

**TEXAS CLEAN ENERGY PROJECT**

**DECISION POINT APPLICATION**

**Section 2: TOPICAL REPORT  
PHASE 1**

**FEBRUARY 2010-OCTOBER 2013**

**August 30, 2013**

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**DOE COOPERATIVE AGREEMENT  
DE-FE0002650**

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# Disclaimer

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# Abstract

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Summit Texas Clean Energy, LLC (STCE) is developing the Texas Clean Energy Project (TCEP or the Project) to be located near Penwell, Texas. The TCEP will include an Integrated Gasification Combined Cycle (IGCC) power plant with a nameplate capacity of 400 megawatts electric (MWe), combined with the production of urea fertilizer and the capture, utilization and storage of carbon dioxide (CO<sub>2</sub>) sold commercially for regional use in enhanced oil recovery (EOR) in the Permian Basin of west Texas.

The TCEP will utilize coal gasification technology to convert Powder River Basin sub-bituminous coal delivered by rail from Wyoming into a synthetic gas (syngas) that will be cleaned and further treated so that at least 90 percent of the overall carbon entering the IGCC facility will be captured. The clean syngas will then be divided into two high-hydrogen (H<sub>2</sub>) concentration streams, one of which will be combusted as a fuel in a combined cycle power block for power generation and the other converted into urea fertilizer for commercial sale. The captured CO<sub>2</sub> will be divided into two streams: one will be used in producing the urea fertilizer and the other will be compressed for transport by pipeline for offsite use in EOR and permanent underground sequestration.

The TCEP was selected by the U.S. Department of Energy (DOE) Office of Fossil Energy (FE) for cost-shared co-funded financial assistance under Round 3 of its Clean Coal Power Initiative (CCPI). A portion of this financial assistance was budgeted and provided for initial development, permitting and design activities. STCE and the DOE executed a Cooperative Agreement dated January 29, 2010, which defined the objectives of the Project for all phases.

During Phase 1, STCE conducted and completed all objectives defined in the initial development, permitting and design portions of the Cooperative Agreement. This topical report summarizes all work associated with the project objectives, and additional work required to complete the financing of the Project. In general, STCE completed project definition, a front-end, engineering and design study (FEED), applied for and received its Record of Decision (ROD) associated with the NEPA requirements summarized in a detailed Environmental Impact Statement. A topical report covering the results of the FEED is the subject of a separate report submitted to the DOE on January 26, 2012. References to the FEED report are contained herein. In August 2013, STCE executed fixed-price turnkey EPC contracts and previously, in December 2011 a long-term O&M agreement, with industry-leading contractors.

Other work completed during Phase 1 includes execution of all commercial input and offtake agreements required for project financing. STCE negotiated long-term agreements for power, CO<sub>2</sub> and urea offtake. A contract for the purchase of coal feedstock from Cloud Peak Energy's Cordero Rojo mine was executed, as well as necessary agreements (supplementing the tariff) with the Union Pacific Railroad (UPRR) for delivery of the coal to the TCEP site. STCE executed firm agreements for natural gas transportation with ONEOK for long-term water supply with a private landowner. In addition, STCE secured

options for critical easements and rights-of-way, completed and updated a transmission study, executed an interconnection agreement and has agreed a target October 31, 2013 financial closing date with debt and conventional and tax equity.

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# Executive Summary

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STCE Texas Clean Energy, LLC (STCE) is developing the Texas Clean Energy Project (TCEP or the Project) to be located near Penwell, Texas. The TCEP will include an Integrated Gasification Combined Cycle (IGCC) power plant with a nameplate capacity of 400 megawatts electric (MWe), combined with the production of urea fertilizer and the capture, utilization and storage of carbon dioxide (CO<sub>2</sub>) sold commercially for regional use in enhanced oil recovery (EOR) in the Permian Basin of west Texas.

This executive summary details the status of progress associated with the statement of project objectives included in the Cooperative Agreement.

STCE completed all necessary objectives for financial closing defined in the Cooperative Agreement for Phase 1. All aspects of Project Definition, Front End Engineering Design (FEED), and Record of Decision (ROD) were completed. STCE also applied for, and executed (and is refreshing) a generation interconnection agreement with the transmission authority. STCE solicited and acquired commitments for equity and debt participation by various entities to position the Project for closing of construction financing.

Further in support of financial closing, STCE completed a variety of other work. All material and necessary offtake agreements, including power, granulated urea, and CO<sub>2</sub>, were executed with capable and financially stable and secure entities. Other byproduct offtake buyers for sulfuric acid, slag, and argon gas were solicited via draft term sheets and extended discussions. These byproducts are minor contributors to the Project's revenue stream, and presale is not considered necessary or desirable for closing of construction financing.

STCE executed firm price, lump sum, turnkey engineering procurement and construction (EPC) contracts for the Project, divided into two blocks: the power block and the chemical block. These contracts are unique and unprecedented in the coal gasification industry. The contracts have strong guarantees and warranties for performance, with substantial penalties for shortfalls in performance and schedule completion.

STCE executed a firm price, lump sum, turnkey operations and maintenance (O&M) contract for the entire Project. This contract also is unprecedented in the industry. The contract includes strong guarantees and warranties for operational performance and maintenance cost.

STCE secured supply of the Project inputs as well, including, water, electricity, land, natural gas and coal. Rail supply of coal was also secured in relation to commitments from Union Pacific Railroad for dedicated rail transport of coal at its

tariff rates. STCE secured commitments from local and state authorities for road access and construction, and easements or options to acquire easements from surrounding landowners.

# 1 Statement of Project Objectives

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The overall objective of the Texas Clean Energy Project is to demonstrate the integration of a commercial electric power generating plant with CO<sub>2</sub> capture, transport and geologic sequestration. The Project will adopt integrated gasification combined cycle (IGCC) power generation and commodity byproduct development, designed with low emission coal technology. Overall performance targets, consistent with Department of Energy (DOE) performance metrics, are as follows:

- Capture and sequester, or put to beneficial use, a minimum of 300,000 tons per year of CO<sub>2</sub> emissions as measured using a thirty day running average;
- Achieve a minimum 50% CO<sub>2</sub> capture efficiency and make progress toward a target CO<sub>2</sub> capture efficiency of 90% in a gas stream containing at least 10% CO<sub>2</sub> by volume; and,
- Make progress toward capture and sequestration goal of less than 10% increase in the cost of electricity (COE) for gasification systems.

Relative to the performance targets above, the Texas Clean Energy Project is targeting the capture of 90% of all CO<sub>2</sub> from the IGCC facility, expected to be a rate of nearly 2,500,000 tons per year, sequestering the captured CO<sub>2</sub> in geologic formations, and requiring extended monitoring, verification, and accounting (MVA) for the sequestered CO<sub>2</sub>. These performance targets were verified during the process simulation portion of the FEED and again in conjunction with the final design basis set forth in the EPC contracts. Performance targets have been incorporated in the EPC contracts as guarantees.

The development, construction and operation of the Texas Clean Energy Project will be conducted in certain agreed phases. The Cooperative Agreement describes the Phase I SOPO as follows:

- 1) The overall objective of **Phase I – Project Definition, Front End Engineering Design (FEED, and Record of Decision (ROD))** – is to refine and make final decisions associated with the technology, schedule, and cost baselines sufficient to reach financial close and enter the design phase. This will be accomplished as follows:
  - a) By developing a detailed project management plan that provides technical, cost and schedule baselines at levels of the Work Breakdown Structure

(WBS) consistent with the structure of this Statement of Project Objectives (SOPO), and that includes management controls and procedures for implementing the Project.

- b) Conducting a FEED study, where approximately 10-15% of the overall Project engineering and design will be completed. During the FEED, all process flow diagrams, preliminary piping, instrumentation, and design diagrams will be completed. This information will provide a top-level description of all major process systems. All major large equipment decisions will be made. Equipment specifications will be written, and inquiries will be made for price and delivery. The remaining work during the FEED would include completion of the performance and emissions summaries for the overall plant, and performing a Level IV cost estimate for the overall plant.
- c) Satisfying the National Environmental Policy Act (NEPA) and accomplishing major permitting efforts, primarily filing for the air and water permits, the two most important environmental permits of the Project. (The Project is planned as a zero liquid discharge facility, so it is possible that no water discharge permit will be required.)
- d) Filing for the generation interconnect request for electrical transmission of the power generated from the Project.
- e) Soliciting equity investors, and acquiring commitments for financing of the entire Project beyond Phase I. If a change in Recipient's ownership structure results, Recipient will provide the Contracting Officer with advance notice of such change and an opportunity to review the new ownership structure.

A summary of the STCE's team's development accomplishment follows. The lists of tasks discussed in subsequent sections are specific to the Cooperative Agreement SOPO. STCE performed many additional tasks outside the Cooperative Agreement scope but necessary nonetheless for project development and financing. A description of each Phase I SOPO task and a summary of the resulting work follows.

## 2 Project Definition & Management Activities

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STCE prepared and implemented a detailed project management plan for the Project. The plan provides for technical, cost, and schedule baselines at levels of the Work Breakdown Structure (WBS) consistent with the structure of the Statement Project Objectives (SOPO) set forth in the Cooperative Agreement. Management controls and procedures for implementing the Project were developed for use throughout Phase I.

The Project Management Plan (PMP) was submitted to the DOE on March 1, 2010, and further revised and submitted on April 15, 2010. The PMP included the following sections:

- Risk Management
- Project Milestones
- Funding and Costing Profile
- Resource-Loaded Schedule
- Project Management Organization
- Roles and Responsibilities
- Key Personnel
- Work Breakdown Structure
- Communications
- Project Monitoring, Change Control, Process Improvement

In order to facilitate normal monthly and quarterly reporting to the DOE, the Project schedule was resource loaded with all anticipated costs for Phase I. STCE implemented procedures for accumulating cost and applying those costs to the monthly schedule. Earned value calculations were performed monthly, and were included in the DOE reports. The earned value calculations included schedule and cost performance indicators such that a high level perspective on progress could be easily ascertained.

STCE implemented a time recording system for accumulating development team manhours expended on the Project. A time recording procedure was developed and presented to all timekeepers. Time sheets were prepared on a weekly basis by each timekeeper and submitted to management personnel for approval. Once approved the time was applied to the SOPO tasks using an approved cost rate for each discipline.

For cost external to STCE, procedures were developed for preparation of inquiries, proposal review and contract execution. Upon submittal of invoices from contractors and vendors, the invoices were reviewed and paid per the terms

of the contracts. The cost was applied to the appropriate SOPO task, and STCE invoiced the DOE for cost share on a monthly basis. In addition, STCE and the DOE cooperated on periodic audits to insure procedures were being followed, and to verify monthly expenditures according to plan.

#### Task (WBS) 101000 Project Management and Planning

The Recipient will employ sound project management principles, including earned value management techniques meeting industry standards, for tracking completion of work, keeping activities on schedule, and controlling costs to remain within the budget. Activities performed under this task will be used to provide oversight and control throughout execution of the project during Phase I.

*As described above, STCE implemented a PMP using earned value management (EVM) techniques to measure progress. Monthly progress using EVM was calculated and submitted in the monthly and quarterly reports to the DOE. In general STCE maintained schedule and budget (after adjustments) for Phase I as evidenced by the EVM calculations and overall completion of work required by the Cooperative Agreement and financing.*

#### Subtask (WBS) 101100 Project Management Plan

The Recipient will implement and manage the Phase I project and report on activities in accordance with the approved Phase I Project Management Plan. The Recipient will update the Phase I Project Management Plan if (1) project management policies and procedures are changed; (2) an adjustment to the project baseline is required; (3) significant changes in scope, methods or approaches are required; or, (4) as otherwise required to ensure that it is the appropriate governing plan for the work required to accomplish the project objectives.

*STCE implemented a Phase I PMP and implemented revisions based on the requirements stated above. A revised PMP was issued to the DOE in April 2010. No additional revisions were made during Phase I.*

#### Subtask (WBS) 101200 Reporting

The Recipient will prepare and submit reports as required in the Financial Assistance Reporting Requirements Checklist and this SOPO. The Recipient will also comply with the American Recovery and Reinvestment Act (Recovery Act) reporting requirements pursuant to the Recovery Act terms and conditions included in this Cooperative Agreement. Sub-award management, communications, outreach, post-completion review, and technology transfer functions will also be performed under this task.

*STCE prepared written monthly, quarterly and ARRA reports, and FEED Topical*

*and Public Design Reports as required by the Cooperative Agreement and participated in audits as directed. In addition, TCEP team members participated in weekly conference calls with the DOE and met and communicated regularly with DOE on an as-needed basis.*

Subtask (WBS) 101300     Technology Baseline

The Recipient will make required decisions about flow sheets, major equipment types, equipment placement, and demonstration configuration.

*STCE made decisions regarding flow sheets, major equipment types, equipment placement, and demonstration configuration. These decisions were made during the FEED, and were reported to the DOE in the FEED Topical Report.*

Sub-subtask (WBS) 101310     Flow Sheet Decisions

The Recipient will analyze all flow sheets for the major processes of the plant, and make final determination of the processes that the final configuration will contain.

*STCE analyzed all flow sheets for the major processes of the plant, and made final determination of the processes that the final configuration will contain. This analysis was completed during FEED, and was reported to the DOE in the FEED Topical Report.*

Sub-subtask (WBS) 101320     Final Demonstration Configuration

The Recipient will perform an analysis and select the final demonstration plant configuration that will be designed to achieve the project objectives. This will be done in conjunction with the pre-FEED Task (WBS) 102000 and will include the overall plant scope of supply.

*STCE analyzed and selected the final demonstration plant configuration that will be designed to achieve the project objectives. This analysis was completed during FEED, and was reported to the DOE in the FEED Topical Report.*

Sub-subtask (WBS) 101330     Major Equipment Selection

The Recipient will make the final decision regarding selection of the major equipment that fits the plant demonstration configuration and achieves the project objectives.

