the ENERGY lab

PROJECT FACTS

Clean Coal Power Initiative (CCPI 3)

Hydrogen Energy California Project: Commercial Demonstration of Advanced IGCC with Full Carbon Capture

Project Description

Hydrogen Energy California, LLC (HECA) will design, build and operate a greenfield, commercial scale, fully integrated advanced Integrated Gasification Combined Cycle (IGCC) with carbon capture and sequestration (CCS) in Kern County, California. The HECA Project will achieve approximately 90% CO_2 capture efficiency while sequestering approximately 2,000,000 tons per year for beneficial use in enhanced oil recovery (EOR) while providing base-load, low-carbon electricity to the California electricity grid. The Project will employ GE gasification technology to generate approximately 250 MW (net) of electricity using a 75% western bituminous coal/25% petroleum coke fuel blend during the DOE Demonstration Phase. The off-take agreements contemplated by HECA will enable sequestration of over two million tons of CO_2 per year during the DOE Demonstration Phase and for the life of the Project thereafter. The captured CO_2 will be transported via pipeline to the Elk Hills oil field approximately 5 miles away from the HECA power plant site. The Elk Hills oil fields are well characterized fields operated by Occidental of Elk Hills Inc. (Oxy). The CO_2 will enable additional domestic oil production, which will contribute to our national energy security.

Artists Rendition of HECA 250 MW IGCC Plant with Carbon Capture and Sequestration

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ADDITIONAL PARTICIPANTS

Fluor (Engineering)
URS (Permitting Manager)
GE Energy (Gasifier and Power Block)

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U.S. DEPARTMENT OF ENERGY

LOCATION

Greenfield Site in
Kern County, CA

ESTIMATED PROJECT DURATION

109 months

COST

Total Project Value
$2.84 Billion

Total Anticipated Construction Cost
$2.32 Billion

DOE/Non-DOE Share
$308,000,000 / $2,532,000,000

The Project incorporates an advanced, IGCC system with CCS while employing numerous technological innovations in a first of a kind approach. The HECA project will provide strong basis for subsequent broad commercial replication of this technology, both domestically and globally. HECA will have the lowest power plant emissions of any commercial coal plant built in the U.S. to date or under construction and will significantly exceed the emission targets for 2020 under the 2005 Energy Policy Act. The Rectisol® process will be used for acid gas recovery and to achieve high CO_2 capture efficiency.

The project also innovatively addresses water quality and availability issues in the greater Kern County region, issues that are widely prevalent in the western United States, via utilization of local non-potable brackish groundwater for all of its process and cooling water supply. This brackish groundwater has a negative impact on agricultural and subsurface water quality in the area. HECA consumption of this brackish water will beneficially impact local agricultural activity and subsurface water quality. HECA will also incorporate a 100% zero liquid discharge (ZLD) system. All Project wastewater, including wastewater generated from the IGCC, raw water treatment and cooling tower blowdown will be directed to ZLD systems with the recovered water recycled for reuse in the process. This further reduces the water demands of the Project.

Benefits

The HECA project will generate low-carbon hydrogen power to meet California's increasing power demand while capturing CO_2 (approximately 2,000,000 tons per year) and sequestering it in nearby oil fields. In doing this, the project will address climate change concerns, enhance US energy security, and boost domestic oil production.

HECA's system configuration was selected because it presents unique advantages:

- It will achieve approximately 90% CO_2 capture efficiency and sequester approximately 2,000,000 tons per year while providing base-load, low-carbon electricity to the California electricity grid.
- It incorporates beneficial use of CO_2 for EOR and sequestration, which is likely to play a major role in commercialization of IGCC with high levels of CO_2 capture. EOR brings economic as well as energy security benefits.
- It provides for emissions of criteria pollutants that are lower than emission targets for 2020 under the 2005 Energy Policy Act. The permit application for the Project indicates criteria pollutant emissions equal to or below any other permitted IGCC (with or without CCS) while meeting California requirements.
- The proposed plant will maximize use of non-potable water for its power production needs, preserving California's limited freshwater sources.
- The new plant is anticipated to boost the local economy by creating 1,500 local construction jobs and over 100 permanent operational positions.

Project Status

The project was awarded on September 30, 2009.