STATE OF CALIFORNIA
PUBLIC UTILITIES COMMISSION
SAN FRANCISCO, CA 94102-3298

ARNOLD SCHWARZENEGGER, *Governor*

March 17, 2009 **Advice Letter 2274-E**

Akbar Jazayeri
Vice President, Regulatory Operations
Southern California Edison Company
P O Box 800
Rosemead, CA 91770

Subject: Request to Establish a Memorandum Account and Authorization to Recover up to $30 Million in Costs for a California IGCC Study

Dear Mr. Jazayeri:

Advice Letter 2274-E is effective February 20, 2009 per Resolution E-4227A.

Sincerely,

Julie A. Fitch, Director
Energy Division

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

Akbar Jazayeri
Vice President of Regulatory Operations

October 10, 2008

ADVICE 2274-E
(U 338-E)

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA
ENERGY DIVISION

SUBJECT: Request to Establish a Memorandum Account and Authorization to Recover Up to $30 Million in Costs for a California IGCC Study

Southern California Edison Company (SCE) hereby submits for approval the following changes to its tariff schedules. The revised tariff sheets are listed on Attachment A and are attached hereto.

This advice filing requests that the California Public Utilities Commission (Commission) approve a modification to SCE's tariff schedules (Preliminary Statement, Part N, Memorandum Accounts) to establish a new memorandum account and to authorize recovery of up to $30 million in costs necessary to co-fund a feasibility study related to the development of an integrated gasification combined cycle (IGCC) facility with carbon capture for use in Enhanced Oil Recovery (EOR) with sequestration, called Hydrogen Energy California (HECA), to be recorded to this memorandum account.

SCE will participate in the HECA study with Hydrogen Energy International LLC (HEI). SCE will record its share of the costs for the HECA study, up to $30 million, in the HECA Memorandum Account (HECAMA) and hereby requests authorization to recover the amounts recorded to HECAMA in the appropriate consolidated rate proceedings after the Commission approval of this Advice Letter. SCE will present the entries to the HECAMA for Commission review in a future Energy Resource Recovery Account (ERRA) Reasonableness proceeding to determine that they were reasonably incurred in compliance with the resolution approving this Advice Letter.

P.O. Box 800 2244 Walnut Grove Ave. Rosemead, California 91770 (626) 302-3630 Fax (626) 302-4829

I. INTRODUCTION AND SUMMARY OF REQUEST

A. Purpose

Global warming and energy security are two important issues facing California and the nation today that require attention now. The Governor and state legislature have already taken the national lead in establishing a number of policies aimed at reducing greenhouse (GHG) emissions and increasing California's energy independence.[1] Achieving an 80 percent reduction in GHG emissions below the 1990 levels during a period when California's population is projected to reach 60 million people by 2050 (an increase of 25 million people over the 2000 decennial census) will require extreme decarbonization of all sectors of California's economy. Therefore, there is a critical need to take affirmative steps towards developing projects – not just policies – that will generate low-carbon electricity within California and still meet the growing energy needs of California's electricity consumers.

The HECA study and the development of the HECA facility, if found feasible and commercially reasonable by the study, will achieve both the goal of providing sustained GHG reductions and meeting California's energy needs. As further explained in this Advice Letter and attached exhibits, the HECA study will evaluate the feasibility of an HECA facility that will be designed to produce low-carbon baseload electricity by gasifying California's non-conventional fuels (primarily petroleum coke and potentially biomass) to produce hydrogen for electric generation through an IGCC, and to capture the CO_2 for EOR with sequestration in California's oil fields. Such non-conventional fuel is currently exported primarily to Asia and used for uncontrolled combustion. It can be kept in California and used to produce much needed baseload low-carbon electricity and other significant benefits for California, including a cleaner environment, jobs, and additional energy security through EOR.

Baseload low-carbon electricity is also needed to significantly reduce emissions in the transportation sector since any significant CO_2 reduction strategy will likely include electric or plug-in hybrid vehicles. Power plants built now will be powering these vehicles in 2050.

HECA study provides an opportunity to bring together the entities with the expertise and experience to execute this first-of-a-kind project. As stated by Hensley Energy Consulting LLC in its independent assessment in Exhibit SCE-3, "HECA represents the most advanced IGCC project in the U.S. where carbon capture and sequestration features are included in the initial facility to be constructed."

The HECA facility is expected to position California at the forefront of developing modern, low-carbon electric generation facilities with EOR and sequestration. To make this happen though, California and its agencies need to think creatively about electric generation within the state, and begin to approve projects that will help achieve the

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[1] See *infra* Section II.

state's environmental and energy-security goals. The HECA study is one of them. And the time to act is now.

B. Consistency with Commission Policy

By filing this Advice Letter, SCE is pursuing a course of action consistent with Decision (D.)08-04-038. In that decision, the Commission approved SCE's request to conduct a study to evaluate the feasibility and costs of a Clean Hydrogen Power Generation (CHPG) plant subject to certain conditions, including a directive that SCE "seek opportunities to leverage the research authorized in [the] decision" and seek other funding opportunities.[2] In this Advice Letter, SCE requests authority to establish the HECAMA to track the costs SCE will incur to participate in the HECA study and to recover those costs in the appropriate consolidated rate proceedings after Commission approval of this Advice Letter. SCE anticipates that the results of the HECA study will add to and enhance the results of SCE's separate CHPG study approved in D.08-04-038. Indeed, by participating in a study already commenced and funded by HEI, SCE is following the Commission's directive in D.08-04-038 to leverage and seek funding from other entities to further advance clean hydrogen technologies utilizing sequestration. Moreover, SCE will provide a minority portion of the funding for the study. HEI and other participants will provide all of the intellectual property and engineering information as well as the majority of the funding to advance the study.

SCE is not seeking to modify the funding approved in D.08-04-038. The CHPG and HECA studies are separate and seek to determine the feasibility of two distinct, albeit related, technologies. In the CHPG study, SCE is seeking to determine the feasibility of a clean hydrogen generation project utilizing coal with carbon capture and sequestration in saline aquifers; that project is most likely to be located outside of California in a western state with coal resources. In the HECA study, SCE and HEI are seeking to determine the feasibility of a commercial scale clean hydrogen generation project that would utilize petroleum coke or a petroleum coke blend with carbon capture for use in EOR with sequestration within the state of California. Accordingly, SCE is seeking authorization in this Advice Letter to establish the HECAMA to record its share of HECA study costs and to recover those costs in the appropriate consolidated rate proceedings after Commission approval of this Advice Letter. SCE will present the entries to the HECAMA for Commission review in a future ERRA Reasonableness proceeding to determine that they were reasonably incurred in compliance with the resolution approving this Advice Letter.

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[2] D.08-04-038, Conclusion of Law No. 12.

C. Summary of Benefits

The HECA study will evaluate the feasibility of developing a facility that will generate clean energy using petroleum coke (or a petroleum coke blend) to produce hydrogen for electric generation, and will capture the extracted CO_2 for EOR with sequestration in nearby depleted oil fields within the state. Although IGCC facilities and carbon capture and sequestration processes are individually proven technologies, there is currently no commercial-scale generation facility in operation anywhere in the world that integrates IGCC with carbon capture and sequestration. As a first-of-a kind study, the HECA study will help to create the technical, cost, regulatory, financial, and commercial framework to lay the foundation for generation resources within California that could utilize petroleum coke, coal, and biomass to generate baseload low-carbon electricity using IGCC with carbon capture and sequestration. Further, it positions California as the leader in this important technology to accelerate wide-scale and critically needed national and international carbon capture and sequestration deployment.

In addition, such a facility will have economic benefits to California. It will reduce California's reliance on foreign crude imports by increased crude production utilizing EOR. It further provides fuel diversity and a low-carbon alternative to generating electricity using natural gas. The HECA facility, if found feasible and commercially reasonable, will also provide local benefits by means of additional tax revenue from income, payroll, property, and sales taxes, including those resulting from EOR, as well as provide other direct economic benefits by stimulating the local economy of Kern County, California, where the HECA facility will be located. The HECA facility also advances SCE's efforts to develop a generation and procurement strategy that provides low-carbon baseload generation and will help the state of California achieve its environmental and energy security objectives. Indeed, as a regulated utility, SCE is uniquely positioned to be an instrument of Commission policy to help achieve these objectives.

