

GUIDANCE FOR PROSPECTIVE SITE OFFERORS

In support of the U.S. Department of Energy's (DOE) FutureGen 2.0 Program, the non-profit, private sector FutureGen Industrial Alliance (FGA) seeks a location for a regional carbon dioxide (CO₂) storage site in the Mount Simon geologic formation within the State of Illinois. This guidance to prospective site offerors provides:

- an overview of FutureGen 2.0;
- a description of the FGA site selection process and schedule;
- the type of criteria that the FGA will use to select the CO₂ storage site;
- the type of site data and documentation the FGA will ask offerors to provide to aid in its site selection process; and
- the time and resource commitments offerors will need to make in order to submit and support a qualifying proposal to host the CO₂ storage site.

The FGA reserves the right to revise this guidance as needed. Any revisions or additional information for prospective site offerors will be posted on the FGA website:

<http://www.futuregenalliance.org>.

Overview of FutureGen 2.0

Carbon capture and storage (CCS) is widely viewed as an essential technology in the effort to address climate change concerns. CCS offers the potential to largely eliminate the carbon dioxide emissions associated with power plants, cement plants, refineries, and other stationary industrial sources.

FutureGen 2.0 will advance one approach to the deployment of CCS. That is, the development of a regional CO₂ storage site ("hub") that could accept CO₂ from a variety of industrial sources for safe, permanent storage. Before commencing full-scale operations, the hub will be the subject of an extensive environmental impact statement (EIS) conducted by DOE in compliance with the National Environmental Policy Act (NEPA) and will be fully permitted by the Illinois Environmental Protection Agency to assure its safety and the opportunity for community input.

As it will be a first-of-its-kind facility, the CO₂ storage hub is expected to be the focus of global attention. Researchers and visitors from around the world will visit to learn about its operations so that they replicate those lessons learned elsewhere. The hub will include a visitors' center as well as research and training facilities in support of its mission. For the local community that hosts the storage hub, additional economic development can be expected as a result.

The first source of CO₂ that will be stored at the hub will originate from a power plant in Meredosia, Illinois. This power plant will be repowered (*i.e.*, upgraded) with advanced oxy-combustion technology that will allow the capture of its CO₂. The CO₂ will then be transported to the storage hub using safe, proven pipeline technology.

The hub will be designed to accept and store a minimum of 1.3 million metric tons (MMT) of CO₂ per year, initially supplied by the Meredosia plant for at least 30 years. The hub will also be designed to provide the opportunity for future acceptance of CO₂ from other large industrial sources. Therefore, the minimum capacity of the hub will be 39 MMT (*i.e.*, 1.3 MMT over 30 years) with the potential for future expansion.

Initially, and contingent upon favorable environmental studies and regulatory approvals, the storage hub will be permitted to accept up to 100 MMT of CO₂. This will allow the storage of the minimum volume of CO₂ from the Meredosia plant (39 MMT over 30 years), the ability to store any additional CO₂ produced by the Meredosia plant, and the ability to store CO₂ produced by a limited number of other sources. Subject to further environmental studies, future regulatory approvals, and stakeholder acceptance, the storage hub could be expanded to accept up to 500 MMT of CO₂.

The CO₂ will be stored in a geologic formation called the Mount Simon sandstone formation, which is well-known for its depth, CO₂ storage capacity, and thick overlying rock seals that will contain the CO₂. However, not all parts of the Mount Simon are suitable for storage so the selected CO₂ storage site must be in a location that is technically appropriate.

The practices used to store the CO₂ will have many similarities to the safe storage of natural gas, which occurs on a large scale in Illinois. In order to provide a full accounting of the stored CO₂ and confirm the permanence of the stored CO₂ within the geologic formation, the FGA will execute a monitoring, verification, and accounting (MVA) program during a multi-year demonstration program co-funded by DOE.

Site Selection Process and Schedule

The FGA will evaluate possible sites for the CO₂ storage hub during the fall of 2010, and expects to announce a site in early in 2011. The FGA will then conduct extensive technical and environmental studies to assure the site's safety and suitability.

