero emissions in the U.S. A breakdown of the different carbon removal and storage methods, concluding with a comparison between Point Source and Direct Air Capture.

Sharon Newman, Physical Scientist, Environmental Protection Agency

Sharon explained the regulatory protections of the SDWA and the UIC programs and the protections for underground sources of drinking water (USDWs). Sharon broke down the testing, monitoring, safety, siting, and public participation requirements for the Class VI injection well construction process required by the EPA.

Karen Gentile, Community Liaison, Department of Transportation, Pipeline and Hazardous Materials Safety Administration

Karen began by introducing the Pipeline and Hazardous Materials Safety Administration and its work on carbon dioxide pipelines since 2001, including transparency around its most significant incident since 2001. Karen followed up with actions that have or will be taken around research and rulemaking about expanding the pipeline network and safeguarding development to minimize further risks.

Sonrisa Lucero, Special Advisor for Stakeholder Engagement, Office of Economic Impact and Diversity, Department of Energy

Sonrisa provided an overview of the Justice40 Initiative implications of any demonstration project, including the requirements for a Community Benefits Plan (CBP) from the application stage. The four priorities of any CBP were outlined; working with a disadvantaged community, equitable access to wealth-building opportunities, creation of good-paying jobs to attract and retain skilled talent and establishing meaningful engagement with the community and labor partners.

Q-and-A: Session I

The Q-and-A that followed Session I focused on the following topics:

1. Timeline of target carbon emissions reductions.
2. Concerns over potential harms of storing CO₂ similar to landfills.
3. Composition of the LCA and the inclusion of the energy usage and construction of the project.
4. Seismic concerns, both caused by or impacting injection sites.
5. The current outlook of storage sites nationally.
6. Classifications of a candidate site and criteria for a site to be closed.
7. CCS's role in blue hydrogen production

Session II: Review of Regional Events**Walt Zalis, Program Director, Energetics**

Walt began the review by identifying the common themes and concerns across the four previous workshops and breaking down each category into the remarks made for each.

Social and Environmental Impacts

- Biodiversity and land use
- Sound/Visual project
- Water Use and Contamination
- Impacts particularly on disadvantaged communities, cumulative impacts
- Future health impacts
- Solvents and sorbents used for injection
- Increased air pollution contributed to using natural gas to power carbon capture.

Adequacy of Governance

- Life cycle assessment of projects to ensure they deliver net CO₂ reductions
- Responsibility and liability and for how long during and after the project
- Pipeline safety, protocols for ruptures, and emergency response
- Data availability and monitoring
- The ability of states which get Class VI primacy to handle permitting
- Lack of transparency and its susceptibility to corruption

Community Benefits

- Opportunity to bring in local tax revenue for municipalities
- Tech, knowledge, economic jobs, as well as construction and operations jobs
- How many jobs, of what sort, and how to train/reskill the workforce
- Financially benefitting the groups that created the problem
- Technology's capability to improve air quality

Access to Information

- Community context-informed information creation
- Unbiased, fact-based information
- Multiple media types to increase accessibility
- Information about existing and planned projects and how to find out more about them

More Resources Are Needed to Engage

- Non-biased, jargon-free, multilingual information
- Clear explanation of how past engagement impacted decisions is motivating for further engagement
- Funding for community groups to do engagement; stipends for individuals who participate
- Considerations around transportation, timing, childcare, and food at future engagements
- These things can enable communities to be involved in planning engagement

Additional Topics

- Project pacing.
- Interactions with existing wells.
- Opportunities and incentives for primacy.
- The efficacy of CBAs and CBPs.

Session III: Regional Breakout Discussions

Walt Zalis, Program Director, Energetics

Walt introduced the virtual breakout discussion as a regional discussion on the idealized pathways to the hopeful future states of each region. The notes taken for each question have been provided below:

Mid-Continent Responses

1. Imagine it's 20 years in the future. Let's assume that your region has done an effective job of addressing issues of climate change, economic inequality, etc. What's going on, in terms of climate, energy, and/or society? What are some key elements of this livable future?