Furthermore, SCE anticipates that studying the feasibility of a HECA project will enhance the results of SCE's separate CHPG study by providing additional information that can be used in assessing the information learned in the CHPG study. Although different in scope and subject matter, the HECA and CHPG studies are sufficiently related that information learned in each of the studies will provide better information from which to evaluate the applicability of the results.

Given the substantial benefits associated with advancing HECA, SCE's request to record its share of HECA study costs in HECAMA and to receive Commission authorization to recover these costs in the resolution disposing of this Advice Letter is sound and reasonable and should be granted.[3]

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[3] See Governor Schwarzenegger's letter to President Peevey on May 22, 2008 attached as Attachment 1 to Exhibit SCE-1.

D. ATTACHMENTS

The following attachments support this Advice Letter.

A. ***Revised Tariff Sheets***

B. ***Exhibit SCE-1 – Report providing a description of HECA study benefits and proposed ratemaking***

C. ***Exhibit SCE-2 – Report providing a description of the HECA study and HEI's contribution***

D. ***Exhibit SCE-3 – Report providing an independent assessment of the benefits SCE will obtain by participating in the HECA study***

E. ***Non-Binding Letter of Intent between HEI and SCE dated September 10, 2008 (without last two attachments)***

II. BACKGROUND

A. California Regulations and Policy Goals

California is a national leader in addressing today's complex issues concerning energy and it has set ambitious goals to reduce statewide GHG emissions and increase California's energy independence:[4]

- In 2005, the State energy agencies issued Energy Action Plan II (EAP II). EAP II emphasized "[the] need to develop and tap advanced technologies to achieve [the] goals of reliability, affordability and an environmentally-sound energy future."
- Assembly Bill 32 (AB 32) was passed to reduce GHG emissions to 1990 levels by 2020. AB 32 requires the California Air Resources Board (CARB) to assign emissions targets to each sector in the California economy and to develop regulatory and market methods to ensure compliance, which take effect in 2012. The Commission and the California Energy Commission (CEC) are to develop specific proposals to CARB for implementing AB 32 in the electricity sector, possibly including a cap-and-trade program.
- Governor Schwarzenegger's Executive Order S-3-05 sets a State target of reducing GHG emissions to 80 percent below 1990 levels by 2050.
- To reduce the State's reliance on conventional coal-fired power generation, the CEC has supported initiatives providing technical support for clean coal projects that can successfully compete for federal funding and incentives.

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[4] The goals are reflected in multiple executive orders issued by the Governor, legislation, and other regulatory initiatives, which SCE discusses in its supporting exhibits attached to this Advice Letter.

California's specific interest is in high-efficiency commercial-scale facilities with western system applicability. In this case, clean coal means non-combustion coal gasification technology.

- Senate Bill 1368 (SB 1368), passed in 2006, establishes an Emission Performance Standard (EPS) for GHG emissions from power plants used to serve baseload power in California, which was set by the Commission at 1,100 pounds of CO_2 per megawatt hour (MWh) of electricity. This law effectively prohibits California utilities from owning or contracting long term with coal-fired power plants, in- or out-of-state, unless they are operated with carbon capture and sequestration (CCS). The intended effect of SB 1368 is to encourage low-carbon power production.
- AB 1925, a law passed in 2006, required the CEC to provide a report to the California legislature by November 2007 "with recommendations for how the State can develop parameters to accelerate the adoption of cost-effective geologic carbon sequestration strategies." This type of legislation clearly demonstrates California's commitment to supporting and encouraging in-state CCS demonstration technology.
- Executive Orders S-3-05 and S-7-04 set forth a state policy to encourage the investigation and development of low-carbon electricity and the use of hydrogen as a clean fuel.

In addition, Governor Schwarzenegger, in a letter to President Peevey on May 22, 2008, further encouraged the Commission's efforts to meet these ambitious goals:

> I applaud the commitment that you and your fellow commissioners, along with each of the state investor-owned utilities, have shown in meeting this challenge, especially by recognizing the role of carbon capture and storage (CCS) and the importance of demonstrating hydrogen production for power and other uses at scale in California. I encourage you to accelerate your efforts by identifying and supporting an in-state low-carbon technology demonstration project that can be developed in partnership with a California investor-owned utility. I look forward to hearing confirmation of a near-term demonstration of IGCC with carbon capture and storage project, and to providing my personal support to making such an important goal become a reality in California.

If shown to be technically feasible and commercially reasonable, HECA facility will add 250 MW of baseload low-carbon power to the grid, provide environmental benefits, particularly in regards to reducing GHG emissions, and help California meet its environmental objectives under AB 32, AB 1925, and SB 1368. HECA is also designed

to support Executive Orders S-7-04 and S-3-05 concerning developing the use of hydrogen as a clean fuel.

B. Advancing Clean Hydrogen Technology Will Help California Meet Its Environmental Objectives and Energy Needs

The ambitious statewide goals set forth above require the rapid advancement of technologies that will reduce GHG output from electric generation resources. To achieve sustained GHG reductions and still meet California's energy needs, California must consider advancing baseload, low-emitting generation technologies.[5] Clean hydrogen generation from carbon-based fuels, such as petroleum coke from California's refineries, should be considered as a prime candidate to be such a resource.

As explained in Exhibits SCE-1, SCE-2, and SCE-3, the HECA study will evaluate the feasibility of an HECA facility that will be designed to bring major environmental and energy security benefits to California by generating clean, low-carbon electricity through gasifying petroleum coke or a petroleum coke blend to produce hydrogen for electric generation, and capturing CO_2 for EOR and sequestration in California. The HECA facility could, therefore, enable California to utilize a significant local energy resource (petroleum coke is a by-product of the refining of crude oil by in-state refineries) that is currently exported to produce approximately 250 MW of low-carbon baseload power while permanently sequestering CO_2 and other GHGs. If all current statewide petroleum coke exports were used in similar projects, as much as 1,500 MW of low-carbon baseload power could be produced.

In reducing California's impact on global emissions by avoiding transportation of petroleum coke from in-state refineries to areas outside of the state and crude oil to the state, the HECA facility could avoid a significant amount of criteria pollutant emissions that have been observed to travel from Asia to California.[6] HECA could prevent a California energy source from being burned in boilers in Asia without carbon capture, preventing the generation of an additional 2 million tons/year of CO_2 emissions (roughly equivalent to the CO_2 output of 500,000 automobiles).

The construction and operation of the HECA facility will create a low carbon energy center in the San Joaquin Valley with significant future growth potential that is aligned with California's policy goals of reducing GHG emissions and developing increased energy security through hydrogen electric generation.

In addition, HECA will have significant economic benefits including energy security and job creation. The HECA facility, for example, could reduce California's reliance on

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[5] SCE's efforts to study the generation technology described herein are in addition to its ongoing development of renewable power and other efforts to promote GHG-reduction in the electricity sector, including through advanced metering, demand reduction, energy efficiency, electric vehicles, etc.

[6] New York Times, "Pollution from Chinese Coal Casts a Global Shadow," June 11, 2006.

foreign crude imports through increased crude production of an estimated 5 to 15 percent by utilizing the captured CO_2 for EOR and sequestration. A more detailed explanation concerning the numerous benefits of this technology and the reason to pursue it at this time is provided in Exhibits SCE-1, SCE-2, and SCE-3.

C. The Need to Deploy Carbon Captures and Sequestration Now

Carbon capture and sequestration has a central role to play in emissions reduction because it can help bridge the gap between the need to reduce GHG emissions and the continued use of fossil fuels. Indeed, numerous studies, including those by the Electric Power Research Institute (EPRI), by the Massachusetts Institute of Technology (MIT), by Princeton University, and by others,[7] have stressed the major role carbon capture and sequestration must play in order to meet targets for GHG emissions reduction. This role is likely to be significant in California, in the United States as a whole, and in the world.