In late October 2010, the FGA will issue a Request for Proposals (RFP). Offerors may be local, state, or other government agencies or private parties or organizations. The FGA is not seeking site developers or operators at this time.

Offerors will be required to submit complete proposals in approximately three weeks (mid-November). Because of the short response time available, it is strongly recommended that prospective site offerors begin now to form proposal teams and acquire the resources needed to provide the data and documentation that will be required for the site selection process. Information regarding the site selection criteria to be used and the data and documentation requirements is provided below. Additional reference material that will assist in proposal preparation will be posted on the FGA website (<http://www.futuregenalliance.org>) as it becomes available.

The FGA will provide an opportunity for prospective offerors to submit questions regarding the RFP. At least one public meeting will also be held to explain the process and accept comments. The date for such a meeting will be set as soon as possible and will be posted on the FGA website.

The FGA will use the proposals submitted to evaluate each of the offered sites, and, as appropriate, will conduct site visits and perform other due diligence activities in December 2010. Offerors should be prepared to respond to questions and support due diligence during this time.

Following the announcement of a site in early 2011, the FGA will prepare and submit to DOE detailed environmental and technical information regarding the site to support DOE's preparation of an EIS on FutureGen 2.0 in accordance with NEPA. The development of this information will require continued close coordination with and data collection efforts with the site offeror. The NEPA process is expected to take at least one year.

Site Selection Criteria

The CO₂ storage site must encompass the necessary surface area for an injection well and related infrastructure as well as the visitor, research, and training facilities. While the site must be able to meet a set of minimum technical requirements (Qualifying Criteria), the FGA's site selection decision will also consider other factors such as the protection of environmental resources and human health and safety, potential for expansion, cost minimization, and the ability to meet an aggressive design and construction schedule (Scoring and Best Value Assessment Criteria). The FGA expects that the selected site offeror will facilitate transfer of ownership (*i.e.*, title) of all necessary surface and subsurface rights associated with the site to the FGA on reasonable terms.

Site offerors' proposals, coupled with the results of the FGA's due diligence, will be evaluated against Qualifying and Scoring Criteria. Offerors will also be asked to provide information regarding any cost contributions and risk considerations, which the FGA will consider in its decision making. Local community support for the CO₂ storage site will be a critical factor in the FGA's site selection.

Qualifying Criteria

In general, all sites must be able to demonstrate the following:

- The Mount Simon sandstone geologic formation is available at the site.
- The proposed injection formation is capable of storing a minimum of 39 MMT of CO₂ and have permeabilities sufficient to support injection. Although the areal extent of subsurface storage will differ from location to location and can only be confirmed with site-specific evaluation, prior work in the Mount Simon formation in Mattoon, Illinois suggests that a 39 MMT CO₂ plume would require approximately 1,000 acres of subsurface storage rights. *[Note: This is the minimum required size, and sites that can provide significantly greater subsurface storage rights to accommodate the storage of CO₂ from multiple sources will be preferred. The site specific geologic conditions will govern the actual requirement for subsurface storage rights.]*
- The proposed injection formation has –
 - Total dissolved solids greater than 10,000 milligrams/liter (*i.e.*, the formation may not be a current or potential underground source of drinking water by U.S. Environmental Protection Agency (EPA) standards);
 - A primary seal (caprock) capable of long-term containment of the injected CO₂. The primary seal must be at least 20 feet thick, be regionally extensive, and not be intersected by any faults;
 - A depth greater than 3,500 feet at the upper boundary of the Mount Simon formation to help ensure the safe, effective storage of the CO₂.

[Note: Much of the Mount Simon formation has the above characteristics, but not all of these qualifying criteria can be met in some parts of the formation.]