*STCE made the final decision regarding selection of the major equipment that fits the plant demonstration configuration and that achieves the project objectives. The equipment selections were reported to the DOE in the FEED Topical Report. A short summary is listed below.*

### **TCEP Key Systems, Equipment, and Manufacturers**

<b>System</b>	<b>Equipment/Process</b>	<b>Manufacturer</b>
<b>Gasifiers</b>	Siemens SFG-500 gasifier (Qty. 2)	Siemens
<b>Combustion Turbine</b>	Siemens SGT6-PAC 5000F (Qty. 1)	Siemens
<b>Steam Turbine</b>	Siemens SST-900RH (Qty. 1)	Siemens
<b>H<sub>2</sub>S Separation</b>	Rectisol	Linde
<b>CO<sub>2</sub> Separation</b>	Rectisol	Linde
<b>Heat Recovery Steam Generator</b>	Triple Pressure (Qty. 1)	Nooter/Eriksen or equal
<b>Water-Gas Shift</b>	Two-stage Sour Shift	Haldor Topsoe
<b>Sulfur Recovery</b>	Sulfuric Acid Plant	Haldor Topsoe
<b>Ammonia Production</b>	Haber Process	Ammonia Casale
<b>Urea Production</b>	Bosch-Meiser Process	Saipem
<b>CO<sub>2</sub> Compression</b>	Axial and reciprocating	Siemens, Mann or equal

#### Subtask (WBS) 101400 Schedule Baseline

The Recipient will refine the schedule and set the baseline. The Recipient will perform a thorough analysis of the project schedule, taking into account Recovery Act schedule requirements, the final demonstration configuration, and selected major equipment, as well as the expected lead time for the major equipment and the overall project design effort required to finish the engineering of the project. All other aspects of the schedule will be reviewed, including permitting, financing, off-take agreements, and other work, in order to ensure that the schedule is refined with the most up-to-date information. The schedule will be further refined such that cost estimating of the overall project, from a schedule point of view, can be accomplished.

*STCE refined the schedule and set the baseline. A thorough analysis of the schedule was performed on a monthly basis. Cost estimating of the overall Project was also accomplished.*

#### Subtask (WBS) 101500 Cost Baseline

The Recipient will refine the project cost and set the baseline through refinement of the project cost estimate. The Recipient will ensure that the quality of the cost information is suitable for reporting. The cost information will be checked with all major suppliers to ensure the latest vendor cost information is included.

*STCE has continuously refined the project cost to establish a reasonable cost*

*baseline. The cost information was checked with all major suppliers to ensure the latest cost estimate was included.*

*An initial cost estimate was obtained during FEED. The result of the cost estimate was reported to the DOE in the FEED Topical Report.*

*The cost estimate was further refined post-FEED using sensitivity analyses in the economic model. Cost targets were developed. The targets were provided to the EPC and O&M contractors, and concurrence was obtained. The costs were included in the EPC, and O&M contracts, as well as cost estimates performed on the Owner offsite laterals and other project costs, and then updated to reflect current conditions during restructuring of the Chemical Block EPC team. The economic model was updated using these project costs and they were used for financing purposes.*

#### Subtask (WBS) 101600     Technology Cost Data

For the purposes of understanding the cost of the advanced technologies being demonstrated – including, especially, CO<sub>2</sub> capture, delivery, geologic injection, and sequestration MVA – the Recipient shall compile costs (estimated, including percent accuracy, and actual when available) associated with the technology but excluding project management and reporting costs. Technology costs will be recorded as follows:

*STCE provided technology cost estimates or actuals (where available) to the DOE on the basis of the initial EPC contracts, and is refreshing the cost data based on the revised EPC pricing on which the Project will close.*

#### Sub-subtask (WBS) 101610     Task-Related Cost Breakdown

Budgeted and actual costs at the subtask level, rolled up to the task level, phase and total project. Include rationale for deviations from the planned budget.

*STCE reported monthly on budgeted and actual costs at the subtask level, rolled the cost up to the task level, phase and total project. Rationale for any deviation from the planned budget was reported.*

#### Sub-subtask (WBS) 101620     Capital and Operating Cost Breakdown

Budgeted and actual capital costs by major system and subsystem components, capital costs by WBS, and fixed and variable operating costs by categories such as labor, fuel and feedstock, chemicals, and maintenance. Include rationale for deviations from the planned budget.

Project development costs, technology fees, pre-production costs and inventory capital shall be reported. Project development costs include but are not limited

to environmental permitting/characterization costs, legal fees, land costs, and infrastructure improvements such as transmission interconnections, roads and rail lines. Technology fees include prepaid licenses and royalties. Pre-production costs include operator training, equipment checkout and startup costs. Inventory capital includes spare parts, stored feed stocks (fuels and other consumables stored on-site), and first fills of chemicals and catalysts within process plant vessels.

The project finance structure shall be reported, along with costs associated with arranging financing and the cost of interest during construction.

All capital costs shall be reported in current-year dollars on an "as-spent" basis. Costs that are non-depreciable will be specified as such.

*During Phase I, STCE reported on capital and operating cost breakdown as described above. For purposes of reporting on the Project's finance structure, the DOE was granted access to STCE's electronic data room, where a copy of the economic model was loaded and updated frequently. The economic model contained all capital and operating cost breakdown as described above.*

#### Sub-subtask (WBS) 101630      Project Team Cost Breakdown

Budgeted and actual costs by project team member (i.e., prime, subcontractors and major vendors and suppliers). Identify the work (i.e., subtask) associated with the cost. Include rationale for deviations from the planned budget.

At the end of each phase, this data (Sub-subtasks 101610, 101620, and 101630) shall be shared with the DOE Program Manager. The Government will use the data internally as part of its project- and program-related due diligence. Additionally, the data may be used, along with other program cost data, as the basis for Federal systems analyses resulting in public reports. The information published in these reports will be presented in a manner that cannot be connected to a specific firm, project or technology.

*STCE reported on the project team cost breakdown as described above. STCE additionally provided DOE with an Excel version of the project economic model for construction cost purposes and updates it frequently. The economic model contains all capital and operating cost breakdown as described above.*

# 3 FEED

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STCE conducted a FEED study, where approximately 10-15% of the overall project engineering and design was completed. During the FEED, all process flow diagrams, preliminary piping, instrumentation, and design diagrams were completed. This information provided a top-level description of all major process systems. All major large equipment decisions have been made. Equipment specifications have been written, and inquiries have been made for price and delivery. The remaining work during the FEED included completion of the performance and emissions summaries for the overall plant, and Level IV cost estimate for the overall plant. The Operations and Maintenance (O&M) FEED was completed, where a cost estimate and RAM analysis was completed.

STCE submitted a FEED topical report to the DOE on January 26, 2012. The report was a detailed summary of all work completed during FEED. An excerpt of the report follows.

STCE contracted with several engineering and technology companies for specific portions of the TCEP FEED, as follows:

- Gasification Block – Siemens Energy, Inc., through its subsidiary Siemens Fuel Gasification Technology GmbH & Co. KG
- Syngas Block – Linde AG, through its subsidiary Selas Fluid Processing Corporation
- Power Block – Siemens Energy, Inc., through its subsidiary Siemens Power Generation
- Balance of Plant and FEED Coordination – Fluor Corporation
- Operation & Maintenance Support – Siemens Energy, Inc., through its subsidiary Siemens Power Generation

In addition, STCE contracted with the following engineering companies to provide specific engineering and technical consulting services as follows:

- CH2M HILL, Inc. – IGCC and process plant technical consulting and support services; permitting and environmental documentation; engineering and cost estimates for plant laterals (i.e. pipelines and transmission line)
- RW Beck (later acquired by SAIC) – owner's engineering services

One of the first project requirements at the beginning of FEED was to develop a Project Design Basis, which set the codes, standards, plant configuration, inputs and desired products and by-products for moving forward with the engineering and design work. Each of the FEED contractors began its FEED work, developing preliminary engineering data, process descriptions, process flow

diagrams, and preliminary heat and material balances needed for integrating with the other FEED contractors' scopes of work. Once that preliminary information was completed, the Project participants (FEED contractors and engineering and technical service providers) met in Fluor's offices for 16 weeks to conduct process simulations, developing overall TCEP facility configurations and heat and material balances for a range of operating conditions (i.e. maximum power generation, maximum urea production, one gasifier out of service. This FEED information was then disseminated to all of the Project participants for use in their more detailed FEED work.

Preliminary engineering data developed prior to the FEED was used to prepare the initial air permit application. As more detailed information became available during the FEED, it was used to update the emission sources, locations, and inventories as part of an amendment to the air permit application. This same information was used in the development of the draft Environmental Impact Statement.

In February 2011, cost estimates were prepared by the individual FEED contractors using their most recent FEED information. Upon review of the combined TCEP cost estimate, STCE initiated a comprehensive Cost Reduction Team. This team worked for 2 months to identify a wide range of design changes that could result in capital cost reductions for the TCEP facility. Representatives from all of the Project participants worked on the team, and identified over \$150 million in cost savings that could be achieved from key changes in design. Some of the largest cost savings came from changing some materials of construction, changing the water shift reactor configuration, deleting a methanol storage tank, combining two of the CO<sub>2</sub> compressors into one, reducing product storage tank sizes, eliminating the coal crushing system, modifying the coal feeding system to the gasifiers, and eliminating some of the buildings and associated cranes.

Siemens performed Reliability, Availability and Maintainability (RAM) modeling of the entire TCEP facility using inputs from all of the FEED contractors. The results of the RAM analyses were used to make design changes that would enhance plant availability. For example, the RAM analyses showed that adding a second 100%-sized sulfuric acid plant would be a cost-effective change that would provide a significant increase in overall TCEP availability.

FEED work continued as these changes were incorporated into the design. In late June and early July, the FEED contractors completed their work and developed their individual FEED cost estimates to provide an overall cost estimate for moving forward into the Engineering, Procurement and Construction (EPC) phase of the Project.

Engineering work continued to incorporate the approved Cost Reduction Team measures and the reliability enhancement measures as part of the transition from FEED into the EPC phase of the Project. STCE then began its negotiations for two major EPC contracts, with Linde AG for the Chemical Block (with the gasification area provided by Siemens Fuel Gasification Technology and the

utilities and offsites provided by SK Engineering and Construction) and Siemens Energy for the Power Block. During the summer of 2012, STCE initiated discussions with Sinopec Engineering Group (SEG) regarding its potential role as lead EPC contractor for the chemical block, in conjunction with Linde, in part because of the resulting access to Chinese financing. The Sinopec EPC contract was executed in December 2012 subject to a pricing refresh given the extension of time and change in current pricing conditions. Price estimates were revised during the course of negotiations with SEG and Linde regarding the chemical block EPC. Large increases were proposed in pricing for the fixed-price chemical block EPC agreements, due in part to commodities pricing and anticipated labor shortages in West Texas. After the STCE team worked through detailed pricing information with SEG and Linde, revised and substantially lower estimates were developed and included in the financial model and in the chemical block EPC agreement currently being finalized.

The following is a list of tasks identified for FEED in the SOPO. A short description of the Phase I results follows each task.

Task (WBS) 102000      FEED Study

The Recipient will conduct the activities associated with performing a FEED study. The objectives of the FEED study are to complete approximately 10-15% of the overall project engineering design, including processes, major equipment selection, performance and emissions, establish battery limits and set the design basis, and specify major equipment for ordering purposes. The Recipient will also perform a cost estimate. This study will address the IGCC facility, CO<sub>2</sub> capture system, CO<sub>2</sub> compression and delivery/transport systems and will include but not necessarily be limited to the following:

- (a) Overall design, the process concept and how it operates (including process flow diagrams with major equipment items and energy and material balances);
- (b) Process chemistry and engineering concepts;
- (c) Identifying the technology hardware, describing the attributes of the devices or modules or major pieces of equipment; and,
- (d) Principles and engineering or research and development analysis and process data to support the design, and the capital and operating costs for the project.

The Recipient will quantify, as applicable, the following programmatic parameters of interest:

- Number of tons of CO<sub>2</sub> emissions to be avoided;
- Megawatt (MW) equivalent of project facilities integrated with CCS capacity; and,
- Total number of tons of CO<sub>2</sub> captured and stored per year, identified by

year starting with the year of first capture.

*STCE conducted the FEED study and addressed the requirements listed above. The results were reported to the DOE in the FEED Topical Report.*

Subtask (WBS) 102100     Pre-FEED Activities

The Recipient will perform Pre-FEED activities in order to enter the FEED study with a clear scope of options for supply, plant configuration, and equipment selection, and identify potential optimizations that the FEED contractor should analyze during the FEED.

*STCE performed Pre-FEED activities as described above. The Pre-FEED activities formed the basis of the FEED Basis of Design (BOD). A system for identifying potential optimizations was implemented prior to FEED in order to insure an orderly process for addressing optimizations within the FEED schedule and budget.*

Sub-subtask (WBS) 102110     Final Plant Configuration

The Recipient will determine the plant configuration that best supports the overall project objectives. Criteria to include but not necessarily be limited to CO<sub>2</sub> capture percentage, CO<sub>2</sub> compression requirements, market analysis of commodity byproducts, availability of major equipment, etc., will be analyzed in order to arrive at a final plant configuration.

*STCE determined the plant configuration that best supports the overall project objectives as described above. The results were reported to the DOE in the FEED Topical Report.*

Sub-subtask (WBS) 102120     Plant Performance Estimate

The Recipient will estimate and verify project plant/technology performance and emissions. This is the preliminary performance and emissions verification that will be used to set the baseline for the project prior to FEED.

*STCE estimated and verified the plant performance and emissions during the FEED. The performance and emissions were incorporated into the EPC contracts as guarantees with penalties and remedies defined. STCE provided the original EPC contracts to the DOE on CD as well as in the electronic data room, and current draft revisions are available in the DOE data room.*

Sub-subtask (WBS) 102130     Class V Cost Estimate

The Recipient will perform a Class V cost estimate as defined by the Association for the Advancement of Cost Estimating. A Class V estimate is typically

performed in the FEED study in order to determine the cost baseline prior to performing more detailed engineering during the FEED.

