



IEAGHG Information Paper 2017-IP47; Introduction to New US DOE CarbonSAFE Projects

The US DOE's annual 'Carbon Storage and Oil & Natural Gas Technologies Review Meeting' was held in Pittsburgh 1st-3rd August 2017. The program included 16 presentations from the new CarbonSAFE projects (see IEAGHG 2016-IP54).

In November 2016 the DOE announced that 16 carbon storage projects had been chosen to receive approximately \$44 million for cost-shared research and development. This funding came under the DOE's Carbon Storage Assurance Enterprise initiative (CarbonSAFE) and will build on the previous work of the Regional Carbon Sequestration Partnerships (RCSPs) which are now reaching their final stages. The projects will provide information on the development of the next scale of geological storage sites (+50 million metric tons of CO₂) from a variety of industrial sources.

The CarbonSAFE FOAs aimed to develop CCS projects that assess the feasibility of constructing and permitting a commercial-scale storage complex and initiate characterization activities. The projects are currently within two phases of development as described below.

Phase 1: Integrated Pre-Feasibility

Thirteen projects have been selected for Phase 1 (representing 10 recipients and \$15 million of federal funding). Full details of each project can be found on the US DOE website including the initial funding opportunity announcement outlining the full objectives for Phase 1 and 2. The Phase 1 projects include, amongst others, two offshore assessments (one into basalt formations), a site in California and a site developing stacked storage hubs in Nebraska and Kansas.

The aims of Phase 1 will be to develop a plan including technical requirements, economic feasibility and public acceptance and identify issues specific to commercial scale deployment of CCS projects. The following objectives must be met to be eligible to move on to Phase 2:

- Formation of capable team (to address technical and non-technical challenges to commercial-scale deployment of CO₂ storage);
- Development of plan (including public acceptance and economic feasibility) to encompass all technical requirements;
- High-level technical evaluations of the sub-basin and potential CO₂ source(s).

Currently the projects are at varying stages of development, having had a kick-off meeting towards the start of the year. Potential capture sources are being assessed as part of the pre-feasibility assessment with numerous sources being considered for each site. These include power plants, refineries, ethanol production plants and other industry sources. Potential pipeline utilisation has also been considered for some of the sites taking into account existing infrastructure. The sites vary in distance between the CO₂ source and storage complex with some being adjacent and some potentially requiring longer distance transportation (e.g. 300 miles for the ICKan project). The pre-feasibility will include an assessment of storage sites given potential sources and the relative benefits of the quality of the storage reservoir versus transportation distance. The projects will aim to make use of the National Risk Assessment Partnership (NRAP) tools.

Fieldwork and data collection has begun at numerous sites already, for example the Rock Springs Uplift site managed by the University of Wyoming has analysed data from a previous seismic survey and conducted fieldwork to start collecting samples. The ICKan project in Kansas, managed by the University of Kansas and Kansas Geological survey, has even completed initial porosity and permeability characterization and technical analysis with the 3D static model completed and a dynamic model underway. Several projects are looking at sites with 'stacked storage' potential and



which could include EOR, one benefit of which would be to reduce the 'Area of Review' for the same storage volume.

Phase 2: Storage Complex Feasibility

Three projects have been selected under Phase 2 funding to conduct an initial characterization of a storage complex identified as having high potential. This work is to establish the feasibility for storage of 50+ million metric tons CO₂ and will utilize over \$29 million of federal funds. As part of the Phase 2 developments the projects will be required to use the NRAP tools to help in evaluating several elements of the subsurface which will help validate the tools and advance their development.

The storage complex characterization will include data collection, geologic analysis, identifying regulatory requirements, subsurface monitoring and risk assessments. The three projects are:

- [Southern States Energy Board](#) – Geologic Storage adjacent to Mississippi Power Company Kemper County Energy Facility (ECO₂S). Two wells have already been drilled at the site (with core recovery for analysis) with 1 more currently being prepared. Initial indications are very positive on the storage geology.
- [University of North Dakota](#) – North Dakota Integrated Carbon Storage Complex. Two stratigraphic wells are planned to be drilled to allow for the collection of new data from the analysis of new core, subsurface fluid samples, and well logs. Reprocessing of existing 3D seismic data is planned as well as the acquisition of a new 2D survey. CO₂ sources under consideration include the Dakota Gasification Company's Synfuels Plant and coal power stations.
- [University of Illinois, Illinois State Geological Survey](#) – CarbonSAFE Illinois Macon County. This project is assessing geologic storage in the Mt. Simon sandstone in Macon County. It is still in the planning phase with the aim of drilling to 7500ft and into the basement rock, and to establish the variability in the lower Mt Simon sandstone depositional environment and therefore porosity variations, at the Forsyth Field (North-West of the existing project sites). Potential CO₂ sources include the ADM ethanol facility and coal power stations.

More details can be found on the US DOE's website:

<https://energy.gov/under-secretary-science-and-energy/articles/energy-department-announces-more-44-million-co2-storage>

And from the forthcoming presentation links on:

<https://www.netl.doe.gov/File%20Library/Events/2017/tech%20review/2017-CS-and-O-and-G-Review-Meeting-Agenda-07312017-FINAL.PDF> .

Overall, these projects appear to have made very quick progress in the short time so far, with a lot of new information being shared at the Carbon Storage Review meeting. We look forward to their results which will contribute towards the development of commercial-scale integrated CCS projects.

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