- Site offerors are able to identify the owners (titleholders) and provide supporting documentation demonstrating ownership for (1) the subsurface area required for the anticipated 39 MMT CO₂ plume (pore space) and (2) the subsurface water, mineral and other resource rights within, immediately adjacent to, and below the anticipated 39 MMT CO₂ plume. The FGA must be able to obtain the subsurface rights for the pore space. In addition, the FGA must also be able to obtain a waiver of all subsurface water, mineral, and other resource rights within, immediately adjacent to, and below the anticipated 39 MMT CO₂ plume or be able to obtain those rights. This is to ensure that natural gas, water, minerals, or other resources cannot be withdrawn from formations underlying the primary seal and anticipated CO₂ plume.
- To avoid interstate regulatory compliance issues, the anticipated CO₂ plume will be located entirely within the State of Illinois with no risk of subsurface migration of CO₂ beyond the Illinois state line.
- Unless the owner (*e.g.*, the State of Illinois or federal land management agency) provides unequivocal permission for such use, the land above the anticipated 39 MMT CO₂ plume

(i.e., approximately 1,000 acres) will not be on a public access area (a state or national park or preserve, national monument, national lakeshore, national wildlife refuge, designated wilderness area, designated wild and scenic river, or a study area for any of the preceding designations). Similarly, the land area above the anticipated plume will not intersect any major surface bodies of water (one that is greater than 150 feet deep or greater than 20 square miles in area) or any large dams, water reservoirs, hazardous materials storage facilities, Class 1 injection wells, or other sensitive features.

- There will be sufficient access to the land surface above the anticipated 39 MMT CO₂ plume to allow the FGA to implement a rigorous MVA program. At least 60 percent of the land above the anticipated CO₂ plume will be physically and legally accessible for the installation of surface and subsurface monitoring equipment (including seismic testing) and monitoring wells. Access restrictions include lakes, rivers, or other bodies of water, public access areas (unless explicit permission is provided), and infrastructure including buildings or other developed property. [*Note: FGA ownership of these surface areas is not required; however, access to and use of these areas for monitoring wells and/or seismic surveys is necessary.*]
- The proposed surface site has at least 25 contiguous acres of land to accommodate one CO₂ injection well and related infrastructure and the visitors' center and research and training facilities. [*Note: This is the acreage estimated for a site requiring one injection well. Depending on the geologic conditions at the site, additional injection wells and additional acreage may be required.*] Site offerors must be able to identify the landowners (titleholders) and provide supporting documentation demonstrating ownership for the surface land area offered. The FGA must be able to obtain title to this land.
- To avoid adverse environmental impacts, the proposed surface site (i.e., the area to be used for the injection well and infrastructure and the visitors' center and research and training facilities) is free of hazardous or radioactive chemical and materials and free of wastes requiring special handling, treatment, or disposal. If zoning restrictions apply, the site is zoned for industrial use or be capable of being rezoned for industrial use. The site is free of structures that are listed on or are eligible for listing on the National Register of Historic Places and free of known cultural or archeological resources, including Traditional Cultural Properties. Except for migratory birds, the site is free of known federally listed threatened or endangered species or critical habitat for such species.
- The elevation of the entire proposed surface site is above the 500-year floodplain to minimize potential adverse impacts as a result of flooding.
- To ensure seismic stability (i.e., that site is not in an earthquake prone area), the proposed surface site has 1) seismic characteristics with a peak ground acceleration less than 30 percent g, with a 2 percent chance of exceedance in 50 years, based on USGS seismic hazard data, or 2) a site-specific seismic analysis demonstrating equivalent ground motion hazard.

Scoring Criteria

Those offered sites that can meet all of the Qualifying Criteria will be compared with one another to identify the site that will be best able to meet the objectives of FutureGen 2.0 at the best value to the FGA. Qualifying sites will be compared against Scoring Criteria, which will be based upon desirable attributes of the CO₂ storage site. The Scoring Criteria will also take into account the FGA's intention to develop a regional CO₂ storage hub and network of CO₂ pipelines to accommodate potential future expansion.

Thus, offered sites that are proximate to the Meredosia plant and other regional CO₂ sources will attain higher scores than those that are less centrally located. Those sites that will be able to store up to 500 MMT of CO₂ will attain higher scores than those with smaller capacities. Capacity in this context refers not only to the subsurface injection formation, but also the ability to obtain the necessary subsurface water, mineral and other resource rights and the necessary surface access for the FGA's MVA program.