*STCE performed a minimum of a Class V cost estimate during FEED. The results of the cost estimate were reported to the DOE in the FEED Topical Report.*

Sub-subtask (WBS) 102140      FEED Study Cost Estimate

The Recipient will develop a FEED Study cost estimate to obtain the cost associated with performing the FEED, including a detailed cost estimate based upon a defined scope of supply, feed stock, schedule, and plant configuration. A calculation of the estimated amount of man-hours to complete the work will also be performed.

*STCE developed a FEED study cost estimate using a defined scope, feedstock, schedule, manhours and plant configuration. STCE provided this to the DOE in the form of a FEED justification package with a detailed bid evaluation dated June 1, 2010.*

Sub-subtask (WBS) 102150      Negotiate FEED Contract

The Recipient will negotiate a final contract for FEED.

*STCE negotiated final contracts for FEED with the following parties and scope;*

**TCEP FEED Contracts**

<b>Vendor</b>	<b>Scope</b>
<b>Fluor</b>	<i>Overall FEED management, designer of utilities and offsites, gasification island, and power block construction.</i>
<b>Siemens</b>	<i>FEED for the power block</i>
<b>Siemens</b>	<i>FEED for the gasifiers</i>
<b>Siemens</b>	<i>FEED for the O&amp;M</i>
<b>Linde</b>	<i>FEED for the chemical island and air separation unit.</i>
<b>CH2M Hill</b>	<i>Owner's Engineer for the FEED</i>

Subtask (WBS) 102200      FEED

The Recipient will complete all engineering and cost estimating activities for the FEED.

*STCE completed all engineering and cost estimating activities for the FEED. The results were reported to the DOE in the FEED Topical Report.*

Sub-subtask (WBS) 102210      Licensor Heat and Material Balances

The Recipient will perform heat and material balances for all major technology licensors respective scopes of supply. Heat and material balances will include all processes, using known input conditions for feed stock, ambient temperature and elevation, and other site ambient conditions. An analytical calculation will be performed using these input conditions to obtain the output conditions from each respective licensor component. This information will then be input to the total plant heat and material balance.

*STCE completed the Licensor Heat and Material Balances as described above. Further, STCE completed all Heat and Material Balances for the entire Project. The results of the heat and material balances were reported to the DOE in the FEED Topical Report.*

Sub-subtask (WBS) 102220      Process Flow Diagrams

The Recipient will develop process flow diagrams for all major and minor processes (i.e., a block-type diagram with flow directions, and in/out conditions at the interface locations for the processes).

*STCE completed the Process Flow Diagrams as described above. The results of the process flow diagrams were reported to the DOE in the FEED Topical Report.*

Sub-subtask (WBS) 102230      Process Flow Simulations

Using the information from the heat and material balances (Sub-subtasks 102210), and the process flow diagrams (Sub-subtask 102220), the Recipient will perform a process simulation for individual processes and the overall project. The purpose of this would be to simulate the behavior of the project using sophisticated engineering computer programs to identify potential design and process issues that then can be resolved prior to detailed design engineering.

*STCE completed the Process Flow Simulations as described above. The results of the process flow simulations were reported to the DOE in the FEED Topical Report.*

Sub-subtask (WBS) 102240      Equipment Specifications

The Recipient will prepare specifications for all major, long-lead components. It is anticipated that the gasifiers, air separation unit (ASU), combustion turbine and generator (CTG), steam turbine and generator (STG), and heat recovery steam generator (HRSG) may be included in the list of long-lead components. A

technical and commercial specification will be prepared that will enable the Recipient to obtain proposals from suppliers of these components.

*STCE completed the Equipment Specifications as described above. The results of the Equipment Specifications were reported to the DOE in the FEED Topical Report.*

Sub-subtask (WBS) 102250      Plant Performance Estimate

The Recipient will perform performance and emission runs using the information from the heat and material balances (Sub-subtasks 102210), process flow diagrams (Sub-subtasks 102220), and results from the process simulation (Sub-subtasks 102230). The Recipient will check the results against earlier performance information, and reconcile any differences.

*STCE completed the Plant Performance Estimate as described above. The results of the plant performance estimate were reported to the DOE in the FEED Topical Report.*

At the end of FEED, the Recipient will perform a Class IV cost estimate, as defined by the Association for the Advancement of Cost Estimating, to obtain a detailed cost estimate based upon a defined scope of supply, feed stock, schedule, and plant configuration. In addition, the Recipient will input all of the information learned during the FEED, including vendor cost and performance, process simulations, delivery schedules, and other important input factors that help in estimating the cost. A calculation of the estimated amount of man-hours to complete the work will also be performed.

*STCE completed the Class IV Cost Estimate as described above. The results of the Class IV Cost estimate were reported to the DOE in the FEED Topical Report.*

# 4 ROD

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The Cooperative Agreement includes a Phase I objective to satisfy the National Environmental Policy Act (NEPA) and accomplishing major permitting efforts, primarily filing for the air permit, the two most important environmental permits of the Project.

STCE obtained a Record of Decision from the DOE and received its air permit from the TCEQ and therefore completed all work required to satisfy these permitting requirements of the Cooperative Agreement. A description of the permitting efforts follows, with a detailed narrative of the work completed, any required mitigation, and a summary of the various permits required for the balance of the operations and maintenance period.

## **Permitting**

Environmental permits and approvals will be required for the construction and operation of the Project. STCE, the DOE, CH2M Hill and SWCA Environmental Consultants, participated in an Environmental Impact Study (EIS). The EIS was prepared to support the request for financial support from the DOE; during this process, regulatory agencies and the affected community had the opportunity to review and provide input on the overall Project. A key permit, the Prevention of Significant Deterioration (PSD) air permit, has been approved. The EIS and the PSD air permit are the environmental permits required to commence construction of the Project. The remaining permits are administrated during execution according to the construction schedule. STCE has prepared a Permit Book to organize and track all of the permits and approvals for the TCEP. The following summarizes the current status of the permits.

### **Key Permits for TCEP Facility**

<b>Permit / Approval</b>	<b>Regulatory Agency</b>	<b>Current Status / Schedule</b>
<b>Prevention of Significant Deterioration (PSD) Construction Air Permit</b>	Texas Commission on Environmental Quality (TCEQ) and US Environmental Protection Agency (EPA)	Permit 92350 PSDTX1218 Approved Dec. 28, 2010
<b>Title V Permit</b>	EPA	Application to be submitted prior to operation.
<b>Acid Rain Permit</b>	EPA	Application to be submitted at least 24 months prior to operation

<b>Community Right-to-Know Act – 112(r) Reporting</b>	EPA	Due initially upon operation and every 5 years thereafter
<b>Community Right-to-Know Act – TRI Reporting</b>	TCEQ	Due annually on July 1 for previous calendar year of operation
<b>Community Right-to-Know Act – Tier II Reporting</b>	Texas Department of State Health Services	Due annually on March 1 for previous calendar year of operation
<b>Aboveground and Underground Fuel Storage Tank (AST and UST) Notifications and Registrations</b>	TCEQ	Ministerial To be submitted during the course of construction
<b>Spill Prevention, Control and Countermeasure (SPCC) Plans for construction and operation</b>	EPA	SPCC Plans to be developed prior to construction and operation, respectively. Do not require submittal or agency approval
<b>Emergency Response Plan</b>	Emergency Responders	To be developed prior to operation in consultation with local emergency response agencies
<b>Class I Injection Well Permit, General Permit / Notice of Intent</b>	TCEQ	For brine disposal. To be submitted at least 60 days prior to construction of injection well
<b>Class I Injection Well Permit, Individual Permit</b>	TCEQ	For alternative disposal of industrial wastewater in lieu of evaporation ponds. If required, application to be submitted at least 12 months prior to construction
<b>Class V Injection Well Permit, Test Well</b>	TCEQ	Received 9/23/11 Authorization No. 5X2700066

<b>Industrial and Hazardous Waste Generation Facility Registration</b>	TCEQ	To be submitted at least 90 days prior to waste generation
<b>Precursor Chemicals/Laboratory Apparatus Business Permit</b>	Texas Department of Public Safety	To be submitted prior to operation
<b>Registration of Public Water System</b>	TCEQ	To be submitted prior to construction of system
<b>Authorization to Construct Onsite Sewage Facility</b>	Ector County and TCEQ	To be submitted at least 30 days prior to construction of sewage facility
<b>Texas Land Application Permit</b>	TCEQ	For disposal of wastewater using evaporation ponds. To be submitted at least 180 days prior to discharge
<b>Texas Pollutant Discharge Elimination System (TPDES) Industrial Wastewater Permit or Multi-Sector General Permit (MSGP)</b>	TCEQ	Project is seeking additional guidance from the regulatory agency to determine which permit is needed (if any).
<b>Construction Stormwater TPDES General Permit</b>	TCEQ	Notice of Intent (NOI) to be submitted at least 7 days prior to construction. General Permit No. TXR150000 issued 2/15/2008, expiration 3/5/2013
<b>General Permit for hydrostatic test water discharge</b>	TCEQ	General Permit TXG670000 General Permit approved April 1, 2010, expires April 5, 2015
<b>Notice of Proposed Construction or Notice of Actual Alteration</b>	Federal Aviation Agency (FAA)	To be submitted at least 90 days prior to construction

### Key Permits for Lateral Corridors

<b>Permit Approval /</b>	<b>For</b>	<b>Regulatory Agency</b>	<b>Status / Schedule</b>
<b>TPDES for Construction / NOI</b>	Transmission Line	TCEQ	General Permit No. TXR150000 issued 2/15/08, expires 3/5/13 NOI to be submitted at least 7 days prior to construction.
<b>Minor Permit to Discharge Hydrostatic Test Water</b>	Natural Gas pipeline	Railroad Commission of Texas (RRC)	To be submitted at least 30 days prior to testing
<b>Organization Report/Operator Number</b>	Natural Gas pipeline	RRC	Operator No. 617094 (ONEOK WestTex)
<b>Permit to Operate Pipeline</b>	Natural Gas pipeline	RRC	To be submitted prior to operation. Requires applying for revisions or an annual certification that no modifications occurred.
<b>Pre-Construction Notification</b>	Natural Gas pipeline	RRC	To be submitted at least 30 days prior to construction
<b>Minor Permit to Discharge Hydrostatic Test Water</b>	CO <sub>2</sub> pipeline	RRC	To be submitted at least 30 days prior to testing
<b>Organization Report/Operator Number</b>	CO <sub>2</sub> pipeline	RRC	To be submitted by pipeline operator once selected. Operator Number typically issued within 5 days of submittal
<b>Permit to Operate Pipeline</b>	CO <sub>2</sub> pipeline	RRC	To be submitted prior to operation. Requires applying for revisions or an annual certification that no modifications occurred.
<b>Pre-Construction Notification</b>	CO <sub>2</sub> pipeline	RRC	To be submitted at least 30 days prior to construction

<b>TPDES Construction / NOI</b>	for CO <sub>2</sub> pipeline	TCEQ	General Permit No. TXR150000 issued 2/15/08, expires 3/5/13 NOI to be submitted at least 7 days prior to construction.
	Process Water Pipeline		Permitting requirements review in progress
<b>TPDES Construction / NOI</b>	for Rail Spur and Loop facility	TCEQ	General Permit No. TXR150000 issued 2/15/08, expires 3/5/13 NOI to be submitted at least 7 days prior to construction.
<b>TPDES Construction / NOI</b>	for Access Roads	TCEQ	General Permit No. TXR150000 issued 2/15/08, expires 3/5/13 NOI to be submitted at least 7 days prior to construction.

### **Environmental Impact Statement**

An Environmental Impact Statement (EIS) was conducted to support the Department of Energy's decision on whether to continue to provide funding for the TCEP. The Final EIS, dated August 2011, provides detailed information on the areas of the Project with potential environmental and social impacts, including air quality and greenhouse gas emissions; climate; soils, geology, and mineral resources; ground water; surface water, floodplains and wetlands; biological resources; aesthetics; cultural resources; land use; socioeconomics and community services; environmental justice; utility services; transportation; materials and waste management; human health, safety, and accidents; and noise and vibration (as listed in the DOE Record of Decision). Research and drafting of the EIS involved extensive consultation with regulatory agencies and the public. The agencies consulted were:

- U.S. Department of the Interior, Regional Environmental Office
- EPA, Region 6, Regional Environmental Review Coordinator, Office of Planning and Coordination
- TCEQ, Region 7, Midland
- U.S. Army Corps of Engineers, Fort Worth District
- U.S. Fish and Wildlife Service (USFWS), Austin Ecological Services Field Office
- U.S. Department of Transportation, Federal Highway Administration

- TxDOT, Office of Planning and Development
- Texas State Historic Preservation Officer (SHPO), Texas Historical Commission
- Texas Parks and Wildlife Department (TPWD), Wildlife Habitat Assessment Program

The responses to comments from the consultations are included in the Final EIS, which is available at the following URL:

[http://www.netl.doe.gov/technologies/coalpower/cctc/EIS/final\\_eis\\_texas\\_clean\\_energy.html](http://www.netl.doe.gov/technologies/coalpower/cctc/EIS/final_eis_texas_clean_energy.html).

The DOE conducted an intensive cultural resources survey for the Poly-Gen facility location, including archeological and historical resources, for submittal to the Texas Historical Commission per Section 106 of the National Historic Preservation Act. The report was submitted September 3, 2010, and a response was received on October 14, 2010, in the form of a stamp on the cover letter that reads “no historic properties affected, project may proceed.” The cultural resource survey included a reconnaissance-level study of the lateral corridors and recommended that a survey plan be developed that targets only high probability areas, to enable the intensity of effort to be increased or decreased based on the presence of disturbances or unfavorable settings for archeological sites. For example, where linear facilities parallel roadways or are co-located with utilities, survey efforts could be reduced.

