

HECA news and update

low-carbon power for California

fall 2010

HECA meets air quality rules

The San Joaquin Valley Air Pollution Control District issued its preliminary determination that the proposed Hydrogen Energy California facility meets all local air quality regulations, including the use of Best Available Control Technology and emission offsets.

In addition, HECA has committed to investing nearly \$700,000 into other programs administered by the air district to fund air quality improvement projects targeted toward the most polluted parts of the valley.

The funds will be made available during the first two years of future plant operations to help farmers in the area replace old tractors and polluting water pump motors. The money may also be used for projects such as replacing old school buses in nearby towns.

The air district's "determination of compliance" is reviewed as part of the California Energy Commission's assessment of the HECA project (see related story at right).

CEC issues initial assessment on HECA

In its early evaluation of the Hydrogen Energy California project, the California Energy Commission found the 250-MW power plant planned for western Kern County would comply with all applicable laws, ordinances, regulations and standards and would not have significant adverse environmental impacts on the areas studied.

As the lead agency in the plant permitting and approval process, the CEC released in August the first of a two-part Preliminary Staff Assessment, which serves as the staff's initial evaluation of the project.

In Part 1, commission staff addressed air quality, efficiency, facility design, geology and paleontology, hazardous materials, noise and vibration, public health, reliability, socioeconomic

resources, traffic and transportation, transmission line safety nuisance and engineering, worker safety and fire protection. Its early conclusions are that "significant adverse direct, indirect or cumulative impacts are not likely to occur in any of the technical areas..."

Part 2 of the PSA, which will be released later this year, covers biological, cultural, soil, water and visual resources, as well as land use and waste management. It also looks at project alternatives and carbon dioxide enhanced oil recovery and storage.

After both parts are issued, a Final Staff Assessment will be released. The FSA will serve as staff's testimony at CEC hearings. If approved, the HECA facility would begin construction in 2012 with initial startup in 2015.

a look at area's potential for CCS

Geological formations in the Central Valley and its potential for carbon capture and storage were among the topics discussed at a CCS public workshop at California State University Bakersfield on October 1.

The workshop -- which attracted about 200 attendees and featured a dozen renowned scientists, industry leaders and local specialists -- provided a forum to discuss CCS, current technologies, applications around the world, its potential to reduce greenhouse gas emissions, and more.

Dr. Jan Gillespie, professor of geology at CSU Bakersfield, said the valley's depleted oil and gas reservoirs were ideal for CCS due to its geologic makeup consisting of layers of porous and nonporous rock and impermeable caprock. The caprock acts as a seal and prevents oil, gas and carbon dioxide, or CO₂, from reaching the surface.

Gillespie explained there are 23 oil fields in Kern County that meet the criteria for



Dr. Rob Negrini of CSUB's geology department addresses workshop attendees.

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a business perspective on HECA



Robin Fleming

The Hydrogen Energy California plant continues its journey through the public permitting process, yet local communities are already experiencing its benefits, according to an opinion piece published September 16 in the *Bakersfield Californian*.

The author, Robin Fleming, senior manager of business development for the Kern Economic Development Corp., writes, "The HECA power generation project proposed in west Kern County is the kind of economic development force and new investment this county needs and should support."

She notes the project represents over \$2 billion in capital investment in the county and will generate 1,500 construction jobs, several hundred direct and indirect jobs and add millions of dollars in new local tax revenues. It will also help reduce dependence on foreign oil, revive some oil fields and generate low-carbon electricity while capturing 90% of the carbon dioxide that normal power plants might emit.

"A local oil company would take that CO₂ and inject it deep into its underground sandstone reservoirs to assist in recovering oil that would otherwise remain in the field -- while simultaneously sequestering the CO₂ within the oil field, keeping it from the atmosphere where it may contribute to global climate change," she says.

While the San Joaquin Valley Air Pollution Control District determined the project would meet stringent pollution control limits, Fleming notes, "HECA took a step further to help the local air district by providing \$700,000 to fund

air quality improvement projects targeted to the most polluted areas of the valley."

Fleming adds a project of this size and scope offers the opportunity to draw new clean-tech investment to the county while ensuring environmental quality.

a look at area's potential for CCS *(continued from pg. 1)*

CCS as established by the U.S. Geological Survey. These include a minimum depth of 3,000 feet and a minimum storage size of 12.5 MM barrels of oil, or 1 to 1.4 MM metric tons of CO₂. She noted the Elk Hills Oil Field near the planned Hydrogen Energy California plant represents the area's largest storage potential for CCS.