While petroleum coke gasification, gas purification with carbon capture, and combined cycle electricity generation are fairly well-established technologies on their own, the integration of the technologies with sequestration on a commercial scale has not yet been performed. There are currently no solid-fueled IGCC projects that include carbon capture and sequestration in operation in California or elsewhere in the world. There are only three operating IGCC plants in the U.S. (with an additional 12 worldwide), and all operate without carbon capture and sequestration. A synthetic natural gas plant operates in North Dakota that includes carbon capture and sequestration but does not generate electricity. In addition, of the approximately 15 IGCC power projects currently under design or development (but not yet operating) in the U.S., only the FutureGen project at Mattoon, Illinois (which recently lost support from the U.S. Department of Energy and is on hold until at least 2009) is being designed to include above 80 percent carbon capture and sequestration. Indeed, only four of the IGCC power projects being developed in the U.S. are including *any* level of carbon capture in their initial design (as opposed to being capable of being retrofitted to include carbon capture and sequestration, known as “carbon capture ready” designs).

The HECA study will evaluate the development of the first integrated IGCC power plant with carbon capture and sequestration in the world; moreover, in terms of GHG emissions, it would be cleaner than any conventional fossil-fueled power generation, including natural gas.[8] It can provide a commercial demonstration of the technology that could stimulate wider state- and nationwide (and indeed worldwide) carbon capture

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[7] Electric Power Research Institute, 2007. The Power to Reduce CO_2 Emissions: The Full Portfolio. Available from http://mydocs.epri.com/docs/public/DiscussionPaper2007.pef.
MIT Joint Program on the Science and Policy of Global Change, 2007. Assessment of U.S. Cap and Trade Proposals. Report No. 146.
S. Pacala and R. Socolow, “Stabilization Wedges: Solving the Climate Problem for the Next 50 Years With Current Technologies,” Science, 13 August 2004, 968-72.

[8] *Id*.

and sequestration deployment. Early deployment of carbon capture and sequestration has the potential to lead to substantial reductions in cumulative worldwide GHG emissions totaling many billions of tons.

The need for early deployment of carbon capture and sequestration is particularly pressing because of the long lead times in the power generation industry. Several years are required to design, permit, and build a power plant. These long lead times mean that the time required to get the technology down its cost curve is correspondingly long. The sooner the first carbon capture and sequestration projects are constructed, the sooner cost reductions will occur. This will enable very large scale deployment in the future. Costs will be lower for widespread deployment if the first deployment of carbon capture and sequestration is not delayed.

D. The HECA Study Involves a Unique Collaboration

As further described in Exhibit SCE-2, an unprecedented collaboration between regulated and non-regulated sectors will be required in order to complete the HECA study. As an instrument of the Commission uniquely positioned to implement vital environmental and energy security policy objectives, SCE has the experience, expertise, and ability to enhance the development of new energy and fuel resources under the Commission's direction. HEI, as a private sector company, brings the technical, subsurface, and large complex project integration expertise necessary to resolve the challenges inherent in integrating the new technologies in an IGCC with carbon capture and sequestration project. In addition, HECA will also involve two oil and gas industry leaders in BP, as a member of HEI, and Occidental Petroleum (Oxy), as a CO_2 purchaser. BP and Oxy collectively have over 40 years of experience in CO_2 EOR. The HECA project, as an opportunity for these companies to work collaboratively on an energy project with a regulated utility, and with the Commission's review of this filing as well as possible future activities before the Commission, arguably represents the quickest and most effective way to meet California's regulatory and leadership goals described above.

Because IGCC with carbon capture and sequestration technology is in the early stages of development, its costs are at the high end of a cost curve that is expected to decline with technological advancements and wide-scale deployment. In addition, CO_2 emissions are expected to become increasingly constrained, increasing CO_2 emissions prices. HECA, with a site already characterized for CO_2 EOR plus sequestration and with the ability to monetize the CO_2 to help offset high initial costs, is ideally placed to become the first operating IGCC with carbon capture and sequestration plant. It can lay the foundation for future projects.

HEI plans to co-fund and advance the HECA study and related work. Therefore, SCE is leveraging funding from other entities to further advance clean hydrogen technologies utilizing sequestration, as directed by D.08-04-038.

E. DESCRIPTION OF STUDY

HEI has filed an Application for Certification (AFC) with the CEC for preliminary siting and analysis of the plant to assess its permittability. This required the development of significant technical, operational, and environmental information. This preliminary siting work is described in Exhibit SCE-2.

The HECA study is divided into two phases. While the phases are generally organized in chronological order by time of implementation, certain aspects of the phases may be implemented on a parallel basis.

Phase I: Phase I shall consist of reports and documents developed for HECA on the following subjects:

- Technology appraisal.
- Feedstock and water.
- Process and system configuration.
- EOR and carbon sequestration.
- Environmental safety and health (ES&H).
- Operations, maintainability, and constructability.
- Water treatment.
- Acid gas removal (AGR).
- CAISO interconnection.
- Value engineering.
- Process design package (PDP).

Phase II: Phase II shall consist of the Front End Engineering Design (FEED) reports and documents developed for HECA.

Prior to commencing Phase II, SCE and HEI intend to negotiate and execute agreements related to the development of HECA including, but not limited to, the purchase of hydrogen through a fuel supply agreement (FSA), the purchase of electricity through a PPA, and/or a development agreement for HECA. If SCE and HEI determine to enter into agreement on the terms of either an FSA or PPA, including whether to apply for a CPCN, a) SCE will require additional co-applicants, and b) HEI will require reasonable commercial certainty regarding HECA implementation contracts and commercial structures. SCE and HEI recognize, if they agree to continue development of HECA after completion of Phase I of the HECA study, that additional funding for HECA would be required. SCE and HEI anticipate that such additional funding would include public and/or private sources. Should such support to ensure

commercial reasonableness not be forthcoming, HEI and SCE will not be required to commence Phase II.

Subject to the Commission's approval of this Advice Letter, SCE anticipates paying HEI for the HECA study as follows:

Payment Schedule	**Payment Amount**
Phase I	
Within thirty (30) days of an acceptable Commission decision approving SCE Advice Letter	$10 million
Within thirty (30) days of HEI Notice of Execution of GE PDP contract	$3.5 million
Within thirty (30) days of HEI's Notice of Completion of GE PDP	$3.5 million
Total Phase I	**$17 million**
Phase II	
Within thirty (30) days of HEI notifying SCE of total Phase II spending of $20 million	$10 million
Within thirty (30) days of delivery of FEED reports and documents to SCE	$3 million
Total Phase II*	**$13 million**
Total Phases I and II*	**$30 million**

* **SCE's total payment amount in Phase II will be approximately $13 million, less SCE's incremental costs (as may be approved by the Commission) associated with the process of applying for and obtaining a Commission decision on a CPCN, FSA or PPA relating to HECA.**

A more detailed description of the HECA study is provided in Exhibit SCE-2.

III. REQUEST TO ESTABLISH THE MEMORANDUM ACCOUNT AND RECOVER THE STUDY COSTS

SCE is requesting Commission authority in this Advice Letter to establish the HECAMA to record all of the costs necessary to study HECA. Entries to the HECAMA shall be made as follows:

- A debit entry to record costs of reports and documents associated with Phase I of the HECA feasibility study, comprised of the following subjects:
  - Technology appraisal.
  - Feedstock and water.
  - Process and system configuration.
  - EOR and carbon sequestration.
  - Environmental safety and health (ES&H).
  - Operations, maintainability, and constructability.
  - Water treatment.
  - Acid gas removal (AGR).
  - CAISO interconnection.
  - Value engineering.
  - Process design package (PDP).
- A debit entry to record costs associated with Phase II of the HECA feasibility study, consisting of the Front End Engineering Design (FEED) reports and documents developed for HECA.
- A debit entry to record SCE's incremental Operations and Maintenance (O&M) Expenses.
- A debit entry to record interest expense by applying the Interest Rate to the average HECAMA monthly balance.