The EIS discusses mitigation methods of the Project’s potential environmental impacts and recognizes that regulatory agencies will impose conditions within their permits and approvals, as jurisdictions allow. As additional permits are obtained, STCE will incorporate the conditions and limits on the Project. Since a handful of the final design specifications had not been determined before the DOE decision, the DOE has put boundaries or requirements on the remaining design steps and decisions still needing to be taken. The DOE mitigation measures will be conditions for continued DOE funding. A Mitigation Action Plan (MAP) will be required; the MAP will be available for public review on the DOE and NETL websites.

The following is a summary of the DOE mitigation measures:

1. The first mitigation measure requires the capture of at least 90 percent of the carbon in the fossil fuels when operating under normal conditions, and best efforts to achieve at least 90 percent capture during the demonstration period. STCE has worked with the Texas Bureau of Economic Geology to develop a monitoring, verification and accounting (MVA) plan for the CO<sub>2</sub> sequestered through EOR. The existing offtake agreements with the CO<sub>2</sub> buyers require compliance with TCEP's MVA plan.
2. Many EIS commenters were concerned with the availability of water for the Project, and the discharge of wastewater from the Project to Monahans Draw. STCE has executed a long-term purchase agreement for water with a nearby landowner. The DOE mitigation measures 3 through 7 address water and wastewater issues:
  - a. The Fort Stockton Holdings waterline is not to be used as a primary water supply for TCEP. If constructed, it may be used as backup.
  - b. STCE is not to enter into contracts whereby wastewater discharge into Monahans Draw would increase by more than 0.75 million gallons per day (gpd, annual average), and 6 million gpd (daily maximum).
  - c. The power island is to be designed with dry cooling towers. If this is found to be technically infeasible, then a hybrid cooling system (or a wet cooling assist) may be used. A wet cooling system can be used for the chemical plant portion of the TCEP.
  - d. If TCEP uses solar evaporation ponds, a plan must be implemented for bird deterrence, monitoring and reporting, including installation of bird deterrent netting.
  - e. If a desalination facility is constructed and desalination reject water is disposed by deep well injection, monitoring will be required. Mitigation measure 7 provides details to be included in a monitoring plan.
3. Mitigation measures 8 and 9 address biological resources and habitat. The first states that field surveys are to be done to protect wetlands, waterways, playa lakes, rare species and critical habitat, and will be specified in the MAP. The DOE requires that STCE consult with the US Fish and Wildlife Service (USFWS) and the Texas Parks and Wildlife Department (TPWD). The next mitigation measure addresses protection of species covered by the Migratory Bird Treaty Act. Ground disturbing

activities in the area of potential breeding habitat are to be avoided from March 1 through July 31. If avoidance is not practicable, the measure outlines diligence to be conducted by a qualified biologist to minimize impacts. STCE is to consider the use of protection measures such as line spacing, perch guards, and insulated jumper wires.

4. The next mitigation measure addresses cultural resources and defers to the State Historic Preservation Office (SHPO). The linear facility routes are to be surveyed for archeological and paleontological resources prior to ground disturbance.
5. The next mitigation measure is for minimizing disturbance to streambeds during construction of the pipelines, and encourages directional drilling. The measure discusses methods to minimize impacts and restore the areas in case trenching is required.
6. Revegetation with native species, erosion control, habitat improvement and other techniques are discussed for the restoration of disturbed areas.
7. Annual reports that document the operations and air emissions from the TCEP are to be submitted to DOE.
8. DOE recommends that STCE choose paint color for exterior surfaces that blends into the landscape, unless regulations, safety, service or material type require other colors or no paint.

Additional mitigation measures are also incorporated in the EIS. The following is a summary of these measures:

1. Air Emissions: Methods to minimize dust emissions during construction, and the air pollution control measures to be incorporated into design and operation. Air pollution control is discussed further in the Air Permit section.
2. Geology and Soils: Construction methods to reduce erosion, runoff and stormwater pollution, and to promote groundwater recharge, are discussed. During operation, stormwater pollution prevention and spill control plans will be implemented.
3. Ground and Surface Water Resources: Dust, stormwater pollution prevention, and permits for construction of linear facilities and water crossings are to be followed.
4. Floodplains: During construction and operation, STCE would implement a stormwater pollution prevention plan to minimize impacts to any downstream floodplains.

5. Wetlands: A Combined Wetland Permit Application would be submitted for disturbance of wetlands. A letter by CH2M Hill dated August 18, 2011, states the Project's intent to comply with Nationwide Permit 12 Utility Line Activities (NWP 12) and lists the two water pipelines as the facilities that will require this permit. The two water lines (from the City of Midland Wastewater Treatment Plant to the Gulf Coast Waste Disposal Authority and then to the Poly-Gen plant) are no longer part of the Project, so this mitigation measure is not currently applicable.

The final EIS provided an analysis of the No Action Alternative, under which DOE would not provide financial assistance to the Project (which assumes that, without federal financial assistance, the Project would not be constructed). After analyzing the No Action Alternative, the EIS concludes that DOE's preferred alternative is: "to provide financial assistance to STCE's proposed project."

The Final EIS satisfies the requirements under NEPA for the federal action of providing funding for the Project.

Following the issuance of the ROD, STCE, the DOE, CH2M Hill, and SWCA initiated work to determine if a supplemental analysis is required after financial closing. This work entails studying the water, power, natural gas, and CO<sub>2</sub> laterals, now that a specific routing and landowner easements have been identified. The supplemental work also includes analysis of potential alternate water supply for the Project.

This analysis continues, and is expected to take several more weeks. If a supplemental analysis is required, the work will be conducted after financial closing. The work will result in a supplement to the ROD.

### **Floodplains**

The DOE Record of Decision (ROD) states that at the TCEP site and along access roads, no surface water resources, floodplains, or wetlands are present. The 20-mile water line pipeline is to be surveyed for wetlands, although none are anticipated.

### **Environmental Site Conditions**

A description of the environmental setting of the Poly-Gen site is included in the EIS and references Horizon Environmental Services, which performed a Phase I environmental site assessment on the proposed polygen plant site in April 2006. The predominant land uses in the area are oil and gas development and ranching activities. The property was donated to STCE by the Odessa Chamber of Commerce in April 2010, although there remain several utility, oil and gas company lease easements for access to subsurface oil and gas resources. One oil well and one gas well remain active (as written in the August 2011 EIS). Other existing structures on the site are gravel roads, abandoned oil- and gas-

related structures, and overhead electricity distribution lines. Crude oil pipeline, natural gas pipeline and condensate pipeline systems are present. No other structures or improvements are known to have historically occurred at the site. The EIS further states that there are no hazardous or radioactive materials, chemicals, or wastes that would be subject to regulation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), or the Nuclear Regulatory Commission.

The EIS states that given the widespread and historic use of land on the polygen plant site and in most of the linear facilities for petroleum and gas production, it is possible that oil or chemical leaks have occurred on the site or in the corridors.

### **Air Permit**

The Application for a TCEQ Air Quality Permit is dated April 2010, and the Permit, referred to as 92350 and PSDTX1218, was approved on December 28, 2010. The permit is in effect for 10 years from the approval date, but can be void under the following circumstances (all of which TCEP has avoided, to date):

- Failure to begin construction within 18 months of the date of issuance
- Discontinuance of construction for more than 18 months prior to completion, or
- Failure to complete construction within a reasonable time.

Once the Poly-Gen facility is operational, STCE will apply for a Title V Permit, which would encompass the conditions in the 92350 and PSDTX1218 permit as well as any other requirements under the Clean Air Act that are relevant to the facility, such as the Acid Rain permit.

The air permit organizes the emission standards and operating requirements into the following categories:

### **Fuel Specifications**

This section discusses the sulfur content limits of the syngas, natural gas and diesel fuel, and the equipment in which each fuel is authorized for use. Fuel consumption is to be monitored to within 5 percent accuracy, and the permit holder shall supply fuel samples upon request of the TCEQ or any air pollution control program having jurisdiction.

### **Combustion Equipment**

This section discusses the performance standards of the combustion turbine and duct burners; the standards are in parts per million (ppm) as shown on the following table.

## **Environmental Performance Standards of the CTGs and Duct Burners**

Pollutant	Performance Standard (ppm)	Compliance Averaging Period
NOx	15.0	1-hour average
	2.5	30-day rolling average when firing natural gas
	3.5	30-day rolling average when firing syngas
CO	25.0	1-hour average
	10.0	12-month rolling average
NH3	10.0	1-hour average

Maintenance, start-up and shutdown (MSS) are provided hourly mass emission rates in lieu of ppm.

Emission limits are provided on a table referred to as the Maximum Allowable Emission Rates Table (MAERT) that is a key part of the permit. In addition to the limits in MAERT, the following restrictions apply:

**Emissions Rates and Other Limits for Certain Regulated Equipment**

Equipment	Maximum MMBtu/hr	Emission rates	Other limits
Duct burners	814	Combined with combustion turbines (above)	
Auxiliary boiler	250	CO = 50.0 ppmvd @ 3% O <sub>2</sub> (3-hour average) NOx = 0.017 lb/MMBtu	500 hours per year
Coal mill dryers (2)	255 (combined)	0.03 lb/MMBtu (each)	
Sulfuric acid plant start-up burners	25		500 hours per year
350 hp emergency fire water pump	-	-	52 non-emergency hours daytime only
Emergency generators (2)	-	-	52 non-emergency hours (each), daytime only
<b>Opacity from all of the above sources shall not exceed 5 percent averaged over a 6 minute period, except during MSS, during which time opacity shall not exceed 15</b>			

**percent averaged over a 6 minute period.**

<b>Flares</b>	Following commissioning, the flowrate to the flares from both gasifiers shall not exceed 14,120,546 standard cubic feet (scf) per hour and 2,542 million scf per 12-month rolling period.
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**Cooling Tower**

The water in the cooling tower has a limit of 6,000 total dissolved solids (TDS) concentration as well as emission rate in the MAERT. The permit describes two options for demonstrating compliance with these limits.

**Tanks**

The diesel tank throughput is limited to 6,600 gallons per 12-month period, and the solvent tank throughput is limited to 761,430 gallons of methanol per 12-month period. Emission limits for the tanks are also included in the MAERT.

### **Fugitive Emission Control**

The permit describes monitoring procedures for the detection of fugitive emissions from piping, valves, pumps and compressors that contain ammonia, hydrogen sulfide, or carbonyl sulfide. No non-fugitive emissions from this equipment are authorized.

### **Material Handling**

The amount of coal received at the facility is limited to 2,114,195 tons per year, except for initial coal pile buildup. Other particle control practices to be followed include paving roads with a hard surface than can be cleaned; fully enclosing conveyors and material transfer points; and not allowing fugitive emissions to cause off-property visible emissions. The permit describes monitoring and reporting procedures for visible emissions.

Material storage area footprints, for the active and inactive coal storage piles, and the slag storage piles, are limited to acres in the permit. The coal crusher building, coal transfer tower, gasifier feed silos, urea transfer towers, urea storage building and the urea rail loading station are all to be equipped with baghouses.

### **Syngas Cleanup System**

The permit requires that the syngas cleanup system use either activated carbon beds or alumina catalyst to remove mercury.

### **Sulfuric Acid Plant**

The tailgas from the condenser section of the sulfuric acid plant is to be routed to the Tail Gas Treatment Unit to achieve the following limits, except during periods of MSS:

- 0.26 lb H<sub>2</sub>SO<sub>4</sub>/ton of H<sub>2</sub>SO<sub>4</sub> produced.
- 10 ppmvd SO<sub>2</sub> in the flue gas.

### **Urea Plant**

The permit requires the urea granular vent to use a wet scrubber to achieve the following limits, except during periods of MSS:

- Particulate emission concentration of 0.012 gr/dscf.
- Ammonia emissions concentration of 20 mg/m<sup>3</sup>.

Ammonia emissions from the low pressure absorber vent are to be controlled to an outlet NH<sub>3</sub> concentration not to exceed 0.4 mole percent, except during MSS. Other permit requirements address monitoring the scrubber liquid flow rate, calibration of the monitoring device, and keeping records.

### **Routine Maintenance, Startup and Shutdown (MSS)**

The permit describes the activities that are or are not allowable during planned maintenance. The following descriptions and limitations are included regarding MSS:

- For the combustion turbine, startup events are limited to six hours for a cold startup and three for a warm startup. A cold startup follows at least a 24-hour period when the combustion turbine has not received fuel, or the steam temperature is less than 400 degrees F. Shutdown events are limited to one hour.
- For the auxiliary boiler, startup events are limited to six hours and shutdown events are limited to two hours.
- For all other combustion sources, startup and shutdown events are limited to one hour and are authorized provided they do not exceed the emission rates specified in the MAERT.
- Only one gasifier is permitted to emit emissions related to MSS at a time. During planned MSS, emissions shall be routed either through the syngas cleanup system, if downstream equipment is operational and available to process the syngas, or gasifier MSS emissions shall be routed to the flares.

Unshifted syngas may be fired in the combustion turbine for a maximum of 360 hour per year, including during catalyst change-out in the Sour Shift Unit.

CO<sub>2</sub> Compressor Bypass venting shall be minimized and tracked.

The permit describes procedures for demonstrating compliance with the emission limits for planned MSS activities, for both Inherently Low Emitting (ILE) planned MSS activities and non-ILE planned MSS activities.

The permit describes the procedures for the initial determination of compliance followed by continuous determination of compliance. Details include continuous emission monitoring system (CEMS) requirements on various equipment, accuracy testing, and stack testing requirements. Recordkeeping, reporting, and requirements to submit as-built plans to the TCEQ comprise the remainder of the Air Permit.

In order to maintain the validity of the air permit requirement to begin construction within 18 months of the date of issuance, STCE installed a permanent foundation at the site. A permanent foundation pad for the emergency diesel generator was installed in June 2012. The location of the pad corresponded to the location of the equipment on the plot plan and general arrangement drawings prepared during FEED. Although this work was completed outside of the scope of the

Cooperative Agreement, STCE ensured that its subcontractor complied with Davis-Bacon wage rate requirements.

STCE consulted with environmental legal counsel to insure all requirements of construction notification to the TCEQ were followed. The TCEQ was notified after completion of the work. STCE will continue to maintain contact with the TCEQ to insure continuing construction notifications are provided.