- Well on the way to net zero; clean power has been realized; new, sustainable, good jobs are back; all people are living high-quality lives; and the rest of the world has done its part.
 - Carbon Removal has been successfully deployed as a public service with local co-benefits in the design.
 - Oil and gas wells have been capped. The ports no longer export oil and gas.
 - Using abandoned oil wells for carbon storage becomes acceptable for land/oil owners.
 - Native American Tribes (large population in Oklahoma) are being seen, heard, listened to, participating in jobs, etc.
 - Alternatives, such as waste and waste carbon resources, have replaced fossil fuels.
 - Clean power is readily and reliably available.
 - Non-fossil fuel energy sources are acceptable to the public in our state.
 - Solar panels are being exported, as well as wind turbines.
 - Climate impacts have slowed or are better known for adaptation purposes.
 - Climate change and our response is no longer political.
 - Affordable and reliable energy for all populations
 - The environment is increasingly turning toward a "natural" state - less human-impacted
 - Student (university) enrollment is up in geosciences which have expanded its definition of what is included in studies...
 - The workforce is readily prepared and well-educated.
 - Utilization of clean power sources/alternative energy
 - Substitution/elimination/reduction of oil & gas substantially
 - Economic development/growth due to clean energy businesses and products
2. If there are carbon capture and storage or carbon removal projects in this future, what sorts of projects are these, and what are the characteristics that make them good projects? Should be included. (For example, good projects could be ones that deliver community benefits, quality jobs, community-based monitoring of impacts, etc.)
- Use carbon utilization to replace fossil-based carbon sources
 - Widespread trust in the projects/approaches within the community
 - Solid LCA
 - Carbon Utilization
 - Carbon monitoring for underground carbon storage sites
 - Long-term monitoring, public acceptance
 - Public understanding of the science is high(er)
 - Consider all factors -- climate, energy use, water use, community impacts, jobs, workforce, and supply chains
 - Minimal physical footprint, use of chemicals, and natural resources
 - Community support and understanding of CCS
 - Lots of job opportunities
 - The projects are not eyesores to the community
 - Incorporation of CCUS into K-12 science curriculum

- Enablers of sustainable industries, protecting existing manufacturing jobs in the region
- Projects meaningfully address local needs; they are realized using pathways to procedural justice and deliver locally designed distributional justice
- Workforce and community engagement
- EEJ conversation - sometimes you come in with the idea of how you will help - instead of asking the community what they want. So should be about tangible improvement
- Hasn't increased seismicity in the region
- Geologic component - impacts are known, minimized, and monitored
- Public education, awareness, understanding, buy-in, and also in traditional education mechanisms
- Economic stability, jobs, industry, etc.

3. Who made your ideal vision of the future happen? What did they do?

- Everybody!
- From local communities to labor to environmental advocates to policymakers, they all worked together to get it done
- Educators
- Technology developers
- Regulators
- Everyone, with a feeling of ownership, making a concerted effort toward change
- children (inspiration for a future, improved vision)
- Risk-takers show us what's possible
- Bill Gates/Funders
- Workforce and community engagement
- Voters
- Utilities
- Leaders (companies, government, communities, etc.)
- The entire political spectrum - conservatives and liberals
- Physical and other impacts on the community are minimized (footprint, resources, etc.)

4. Who do you think is best positioned to carry out public and community engagement? What skills and resources do they need to make it successful?

- Community leaders themselves
- Scientists
- State departments of education (these topics need to be part of the science standards)
- Labor unions
- Someone that is actually in the community, someone with a background and ability to present information working in conjunction with regulators and industry
- Need scientific data presented in an accessible/ understandable way
- Teachers, but they're going to need a great deal of professional development to make it happen
- Environmental groups (incl. national eNGOs)

- Utilities? City council?
 - Technology developers, small companies vs. large
 - Regulators
 - Funding agencies need to support community engagement efforts
 - Good Communicators
 - Farmers/landowners where these projects will be constructed and whose land will be over the storage sites
 - Youtubers and social media who are influencers and reach the most audience
5. We have heard that in addition to meaningful two-way engagement. People also want clear information. What mediums or forms would be the best for learning and keeping informed about these topics?
- Local universities/educational institution-hosted sessions
 - Short videos that are accessible to the general public
 - Public meetings
 - Databases from regulators
 - Train the trainer sessions - educate local people to be the messengers
 - Scientific talks that are geared toward the public
 - Community meetings
 - General media/journalist education
 - Webinars, online educational tools
 - Town hall meetings
 - Colleges of education
 - Social media outlets
 - Scientists will need professional development to learn how to talk to people
 - To get the general public buy-in, you need an easily understood story about carbon management