The establishment of the HECAMA is necessary in order to ensure that the HECA study can proceed without delay. Similar to all Commission-approved memorandum accounts, establishing this memorandum account will protect against retroactive ratemaking concerns. SCE also requests authorization from the Commission, in the resolution disposing of this Advice Letter, to recover the amounts recorded to HECAMA in the appropriate consolidated rate proceedings after the Commission approval of this Advice Letter. SCE will present the entries to the HECAMA for Commission review in a future ERRA Reasonableness proceeding to determine that they were reasonably incurred in compliance with the resolution approving this Advice Letter.

A more detailed description of the ratemaking for HECA study is provided in Exhibit SCE-1.

IV. CONFIDENTIALITY

SCE will strive to make information relevant to public policy developed by the HECA study publicly available, consistent with General Order (GO) 96-B, section 9.0 (adopted in Fourth Interim Decision, D.07-01-024). However, as detailed in this filing, the HECA study will address a unique combination of new and existing proprietary technologies in order to develop a new clean fuel source for electric generation from a byproduct of refining combined with carbon sequestration. Clearly, the development of such a new process and related technology requires confidential treatment for trade secret and certain other information related to HECA. New technology information is specifically the type of material recognized in statute, court rule, and prior Commission decisions as deserving of confidential treatment.

SCE anticipates that general information that does not involve a level of detail that will trigger the need for confidentiality will certainly be made available to the public. The detail of this Advice Filing, and the HECA CEC application attached hereto, provide significant HECA Project detail and the expected publicly-available sections of any final HECA study is expected to contain even further detail.

However, the HECA study will necessarily involve commercial relationships between the parties. This will include intellectual property of the parties and third parties with expected confidentiality and non-disclosure clauses and protections. Significant third party vendor engagement is also required for licenses and other proprietary and confidential equipment, designs, and processes that are required to establish HECA feasibility.

Consistent with GO 66-C, information obtained in confidence from other than a business regulated by this Commission, where the disclosure would be against the public interest, is maintained as confidential and not released under a "public records" request. This has traditionally included trade secrets, commercially sensitive and proprietary information, including intellectual property such as that contemplated for HECA.

It is currently anticipated that the HECA study will contain material that must be withheld from public scrutiny at this time. Therefore, pursuant to GO 96-B, SCE requests advance approval to file the full material received as to the HECA study to the Energy Division, but to maintain the confidentiality of data as to which parties and vendors not subject to this Commission's jurisdiction require such confidentiality pursuant to license, confidentiality or non-disclosure agreements. As the extent of this data and information is not known at this time, SCE will submit a more detailed written request for confidential treatment with supporting documentation when the HECA study is completed.

V. AUTHORITY

In Resolution E-4182, the Commission stated that a utility may file an advice letter requesting the establishment of a memorandum account to record new generation or long-term procurement costs only when certain mitigating circumstances exist. Here, SCE is not seeking recovery of new generation or long-term procurement costs; instead, SCE is seeking recovery of a feasibility study's costs. And, as further explained in Exhibit SCE-1, urgent mitigating circumstances exist here, warranting SCE making its request via this Advice Letter. HEI has already funded and commenced Phase 1 of the study, and the remainder of the study will proceed on a fast-paced timeline under which it is anticipated that Phase I will be completed in less than one year. This fast-paced timeline effectively precludes the filing of an application, and requires that SCE seek approval via an advice letter. Accordingly, the Commission should permit SCE to make its request via this Advice Letter.

Furthermore, SCE is aware that GO 96-B generally reserves the filing of an advice letter for matters that are expected neither to be controversial nor to raise important policy questions. SCE believes its request in this Advice Letter is consistent with the Commission and State policy on GHG reduction and is narrow in scope, such that the request does not require an application. To the extent GO 96-B is deemed applicable by the Commission, SCE respectfully requests that the Commission affirmatively waive GO 96-B requirements with respect to this Advice Letter.

VI. TIER DESIGNATION

Pursuant to D.07-01-024, Energy Industry Rule 5.3, this Advice Letter is submitted with a Tier 3 designation.

VII. EFFECTIVE DATE

SCE respectfully requests that this advice filing become effective on the date approved by a Commission resolution.

VIII. NOTICE

Anyone wishing to protest this advice filing may do so by letter via U.S. Mail, facsimile, or electronically, any of which must be received no later than 20 days after the date of this advice filing. Protests should be mailed to:

CPUC, Energy Division
Attention: Tariff Unit
505 Van Ness Avenue
San Francisco, California 94102
E-mail: jnj@cpuc.ca.gov and mas@cpuc.ca.gov

Copies should also be mailed to the attention of the Director, Energy Division, Room 4004 (same address above).

In addition, protests and all other correspondence regarding this Advice Letter should also be sent by letter and transmitted via facsimile or electronically to the attention of:

Akbar Jazayeri
Vice President of Regulatory Operations
Southern California Edison Company
2244 Walnut Grove Avenue
Rosemead, California 91770
Facsimile: (626) 302-4829
E-mail: AdviceTariffManager@sce.com

Bruce Foster
Senior Vice President, Regulatory Affairs
c/o Karyn Gansecki
Southern California Edison Company
601 Van Ness Avenue, Suite 2040
San Francisco, California 94102
Facsimile: (415) 673-1116
E-mail: Karyn.Gansecki@sce.com

There are no restrictions on who may file a protest, but the protest shall set forth specifically the grounds upon which it is based and shall be submitted expeditiously.

In accordance with Section 4 of GO 96-B, SCE is serving copies of this advice filing to the interested parties shown on the attached GO 96-B and A.07-05-020 service lists. Address change requests to the GO 96-B service list should be directed by electronic mail to AdviceTariffManager@sce.com or at (626) 302-2930. For changes to all other service lists, please contact the Commission's Process Office at (415) 703-2021 or by electronic mail at Process_Office@cpuc.ca.gov.

Further, in accordance with Public Utilities Code Section 491, notice to the public is hereby given by filing and keeping the advice filing at SCE's corporate headquarters. To view other SCE advice letters filed with the Commission, log on to SCE's web site at http://www.sce.com/AboutSCE/Regulatory/adviceletters.

For questions, please contact Doug Snow at (626) 302-2035 or by electronic mail at Douglas.Snow@sce.com.

Southern California Edison Company

Akbar Jazayeri

AJ:ds:sq
Enclosures

CALIFORNIA PUBLIC UTILITIES COMMISSION

ADVICE LETTER FILING SUMMARY
ENERGY UTILITY

MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No.: Southern California Edison Company (U 338-E)

Utility type:
☑ ELC ☐ GAS
☐ PLC ☐ HEAT ☐ WATER

Contact Person: James Yee
Phone #: (626) 302-2509
E-mail: James.Yee@sce.com
E-mail Disposition Notice to: AdviceTariffManager@sce.com

EXPLANATION OF UTILITY TYPE
ELC = Electric GAS = Gas
PLC = Pipeline HEAT = Heat WATER = Water

(Date Filed/ Received Stamp by CPUC)

Advice Letter (AL) #: 2274-E Tier Designation: 3

Subject of AL: Request to Establish a Memorandum Account and Authorization to Recover Up to $30 Million in Costs for a California IGCC Study

Keywords (choose from CPUC listing): Memorandum Account, EOR/Enhanced Oil Recovery

AL filing type: ☐ Monthly ☐ Quarterly ☐ Annual ☑ One-Time ☐ Other

If AL filed in compliance with a Commission order, indicate relevant Decision/Resolution #:

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL:

Summarize differences between the AL and the prior withdrawn or rejected AL[1]:

Confidential treatment requested? ☐ Yes ☑ No

If yes, specification of confidential information:
Confidential information will be made available to appropriate parties who execute a nondisclosure agreement.
Name and contact information to request nondisclosure agreement/access to confidential information:

Resolution Required? ☑ Yes ☐ No

Requested effective date: Date approved by a Commission resolution No. of tariff sheets: -3-

Estimated system annual revenue effect: (%):

Estimated system average rate effect (%):

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected: Preliminary Statement Part N and Table of Contents

Service affected and changes proposed[1]:

Pending advice letters that revise the same tariff sheets: 2062-E-B

[1] Discuss in AL if more space is needed.