## 5 Other Phase I Work

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A description of the remaining tasks in the SOPO is provided below with a summary of STCE's efforts to complete them during Phase I.

### Subtask (WBS) 103000 Site Plan

The Recipient will prepare site plan and general arrangement drawings that depict the project from a top view, including the entire plant site, location of roads, bridges, interface points, and major equipment.

*STCE prepared a site plan and general arrangement drawing during FEED. The site plan is included in the EPC and O&M agreements and has been provided to DOE in the electronic data room and on CD.*

### Subtask (WBS) 103100 Architectural Plans and Elevations

The Recipient will prepare site architectural plans and elevation drawings that depict the project from top and side views, including the entire plant site, and major buildings and equipment.

*STCE prepared site architectural plans for all major buildings during FEED. The architectural plans are included in the EPC and O&M agreements and have been provided to DOE in the electronic data room and on CD.*

### Task (WBS) 104000 Site Investigation

The Recipient will conduct work associated with determining the actual condition of soils, topography, underground conditions, wildlife, water resources, and other natural occurring resources within the project boundary.

*STCE completed this work as indicated in Section 4 above.*

### Subtask (WBS) 104100 Site Survey

The Recipient will perform a formal site survey to determine lot size and boundary location, as well as a topographical survey to determine elevations. Biological surveys will also be performed.

*STCE completed this work as indicated in Section 4 above. STCE also completed a detailed survey of the site to facilitate FEED work related to the plot plan, general arrangement and geotechnical work. These are attached to the EPC agreements as exhibits and have been provided to DOE.*

Subtask (WBS) 104200     Geotechnical Work

The Recipient will prepare a detailed geotechnical survey specification that will be used to obtain underground rock samples, and report findings to determine the required foundations of the major equipment. The Recipient will prepare a bid package, send out inquiries, obtain bids, and negotiate a contract for the geotechnical work. The Recipient will obtain geotechnical samples and perform an analysis of the underground soils and issue a report with findings.

*STCE contracted with Hamilton Engineering who completed geotechnical work on the site and issued a report dated July 1, 2011. The report was shared with the FEED contractors who used the report as the basis for the foundation design and cost estimate. The report is attached to the EPC agreements as an exhibit and has been made available to the DOE.*

Task (WBS) 105000     Transmission Interconnect

The Recipient will conduct all activities required to apply for a transmission interconnect agreement.

*A Standard Generator Interconnection Agreement (SGIA) was executed on September 4, 2012 by STCE and Oncor Electric Delivery Company LLC (Oncor, or the TSP).*

*Transmission service is provided through the ERCOT transmission tariff.*

*A summary of key points of the agreement follows.*

**Operation of the Project**

- 1. The Generator will procure, install, maintain and operate power system stabilizers if required to meet ERCOT Requirements.*
- 2. ERCOT requires the Generator to provide a power factor at the Point of Interconnection of 0.95 leading to 0.95 lagging.*
- 3. The Generator is responsible for the proper synchronization of the Project to the TSP System*
- 4. ERCOT is the Control Area operator in accordance with ERCOT Protocols and has all authority as the Control Area Operator.*

5. *Service Interruption is provided for by PUCT Rules and the Generator will promptly disconnect the Project from the TSP transmission system when so directed.*
6. *Switching will be done in accordance with Good Utility Practice and ERCOT Requirements. Any special switching requirements that have special application to the Plant shall be addressed in Exhibit "C".*
7. *If the Project is capable of blackstart operations, Generator will coordinate start-up procedures consistent with ERCOT Requirements. Generator is not required to have blackstart capability. If the Generator has blackstart capability, it will interface with the TSP during blackstart conditions.*
8. *The parties will maintain their systems in accordance with Good Utility Practice, National Electrical Safety Code, ERCOT Requirements, PUCT Rules and all applicable laws. Each party will provide necessary equipment outages to allow the other party to perform periodic maintenance, repair or replacement of its facilities. Such outages will be at mutually agreeable times. No changes are permitted in the normal operation of the Point of Interconnection without the mutual agreement of the parties except as provided in the Agreement. All testing of the Project that affects the operation of the Point of Interconnection shall be coordinated between the TSP, the Control Area(s) in which the Project and the TSP are located, and the Generator and will be conducted in accordance with ERCOT Requirements.*

#### **Metering and Communications**

*TSP shall own, operate, inspect, test, calibrate, and maintain 138 kV metering accuracy potential and current transformers and associated metering and telemetry equipment (including an RTU) located in the TIF. TSP will connect its ERCOT-polled settlement (EPS) primary meters to its RTU via a communications link. The Generator may be provided EPS data for its own informational use only. The TSP makes no guarantee for the quality or availability of this data.*

*For the provision of data to the Qualified Scheduling Entity of the Generator, the Generator will install, own, operate, inspect, test, calibrate, and maintain the potential and current transformers and associated metering and telemetry equipment in accordance with Good Utility Practice and ERCOT Requirements.*

*The Generator will provide the same services and care to provide metered and telemetry data for all electrical parameters of the Project and GIF designated in SCADA Table 2 in Exhibit "C" of the SGIA, to the TSP, at a location designated by the TSP.*

*The Generator will provide communications facilities that are or may be necessary for effective interconnected operation of the Project with the transmission system. The Generator will bear the procurement and installation costs of these items:*

- *One private line voice circuit (an off-premise extension of TSP's PBX) in the Control Center. The handset for this voice line will be located in the Generator Control Center for ready access to TSP's Control Center to Control the voltage of the Plant.*
- *One four-wire Bell Standard Type 420, or equivalent data circuit installed from a DNP 3.0 or VanCom/Alert protocol communication port in Generator's RTU (or other equipment acceptable to Oncor) to a location designated by TSP.*
- *One dedicated telephone demarcation, acceptable to TSP, for TSP's use at the Penwell Switching Station. The location will be designated by TSP and shall include, but not be limited to two private line voice circuits, and one four-wire Bell Standard Type 420, or equivalent data circuit.*

### **Point of Interconnection**

*The Point of Interconnection is located in Ector County, Texas, at the Penwell Switching Station which will have been constructed to sectionalize Oncor's Moss Switch – Permian Basin 138 kV transmission line. The specific Point is where Oncor's 138 kV conductors connect to Generator's 138 kV jumpers on Generator's dead-end structure located adjacent to Penwell Switching Station located 6.8 miles west for Oncor's Moss Switching Station.*

### **Interconnection Facilities**

#### **Generator**

*The GIF consist of one mile of single circuit from the Project Switchyard to the Generator's self-supporting/unguyed steel or concrete dead-end structure, located adjacent to the Penwell Switching Station. The transmission line will include multi-fiber 1300nm single mode fibers for SCADA communications and primary and secondary line relaying.*

*In ERCOT, the Project Switchyard and all equipment in the switchyard are GIF.*

#### **Transmission Service Provider**

##### **A. Penwell Switching Station**

- 1. A three breaker ring bus configured to transition in the future to a breaker-and a-half layout;*
- 2. Three, 138 kV, 3200 Amp, 50 KA Circuit breakers;*
- 3. Ten air break switches, 138 kV, 3200 Amp, gang operated, 3 phase;*
- 4. Three metering CTs, and three metering PTs with dual secondary windings;*
- 5. Six CCVT's, 138 kV dual secondary windings or relaying with carrier coupling;*
- 6. Two line traps, 138 kV, 3000 Amps with tuners;*
- 7. Nine surge arrestors, 138 kV;*
- 8. Structures, dead-ends, switch stands, etc;*
- 9. Supervisory equipment, digital fault recorder;*
- 10. Control house with emergency generator to back-up the two 125 VDC battery set;*
- 11. Connectors, buswork, fencing and etc;*
- 12. Relaying Equipment; and*
- 13. Add a single span (125 feet) of 1590 kcmil conductor to connect to the Gen-tieline.*

##### **B. Moss – Permian Basin 138 kV Transmission Line**

- 1. Rebuild 6.8 miles of from Penwell to Moss Switching Station with 959 ACSS conductor and terminate on a new dead-end structure in Penwell; and*
- 2. Remove on tangent structure on the line to Moss outside Penwell and terminate the existing structure on a new dead-end structure, use the existing conductor.*

##### **C. Moss Switchyard**

1. Add transfer trip carrier equipment to the Permian Basin 138 kV transmission line
    - a. Line Tuner and tuning pack; and,
    - b. Transfer Trip Receiver Panel
  2. Meet 2000 Ampacity duty level for bus work, two disconnect switches, jumpers, and line breaker. Replace one circuit breaker with inadequate fault duty.
    - a. Two circuit breakers, 3200 Amps, 63 kA
    - b. Two air break switches, 3,200 Amps, gang operated, 3 phase; and,
    - c. Six surge arrestors
- D. Permian Basin Switching Station
1. Add transfer trip equipment to the Moss 138 kV line #1 terminal
    - a. Line tuner, and line trap tuning pack; and,
    - b. One transfer trip receiver panel
- E. Miscellaneous: Communication facilities, system protection equipment, telemetry equipment.

### **Network (SYSTEM) Upgrades**

Load customers in ERCOT fund transmission upgrades at or beyond the point of interconnection, and the term “Network Upgrades” is not used in the ERCOT SGIA.

### **Milestone Dates**

The milestone dates are currently being updated to reflect an October 31, 2013 financial closing and NTP and the overall project schedule.

### **Regulatory Filings**

Unless exempt, the TSP shall timely request ERCOT and all regulatory approvals necessary for the TSP to carry out its responsibilities under this agreement. Such approvals shall include any CCN required for the construction of the TIF.

The TSP shall file this executed Agreement with the appropriate Governmental Authority, if required. The Generator may assert that portions of this Agreement contain sensitive commercial or financial information, and the TSP shall file that information under seal stating, for the TSP’s showing of good cause, that the generator has requested such filing under seal, and the TSP may disclose such writing to the appropriate Governmental Authority.

STCE is refreshing the transmission study for closing and no material changes are expected.

### Subtask (WBS) 105100 Interconnect Request Preparation and Submission

The Recipient will prepare and submit the new generator interconnect request. All information related to the power rating, type of generator, load regime,

protective systems, and all electrical related information will be developed for inclusion to the application.

*STCE prepared and submitted a new generator interconnect request on March 1, 2010.*

Subtask (WBS) 105200    Feasibility Study

The Recipient, working in conjunction with the transmission provider, will perform a system feasibility study, which is a top-level study to determine if it is feasible to add the new generation being proposed to the transmission grid.

*STCE completed the feasibility study in June 24, 2010.*

Subtask (WBS) 105300    System Impact Study

Given positive results of the feasibility study (Subtask 103200), i.e., the project has been determined as being feasible to add to the transmission system, the recipient, working with the transmission provider, will perform simulations on the transmission system assuming the project being in place and commercially operating. The impact study results will determine the behavior of the transmission system with the new project in place, and will provide recommendations with respect to any system upgrades that may be required. A cost estimate will also be included to estimate the transmission system scope that is needed to interconnect the new generator, and the addition of any system upgrades and monitoring that may be required.

*There were a variety of studies that were performed beyond a system impact study. A summary of the studies and completion date is listed below. In general the system studies indicate that the local service is able to absorb the additional load without taxing the system. Further, the system upgrades that are required are not significant, and the schedule for implementation fits within the overall project schedule.*

**Transmission Studies Completed to Date**

<b>Study Name</b>	<b>Completion Date</b>
<i>Initial Screening Study</i>	<i>6/24/2010</i>
<i>Steady State Study</i>	<i>3/16/2011</i>
<i>Circuit                      Breaker Interrupting Duty (Short Circuit) Study</i>	<i>3/17/2011</i>
<i>Relaying Facility Study</i>	<i>4/18/2011</i>
<i>Facility Study</i>	<i>6/22/2011</i>
<i>Stability Study</i>	<i>2/17/2012</i>

<i>Updated Steady State, Short Circuit, Stability and Facilities Studies</i>	<i>In progress</i>
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*No other studies are required to support financial closing.*

Task (WBS) 106000      Environmental Impacts and Permits

The Recipient will define and document the project’s potential impacts on the environment and make the necessary applications to jurisdictional authorities for permits to operate the project with the anticipated impacts, including emissions.

*Reported above under Section 4.*

Subtask (WBS) 106100      National Environmental Policy Act (NEPA)

The Recipient will develop and provide environmental information and other technical information required by the SOPO to the DOE, and any DOE authorized subcontractors, needed to support DOE’s responsibilities under NEPA. This information should include, without limitation, the location of the project and any alternative locations considered by the Recipient, the environment in the vicinity of the project, and the potential environmental impacts of the project and any “connected actions” as that term is defined under NEPA.

*Reported above under Section 4.*

Subtask (WBS) 106200      Permits and Other Regulatory Authorizations

The Recipient will obtain the necessary approvals from appropriate environmental and other regulatory bodies for all aspects associated with the Texas Clean Energy Project. As part of its Phase II “Decision Point Application,” the Recipient will provide documentation as evidence to the DOE demonstrating that it has the necessary approvals from appropriate environmental and other regulatory bodies to proceed into Phase II of the project. If this is not available, the Recipient will provide documentation showing that sufficient progress has been made and permitting strategies developed that provide a sufficient degree of confidence that such permits are likely to be obtained in a time frame which will not adversely impact the successful accomplishment of the project schedule baseline and Recovery Act requirements (including those related to schedules) and technical performance targets.

*Reported above under Section 4.*

Sub-subtask (WBS) 106210      Air Permit

The Recipient will prepare the air permit application, including performance

emissions runs for the project, and a summary and location of all emitter locations. The application and all support documents will also be prepared and included in the submission. The Recipient will formally file the application and meet with key members of the Agency or Department, as necessary, to answer questions and provide clarifications. The Recipient will provide follow-up submittals of requested information, any clarifications on the submitted application, and any meetings with Agency members to discuss any aspects of the application. The Recipient will provide testimony to present the project and answer any questions, provide any follow-up information that may be requested, and other clarifying activities in support of releasing the permit for public comment. The Recipient will support the Agency, as applicable, with respect to a final approval order and issuance of the formal air permit.