Gulf Coast Responses

1. Imagine it's 20 years in the future. Let's assume that your region has done an effective job of addressing issues of climate change, economic inequality, etc. What's going on, in terms of climate, energy, and/or society? What are some key elements of this livable future?
- Re-seeded oysters, oyster reefs prolific again (living shoreline, living breakwater). Like a coastal necklace. Not just Corpus Christi Bay but up to Aransas Bay.
 - Citizens have a clear pathway to commenting on & challenging projects/industries that are incompatible with their neighborhoods
 - The general public needs to be more educated in whole world subjects. Would like to see it become part of people's lives. (e.g., Do we need big trucks with huge fuel consumption, miles per gallon)
 - All oil and gas wells have been capped, and we are no longer exporting oil and gas
 - We are protecting all biodiversity in our area
 - Should have some accountability on a local scale. Being listened to without it being siloed that local government doesn't talk to the federal government
 - E.g., contd. Lightbulb switching; minimizing our energy consumption

- All oil and gas wells are being monitored for leaks
 - Water and air pollution have been eliminated
 - People take pride in their natural amenities. Currently, folks scoff at the quality of local waterways -- toxic, polluted, avoided.
 - Less wasteful with our resources; consume less. Manage resources better and make them last longer. Don't waste as much.
 - We are now exporting solar panels and wind turbines
 - The goal should be carbon negative
 - Carbon management will be necessary after the transition to 100% electric powered by renewables
 - Zero carbon fuel sources
 - Want environmentally friendly fuels (H2) rather than electric. Having the choice, being able to see there are alternatives. Having an open mind.
 - Zero emission fuel sources
2. If there are carbon capture and storage or carbon removal projects in this future, what sorts of projects are these, and what are the characteristics that make them good projects? (For example, good projects could deliver community benefits, quality jobs, community-based monitoring of impacts, etc.)
- Needs to be a site with high confidence that the CO₂ will stay there for thousands of years. How do you ensure that no leaks will happen.
 - Correctly sited and monitored, so no leaks happen
 - Record keeping of sites, so future civilizations a thousand years from now know where they are and don't uncap the wells
 - Start slow and steady and learn before ramping up
 - Long-term aspects - still research to be done. (Not the same as O&G)
 - Make sure that all the wells in the Area of Review of the project have adequate construction so that no pathway for fluid migration can open into the injection zone where the CO₂ injects.
 - What is your backup plan? What are you going to do when you are injecting CO₂ and find it's coming out somewhere? Do you have an alt place to put it? Financial penalty?
 - Not placed in areas of poor and colored communities
 - Training and learning need training programs to allow many people to be included
 - Where will the energy come from to power the operations?
 - General location - onshore vs. offshore; area 1 vs. area 2. That will influence the need for learning.
3. Who made your ideal vision of the future happen? What did they do?
- My grandchildren. The next generations will be the ones affected. They are my driver. It might be too late by the time they move in if it still needs to be sorted out.
 - The US Environmental Protection Agency will do a lot of work in the next 20 years to combat climate change, particularly permitting Class VI wells.
 - Government, grassroots organizations, and private companies
 - Pure science

4. Who do you think is best positioned to carry out public and community engagement? What skills and resources do they need to make it successful?
- We are paying for it with our taxes; it's our money. It's the government's responsibility is to lead the engagement. Difficult for operators to have the money for education.
 - Need to be educated; the people doing the teaching need to be educated; they need to go to school. Include this in the school curriculum at a young age.
 - Skills in conducting meetings
 - Skills in reaching out to all members of the community
 - Great question. Federal government.
 - Education above the state level; is not filtered out by state or local levels. You must reach all levels, not just those with power and influence.
 - Cross-section of skills, PR, Engineering, and Science; the whole group has lots of skills needed to answer questions and give input.
 - People who live in the affected communities need to have their voices amplified by government.
 - E.g., RRC is not doing its job of monitoring wells; there are leaking wells.
 - Contact CAPE
 - <https://capetx.com>
 - We have heard that in addition to meaningful two-way engagement, people also want clear information. What mediums or forms would be the best for learning and keeping informed about these topics?
 - Time did not permit for discussion