Protests and all other correspondence regarding this AL are due no later than 20 days after the date of this filing, unless otherwise authorized by the Commission, and shall be sent to:

CPUC, Energy Division
Attention: Tariff Unit
505 Van Ness Ave.,
San Francisco, CA 94102
jnj@cpuc.ca.gov and mas@cpuc.ca.gov

Akbar Jazayeri
Vice President of Regulatory Operations
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Attachment A

Cal. P.U.C. Sheet No.	Title of Sheet	Cancelling Cal. P.U.C. Sheet No.
Revised 44296-E**	Preliminary Statement Part N	Revised 44369-E**
Revised 44297-E	Preliminary Statement Part N	Revised 42854-E
Revised 44298-E	Table of Contents	Revised 44206-E

PRELIMINARY STATEMENT Sheet 2

(Continued)

N. MEMORANDUM ACCOUNTS (Continued)

2. Definitions. (Continued)

d. Specified Project (Continued)

Section No.	Specified Project	Interest Bearing Memorandum Account*	
(1)	Purpose – Not a Specified Project		
(2)	Definitions – Not a Specified Project		
(3)	Self-Generation Program Incremental Cost (SGPIC) Memorandum Account	Yes	
(4)	Catastrophic Event	Yes	
(5)	Reliability Costs Memorandum Account (RCMA)	Yes	
(6)	Not Used		
(7)	Not Used		
(8)	Result Sharing Memorandum Account (RSMA)	Yes	
(9)	Mass Media Campaign Memorandum Account (MMCMA)	Yes	
(10)	Research, Development, and Demonstration Royalties	Yes	
(11)	Distributed Generation Implementation Cost Memorandum Account (DGICMA)	Yes	
(12)	Advanced Metering and Demand Response Memorandum Account (AMDRMA)	Yes	
(13)	California Power Exchange Wind-Up Charge Memorandum Account (PXWUC)	Yes	
(14)	Income Tax Component of Contribution Memorandum Account	Yes	
(15)	Not Used		
(16)	DWR Franchise Fee Obligation Memorandum Account	Yes	
(17)	Renewable Transmission Feasibility Study Costs	Yes	
(18)	Quarterly Compliance Filings Audit Expense Memorandum Account (QCFAEMA)	Yes	
(19)	Hydrogen Energy California Memorandum Account (HECAMA)	Yes	(T)
(20)	Distributed Energy Resources Memorandum Account (DERMA)	Yes	
(21)	Nuclear Claims Memorandum Account (NCMA) Memorandum Account (DFG Memorandum Account)	Yes	
(22)	Energy Efficiency 2009-2011 Memo Account (EEMA)	Yes	
(23)	GRC Revenue Requirement Memorandum Account (GRC RRMA)	Yes	
(24)	Not Used		
(25)	PBR Distribution Revenue Sharing Memorandum Account	Yes	
(26)	PBR Distribution Rate Performance Memorandum Account (PDRPMA)	Yes	
(27)	Energy Efficiency DSM (EEDSM) Memorandum Account	Yes	
(28)	Energy Settlements Memorandum Account (ESMA)	Yes	
(29)	Affiliate Transfer Fee Memorandum Account	Yes	
(30)	Rate Reduction Bond Memorandum Account (RRB Memorandum Account)	Yes	
(31)	Not Used		
(32)	Agricultural Line Extension Costs Memorandum Account (ALECMA)	Yes	
(33)	Not Used		

* Interest shall accrue monthly to interest-bearing Memorandum Accounts by applying the Interest Rate to the average of the beginning and ending balance.

(Continued)

PRELIMINARY STATEMENT Sheet 24

(Continued)

N. MEMORANDUM ACCOUNTS (Continued)

19. Hydrogen Energy California Memorandum Account (HECAMA) (T)

The purpose of the Hydrogen Energy California Memorandum Account (HECAMA) is to record up to $30 million of costs related to the development of an integrated gasification combined cycle (IGCC) facility with carbon capture for use in Enhanced Oil Recovery (EOR) with sequestration, called HECA. (N)

Entries to the HECAMA shall be made as follows:

a. A debit entry to record costs of reports and documents associated with Phase I of the HECA feasibility study, comprised of the following subjects:

1. Technology appraisal.
2. Feedstock and water.
3. Process and system configuration.
4. EOR and carbon sequestration.
5. Environmental Safety and Health (ES&H).
6. Operations, maintainability and constructability.
7. Water treatment.
8. Acid Gas Removal (AGR).
9. California Independent System Operator (CAISO) interconnection.
10. Value engineering.
11. Process Design Package (PDP).

b. A debit entry to record costs associated with Phase II of the HECA feasibility study, consisting of the Front End Engineering Design (FEED) reports and documents developed for HECA.

c. A debit entry to record SCE's incremental Operations and Maintenance (O&M) Expenses;

d. A debit entry to record interest expense by applying the Interest Rate to the average HECAMA monthly balance. The review and disposition of costs recorded in the HECAMA shall be made in a proceeding expressly provided for by the Commission. (N)

(Continued)

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(Continued)

Attachment B

Exhibit No.:	SCE-1
Authors:	Southern California Edison Company
	Hydrogen Energy International LLC

Report on the Benefits of the HECA Study and Proposed Ratemaking in Support of Advice Letter for Authorization to Incur and Recover Costs Necessary to Determine Feasibility of a Central California Integrated Gasification Combined Cycle Plant with Enhanced Oil Recovery and Carbon Sequestration

October 10, 2008

Report on the Benefits of the HECA Study and Proposed Ratemaking in Support of Advice Letter for Authorization to Incur and Recover Costs Necessary to Determine Feasibility of a Central California Integrated Gasification Combined Cycle Plant with Enhanced Oil Recovery and Carbon Sequestration

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Table Of Contents (Continued)

I.

INTRODUCTION

A. Purpose

In its Advice Letter filing, Southern California Edison Company (SCE) requests that the California Public Utilities Commission (Commission) approve a modification to SCE's tariff schedules to establish a new memorandum account and to authorize recovery of up to $30 million necessary to co-fund a feasibility study related to the development of an integrated gasification combined cycle (IGCC) facility with carbon capture for use in Enhanced Oil Recovery (EOR) with sequestration called Hydrogen Energy California (HECA), to be recorded to this memorandum account.

SCE will participate in the HECA study with Hydrogen Energy International LLC (HEI). SCE will record its share of the costs for the HECA study, up to $30 million, in the HECA Memorandum Account (HECAMA) and hereby requests authorization to recover the amounts recorded to HECAMA in the appropriate consolidated rate proceedings after the Commission approval of SCE's Advice Letter. SCE will present the entries to the HECAMA for Commission review in a future Energy Resource Recover Account (ERRA) Reasonableness proceeding to determine that they were reasonably incurred in compliance with the resolution approving SCE's Advice Letter.

B. Consistency with Commission Policy

By filing its Advice Letter, SCE is pursuing a course or action consistent with Decision (D.) 08-04-038. In that decision, the Commission approved SCE's request to conduct a similar study to evaluate the feasibility and costs of a Clean Hydrogen Power Generation (CHPG) plant subject to certain conditions, including a directive that SCE "seek opportunities to leverage the research authorized in [the] decision" and seek other funding opportunities.[1] In its Advice Letter, SCE requests authority to establish HECAMA to track those costs in the appropriate consolidated rate proceedings after

[1] D.08-04-038, Conclusion of Law No. 12. D.08-04-038 further required SCE to establish a number of memorandum accounts to track costs associated with the CHPG feasibility study, including establishing a Clean Technology Generation Balancing Account (CTGBA). By this Advice Letter, SCE seeks authorization to establish the memorandum account to track the costs of the study concerning California IGCC, which is consistent with the requirements set forth in D.08-04-038.

Commission approval of SCE's Advice Letter. SCE anticipates that the results of the HECA study will add to and enhance the results of its separate CHPG study approved in D.08-04-038. Indeed, by participating in a study already commenced and funded by HEI, SCE is leveraging funding from other entities to further advance clean hydrogen technologies utilizing sequestration, as directed in D.08-04-038. SCE will provide a minority portion of the funding for the study. HEI and other participants will provide all of the intellectual property and engineering information as well as the majority of the funding to advance the study. If the HECA study demonstrates that a HECA facility is technically feasible and commercially reasonable, the HECA project will bring substantial benefits to California by providing baseload low-carbon electric generation within the state, as well as EOR.