*Reported above under Section 4.*

Sub-subtask (WBS) 106220      Water Permit

The Recipient will prepare the water permit application, including performance runs for the project to determine water usage and water quality, and a summary and location of all emitter locations. (Note that the project is currently planned as a zero liquid discharge facility, however.) The application and all support documents will also be prepared and included in the submission. The Recipient will formally file the application and meet with key members of the Agency or Department, as necessary, to answer questions and provide clarifications. The Recipient will provide follow-up submittals of requested information, any clarifications on the submitted application, and any meetings with Agency members to discuss any aspects of the application. The Recipient will provide testimony to present the project and answer any questions, provide any follow-up information that may be requested, and other clarifying activities in support of releasing the permit for public comment. The Recipient will support the Agency, as applicable, with respect to a final approval order and issuance of the formal water permit.

*Reported above under Section 4. In general, the Project is designed as a Zero Liquid Discharge facility. All liquid wastewater will be processed so no wastewater is discharged.*

*As of this writing STCE is planning a deep well injection of the pretreatment wastewater from the reverse osmosis system. This system is used to process sulfur, total dissolved solids, and other constituents in the Capitan Reef water STCE has contracted to purchase from a private landowner*

Sub-subtask (WBS) 106230      Miscellaneous Permits

The Recipient will prepare any other necessary permit applications, including preparation of any supporting documents as required. The application and all

support documents will also be prepared and included in the submission. The Recipient will formally file the application(s) and meet with key members of the respective Agency or Department, as necessary, to answer questions and provide clarifications. The Recipient will provide follow-up submittals of requested information, any clarifications on the submitted application(s), and any meetings with Agency members to discuss any aspects of the application(s). The Recipient will provide testimony to present the project and answer any questions, provide any follow-up information that may be requested, and other clarifying activities in support of releasing the permit(s) for public comment. The Recipient will support the Agency, as applicable, with respect to a final approval order(s) and issuance of the formal permit(s).

*Reported above under Section 4.*

Task (WBS) 107000      Project Financing

The Recipient will accomplish financing activities of the project. The Recipient will prepare a list of known investors that may be interested to participate in the project. This will include known resources, industry relationships and other sources for equity investment. The Recipient will also prepare a list of financing entities that may be interested to provide monies for development of the project. The Recipient will meet with parties on the investment and financing list to present the details of the project, discuss the terms of the investment, and determine if there is a general interest in participating in the project. The Recipient will negotiate with the equity investor(s) and financing entities to obtain an agreed term sheet. The terms sheet will describe the main points of the agreement between the parties. The Recipient will negotiate a financing agreement with equity investor(s) and financing entities that will include all aspects of the term sheet and other more detailed aspects of the agreement.

*TCEP is designed to be a project financed plant, with a sustainable and responsible combination of debt and equity financing coupled with the DOE cost share. As such considerable work in support of financing was completed during Phase I as investors and lenders in typical project finance transactions have exacting requirements of primary project contracts. As a result, the STCE finance team worked very closely with the STCE development team to design the Project with project finance discipline in mind.*

*In the first quarter of 2011, STCE engaged the Royal Bank of Scotland (RBS) as lead financial advisor for the purposes of raising debt financing. In that capacity, RBS advised on all key Project contracts (EPC, offtake agreements, O&M) and developed a series of reports to inform debt financing. These reports included market overviews of the urea and CO<sub>2</sub> markets (deemed necessary to inform lenders of price risks associated with those commodities) and an independent engineer's report (deemed necessary to review and verify technical risks and the strength and scope of the EPC contracts). RBS also advised the STCE team*

*regarding numerous debt structures. They led a series of meetings with ratings agencies and led discussions with Hermes, the export-import bank of Germany, and Korea Eximbank (important because of German and Korean content in the Project).*

*In late 2011, RBS' engagement was expanded to include equity fundraising. This was done after all material development tasks were complete and it was deemed time to begin the equity fundraising process in earnest. In this capacity, RBS led an extensive fundraising process which included developing a target list of investors, a short form "teaser" overview of the Project, a long form Confidential Information Memo overview of the Project, and various powerpoint presentations to a series of investors. RBS managed the day-to-day operations of the fundraising process, including managing relationships with investors and responding to due diligence requests.*

*In mid 2012, the decision was reached to switch lead EPC vendors (for the chemical block) from Linde AG to Sinopec Engineering & Construction in part to gain access to Chinese financing. As part of that process, the TCEP financing plan was augmented considerably and the STCE finance team supported those efforts. STCE also hired CICC as its advising Chinese investment bank and developed presentations and provided information to a series of interested investors in China. As part of this, the STCE finance team has also been involved in vetting the proposed equity and debt investments in TCEP with the Committee on Foreign Investment in the United States (CFIUS).*

*Finally, the STCE finance team has been managing the tax attributes of the construction financing transaction. At different times, as the proposed debt and equity investment structure has evolved, STCE has relied on two separate sets of advisors to deal with the complexities associated with the monetization of tax credits associated with TCEP. STCE worked with its advisors to develop structures that match up those who want to invest in the Project for its strategic and cash attributes with those who wanted to invest in the Project for its tax attributes. STCE developed presentations, spoke with investors and responded to due diligence requests. Tax equity transactions are not currently considered part of the financial closing and will be considered closer in time to commencement of commercial operations.*

*Specifically regarding financing, at financial closing a new STCE holding company, STCE FinCo, will replace the existing STCEH holding company, of which Summit Power Group, LLC is the majority member. STCEH will contribute 100 percent of the membership interests of STCE to STCE FinCo in exchange for membership interests of STCE FinCo representing a \$50 million capital contribution. Following financial closing, STCE FinCo will own 100 percent of the membership interests in STCE, which owns 100 percent of TCEP's assets.*

*STCE FinCo then will make an offering of membership interests to key*

*participants and strategic investors in an amount sufficient, with the inclusion of the CCPI grant and debt from CHEXIM, to satisfy 100 percent of TCEP's development, financing and construction costs. The purchasers of these membership interests will become members in STCE FinCo in proportion to their relative capital contribution commitments. Noble and SGE each will purchase equity interests in STCE FinCo in exchange for an investment of at least \$300 million and \$295 million, respectively. TCEP EPC contractors Siemens (through its investment affiliate, Siemens Financial Services, Inc.) ("Siemens Financial") and Linde North America, Inc. or another wholly owned U.S. affiliate of Linde AG ("Linde N.A.") are expected to maintain a material equity stake, which together with other smaller equity investments or increases in the investment by the parties previously named will round out the equity capital required.*

*STCE will review the current and post-transaction organizational and ownership structures of STCE and the acquiring entities as part of its closing activities. Post-closing, the relative ownership interests of STCE FinCo are expected to be as follows: 6 percent of STCE's membership interests will be owned by STCEH (of which in turn 78.3 percent of the membership interests will be owned by Summit, and the remaining 21.7 percent of the membership interests will be owned by CWNI); 24 percent of its membership interests will be owned by Linde, Siemens, and other third-party investors; 35 percent of its membership interests will be owned by Noble; and 35 percent of its membership interests will be owned by SGE.*

*Summit will maintain an interest in the Project based on its STCEH subsidiary's \$50 million "investment" as developer, and a wholly-owned Summit subsidiary will serve as Manager of STCE FinCo. As Manager, Summit will direct all of the management and operations of STCE FinCo and STCE, except for matters requiring member approval. Management rights not requiring member approval will be exclusive to Summit as Manager, and include the ability to oversee, supervise and manage the construction and day-to-day operations of TCEP, the ability to direct STCE to enforce rights under any TCEP contract, the authority to take actions or make decisions regarding operations that could impact the production of electric power or other products produced by TCEP, and the ability to administer all agreements between STCE and any governmental instrumentalities, including the U.S. DOE and IRS.*

*STCE will submit detailed information regarding the transaction and its parties as part of the review process by the Committee on Foreign Investment in the US, the approval of which will be required for (or a condition precedent to) closing. Additional financing documentation is ongoing: the equity investors are negotiating a limited liability company operating agreement for FinCo on the basis of a detailed term sheet finalized in May 2013; the equity investors further are negotiating (including with Chexim) equity capital contribution agreements; Chexim and STCE will negotiate a detailed term sheet in August and September that will be memorialized in final loan documentation in September. All such*

*agreements will be binding on the parties for TCEP construction funding, and STCE will review with the DOE as necessary to provide the DOE with assurances of the corresponding binding funding commitments of the parties. All efforts remain ongoing as of this writing, with financial closing targeted for October 31, 2013.*

Task (WBS) 108000      Fuel Supply

The Recipient will secure a fuel/feed stock supply, including transport to the project site(s). The Recipient will prepare a list of known fuel suppliers and transporters that may be interested to participate in the project. This will include known resources, industry relationships and other sources for fuel supply. The Recipient will meet with parties on the fuel supply and transport list to present the details of the project, discuss the terms of the fuel supply, and determine if there is a general interest in participating in the project. The Recipient will negotiate with the fuel supply and transport entities to obtain an agreed term sheet. The term sheet will describe the main points of the agreement between the parties. The Recipient will negotiate a fuel supply and transport agreement which will include all aspects of the term sheet and other more detailed aspects of the agreement.

*STCE secured the fuel supply for the Project, including transportation. A summary of the agreements is provided below.*

**Coal Supply**

**Coal Supply Agreement**

*STCE and Cloud Peak executed a long-term contract for the portion of coal devoted chemical process in September 2012. CPS Energy, the power offtaker, is responsible to supply fuel devoted to its offtake of electrical energy. Cloud Peak is willing and able to supply coal sufficient to satisfy CPS Energy's obligation, although CPS Energy is under no obligation to purchase coal from Cloud Peak. The coal supply agreement specifies supply of Power River Basin sub-bituminous coal from the Cordero Rojo mine. This is the coal that was used as the design coal in the FEED.*

**Coal Transportation Plan**

*A coal transportation plan was developed during FEED, and further refined in discussion with Union Pacific Railroad (UP). Commercial tariff rates are known and competitive regulations prohibit the UP from using alternative rates. The rates have been included in STCE's economic model. STCE and UP have not entered into a transportation service agreement at this time because STCE's financial advisors indicated that such an agreement is not a requirement for financial closing*

**Industrial Track Agreement**

STCE entered into a standard Industry Track Agreement with the UP in August 2012 regarding construction, operation and maintenance of tracks serving TCEP's Penwell site in two phases.

### **Natural Gas**

The FEED study identifies the role of natural gas supply to start-up and back-up the fuel for the combustion turbine, provide fuel for the auxiliary boiler, provide fuel for the coal drying system, and for various pilots in the plant. In addition, the coal will be dried to approximately eight percent moisture by hot gases heated by natural gas and/or syngas.

### **Oneok Facilities Agreement**

The ONEOK Facilities Agreement executed between ONEOK Westex Transmission, L.L.C. (OWT) and STCE in January 2012 describes the OWT Measurement and Delivery Facilities (OWTMDF) to be installed to deliver natural gas to the Project. The OWTMDF is a 12-inch, 3.5-mile, 953 psig maximum allowable operating pressure (MAOP) natural gas pipeline connecting the Project with the nearby 20-inch OWT transmission pipeline, and is designed to deliver a maximum 72 MMcf per day, or 3 MMcf per hour. The related OWTMDF gas measurement facility site will be located just outside the perimeter of the Project. The OWTMDF includes but are not limited to all welded pipe, valves, fittings, meter tubes, recorders, electronic flow measurement (EFM), transmitters, controllers, electrical equipment, chromatographs, regulation, supervisory control and data acquisition (SCADA) and ancillary wiring, tubing, and supports. The cost of material procurement and project engineering cost to construct the Measurement and Delivery Facilities is expected to total approximately \$1.858 million. The OWTMDF total cost will be presented to STCE as a Construction Invoice that includes these procurement and engineering totals plus the cost of OWTMDF construction labor and incremental materials not included in the cost estimate and a 20.62 percent MLP tax "gross up" on the total cost of the OWTMDF. The Construction Invoice is expected to total approximately \$4.049 million.

STCE may submit a written request for a Final Definitive Cost Estimate (FDCE) of the OWTMDF, and OWT is required to deliver the FDCE to STCE within 30 days of receipt of the request.

Specified OWTMDF pipeline gas quality and measurement of is consistent with industry standards of pipeline gas quality. Specified measurement of specific gravity, pressure, and temperature also conform to industry standards. For OWTMDF operational purposes, a list of relevant OWT contacts with telephone numbers is offered.

### **Natural Gas Supply Agreement**

STCE entered into a Gas Service Agreement with OWT under which natural gas supply is to be provided by spot natural gas volumes from one or more of many

*gas suppliers currently shipping on the OWT system, where gas volumes will be nominated on an hourly basis at Waha Hub pricing. The selection of the origin of natural gas supply for the operation of the Facility, will be consistent with the approved Fuel Plan, as part of and consistent with the Project Operating Procedures, the Fuel Arrangements, and Prudent Industry Practices. Access to the Waha Hub affords STCE the flexibility to handle seasonal, daily and even hourly load swings due to demand or supply variations. The gas storage and hub services (available via the Waha Hub), coupled with approximately 7 Bcf/day of area third party pipeline capacity, provides the liquidity to ensure access to gas supply or market is available when desired.*

*OWT pipeline will be transporting natural gas supply to the Project from a variety of natural gas suppliers available from Waha Hub and from interconnections from other natural gas pipelines in the area. A partial list of these potential natural gas suppliers includes Sequent Energy Management, LP United Energy Trading, LLC Oneok Energy Services Company, LP EDF Trading North America, LLC Chesapeake Energy Marketing, Inc. Chevron USA, Inc. DCP Midstream, LP Cimarex Energy Co. Enbridge Marketing (US), LP Seminole Energy Services, LLC Tenaska marketing Ventures Tristar Gas Marketing Company Atmos Energy Marketing, LLC WTG Gas Marketing, Inc. Wells Fargo Commodities, LLC Cokinon Natural Gas Company SUG Energy, LLC U.S. Energy Services, Inc. Constellation Energy Commodities Group, Inc. ACES Power Marketing, and Eagle Rock Gas Services, LLC.*

### **Natural Gas Transportation Agreement**

*STCE has reached an agreement with OWT for firm transportation and balancing of natural gas on the OWT system. The transmission system consists of approximately 2,380 miles of pipeline of various sizes up to 24 inches in diameter. It operates at pressures up to 1,200 psig and has a peak day capacity of 750 MMcf per day. The pipeline is connected to major natural gas producing areas in the Texas Panhandle, Waha Hub and Permian Basin, and to OWT's Texas Gas Storage Facility at Loop, Texas.*

#### **Task (WBS) 109000      Water Supply**

The Recipient will secure the water supply to the project. The Recipient will prepare a list of known water suppliers that may be interested to participate in the project. This will include known resources, industry relationships and other sources for water supply. The Recipient will meet with parties on the water supply list to present the details of the project, discuss the terms of the water supply, and determine if there is a general interest in participating in the project. The Recipient will negotiate with the water supply entities, which may involve the development of an agreed term sheet that will describe the main points of the agreement between the parties. The Recipient will negotiate a water supply agreement which will include all aspects of the term sheet, if one exists, and other more detailed aspects of the agreement.

