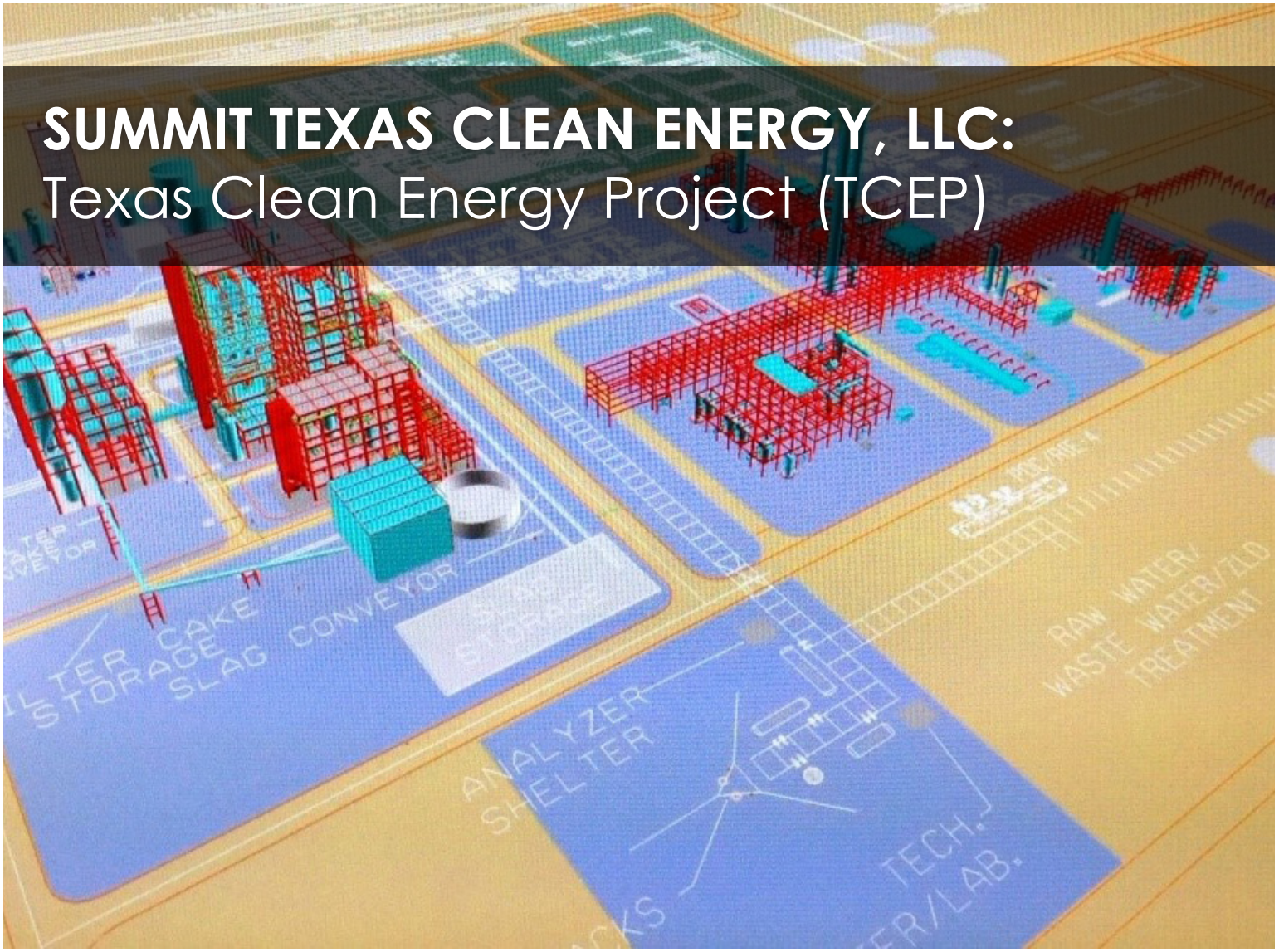
SUMMIT TEXAS CLEAN ENERGY, LLC:
Texas Clean Energy Project (TCEP)



NETL

NATIONAL ENERGY TECHNOLOGY LABORATORY

PARTNERS

China Huanqiu Contracting & Engineering Corporation (HQC)

Siemens AG

SNC-Lavalin

CH2M

PROJECT DURATION

Start Date: 02/01/2010

End Date: 07/15/2017[1]

PROJECT NUMBER

DE-FE0002650

COST

Total Project Value

$1,726,628,299[2]

DOE/Non-DOE Share

$134,350,974 / $1,592,277,325

TECHNOLOGY LICENSORS

Casale

Haldor Topsoe

Saipem or UHDE

The Linde Group

Veolia Water Technologies

[1] This is the period of performance recognized under the DOE Financial Assistance Award. The commercial project may be continued well beyond the DOE's involvement.

[2] This is the value established for the portion of the total project costs recognized under the DOE Financial Assistance Award for cost-sharing purposes. It is not necessarily equal to the actual total project cost burden of the Performer.