SCE is not seeking to modify the funding approved in D.08-04-038. The CHPG and HECA studies are separate and seek to determine the feasibility of two distinct technologies. In the CHPG study, SCE is seeking to determine the feasibility of clean hydrogen generation utilizing coal with carbon sequestration in saline aquifers, likely in western states outside of California. In the HECA study, SCE and HEI are seeking to determine the feasibility of low-carbon hydrogen generation utilizing petroleum coke or a petroleum coke blend with EOR and sequestration in California. Accordingly, SCE is seeking authorization in this Advice Letter to establish the HECAMA to record its share of HECA study costs and to recover those costs in the appropriate consolidated rate proceedings after Commission approval of SCE's Advice Letter. SCE will present the entries to the HECAMA for Commission review in a future ERRA Reasonableness proceeding to determine that they were reasonably incurred in compliance with the resolution approving SCE's Advice Letter.

C. Summary of Benefits

As more fully explained within SCE-1 and SCE-2, the HECA study will evaluate the feasibility of developing a facility that will generate clean energy using petroleum coke that is a byproduct of California's refineries (or, as needed, petroleum coke and coal or biomass blends) to produce hydrogen for electric generation through an IGCC, and will capture the CO_2 for EOR with sequestration in deep

underground oil reservoirs. Numerous studies, including by EPRI, MIT, Princeton, and others,[2] have stressed the major role carbon capture and sequestration must play in meeting targets for GHG emissions reduction. This role is likely to be significant in California, the United States as a whole, and the world. Although IGCC and sequestration processes are individually proven technologies, there is currently no commercial-scale generation facility in operation anywhere in the world combining IGCC with carbon capture and sequestration. With the ambitious goals recently established in California,[3] there is a critical need to advance new technologies such as those utilized by HECA to reduce GHG output from electricity generation sources, particularly those utilizing carbon-based fuels. As a first-of-a-kind study, the HECA study will help to create the technical, cost, regulatory, financial, and commercial framework to lay the foundation for generation resources within California utilizing petroleum coke, coal, and biomass to generate baseload low-carbon electricity using IGCC with carbon capture and sequestration. Further, it positions California as the leader in this important technology to accelerate wide-scale and critically needed national and international carbon capture and sequestration deployment.

In addition, such a facility, if found to be technically feasible and commercially reasonable, will have economic benefits to California. It will reduce California's reliance on foreign crude imports through increased crude production from EOR utilizing CO_2. It further provides fuel diversity and a viable alternative to California's large and increasing dependence on natural gas. HECA will also provide broadly based additional tax revenue and other direct economic benefits by stimulating the state's economy in the local Kern County community by creating jobs associated with construction and operation of a HECA facility in the state.

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[2] Electric Power Institute, 2007. The Power to Reduce CO_2 Emissions: The Full Portfolio. Available from http://mydocs.epri.com/docs/public/DiscussionPaper2007.pdf;

MIT Joint Program on the Science and Policy of Global Change, 2007. Assessment of U.S. Cap and Trade Proposals, Report No. 146.

S. Pacala and R. Socolow, "Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies," Science, 13 August 2004, 968-72.

[3] These goals are reflected in the passage of AB 32 and SB 1368 (discussed herein) and other regulatory initiatives.

Given the substantial benefits associated with advancing HECA, SCE believes that its request to record costs provided to study HECA is sound and reasonable and should be granted.[4]

II.

HECA WILL BRING SUBSTANTIAL ENVIRONMENTAL AND ECONOMIC BENEFITS TO CALIFORNIA

The HECA facility will produce baseload low-carbon electricity by gasifying 100 percent petroleum coke (or as needed, blends of petroleum coke and other solid fuels such as coal or biomass) to produce hydrogen for baseload low-carbon electric generation in an IGCC, and capturing CO_2 for EOR and sequestration in the Elk Hills Oil Field Unit near Kern County, California. Petroleum coke is a by-product created through the refining process of crude oil. Turning a low-value refinery by-product into much needed baseload low-carbon power has significant environmental and energy-independence benefits for California.

A. California Regulations and Policy Goals

California has enacted several policies and executive orders to address GHG emissions from power plants:

- In 2005, the State energy agencies issued Energy Action Plan II (EAP II). EAP II emphasized "[the] need to develop and tap advanced technologies to achieve [the] goals of reliability, affordability and an environmentally-sound energy future."
- Assembly Bill 32 (AB 32) was passed to reduce GHG emissions to 1990 levels by 2020. AB 32 requires the California Air Resources Board (CARB) to assign emissions targets to each sector in the California economy and to develop regulatory and market methods to ensure compliance, which take effect in 2012. The Commission and the California Energy Commission (CEC) are to develop specific proposals to CARB for implementing AB 32 in the electricity sector, possibly including a cap-and-trade program.

[4] See Governor Schwarzenegger's letter to President Peevey on May 22, 2008, attached as Attachment 1 in Exhibit SCE-1.

- Governor Schwarzenegger's Executive Order S-3-05 sets a State target of reducing GHG emissions to 80 percent below 1990 levels by 2050.
- To reduce the State's reliance on conventional coal-fired power generation, the CEC has supported initiatives[5] providing technical support for clean coal projects that can successfully compete for federal funding and incentives. California's specific interest is in high-efficiency commercial-scale facilities with western system applicability. In this case, clean coal means non-combustion coal gasification technology.
- Senate Bill 1368 (SB 1368), passed in 2006, establishes an Emission Performance Standard (EPS) for GHG emissions from power plants used to serve baseload power in California, which was set by the Commission at 1,100 pounds of CO_2 per megawatt hour (MWh) of electricity. This law effectively prohibits California utilities from owning or contracting long term with coal-fired power plants, in- or out-of-state, unless they are operated with carbon capture and sequestration. The intended effect of SB 1368 is to encourage low-carbon power production.
- AB 1925, a law passed in 2006, required the CEC to provide a report to the California legislature by November 2007 "with recommendations for how the State can develop parameters to accelerate the adoption of cost-effective geologic carbon sequestration strategies." This type of legislation clearly demonstrates California's commitment to supporting and encouraging in-state carbon capture and sequestration demonstration technology.

Governor Schwarzenegger, in a letter to President Peevey on May 22, 2008,[6] applauded and further encouraged the Commission's efforts to fulfill these goals:

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[5] AB 1925, Blakeslee, Ch. 471, Statutes of 2005 – requires CEC to submit a report to the Legislature containing recommendations for how the state can develop parameters to accelerate the adoption of cost-effective geologic sequestration for the long-term management of industrial carbon dioxide. CEC Docket 06-IEP-IO – Notice of Committee Workshop to Address Clean Coal Technology and Carbon Dioxide Capture and Storage.

[6] Attachment 1 in Exhibit SCE-1.

> I applaud the commitment that you and your fellow commissioners, along with each of the state investor-owned utilities, have shown in meeting this challenge, especially by recognizing the role of carbon capture and storage (CCS) and the importance of demonstrating hydrogen production for power and other uses at scale in California. I encourage you to accelerate your efforts by identifying and supporting an in-state low-carbon technology demonstration project that can be developed in partnership with a California investor-owned utility. I look forward to hearing confirmation of a near-term demonstration of IGCC with carbon capture and storage project, and to providing my personal support to making such an important goal become a reality in California.