The scoring criteria will include the:

- Distance from the Ameren Meredosia plant, which equates to cost and potential right-of-way complexity;
- Proximity to other CO₂ sources;
- Existence of wetlands on the site and along the prospective pipeline routes;
- Extent and availability of existing rights-of-way along prospective pipeline routes;
- Presence of sensitive environmental resources or sensitive receptors (including residences) along prospective pipeline routes;
- Capacity of the proposed injection formation to accept amounts of CO₂ above 39 MMT over the lifetime of the storage hub;
- Geologic properties of the proposed CO₂ storage formation such as injectivity, orientation (slope), thickness, permeability, and porosity;
- Quality of the seal integrity;
- Availability of subsurface rights between the top of the primary seal and the land surface above the anticipated plume;
- Presence of more than one geologic target formation with additional competent seals to contain the CO₂ ;
- Ease with which the FGA will be able to monitor the proposed injection formation and measure and verify the location and movement of stored CO₂ in accordance with EPA's existing and proposed Underground Injection Control and Greenhouse Gas Reporting regulations;
- Presence of cultural or other sensitive resources on the land area above the anticipated CO₂ plume that could preclude seismic evaluation and MVA.

- Risks associated with natural hazards;
- Access to the site, including road access and proximity to major airports to accommodate national and international visitors;
- Extent of the groundwork that will be required at the site before it is suitably graded for construction of the visitors' center and research and training facility;
- Availability and proximity of offsite facilities for use as a visitors' center and/or research and training facility until onsite facilities are operational;
- Ability of the site offeror to obtain or assist the FGA in obtaining the necessary surface and subsurface property rights on behalf of the FGA and on reasonable terms to the FGA; and
- Degree to which the community supports the development of a regional CO₂ storage hub at the site.

Best Value Assessment Criteria

In addition to evaluating the proposed sites against the Qualifying and Scoring Criteria, the FGA will seek additional information from site offerors to aid in the decision making process. Best value assessment criteria will include:

- Cost – sites (including surface and subsurface rights) offered at no or nominal cost to the FGA will be preferred over sites that require the FGA to pay prevailing market prices.
- Availability of data – sites that are better characterized will be preferred due to the inherently lower risk in siting the regional CO₂ storage hub at a well-characterized site.
- Land and subsurface ownership – offerors who are able to demonstrate the highest degree of timely land and subsurface use availability will be preferred.
- Residences or sensitive receptors above the proposed injection formation – proposed formations that involve the fewest residences, and/or sensitive receptors are desired.
- Permitting – the ability to expedite the various permitting processes is highly desirable to the FGA.
- Overall cost and schedule – sites that provide the best opportunity for the FGA and DOE to meet the goals of FutureGen 2.0 within the available funding and in accordance with established schedule requirements (including the associated Ameren Meredosia repowering component of FutureGen 2.0) will be preferred.

Data and Documentation Requirements

Site offerors will be asked to submit proposals to host the regional CO₂ storage site approximately three weeks following the issuance of the FGA's RFP. Mindful of the short response period, the FGA will limit its data and document requests to information that it cannot readily obtain from public sources, including the Illinois State Geologic Survey. However, fulfilling the data and documentation requests contained in the RFP is likely to require a multi-

person team working full-time during the proposal preparation and at least one designated person to serve as the FGA's point of contact for questions or additional data needs through the proposal evaluation process and, for the successful offeror, through the preparation of additional technical and environment assessment work. Additional support is likely to be needed during DOE's NEPA process.

Prospective site offerors are advised to use this guidance to recognize the attributes the FGA is seeking for the regional CO₂ storage site, develop an understanding of proposal requirements, and, if a decision is made to proceed, begin data and documentation collection efforts to meet those requirements. Questions regarding this guidance should be sent to siteinfo@futuregenalliance.org. The FGA will post responses to questions on its website.