Mid-Atlantic/Northeast Responses

1. Imagine it's 20 years in the future. Let's assume that your region has done an effective job of addressing issues of climate change, economic inequality, etc. What's going on, in terms of climate, energy, and/or society? What are some key elements of this livable future?
- Housing is a human right
 - Polluting industries have repaired their harms
 - Strategic areas of the city have been designated as wilderness reserves/protected public forests
 - Walkable communities reduce the need for cars
 - Carbon sequestration is treated like brownfield restoration: It's what the public has to do when an operator has failed to fulfill its responsibility to the environment.
 - Hard-to-decarbonize industry has made progress in reducing their emissions.
 - No homes have mold.
 - Large birds of prey and other native wildlife have returned to the Ohio River Valley.
 - Public transportation is free.
 - Our region is attractive because we have plenty of fresh water, productive soil, a temperate climate, adequate rainfall, and safe from tidal flooding.
 - Carbon Removal has been successfully deployed as a public service with local co-benefits in the design.
 - Abandoned mines are closed.

- We don't bury "bad things" in the ground anymore.
 - Our economy is focused on people, not capital. (We look for investments that increase labor content rather than eliminating it.)
 - Carbon management is used only for industrial laggards, who are heavily penalized while requiring CO2 sequestration instead of changing their operations.
 - Health care is available to people, not employees.
 - Brownfields and Superfund sites have been remediated.
 - No one has to breathe bad air.
 - Everyone has decent and affordable healthcare.
 - Everyone has fair and safe access to public lands, recreation, clean water, and air.
 - Smart agriculture best practices are the norms.
 - Healthcare is not tied to your job.
 - True racial equality exists.
 - Significant progress has been made to move away from fossil fuels.
 - Climate has begun to stabilize.
 - Carbon management will lean more toward utilization in useful products.
 - Technologies such as fusion will be close to scale.
 - We will shut down processes that continue to inflict harm. We have a corporate death penalty for unsalvageable businesses.
 - The industry has decarbonized. Air is cleaner accordingly.
 - We don't have trash to hide.
 - We decide on "governance" before - not after - we develop life-changing technologies.
2. If there are carbon capture and storage or carbon removal projects in this future, what sorts of projects are these, and what are the characteristics that make them good projects? (For example, good projects could be ones that deliver community benefits, quality jobs, community-based monitoring of impacts, etc.)
- This is a troubling framing, asking us to assume this will happen in this context.
 - Union laborers lead construction
 - CCS/CCUS *cannot* be owned and operated by the entities which produce carbon. For transparency and good governance, the cost of handling carbon must be distinct.
 - Industry happens in industrial zones with sufficient offsets, not residential/agricultural ones. Fracking changed that for the worse.
 - Good projects have emergency plans that are realistic for the affected population.
 - Fines go to community members--direct payouts that allow residents to take care of their own needs
 - Lobbyists are last in line for government attention.
 - Projects meaningfully address local needs; they are realized using pathways to procedural justice and deliver locally designed distributional justice.
 - Direct capture can be anywhere -- the atmosphere is "well stirred." So there needs to be a justification for direct capture in populated places.

- Environmental justice is the foremost concern
- Blue hydrogen is not part of this vision; only "green."
- They aren't near landslide-prone areas.
- Fence line monitoring extends BEYOND the fence line and into communities near potential harm.
- Community engagement leads the placement of wells and plants.
- The best way to remove GHG is to not create it.
- Good projects don't have horrible light pollution that impacts fertility and mental health.
- Penalties are sufficiently large to dissuade action and make problematic behavior NOT profitable.
- The good neighbor principle is adopted for all projects.
- Good projects pay livable wages.
- Toxic pollution is cut just as much as CO₂ emissions.
- Good projects are quiet.
- There are lots of endeavors that create jobs. We need CLEAN jobs.
- A third-party monitors violation.
- Good projects are pretty.
- Good projects are a benefit to the community
- Fines for violations are significant enough to change behaviors.
- Good projects don't create dangerous, community-destroying highways.