### **Water Supply Agreement**

*A contract for water supply was executed on January 31, 2012. The water will be supplied from the underground Capitan Reef formation, which extends over a wide portion of west Texas and the southeastern portion of New Mexico. The wells will be drilled on the Massey Ranch, private property owned by the Massey family. A study has shown that the supply will yield sufficient water for TCEP. A title research and review process is complete.*

*The plan is to construct a water well field of approximately six wells, and install approximately 27 miles of water pipeline and a pumping station to deliver water to the Project Site. The water in the Capitan Reef formation is slightly to moderately saline, referred to as brackish, and is not suitable for use as potable water. The brackish water will require treatment prior to use at TCEP; treatment is expected to involve filtration, softening and a two-stage reverse osmosis system. The Total Dissolved Solids (TDS) entering the treatment process is designed for approximately 7,500 mg/L (the actual average water quality is expected to be closer to 5,000 mg/L based on numerous samples). The concentrated water, or reject water, will be disposed by a deep well injection system. It is anticipated that 75 percent of the water will be treated for use, while 25 percent will be rejected as brine.*

*The water supply wells and the pipeline will be on public and private property. No permits are required to construct the water pipeline on private property, and the public property will simply require local agency approval. The entire route will be surveyed for sensitive resources including archeological surveys and wetlands surveys in an update to the EIS as discussed more thoroughly above.*

### **Underground Injection of Reject Brine**

*STCE has obtained a permit to drill a test injection well which was completed in January 2012 and initial testing was conducted during February 2012. The permit is dated September 23, 2011, and authorizes the use of one Class V vertical injection well to collect specific reservoir data and perform injectivity testing in certain subsurface formations. The testing will provide information on underground zones and absorption rates in the formations. The test well permit has conditions, including satisfaction of state, status reports and posting security for well closure costs.*

*STCE estimates 30 days to compile information and prepare the Class I well permit application. Once submitted, this standard permit takes approximately 90 days to be processed by the TCEQ and is not subject to public comment. A state-wide permit for these wells already exists, and TCEP's will simply be added to the list covered by the existing permit*

### **Deep Well Injection of Process Wastewater**

*The form of wastewater disposal had not been determined at the time of the EIS.*

*The EIS states that STCE would use a mechanical crystallizer and filter press system, solar evaporation ponds, or deep well injection for disposal of wastewater (page 2-67). STCE's preference is to use deep well injection for all wastewater. At this time a Zero Liquid Discharge system, which uses the wastewater treatment followed by recycling and evaporation ponds, is the design being planned for the Project.*

Task (WBS) 110000      Power Purchase Agreement

The Recipient will secure power purchase agreement(s) for the net electric power generated by the project.

*On December 6, 2011 STCE entered into a Power Purchase Agreement (PPA) with CPS Energy.*

*The PPA is a base-load tolling arrangement for a term of 25 years. The effect of the document is to assign the first 195 MW of syngas fuelled capacity available in any hour to CPS Energy. For such capacity, CPS Energy pays a monthly fixed capacity payment and pays a set, negotiated allocation of fixed O&M.*

*CPS Energy is obligated to take up to 195MWh per hour of power if, as, and when available. For each MWh of energy actually delivered, CPS Energy is also obligated to pay a tolling charge for fuel and variable O&M.*

- *The fuel charge is a pass-thru of delivered coal cost to the Project; and*
- *The Variable O&M charge is a fixed amount per MWh.*

*STCE considers CPS Energy to be a financially solid counterparty that has strong political and strategic motivations to perform under the contract. CPS Energy is the largest combined gas/electric municipal utility in the United States and has double A category ratings by all three rating agencies. CPS Energy has announced its intention to increase its green energy power supply portfolio to 65% low- or no-carbon sources by 2020. This goal is a major strategic change given CPS Energy's current heavy reliance on conventional coal. Finally, CPS Energy has announced, simultaneously with the announcement of a purchase of power from TCEP, its intention to shut down its 1970s vintage 871 MW J.T. Deely coal-fired power plant in 2018, 15 years earlier than had been planned.*

Task (WBS) 111000      Byproduct Off-take Agreements

The Recipient will secure agreements for CO<sub>2</sub>, argon, sulfuric acid, ammonia, urea, and slag, as applicable. The Recipient will prepare a list of known byproduct off-take parties that may be interested to participate in the project. This will include known resources, industry relationships and other sources for byproduct off-take. The Recipient will meet with parties on the byproduct off-take

lists and request proposals, as applicable. The Recipient will review all proposals from potential byproduct off-take parties. The Recipient will negotiate with the byproduct off-take entities to obtain an agreed term sheet. The terms sheet will describe the main points of the agreement between the parties. The Recipient will negotiate byproduct off-take agreements which will include all aspects of the term sheet and other more detailed aspects of the agreement.

### **Urea Offtake Agreement**

*STCE and CHS executed a Urea Offtake Agreement dated January 17, 2011. CHS has agreed to purchase the full output of Urea Product during the 15-year term of the Agreement, subject to Minimum and Maximum Quantity provisions and certain product specifications. The pricing terms of the Agreement are extremely sensitive, but a redacted version has been loaded into the electronic data room for review by DOE.*

### **CO<sub>2</sub> Purchase and Sale Agreements (PSA)**

*Blue Strategies, LLC, STCE's Carbon Management consultant, leads North America in the CO<sub>2</sub> management sector, and its principals are responsible for developing almost all existing U.S. CO<sub>2</sub> pipelines and the 300-mile CO<sub>2</sub> pipeline from Dakota Gasification to the Weyburn Field in Saskatchewan, Canada. Blue Strategies has worked closely with STCE to optimize the structure and terms of CO<sub>2</sub> offtake agreements.*

*STCE has optimized the structure of CO<sub>2</sub> offtake agreements with Permian Basin oil producers for EOR. CO<sub>2</sub>/EOR injections currently total thirty-seven million tons per year in the Permian Basin, approximately 12 times what TCEP will produce. Demand greatly outstrips available supply in the Permian Basin, where an injected ton of CO<sub>2</sub> yields 2.5 to 3 barrels of oil. Typical CO<sub>2</sub>/EOR contracts have the price of West Texas Intermediate ("WTI") crude oil as their only variable, which allows CO<sub>2</sub> sales to be forecasted and hedged based on the price of oil. Additional revenues may come from the sale of voluntary emissions reductions ("VER") credits, and government incentives such as carbon dioxide sequestration credits under IRC Section 45Q. STCE has estimated CO<sub>2</sub>/EOR revenues conservatively in its model. There is potential for upside through higher oil prices, increased prices in the market for CCS-related carbon credits, and potential new government-enacted grants or credits. Blue Strategies and Summit Carbon Capture, LLC will work together to develop and market VERs from TCEP.*

*STCE has entered into 10, 15 and 30-year contracts for all of TCEP's lifetime production of CO<sub>2</sub>. The price in each of these contracts tracks WTI. Because the injection rate of new CO<sub>2</sub> in an individual EOR operation decreases over time as oil reserves in the field are recovered and some of the injected CO<sub>2</sub> (the portion that comes to the surface with the produced oil) is re-captured and re-injected, the 15-year contract with Whiting Petroleum Corporation, a publicly traded oil and gas company, features take or pay for decreasing volumes over its term. The identities of the other two offtakers are confidential, but redacted offtake agreements have been made available for review in the confidential*

*electronic data room. The 30-year contract also features take or pay, but this offtaker's volumes increase over the term as Whiting's volumes tail off. The 10-year contract features take or pay for a consistent volume.*

### **Other Revenue Sources**

*STCE financial advisors have indicated that slag, acid, and argon contracts are not required as a prerequisite for financial closing, and that STCE would benefit from executing contracts post-closing or selling at market.*

### **Slag Offtake**

*In August 2011, Headwaters Resources delivered a letter of interest for the offtake of slag from the Facility. Headwaters claims to be the largest manager and marketer of coal combustion products in the heavy construction materials industry. Depending on final analysis of the plant's slag, Headwaters anticipates its use as raw feed for cement kilns, aggregates, and/or fillers.*

### **Sulfuric Acid Offtake**

*In June 2011, STCE signed an offtake Term Sheet with Shrieve Chemical Company which provides for Shrieve to take and resell the sulfuric acid. The Term Sheet stipulates that both Parties agree to negotiate the 20-year take or pay offtake contract following financial closing.*

### **Argon Offtake**

*To forecast revenue from the sale of Argon, J.R. Campbell & Associates was contracted to perform a market study in October 2011. Campbell has forecast fairly tight supplies, and noted that historical demand has outpaced GDP growth. STCE notes that Linde has expressed interest in the Argon, and Campbell noted that Linde, among others, would be a prospective customer. For the purpose of modeling Argon revenue, TCEP has used the midpoint of the Campbell price forecast, escalated at the CPI rate.*

*STCE is negotiating a market purchase and sale agreement with Linde for the Project's argon and nitrogen supply at pricing supportive of what is currently modeled. STCE expects that the agreement will be finalized prior to closing. Linde is a major player in the industry and has access to significant markets.*

Task (WBS) 112000      MVA Program

The Recipient will develop and execute a MVA program; i.e., work associated with the geologic sequestration of CO<sub>2</sub> captured by the project and the monitoring, verifying and accounting for the CO<sub>2</sub> captured and subsequently injected into geologic formations for use in EOR or otherwise sequestered. The Recipient will design and plan for the sequestration method, including but not necessarily limited to, securing a sequestration partner(s), well drilling, pipelining, and surface equipment including compressors, tanks, and fluid processing towers, as appropriate.

The Recipient will ensure that the binding teaming arrangements include furnishing the information disclosing to the public the efficacy of CO<sub>2</sub> capture, CO<sub>2</sub> delivery, geologic sequestration, and sequestration MVA. The MVA program will be designed in coordination with the Texas Bureau of Economic Geology of the University of Texas (Austin), which is charged with this responsibility via-a-vis the project under Texas law, and with any carbon management firms with which the Project may contract for this and related purposes. The Recipient will quantify, as applicable, the following programmatic parameters of interest:

- Incremental barrels of oil produced with CO<sub>2</sub> EOR, identified by year starting with the year of first production;
- Number of geological reservoirs characterized in detail and incremental CO<sub>2</sub> storage capacity verified as available for commercial development, in preparation for long-term storage and (MVA); and,
- Number of barrels of oil consumption displaced (Crude Oil Equivalent).

#### Subtask (WBS) 112100 Develop Scope of Supply

The Recipient will develop a complete scope of supply for the MVA program. The Recipient will request proposals from parties on the list. The Recipient will review all proposals from potential MVA companies. The Recipient will negotiate with the MVA companies to obtain an agreed term sheet. The terms sheet will describe the main points of the agreement between the parties. The Recipient will negotiate an agreement which will include all aspects of the term sheet and other more detailed aspects of the agreement.

*STCE has developed a scope of supply for the MVA program, and this scope of supply is fully detailed in the MVA plan. STCE has provided the plan in the electronic data room made available to the DOE.*

#### Subtask (WBS) 112200 MVA Program Plan

The Recipient will develop a MVA Program Plan. The purpose of the plan is to document the actions to be implemented as part of the Texas Clean Energy Project to monitor, verify and provide an accurate accounting of captured and stored CO<sub>2</sub> and a high-level of confidence that the CO<sub>2</sub> will remain sequestered permanently in geologic formations. This may involve the application of innovative, advanced technologies and protocols for MVA of CO<sub>2</sub> sequestration in geologic formations in order to: (1) monitor the movement of CO<sub>2</sub> into, through, and out of the targeted geologic storage area; (2) verify the location of CO<sub>2</sub> that has been placed in geologic storage; and, (3) account for the entire quantity of CO<sub>2</sub> that has been captured, transported and injected into geologic storage sites. The MVA program will be designed in coordination with the Texas Bureau of Economic Geology of the University of Texas (Austin), which is charged with this responsibility vis-a-vis the project under Texas law, and with any carbon

management firms with which the Project may contract for this and related purposes.

*STCE has developed an MVA plan in connection with TBEG, and this plan has been loaded in the electronic data room available to the DOE.*

Subtask (WBS) 114000    EPC and O&M Contracts

Recipient will negotiate and execute lump sum, turnkey contracts for engineering, construction and procurement of the project, and an operation and maintenance contract for the project.