Other workshop participants included: Dr. Horace Mitchell, CSUB president; Dr. Bob Horton, chair, CSUB geology department; Dr. Rob Negrini, CSUB professor of geology; Les Clark, executive vice president, Independent Oil Producers Assn.; Dr. Roger Aines, carbon fuel program, Lawrence Livermore National Laboratory; Stacey Shepard, South Valley Office for Great Valley Center; Dr. Liz Burton, technical director, and Rich Myhre, outreach coordinator, West Coast Regional Carbon Sequestration Partnership, California Energy Commission; William Barrett, CO₂ business manager, Occidental Petroleum Corp.; Tiffany Rau, board member, California CCS Coalition, and Richard Chapman, president, Kern Economic Development Corp.

This was the second workshop held on the Bakersfield campus. Additional CCS workshops were held in Sacramento, Los Angeles, and Washington, DC.

in the community



Buttonwillow School's John Caulfield (second from left) is flanked by HECA team members Jordan Feilders, Pete Kefalas, Jessica Brown and Tom Rye.

HECA sponsors local 5K

Hydrogen Energy California was the lead sponsor in the Buttonwillow Elementary School Runner's Club 5K race held September 18 at the town's annual Fall Farm Festival.

Four members of the HECA team participated in the race along with more than 100 community members. HECA contributed \$500 to the festival and provided raffle prizes.

CSUB students create CCS model

Three Cal State Bakersfield students created a table-top display of the HECA facility and carbon capture and storage process, thanks to a \$5,000 HECA grant to the

school's Department of Geology.

The display, which includes graphics of the CO₂ injection and storage process as well as information about CCS, will be used for HECA outreach and education in the community.



CSUB students who created the display (from left), Jera Tucker, Alyshia Parnell and Christine Hagerman.

HECA gives to water well fund

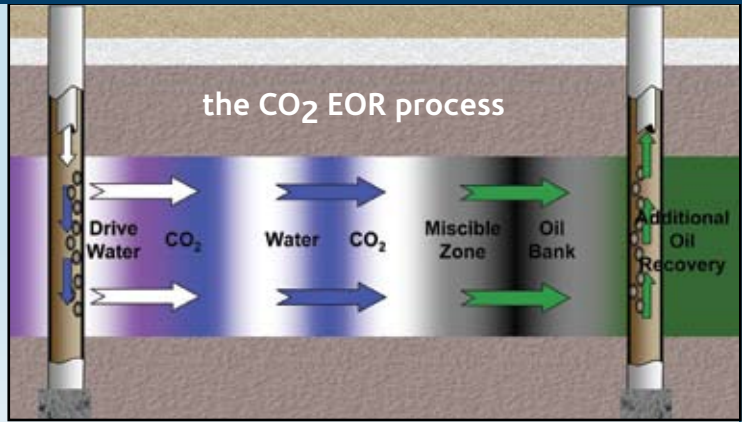
In October, HECA gave \$500 to the Bakersfield American Public Works Assn. and American Society of Civil Engineers' campaign to fund the construction of a drinking water well in the developing world. The grant will be given to the H2Oproject.org, an organization that builds and maintains water wells for international communities in need.

CO₂ and EOR - a winning combination

The Hydrogen Energy California plant will be capturing carbon dioxide generated by its gasification operations, and neighboring oil producer, Occidental of Elk Hills, Inc., will be using it in its enhanced oil recovery operations. Oxy, which owns the Elk Hills Oil Field near the HECA site, sees the CO₂ as a means to recover trapped oil and extend the life of its oil field.

The injection of CO₂ into oil wells can increase the amount of oil that can be extracted. The practice, known as CO₂ EOR (enhanced oil recovery), has been around for nearly 40 years. There are currently 100-plus CO₂ EOR projects nationwide with more than 100 million tons of CO₂ annually injected in oil fields and over 3,000 miles of CO₂ transportation pipelines. Oxy operates most of those projects.

The HECA project calls for using pet coke with coal as needed and non-potable water to produce hydrogen and CO₂. The hydrogen will be used to generate low-carbon electricity while the CO₂ will be compressed into a liquid form, piped to the Elk Hills field and injected for CO₂ EOR. As described below, CO₂ EOR inevitably results in permanent storage of injected CO₂. Oxy estimates the CO₂ will help it produce additional



oil that would otherwise remain trapped in the ground.