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BACKGROUND

The Clean Coal Power Initiative (CCPI) is a federal government and industry collaboration with the goal of accelerating the readiness of new coal utilization technologies for commercial use to ensure that abundant domestic coal is a portfolio option for clean, reliable, and affordable power. The CCPI directly supports the national Climate Change Technology Program, a multi-agency R&D program to reduce carbon dioxide (CO_2) emissions. Under Round 3 of the CCPI, the objective was to demonstrate the commercial viability of advanced technologies that would capture CO_2 and store it in deep geological formations, with concomitant beneficial use in enhanced oil recovery (EOR) operations. Once demonstrated, the technologies could readily be considered in the commercial marketplace by the electric power industry.

The Texas Clean Energy Project (TCEP) was selected by the U.S. Department of Energy (DOE) for cost-shared co-funded financial assistance under CCPI Round 3. The TCEP represented a capstone commercial-scale, clean coal demonstration incorporating decades of DOE-sponsored research and development (R&D) into coal gasification; environmental controls for the oxides of nitrogen and sulfur, particulate matter, and mercury; high-hydrogen (H_2)-capable combustion gas turbines; and carbon capture and storage (CCS). Under Round 3 of the CCPI, the DOE was to provide up to $450 million in financial assistance, including funding from the American Recovery and Reinvestment Act (Recovery Act) of 2009. Due to the expiration of unused funds under the Recovery Act and other subsequent contributing factors, the DOE funding for the project was reduced by about $315.6 million to a total of $134.4 million.

PROJECT DESCRIPTION

In January 2010, DOE awarded a Cooperative Agreement to develop, construct, and operationally demonstrate the TCEP. The TCEP would incorporate full CO_2 capture with integrated gasification combined cycle (IGCC) technologies in a commercial poly-generation setting. The project, which would be located on a former FutureGen candidate site in Penwell, Texas, about 15-miles west of Odessa, would feature Siemens IGCC technologies; carbon monoxide (CO) shift; and Linde Rectisol® Wash Unit (RWU) acid gas removal (AGR). The TCEP would generate about 405 megawatts-electric (MWe), which would support all facility loads while delivering about 190 MWe of low-carbon power to the electric utility grid. The facility would also produce granulated urea fertilizer and pipeline-quality CO_2 as primary products as well as inert non-leachable slag, argon, liquid nitrogen, sulfuric acid, and ammonium sulfate. The facility would convert about 1.41 million tonnes per year of sub-bituminous coal to a high-H_2 synthesis gas (syngas) using a Siemens SFG-850 entrained-flow, oxygen-blown gasifier and downstream two-stage CO shift (a.k.a. water-gas shift). Shifting would convert CO to CO_2, increasing CO_2 capture efficiency, and increasing the H_2 concentration of the syngas. About 2.18 million tonnes of CO_2 per year would be captured using RWU AGR, with about 77% compressed and delivered via existing regional pipeline to depleted Permian Basin oil fields for deep geologic storage with concomitant EOR—the Permian Basin is the world's largest market for CO_2-flood EOR. The University of Texas Bureau of Economic Geology would develop and assure compliance with monitoring, verification, and accounting (MVA) requirements at the injection site(s). The remaining captured CO_2 would be used, along with a portion of the high-H_2 syngas, to produce urea fertilizer. The Linde RWU AGR system would also capture sulfur-containing gases for on-site conversion to marketable sulfuric acid. The advanced Siemens power block would consist of a SGT6-8000H high-H_2 capable combustion turbine generator set, a triple-pressure heat recovery steam generator, and a SST-900RH reheat steam turbine generator set.

Acid Gas Removal System

GOALS/OBJECTIVES

The overarching DOE programmatic objective was to advance CCS technologies from the demonstration stage to commercial practice. The goals of the TCEP were to develop, construct, and operationally demonstrate a greenfield, commercial-scale, fully-integrated, advanced IGCC electric power and chemicals production facility that demonstrated high CO_2 removal from the pre-combustion syngas stream, compression and transport of pipeline-quality CO_2, and the disposition through MVA of CO_2 stored in deep geologic formations with concomitant EOR.