3. Who made your ideal vision of the future happen? What did they do?

- Citizen science made it happen.
- People demanded proper accounting of all costs.
- We insisted on transparency, shared the data and acted on the conclusions.
- Governments fund and empower community leaders who then make decisions for the best of their fellow community members.
- We designed regulatory financing models that employed the "polluters pay principle" to ensure just the deployment of CDR comes from those most responsible.
- Fence line community leaders
- Those most impacted lead the decisions.
- The most important stakeholder is the voice of the people, both local community groups and the knowledge of voters as taxpayers fund these projects.
- A sizable fund is created for accidents and cleanups with required annual payments.
- The government tipped the playing field in favor of community leadership (and away from corporate leadership), and then businesses followed community leadership in their actions.
- Micro-grids
- Innovation that includes the expertise of grassroots and frontline communities
- Fines were significant enough to change industry behaviors.
- Industry bonds were so big that industry behaviors changed
- Corporate execs and boards of directors were held personally accountable for the criminal acts of their corporations. CEOs went to jail.

- Community benefits agreements must be met in stages before more permits are granted.
 - People have more rights than businesses.
 - Fossil fuel companies have almost zero voice.
 - Real democracy by the people, not by corporations.
 - The government spoke loudly about appropriate corporate behavior and enforced good behavior.
 - Scientists, government, and businesses, led by community visions of healthy places to live.
 - Tax equity schemes to finance carbon management are designed progressively by those most financially able to shoulder the economic costs.
 - We (somehow, please G**) discovered a way to make public decisions WITHOUT "dollarizing" everything and "crunching the numbers."
 - Raising community engagement to the level of project financing during all phases of project development.
 - All people are equally protected--including the historically marginalized.
 - Bankruptcy was removed as an escape valve for bad corporate behavior.
4. Who do you think is best positioned to carry out public and community engagement? What skills and resources do they need to make it successful?
- Welcoming and accessible workshops and webinars.
 - A diverse array of community members in a range of settings. Churches, schools, politicians, students, leaders, and non-profits.
 - Local non-profits
 - There is no one size fits all. Each community will be different.
 - DOE is already meeting such people. "Justice" won't be achieved by a hands-off approach from DOE.
 - Funded project positions, with full visibility into financial and technical data, to be staffed by community representatives.
 - Consider that many of us have been working on this for decades. The government and industry have been working against this for decades.
 - Project budgets need to include budgets for legal representation of community interests -- even to oppose DOE and the prime contractor.
 - Funding to pay people in a way that allows for experimentation. Often government funding can come with strict guidelines that prevent meaningful adaptation.
 - Give meaningful and truth-based hope that the government can navigate this course successfully. Lots of cynicism out there about the government's capacity to do good.
 - A stipend for participating. As an independent contractor, I'm giving up my income to attend today. I'm losing money by being here.
 - Even-handedness (e.g., in procurement) is a recipe for continued domination by the powerful.
 - Paying for small group discussions.
 - Pay people enough that they want to come back. Ex: transportation for the month, not just that day.
 - Funding to provide meals and childcare.
 - Progressive leaders in government and non-profits are valuable.
 - They need sustained funding to hire an outreach team for years, not months, at a time.
 - Empathy and assertiveness.

- People with a general desire to be inclusive and not going with a paternalist mindset--that is, I know what you need.
 - It is critical that the community engagement team is well-trained and has a visionary capacity that inspires meaningful change.
 - Local groups need funding for marketing. The most trusted often have terrible websites.
 - At present, DOE holds the money. The procurement process needs to put teeth into "justice" criteria.
 - Go/No-go funding decisions must be made with community input.
 - People are busy. Government should pay its enforcers, so we don't have to rely on industry to police themselves.
 - Our communities are tired and busy. We should be able to trust the government to protect us.
 - Community leaders who have access to the needs and desires of most vulnerable local groups should be able to translate needs into demonstrable action at the project level.
5. We have heard that in addition to meaningful two-way engagement, people also want clear information. What mediums or forms would be the best for learning and keeping informed about these topics?
- Twitter. Mastodon. Slack. Email. Text message. A little email. YouTube.
 - A tiered approach to information sharing/learning materials so stakeholders with different degrees of knowledge/expertise can find granular answers to Qs.
 - Prepare information for us as if our time cost you \$1000/hour.
 - Make it possible to live off one household income, so people have time to learn, engage, and remember.
 - Start with societal equality. Economic and racial justice FIRST.
 - Purchase airtime and newspaper pages for community messages.