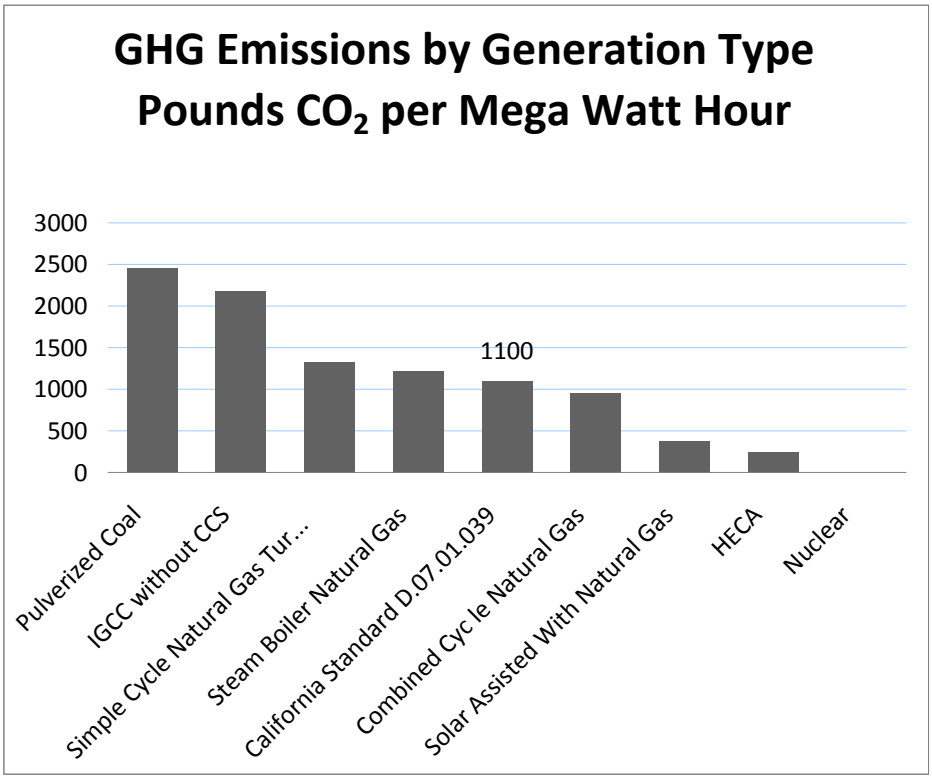
HECA would add 250 MW of baseload low-carbon power to the grid, provide environmental benefits in regards to GHGs (among others), and help California meet its obligations under AB 32, AB 1925, and SB 1368. As discussed below, HECA's estimated CO_2 emissions per MWh are well below any other carbon-based fuel. HECA is also designed to support Executive Order S-3-05, discussed above, as well as Executive Order S-7-04 because of its production of hydrogen fuel.

B. HECA Can Support State Goals to Reduce GHG Emissions

The figure below shows the estimated amount of CO_2 per MWh released by various generation technologies. A typical pulverized coal plant emits approximately 2,460 pounds of CO_2 per MWh, a combined cycle natural gas plant approximately 960 pounds per MWh, and an IGCC without carbon capture and sequestration approximately 2,180 pounds per MWh.[7] In contrast, HECA would emit approximately 250 pounds per MWh during steady-state operations. Advancing this technology supports California's ambitious goals for reducing GHG emissions, and at the same time enhances energy security by utilizing domestic fuels.

[7] *See* Figure II-2.

Figure II-1
Baseload Generation GHG Emissions



In HECA, the CO_2 is removed prior to combustion (pre-combustion carbon capture) and sequestered underground rather than released into the atmosphere.

C. The Challenge for California in Meeting its Emissions Reduction Goals

California faces even greater challenges than many other jurisdictions in reducing emissions from electric generation because in some respects California has more limited options. California already has a large proportion of generation from natural gas, making it more difficult to reduce emissions levels by fuel switching, which would be available on systems with a high proportion of coal-based generation (although there is some potential for reducing emissions by improving the efficiency of the current inventory of gas plants). Furthermore, current California law prohibits the construction of new nuclear generation facilities within the state. Accordingly, plants with carbon capture and sequestration represent the most promising source of secure low-carbon baseload power to complement

renewables and increased efficiency as a means of securing target reductions in GHG emissions from California's power sector.[8]

In addition, low-carbon electricity or low-carbon hydrogen is likely to be essential in securing the necessary reductions in transportation sector emissions. These account for 40% of total California emissions, a higher proportion than in most other jurisdictions. Although increasing the efficiency of the vehicle fleet will allow some emissions reductions, deep cuts in emissions are likely to require either fuel cell vehicles, which will require hydrogen from low-carbon sources, or plug-in hybrid or electric vehicles, which require low-carbon power. Power generation with carbon capture and sequestration is thus likely to play a central role in reducing California's emissions.

D. Key Project Benefits for California

HECA will have numerous environmental and economic benefits for California. HECA will provide approximately 250 MW of new, baseload, low-carbon generating capacity, enough to power over 150,000 homes. It would provide approximately 1.8 million MWh annually, more than 25% of all the wind-based electricity dispatched to the California grid in 2007. When dispatch factors are taken into account, HECA would be equivalent to the output from approximately 750 MW of wind power. This output would be provided at a time when the CEC estimates that to meet peak energy demand growth, the State will need to add over 9,000 MW in capacity between 2008 and 2018.[9]

HECA enables California to utilize a significant local energy source (petroleum coke) that is currently exported primarily to Asia to produce 250 MW of low-carbon baseload power for the State. If all current California petroleum coke exports were used, as much as 1,500 MW of power could be produced. This same technology can also be utilized to bring other non-traditional energy sources into

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[8] The role of renewable energy is limited in part by its intermittency. The role of renewables would potentially be greater with availability of large scale, cost-effective technologies allowing storage of electricity or, in the case of solar thermal generation, high grade heat.

[9] California Energy Commission, California Energy Demand 2008-2018 Staff Revised Forecast. CEC 200-2007-015-SF2, November 2007.

the energy mix including biomass, where as much as 16,000 MW of gross electrical generation potential exists.[10]

HECA also reduces California's reliance on foreign crude imports through increased crude production of an estimated 5 to 15 percent from EOR utilizing CO_2. A U.S. Department of Energy study concluded that a significant portion of California's onshore "stranded oil", up to 5 billion barrels, is potentially recoverable using EOR with CO_2.[11] Thus, there is tremendous potential with carbon capture and sequestration in California because CO_2 EOR would not only enable recovery of this "stranded oil" but, more importantly, allow storage of over 1 billion tons of CO_2 that may otherwise be emitted into the atmosphere.

HECA creates a low-carbon energy center in the San Joaquin Valley aligned with California's policy goals of hydrogen and electricity production with zero or low carbon emissions. The growth opportunity is enormous with significant CO_2 storage and EOR potential, availability of indigenous non-traditional fuels (including petroleum coke and biomass), and substantial power base.

In reducing California's contribution to global emissions by avoiding the transportation of petroleum coke to Asia and crude oil from South America to California, HECA could avoid a significant amount of criteria pollutant emissions that have been observed to travel from Asia to California.[12] HECA could contribute to the prevention of a California energy source being burned in boilers in Asia without carbon capture, potentially eliminating the generation of an additional 2 million tons/year of CO_2 emissions (roughly equivalent to the CO_2 output of 500,000 automobiles).

As discussed above, large reductions in California transportation sector emissions will require the availability of either low-carbon hydrogen for fuel cell powered vehicles or low-carbon electricity for plug-in hybrids or electric vehicles. Because HECA produces low-carbon baseload power as well as

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[10] California Biomass Collaborative, "An Assessment of Business Resources in California, 2006," December 2006.

[11] U.S. Department of Energy study, "Basin Oriented Strategies for CO_2 Enhanced Oil Recovery: Onshore California Oil Basins," April 2005.

[12] New York Times, "Pollution from Chinese Coal Casts a Global Shadow," June 11, 2006.

low-carbon hydrogen, it could materially address two of the most powerful pathways for reducing CO_2 emissions from California's transportation sector.

HECA further provides fuel diversity and a viable alternative to California's large and increasing dependence on natural gas. It provides additional tax revenue from income taxes (including EOR), property and sales taxes, as well as direct economic benefits such as an estimated 1,500 jobs associated with construction and 100 permanent positions associated with HECA operations. HECA provides further indirect economic benefits through stimulating the local economy during its construction and operation. Importantly, HECA positions California as a leader in the development of clean energy technology.