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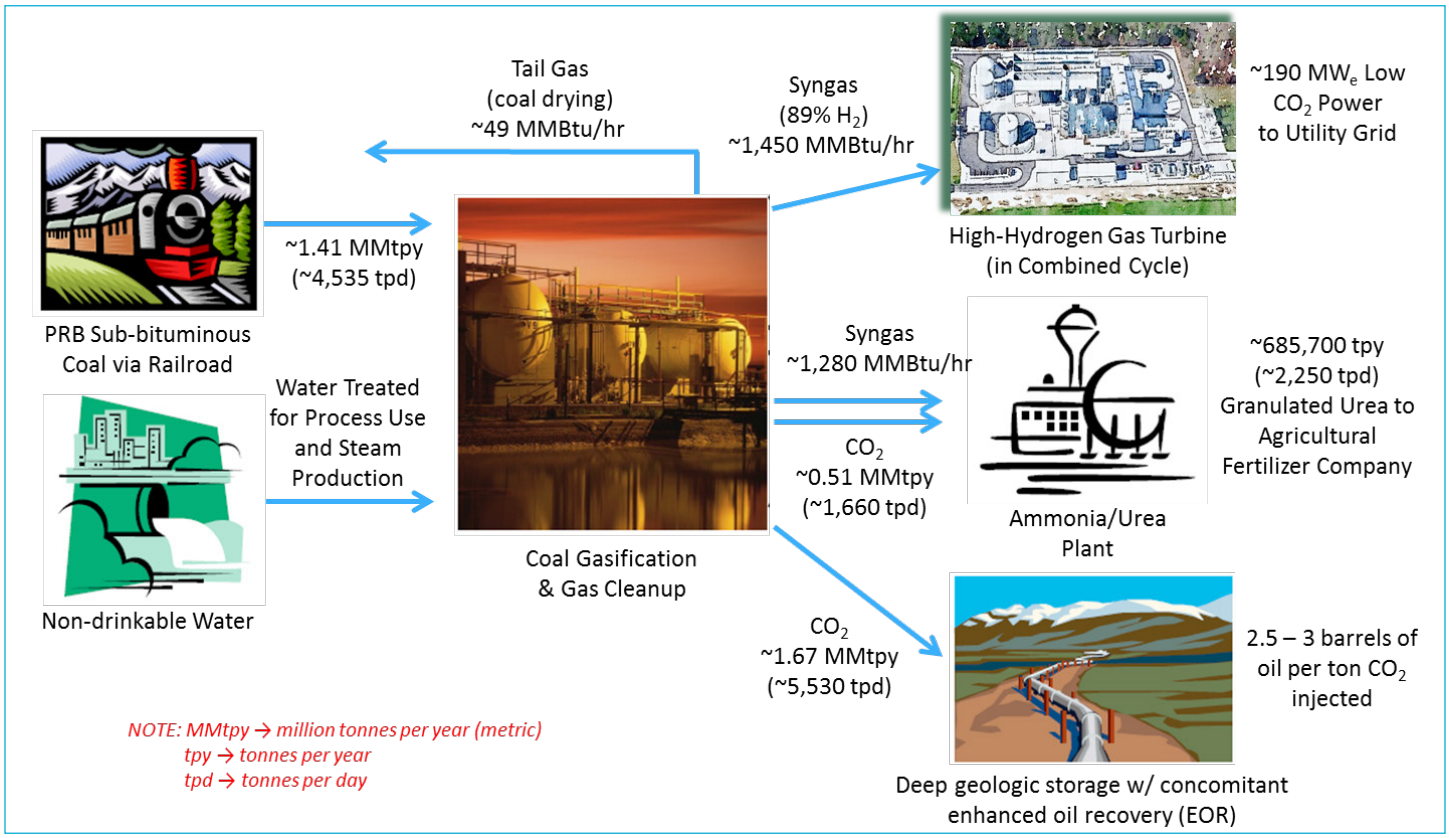

TCEP Process Flow

BENEFITS

The TCEP facility would be among the cleanest commercial, solid-fuel power facilities in the world and would significantly surpass the emissions reduction targets for 2020 established under the Energy Policy Act of 2005 (EPAct 2005). The facility's emissions would be far below any limits previously permitted in the state of Texas for a fossil-fuel plant. Its CO_2 emissions on a pound per megawatt-hour (MWhr) basis will be about half that of a comparably-sized natural gas combined cycle (NGCC) power plant without CO_2 capture. Other specific project benefits would include:

- Mitigation of greenhouse gas (GHG) emissions through the long-term geologic storage of about 1.67 million tonnes of CO_2 per year, greatly exceeding the minimum Round 3 CCPI requirement of 300,000 tonnes per year.
- Satisfying electricity demand with low-carbon high-H_2 power from coal feedstock while making progress toward a less than 10 percent increase in the cost of electricity (COE) for gasification systems through revenues generated by multiple products.
- Achieving greater than 90 percent CO_2 capture efficiency for the entire coal-gasification syngas stream (and 90 percent on a facility-wide basis), significantly exceeding the minimum Round 3 CCPI requirement of 50 percent capture efficiency.
- Increased domestic oil production of about seven million barrels a year, which would contribute to the U.S. economy and energy security.
- Providing a low-carbon footprint for domestic agricultural fertilizer markets and substantially reducing foreign imports through production of about 685,700 tonnes of urea per year.
- Providing a 'lead-the-fleet' path forward for new coal-based poly-generation facilities to provide economical energy and other valuable products, while significantly reducing the anthropogenic component of atmospheric GHG.

PROJECT STATUS

The project received its final air quality permit from the Texas Commission on Environmental Quality on December 28, 2010. The front-end engineering and design (FEED) was completed in July 2011. The National Environmental Policy Act final Environmental Impact Statement (EIS) was issued in July 2011 and the Record of Decision was issued in September 2011. A FEED Update was completed in February 2015. A final supplement analysis for the final EIS, addressing the FEED Update, was issued in May 2015. In August 2016, the DOE made a final determination to discontinue its participation in the TCEP.

Contacts

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