Western US Responses

1. Imagine it's 20 years in the future. Let's assume that your region has done an effective job of addressing issues of climate change, economic inequality, etc. What's going on, in terms of climate, energy, and/or society? What are some key elements of this livable future?
- Smart water policy that is well integrated into energy planning
 - Washington has fully implemented the Climate Commitment Act, the Health Environment for All Act, and the executive order for Equity and Anti-Racism to enact Environmental Justice
 - Clean drinking water for everyone
 - The climate is relatively the same
 - How does our area compare to other areas and the global environment? Global issue. What can our successes teach others?
 - Integrated CM Hubs that include BECCS and DAC into CCUS plans.
 - Most transportation is electric-powered vehicles
 - Figured out how to mine critical minerals for decarbonization while addressing current & legacy issues of mining and land ownership
2. If there are carbon capture and storage or carbon removal projects in this future, what sorts of projects are these, and what are the characteristics that make them good projects? (For example, good projects could deliver community benefits, quality jobs, community-based monitoring of impacts, etc.)

- A workforce that has jobs that are accessible to all.
 - Making sure these carbon capture/removal systems are placed in an area that considers Environmental Justice and who is affected by the presence of the operations.
 - Projects that provide defensible and easily understandable data for educating and demonstrating carbon removal and storage to the public. Need the public to embrace this.
 - Make sure that Carbon Management is not limited to sequestration but also to emissions. For example, thermal energy storage and geothermal resource utilization to reduce energy demand.
 - I have an issue with carbon transport, so if this developed in our region, it would mostly be Direct Capture.
3. Who made your ideal vision of the future happen? What did they do?
- Legislation to mandate and incentive clean energy structures combined with public-private investments to realize the needed infrastructure
 - <https://breakthroughenergy.org/>
 - Community planners encouraged projects and provided incentives for these projects to come to their community
 - Federal agencies improved their ability to engage with Tribal nations and communities in meaningful ways.
 - Scientists/research made it happen but needed public engagement/acceptance, affected industries embracing, and proper governance for success.
 - Community (general public), scientists/researchers, state/local/regional government, federal
 - Buy-in across the stakeholder chain
4. Who do you think is best positioned to carry out public and community engagement? What skills and resources do they need to make it successful?
- In Washington, right now, it is falling on our team in DNR (for several reasons). I hope that can expand more to the teams in Policy and Commerce.
 - Working at county health, I think we can assist with community engagement.
 - Private or Non-profit PR groups may be better at interacting with Tribes due to non-trust.
 - Schools to educate the next generations
 - Local/Regional governance
 - Skills - understand the intricacies of the local population
 - Educate to ingrain climate consciousness.
5. We have heard that in addition to meaningful two-way engagement, people also want clear information. What mediums or forms would be the best for learning and keeping informed about these topics?


Time did not permit for discussion.

Conclusion

The event was concluded with a presentation of the regional responses to the discussion activity by the regional facilitators and was wrapped up with statements from Walt Zalis, thanking participants for attending.