Injected a mile or more underground, the CO₂ will become trapped within layers of porous and permeable rock. Impermeable layers of caprock, such as shale, act like seals that keep the CO₂ trapped underground just as the oil and gas have been trapped for millions of years.

Since CO₂ EOR has been ongoing for almost 40 years, regulations are well-established, and there is a wide range of monitoring programs -- similar to how oil and gas wells are monitored -- that are intended to account for CO₂ and ensure there is no leakage.

workshop addresses CO₂ EOR

As part of its review of the Hydrogen Energy California project, the California Energy Commission held a public workshop to address the use of carbon dioxide for permanent storage and enhanced oil recovery operations.

Held August 17 in Sacramento, the workshop focused on the first draft of Occidental of Elk Hills, Inc.'s "Monitoring Reporting and Verification" Plan. Oxy plans to use CO₂ from HECA to enhance oil recovery at its Elk Hills Oil Field.



Elk Hills Oil Field.

The plan is designed to identify and assess the risk of potential CO₂

leakage to the surface, monitor to confirm injected CO₂ behaves as expected and determine storage volumes. Oxy stated the site is ideal for CO₂ EOR for several reasons, including:

- The Elk Hills Oil Field has been studied and extensively documented during its 100-plus year history and has extensive past records regarding field

pressures and gas and fluid compositions.

- The target injection zones are located within a geologic structure that is known to have contained oil and natural gas for millions of years, indicating an insignificant risk of leakage.
- Extensive monitoring capabilities are in place, including a central control system that continuously monitors pressures and fluid composition.
- All the wells and facilities are metered and Oxy intends to use data from existing systems and additional data to calculate the volumes of stored CO₂.

The Oxy plan is being reviewed as part of the commission's Preliminary Staff Assessment of the HECA project (see *related story*, page 1).

CCS featured in *Clean Energy Future*

Carbon capture and storage was featured in *California's Clean Energy Future*, a report that describes the key elements needed to achieve the state's energy and environmental goals in 2020 and beyond.

Released by California's Air Resources Board, Energy Commission, Public Utilities Commission, Environmental Protection Agency and Independent System Operator on September 21, the report discusses the importance of CCS and the operation of a major electric generation facility with CCS in the near future.

HECAs 'pioneering effort' in NYT

The Hydrogen Energy California project was hailed in the *New York Times* as "a pioneering effort being closely watched from a number of levels."

Published August 13, the story holds up the HECA plant as a catalyst for debate over a "decarbonized energy system."

The article states the project has "charmed state regulators" but "has a ways to go," including "permits from 18 different federal, state, and local agencies before construction can begin next year."

The story goes on to say, "HECA may still have the best shot at winning public support because it has financial support and its technology is the most conservative among large-scale projects being planned."

about HECA

Hydrogen Energy California has proposed its new hydrogen-powered electricity generating facility for the Kern County area that would store most of its carbon-related emissions. Instead of using natural gas to run its turbine electrical generators, this plant will use hydrogen. The result will be local low-carbon baseload power generation for a state with growing power demands - enough power for over 150,000 homes - along with reductions in the emission of carbon dioxide (CO₂), the most common greenhouse gas. The captured CO₂ emissions will be stored deeply underground and will not be released into the atmosphere.

For more information, visit www.hydrogenenergycalifornia.com or call the Information Line at (661) 632-2536. You can also visit HECA's Information Center, located at 189 E. Front St. in Buttonwillow. The center, which is open Monday through Friday from 8:30 a.m. to 5 p.m., can be reached at (661) 764-6442.

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coalition launches website

The California CCS Coalition, formed this past spring to promote carbon capture and storage use in the state, launched a new website that features a variety of resources on



CCS, including fact sheets, videos and news articles.

The site also provides information on coalition activities as well as state legislative and regulatory proceedings related to CCS.

To view the site, go to <http://caccscoalition.org>.

CCS review panel meets

The blue ribbon panel created by Gov. Arnold Schwarzenegger to review CCS state policies held its last two public meetings in August and October of this year to continue its work on the formulation of CCS regulatory, legislative and policy recommendations for California.

At both meetings in Sacramento, the California Carbon Capture and Storage Review Panel heard presentations and comments on various regulatory, statutory and policy issues confronting CCS. The panel will use this information to prepare a report, which is expected to be completed later this year.

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Hydrogen Energy California

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