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**Carbon Storage Assurance Facility Enterprise (Carbon SAFE):
Carbon Storage Infrastructure Development for a Sustainable Future**

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Abstract

The U.S. Department of Energy (DOE) Office of Fossil Energy and Carbon Management's (FECM) Carbon Transport and Storage (CTS) Program focuses on addressing technical and non-technical challenges associated with geologic storage of carbon dioxide (CO₂). With recent legislation providing financial incentives, the CTS Program is accelerating efforts to advance carbon capture, transport and storage (CCTS) technologies and to facilitate the development of a CCTS industry. The Carbon Storage Assurance Facility Enterprise (CarbonSAFE) initiative is de-risking geologic storage to facilitate the deployment of commercial-scale storage across the U.S. Bolstered by the Bipartisan Infrastructure Law's (BIL) \$2.5 billion allocation for Carbon Storage Validation and Testing (BIL Section 40305), CarbonSAFE is committed to expediting large-scale carbon storage projects toward commercialization. Since its inception in 2016, CarbonSAFE has focused on identifying (Phase I), characterizing (Phases II, III), and constructing (Phase IV) storage facilities, each designed to hold 50+ million metric tons of CO₂. In response to the BIL provision, CarbonSAFE is enhancing its framework to accelerate storage deployment, ultimately providing access, by 2030, to storage capacity of 2 billion metric tons, with 5.5 billion identified contingent storage resources nationwide, and enabling the injection of at least 65 million metric tons per year.

The CarbonSAFE initiative is aligning its targets with the standardized framework of the Storage Resources Management System (SRMS) in order to allow tracking of the initiative's progress utilizing this international system. Each of the CarbonSAFE phases aligns with a specific SRMS classification: CarbonSAFE Phase I corresponds to SRMS Prospective Storage Resources; Phases II and III link to Contingent Storage Resources; Phase

IV aligns with Capacity. Utilizing the SRMS allows DOE to provide an accepted framework to classify the commercial potential of storage projects and quantify and categorize storage estimates. SRMS provides a consistent approach to estimating storage quantities, moving carbon storage resources from prospective through contingent storage resources to capacity. The SRMS is source-agnostic and intended to be used for CO₂ storage in brine aquifers and abandoned oil and gas reservoirs. Through implementing SRMS, CarbonSAFE aims to advance the nation's prospective carbon storage resources to contingent storage resources and eventually to capacity status as projects move toward commerciality.

The CarbonSAFE initiative is continually expanding its efforts to include additional geologic settings, adding sites across the United States, both on- and offshore. Expansion involves the detailed characterization of locations where little subsurface data is currently available, addressing site-specific technical challenges related to particular geologic settings, and considering unconventional storage options like basalts. In its first six years of existence, the initiative completed nineteen projects (thirteen Phase I; six Phase II) and initiated five Phase III projects. Currently through BIL funding, an additional nine Phase II projects and sixteen Phase III projects have been selected. While Phase II projects will perform a feasibility assessment for a commercial-scale project, the Phase III projects will finalize the detailed characterization required for permitting; complete transport front-end engineering and design study; and incorporate all the costs necessary to develop the site into Storage Field Development and Commercial Plans. Engagement with the communities where these sites will be located is a critical component to deployment, and future project developers will develop and implement Community Benefits Plans as part of these projects. The CarbonSAFE initiative foresees a promising, active future with up to 40 projects across all its phases through year 2026. The successful implementation of CarbonSAFE will stimulate the growth of a geographically widespread industry, reduce risks and costs for future projects, and demonstrate that commercial-scale storage facilities can be developed throughout the U.S.

Keywords: commercial-scale; CarbonSAFE; Storage Resources Management System; SRMS; detailed characterization