Appendix B: Event Agendas

Tulsa, Oklahoma, November 7, 2022



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Carbon Interactive Workshop - Tulsa

Introductions	12:30
<u>Session 1: What kind of carbon projects, and why?</u>	1:00
<i>How the energy transition is unfolding, and why carbon capture and carbon removal projects are now coming up as an area of development.</i>	
<ul style="list-style-type: none"> • Kenneth Wagner, Director, Hamm Institute for American Energy • Holly Buck, Management and Program Analyst, Dept. of Energy • Quincy Childs, Fellow, Dept. of Energy • Oklahoma's Secretary of Energy and Environment Ken McQueen 	
<u>Session 2: Would these projects fit here?</u>	1:40
<i>Basics of carbon capture, transport, and storage, the history of infrastructure development and community benefits in this area, and the kinds of concerns that have been raised about carbon management projects.</i>	
<ul style="list-style-type: none"> • Michael Thompson, Management and Program Analyst, Dept. of Energy • Dr. Nicholas Hayman, Director, Oklahoma Geological Survey • Traci Rodosta, Carbon Storage Program Director, Dept. of Energy • William Lynn, Geologist, Osage Minerals Council • Dr. Hank Jenkins-Smith, Co-Director, Institute for Public Policy Research and Analysis, University of Oklahoma • Dr. Tom Mueller, Assistant Professor of Geography and Environment, University of Oklahoma 	
<u>Break</u>	2:40
<u>Session 3: What can be done to mitigate project impacts?</u>	2:55
<i>Government role in responsible research</i>	
<ul style="list-style-type: none"> • Traci Rodosta, Carbon Storage Program Director, Dept. of Energy 	
<i>Government role in regulation</i>	
<ul style="list-style-type: none"> • Vincent Holohan, Engineer, Engineering and Research Division, Dept. Of Transportation, Pipeline and Hazardous Materials Safety Administration • Brandon Maples, Geologist, Environmental Protection Agency Region 6 	
<u>Session 4: Interactive discussion</u>	3:35
<u>Session 5: Networking open plan session – Q-and-A and exhibits</u>	5:00
<i>Explore and discuss information from both researchers and community groups.</i>	

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1

Corpus Christi, Texas, November 10, 2022



Carbon Interactive Workshop – Corpus Christi

Introductions and event goals **12:30**

Session 1: Introducing the context **12:55**

How the energy transition is unfolding, and why carbon capture and carbon removal projects are now coming up as an area of development.

Local social & environmental priorities

- Jim Klein Coleman, President of the Coastal bend Sierra Club
- Dr. Amie West, Harte Research Institute

Global and national context for carbon projects

- Holly Buck, Management and Program Analyst, Dept. of Energy
- Quincy Childs, Fellow, Dept. of Energy

Session 2: Would these projects fit here? **1:35**

Basics of carbon capture, transport, and storage, the history of infrastructure development, regulation, and community benefits in Texas, and the kinds of concerns that have been raised on carbon management projects.

- Michael Thompson, Management and Program Analyst, Dept. of Energy
- Dr. Tip Meckel, Senior Research Scientist, Gulf Coast Carbon Center
- Sarah Leung, Carbon Transport Program Manager, Dept. of Energy
- Sonrisa Lucero, Special Advisor on Engagement, Office of Economic Impact and Diversity, Dept. of Energy
- Virginia Palacios, Executive Director, Commission Shift

Discussion I **2:40**

Session 3: What can be done to mitigate project impacts? **3:15**

Government role in responsible research & regulation

- Sarah Leung, Carbon Transport Program Manager, Dept. of Energy
- Steve Nanney, Dept. Of Transportation, Pipeline and Hazardous Materials Safety Administration
- Brandon Maples, Geologist, Environmental Protection Agency Region 6
- Lisa Grant, P.E., Senior Technical Advisor, Office of Offshore Regulatory Programs, Bureau of Safety and Environmental Enforcement
- Mike Celata, Gulf of Mexico Regional Director, Bureau of Ocean Energy and Management

Discussion II **4:10**

Session 4: Networking open plan session – Q-and-A and exhibits **4:45**

Explore information from both researchers and community groups.

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1

Richland (Tri-Cities), Washington, November 30, 2022



Carbon Interactive Workshop – Tri-Cities

Introductions **12:30**

Carbon capture definitions **1:00**

Session 1: Introducing the context **1:10**

How is the energy transition unfolding in the Tri-Cities area? What are the local social and environmental priorities?

- Steve Ghan, Citizens' Climate Lobby
- Karl Dye, President and CEO, Tri-City Development Council
- Jillian Cadwell, Washington State University Tri-Cities
- Clint Whitney, Energy Services Director, City of Richland

Break

Session 2: What do these projects involve? **2:05**

Why carbon capture and carbon removal projects are now coming up as an area of development, deeper dive into carbon capture, transport, and storage, and phases of developing a project.