*STCE negotiated and executed fixed price EPC and O&M contracts with Linde/SK, Siemens, and a joint venture of Siemens and Linde for the latter contract. A summary of the contracts is listed below. STCE has loaded the EPC and O&M contracts in the electronic data room and provided access to the DOE. Further, STCE provided a reasonableness justification to the DOE for the same in January 2012; this will be updated to reflect new pricing in support of the projected October 2013 financial closing. A summary of the scope of the subject contracts follows; more detailed summaries have been provided to DOE during negotiations and while STCE was seeking construction financing. These will be updated to reflect any changes that result from the final executed EPC contract with Sinopec.*

**Chemical Block EPC Contract**

*STCE executed an EPC Contract with Selas Fluid Processing Corporation (US subsidiary of Linde) and SK Engineering and Construction Co. Ltd on December 21, 2011.*

*As a result of interest in the Project on the part of SEG coupled with interest in providing debt financing from the China Import Export Bank, STCE and SEG executed an EPC contract for the Chemical Block and will re-execute with the refreshed pricing incorporated. In this contract SEG will step into the Selas contract for the same scope and assume all responsibilities under the Chemical Block contract.*

**Scope of Work**

**CB Contractor**

*Under the CB EPC, the CB Contractor shall provide all goods and services required to design, engineer, supply and procure, pack and transport, construct, commission, start-up and test the CB in accordance with the requirements of the CB EPC. The CB Contractor's Scope of Work includes the full integration of the CB with other Facility components including integration of the overall process and control systems.*

*The CB incorporates sections of the plant known as:*

- *Coal milling and drying;*
- *Gasification;*
- *Two-stage sour shift;*
- *Low temperature gas cooling;*
- *Mercury removal;*
- *Rectisol wash unit;*
- *Temperature swing absorption and nitrogen wash unit;*
- *Sulfuric acid plant;*
- *Ammonia synthesis;*
- *Ammonia refrigeration unit;*
- *Ammonia storage;*
- *Urea synthesis;*
- *Urea granulation;*
- *CO<sub>2</sub> compression for enhanced oil recovery;*
- *CO<sub>2</sub> compression and purification of urea;*
- *Air separation plant for the production of oxygen and nitrogen for facility internal use and argon for export;*
- *And all related controls and the corresponding Utilities and Offsites*
  - *Utilities and Offsites include:*
    - *Coal;*
    - *Slag and urea storage and handling systems;*
    - *Storage tanks;*
    - *Sour water stripper;*
    - *Auxiliary steam boiler;*
    - *Steam;*
    - *Condensate and blowdown systems;*
    - *Cooling water system;*
    - *Water treatment (raw, potable, demin and waste);*
    - *Storm and oily water sewer system;*
    - *Plant and instrument air;*
    - *Flare systems;*
    - *Firewater system;*
    - *A fire and gas detection system;*
    - *Utilities and Offsites control system;*
    - *Radio and telephone system;*
    - *Site access and closed circuit television system;*
    - *Interconnection pipe racks;*
    - *Site preparation;*
    - *Roads;*
    - *Fencing;*
    - *Buildings;*
    - *Railroad system; and*
    - *Natural gas and CO<sub>2</sub> pipeline tie-ins.*

*The CB and Utilities and Offsites are to be completed fully in accordance with the Work Scope. The Work Scope means all requirements of the Work that is*

*consistent with the applicable Legal Requirements, Permits, Prudent Industry Practices as memorialized in the CB EPC.*

*The Work shall include but not be limited to:*

- Designing and constructing the CB;*
- Performing all procurement, supply, packing, transporting, delivery, receiving and storage, installation, testing, erection and warranty of Materials;*
- Obtaining and maintaining all Permits to be obtained by the CB Contractor;*
- Assisting STCE with obtaining and maintaining Owner provided Permits;*
- Commissioning, starting-up and testing the CB in compliance with the Operations and Maintenance Manuals;*
- Providing all required CB drawings, records, manuals, registers, and written procedures required to operate and maintain the CB and training of STCE's operational staff, and;*
- Other acts as may be necessary to provide a fully operational CB that meets or exceeds the Performance Guarantees and satisfies the terms and conditions of the CB EPC.*

### **Power Block EPC Contract**

*STCE executed an EPC Contract with Siemens Energy, Inc. on December 12, 2011. The following is a summary of PB EPC.*

### **Scope of Work**

#### **PB Contractor**

*Under the PB EPC, the PB Contractor shall provide all goods and services required to design, engineer, supply and procure, pack and transport, construct, commission, start-up and test the PB in accordance with the requirements of the PB EPC.*

*The PB incorporates sections of the plant known as:*

- Power Block scope including:*
  - One Gas Turbine Generator (CTG);*
  - One Steam Turbine Generator (STG);*
  - One Heat Recovery Steam Generator (HRSG);*
  - One Air Cooled Condenser (ACC);*
  - A complete PB electrical system;*
  - Steam bypass valves;*
  - Boiler feedwater pumps;*
  - Export feedwater pumps;*
  - Deaerator, booster pump and external condensate heater;*
  - Feedwater control valves;*
  - Condensate pumps;*
  - PB control systems;*
  - Detail design of Owner supplied materials;*

- *Design of piping for Natural Gas (NG) and Syngas (SG).*
- *Switchyard Systems*
  - *Engineering and Project Management;*
  - *138kV High Voltage Circuit Breakers;*
  - *Surge Arrestors;*
  - *Disconnecting Switches;*
  - *Protection Panels;*
  - *Installation and Commissioning;*
  - *Training.*

*The PB shall be completed fully and completely in accordance with the Work Scope. The Work Scope means all requirements of the Work that is consistent with the applicable Legal Requirements, Permits, Prudent Industry Practices as memorialized in the PB EPC.*

*The Work shall include but not be limited to:*

- *Designing and constructing the PB;*
- *Performing all procurement, supply, packing, transporting, delivery, receiving and storage, installation, testing, erection and warranty of Materials;*
- *Obtaining and maintaining all Permits to be obtained by the PB Contractor;*
- *Assisting STCE with obtaining and maintaining Owner provided Permits;*
- *Commissioning, starting-up and testing the PB in compliance with the Operations and Maintenance Manuals;*
- *Providing all required PB drawings, records, manuals, registers, and written procedures required to operate and maintain the PB and training of STCE's operational staff, and;*
- *Other acts as may be necessary to provide a fully operational PB that meets or exceeds the Performance Guarantees and satisfies the terms and conditions of the PB EPC.*

*The Master Schedule for the Chemical Block and Power Block contracts is 47 months from Notice to Proceed to Commercial Operation.*

### **Operations and Maintenance Agreement**

*STCE executed an Operations and Maintenance (O&M) Agreement dated December 21, 2011 with Linde LLC. The O&M Agreement anticipates that Linde and Siemens Energy, Inc. will form a Joint Venture (JV) Company to perform the services outlined in the O&M Agreement.*

*The O&M Agreement obligates the Operator to provide certain services during three distinct phases of Project development and operation; Design and Operability Review Phase, Pre-Operations Phase, and the Operation and Maintenance Phase. The scope of the services to be provided during each phase is described below.*

### **Design and Operability Phase**

*Prior to the execution of the O&M Agreement, the Operator participated in operability reviews of the Project. Included in this effort was review of preliminary Project layout, system schematics, equipment and tooling lists, building sizes, tank capacities, overall control system, raw water quality and the Plant Design criteria. Based on these reviews and review of the O&M Assumptions, the Operator determined its ability to perform the O&M Services in the O&M Agreement.*

*The Operator shall establish an O&M team experienced in the operation and maintenance of facilities similar to the Project. That team is to conduct operability and maintainability reviews of the Project at intervals commensurate with 30, 60 and 90 percent completion of the detailed design. The focus of the reviews will be on any changes or additions to the detailed design impacting the Operator's ability to perform the Services pursuant to the O&M Agreement. The O&M team will issue written reports at the completion of each review.*

*In addition the Operator will provide management and other competent personnel who will participate in schedule coordination meetings, design reviews, project development processes and procedures, and regularly scheduled progress review meetings. The Design and Operability Phase ends eighteen months prior to the Scheduled Provisional Acceptance Date or a date mutually agreed upon by the Owner and Operator.*

*Operability Review Phase activities included:*

- Implement project management program;*
- Establish a staffing plan and identify interface personnel for this Phase;*
- Participate in project steering team committee meetings;*
- Provide operational hazards & safety reviews;*
- Implement O&M change management & notification process;*
- Attend cost reduction reviews;*
- Review EPC drawings and deliverables regarding plant and component maintainability and process system and component operability;*
- Initiate implementation of O&M document management;*
- Develop Project specific business practices and operating procedures;*
- Prepare enterprise business systems, initial Pre-operations personnel mobilization schedule, set-up and Pre-operational planning;*
- Develop and initiate implementation of O&M mobilization plan;*
- Initiate supporting subcontracts, leasing agreements, and place related orders; and*
- Perform record keeping and monthly reporting.*

### **Pre-Operations Phase**

*The services to be provided by the Operator during the Pre-Operations Phase bridge the activities between the Design and Operability Phase and commercial operations. It is anticipated that these activities will be performed between the*

sixteenth and twenty-ninth months prior to the Scheduled Provisional Acceptance Date. The Pre-Operation Services include:

- *Hiring the Plant Manager subject to the Owner's approval.*
- *Hiring the Plant Personnel (projected total of 144 employees) in accordance with the summary job descriptions, organization chart and hiring schedule.*
- *Training and Certification of plant personnel in accordance with the Operator's regular training procedures.*
- *Obtain Governmental Approvals and provide assistance as needed to the Owner in obtaining the Owner required Governmental Approvals and Project inspections.*
- *Procure Plant Tools, Mobile Equipment and Test Equipment required to perform the Operator's Services..*
- *Review Normal Spare Parts and Capital Spare Parts List, and recommend any required changes to Owner in a timely manner*
- *Prepare Project Procedures including plant operations, safety program, scheduling, predictive and preventive maintenance, periodic maintenance, operator training and certification, feedstock and fuel quality monitoring, accounting, purchasing, statistical performance and unit start reliability monitoring, environmental monitoring, emergency response, and performance monitoring subject to the Owners review and comment*
- *Procure and set-up a Maintenance Management System.*
- *Communicate with the Owner regarding any reimbursable costs and issue monthly status reports regarding the Pre-operation Phase services.*
- *Analyze and report to the Owner impacts on any Plant Design and/or O&M Assumption changes.*
- *Provide commissioning assistance.*
- *Assist in developing the Final Punch List.*

*The Operations and Maintenance Phase ("O&M Phase") includes the time period from Provisional Acceptance until the expiration of the Term or termination of the agreement. The initial term of the agreement expires 15 years after Provisional Acceptance.*

*The Operator is to provide the following services during the O&M Phase.*

- *Perform day to day operations of the Project including Predictive and Preventive Maintenance of Project equipment. Services to be performed in a manner as required to keep the Project in a safe, reliable efficient and operable condition' subject to normal wear and tear.*
- *Perform Planned Maintenance in accordance with an annual plan to be submitted to the Owner 120 days prior to the completion of each Contract Year. The annual plan will include 1 year, 3 year and 5 year work scopes and schedules.*
- *Perform Unplanned Maintenance, which includes all maintenance except*

*Planned and Predictive Maintenance.*

- *The O&M Agreement includes adequate administrative procedures for tracking and invoicing Unplanned Maintenance Change Orders. The O&M Agreement also includes provision that the Operator pay for Unplanned Maintenance caused by the Operator's willful misconduct or gross negligence (subject to certain limitation).*
- *Restore the Project to operation as soon as practicable follow any Forced Outage.*
- *Maintain, test, recalibrate, and maintain necessary records for all meters, scales, gauges, relays, and other measuring devices in accordance with good operating practice.*
- *Assist the Owner in submittal of any Warranty and Insurance claims.*
- *Provide at its expense all Operator Consumables and manage the supply of the Owner Consumables, generally including all process chemical feed stocks, power block catalysts, certain replaceable filters, certain lubricating oils and fuel for the Project's mobile equipment.*
- *Assist the Owner in the preparation of the Final Punch List.*
- *Update Project procedures as necessary.*
- *Coordinate with the Owner and others as requested by Owner.*
- *Maintain sufficient personnel to operate and maintain the Project including a Plant Manager whose appointment is subject to the Owners approval, and administer all personnel matters.*
- *Provide proper Training and Certification of Project personnel.*
- *Provide addition services related to Project operation in accordance with approved Change Orders.*
- *Obtain and maintain Governmental Approvals including those required for the Operator to: conduct business in Texas, own/lease and operate vehicles, and qualify Operator personnel (operator Licenses).*
- *Make Project alterations and/or modifications with the Owner's written approval. Advise Owner of the availability of Equipment upgrades.*
- *Provide any additional or replacement machinery, tools, and test equipment required for the operation of the Project.*
- *Provide, repair or replace Normal Spares, Operator Consumables, and Program Parts.*
- *Maintain Project Data, Records and Accounts and regularly communicate and report to the Owner.*
- *Maintain the Project site free from waste materials and rubbish.*
- *Procure/lease any required Office Equipment.*
- *Periodically and at least once during each Contract Year operate the Project at full capability.*
- *Install and maintain a Remote Monitoring System.*
- *Conduct Performance Test annually.*
- *Perform other services including providing operating plans, dispatch of power block, and nomination and scheduling of products from the chemical block, specified training program), plant equipment and furnishings and Carbon Dioxide Off take contract Requirements .*

### **Owner's Engineer Agreement**

*STCE has negotiated and will execute an Owner's Engineer agreement with CH2M Hill immediately prior to financial closing. The Owner's Engineer (OE) will be the eyes and ears of STCE during project execution. The OE will be responsible to review all contractor drawings and technical information. They also will perform witness testing for select major components. The OE will have a site presence, monitoring construction and commissioning progress, and reporting to STCE on progress relating to milestone payment applications. The OE will also be responsible for managing completion of the offsite laterals for water, natural gas, power, and CO<sub>2</sub>.*

# 6 Conclusion

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As described in this Topical Report, STCE has achieved all objectives described in the Phase I Statement of Project Objectives and is poised to transition to Phase II/III, design and construction, upon receipt of financing commitments. This Topical Report is submitted in support of STCE's Decision Point Application in accordance with the Cooperative Agreement, and is accompanied by a detailed budget and plans for Phases II and III. As always, STCE is available at any time to answer questions or to respond to comments regarding the contents of this Topical Report.