- Michael Thompson, Management and Program Analyst, Dept. of Energy
- Casie Davidson, Pacific Northwest National Labs
- John Litynski, Carbon Transport and Storage Program Director, Dept. of Energy

Interactive Break-out Discussions **2:40**

Break

Session 3: What can be done to mitigate project impacts? **3:40**

Government role in responsible research

- John Litynski, Carbon Transport and Storage Program Director, Dept. of Energy

Government role in regulation

- Karen Gentile, Dept. Of Transportation, Pipeline and Hazardous Materials Safety Administration
- Sharon Newman, Physical Scientist, Environmental Protection Agency Headquarters

Plenary Discussion **4:40**

Session 4: Networking open plan session – Q-and-A and exhibits **5:05**

Explore information from both researchers and community groups, and follow up with questions.

Pittsburgh, Pennsylvania, December 8, 2022



Carbon Interactive Workshop – Pittsburgh

Introductions **12:40**

Session 1: Introducing the context **12:55**

How the energy transition is unfolding here, why carbon capture and carbon removal projects are coming up as an area of development, and how we can prioritize clean energy justice

Local social & environmental priorities

- Edith Abeyta, North Braddock Residents for our Future
- Dr. Matt Mehalik, Executive Director, Breathe Project

Global and national context for carbon projects

- Dr. Holly Buck, Management and Program Analyst, Dept of Energy (DOE)
- Dr. Ewan Morton, AAAS Science & Technology Policy Fellow, DOE
- Dr. Simone Stewart, Industrial Policy Specialist, Climate & Energy Policy, National Wildlife Federation

Break **1:45**

Session 2: What kinds of projects might be built? **2:00**

Basics of carbon capture, transport, and storage, the phases of a project, and the kinds of concerns that have been raised about carbon management projects.

- Adam Wong, Director for Strategic Engagement, Office of Fossil Energy Carbon Management, DOE
- Dr. Neeraj Gupta, Battelle, Technical Director and Midwest Carbon Regional Initiative CO-PI
- Darin Damiani and Dan Hancu, Carbon Storage and Carbon Capture Program Managers, DOE
- Sonrisa Lucero, Special Advisor on Engagement, Office of Economic Impact and Diversity, DOE

Interactive discussion I **2:50**

Break **3:40**

Session 3: What can be done to mitigate project impacts? **3:55**

Government regulation of carbon transport and storage; how federal agencies work to mitigate impacts

- Karen Gentile, Dept. Of Transportation, Pipeline and Hazardous Materials Safety Administration
- Kevin Rowsey, Senior Permitting Specialist, Environmental Protection Agency Region 3

Summary of interactive discussion I **4:25**

Interactive discussion II **4:45**

Session 4: Networking open plan session – Q-and-A and exhibits **5:10**

Virtual event, December 15, 2022



Carbon Interactive Workshop – Virtual

Welcome

2:00 EST

Session 1: Invited Speakers

2:05 EST

Why carbon management is in the U.S. net-zero strategy, what recent legislation means for carbon management development, and what carbon management is.

- Holly Buck, Management and Program Analyst, Dept of Energy (DOE)
- Matt Antes, Management and Program Analyst, DOE

How the government mitigates risks and impacts

- Sharon Newman, Physical Scientist, Environmental Protection Agency Headquarters
- Karen Gentile, Dept. Of Transportation, Pipeline and Hazardous Materials Safety Administration

Justice 40 and community engagement priorities in government-supported projects

- Sonrisa Lucero, Special Advisor on Engagement, Office of Economic Impact and Diversity, DOE

Moderated Q-and-A

3:05 EST

Break

3:25 EST

Session 2: Review of Regional Events

3:30 EST

Common themes from the regional in-person workshops.

- Walt Zalis, Program Director, Energetics

Session 3: Breakout Discussions

3:40 EST

Regional breakout group discussions (Mid-continent, Gulf Coast, Mid-Atlantic and Northeast, and Western U.S.).

Closing Remarks

4:55 EST



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