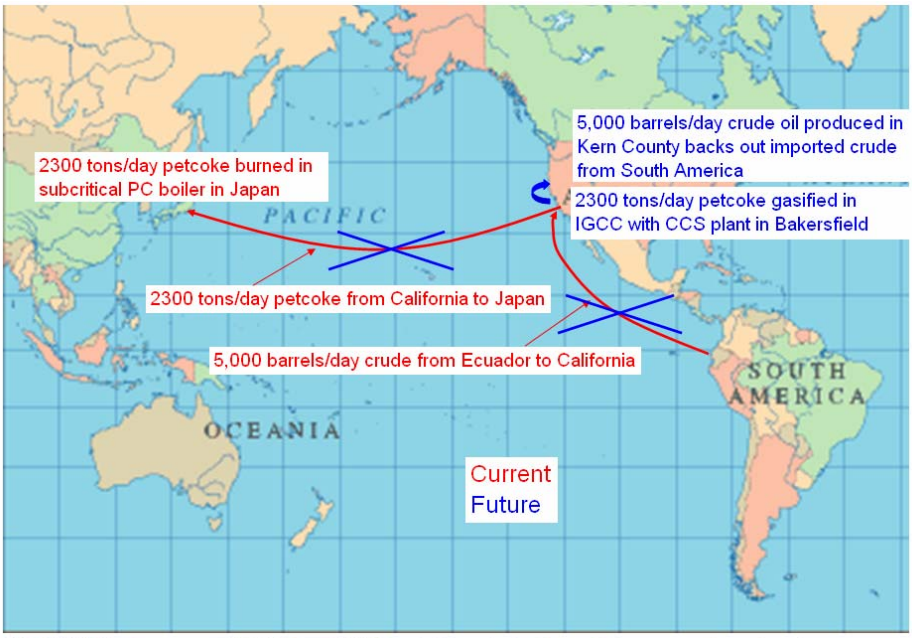
Each of these environmental and economic benefits is described in more detail below.

1. Environmental Benefits

a) Avoided Emissions and Fuel From Petroleum Coke and Crude Oil Transportation

Currently petroleum coke is trucked to the Los Angeles area and shipped approximately 5,500 miles to Asia. HECA reduces the emissions associated with transporting this fuel source by utilizing it locally to produce baseload low-carbon electricity for California. In addition, as California crude oil production has declined, imports have increased. HECA also avoids these crude oil shipping emissions by increasing crude production locally through EOR. The effect on fuel movements is shown in the map below:

Figure II-2
Reduction in Fuel Movements from HECA



Taking into account that HECA will require trucking of petroleum coke to the Kern County area, the net avoided emissions from transporting petcoke and importing crude is estimated to be as follows:

Table II-1
HECA Emissions Savings From Avoided Petcoke and Crude Transportation

Pollutant	**Savings From Avoided Petcoke and Crude Transportation (Tons/Year)**
CO_2	40,000
NO_x	1,600
CO	80
PM_{10}	170
SO_x	9,000

HECA would also avoid approximately 8,000 gallons per day in diesel and bunker fuel from not transporting the petroleum coke and crude.

b) Avoided Global CO_2 and Criteria Pollutant Emissions Generated from California Fuel

The technology employed in HECA results in significant CO_2 emissions savings generated from California fuel as well as low emissions of criteria pollutants including SO_x, NO_x, carbon monoxide (CO), mercury, and particulates. Assuming that 2,300 tons/day of petroleum coke is gasified in an IGCC plant with carbon capture and sequestration instead of burned in a subcritical PC boiler *without* carbon capture, the emissions avoided are as follows:

Table II-2
Emissions Avoided Through Clean Use of California Fuel

Pollutant	**Emissions Avoided Through Clean Use of California Fuels (Tons/Year)**
CO_2	2,000,000
NOx	500
CO	3,500
PM_{10}	270
Sox	1,200

There are also reductions in emissions of heavy metals.

c) Addressing CO_2 Emissions from the California Transportation Sector

Reducing emissions in the transportation sector is particularly important in California. Approximately 40% of California's CO_2 emissions come from the transportation sector,[13] as compared to the U.S. average of approximately 33%.[14] Therefore, addressing transportation emissions

[13] California Energy Commission Greenhouse Gas Inventory.

[14] U.S. EPA.

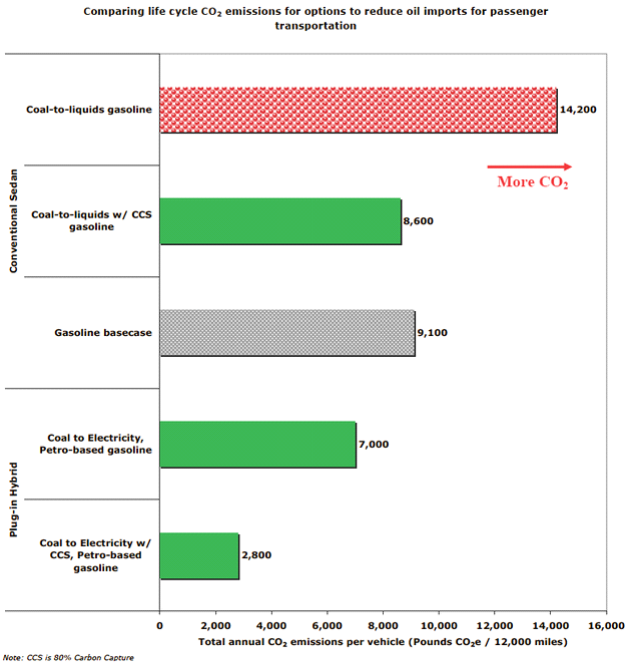
is essential for meeting long-term emissions goals such as those established by AB 32. Reducing emissions from the transportation sector, with its millions of mobile sources, is a challenging task.

Although some reductions in transport emissions may be realized from increased efficiency of vehicles powered by conventional internal combustion engines, large reductions in transport emissions will require the availability of either low-carbon hydrogen for fuel cell powered vehicles or low-carbon electricity for plug-in hybrids or electric vehicles.

Studies such as those performed by Carnegie Mellon University[15] have shown that the plug-in hybrids charged by baseload power with carbon capture and sequestration are much more effective at decarbonizing the transportation sector than synthetic transportation fuels derived from coal, even with carbon capture and sequestration deployed at the point of manufacture, as shown in the figure below.

[15] "For Energy Security and Greenhouse Gas Reductions, Plug-in Hybrids a More Sensible Pathway Than Coal-to-Liquids Gasoline," Tepper School of Business, Carnegie Mellon University. Available on the web at http://wpweb2.tepper.cmu.edu/ceic/papers/ceic-07-04.asp.

Figure II-3
Lifecycle CO_2 Emissions Comparison for Passenger Transportation



HECA produces low-carbon baseload power as well as low-carbon hydrogen. It produces approximately 180 MMscfd of low-carbon hydrogen which is currently projected to be used to produce low-carbon electricity. A portion of this hydrogen could potentially be used for other applications such as transportation. HECA could therefore materially address two of the most significant pathways for reducing CO_2 emissions from California's transportation sector. The same technology that will be technically and commercially demonstrated with HECA can be directly applied for the large-scale production of low-carbon hydrogen for the transportation sector.

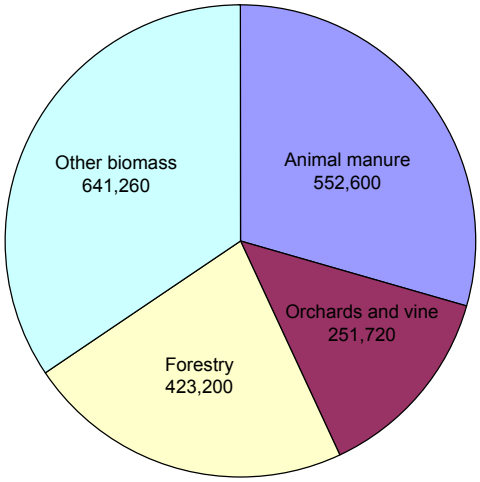
d) The Potential Future Use of Biomass Waste

HEI is currently reviewing the potential to include biomass waste as a partial (5 to 10%) feedstock for HECA. According to the California Biomass Collaborative, biomass in California totaled 83 million gross bone dry tons per year (BDT/year) in 2005 and was projected to increase to 99

million BDT/y by 2020.[16] Gross electrical generation potential from biomass was estimated to be 9,500 MW in 2005 and projected to increase to 16,000 MW in 2020. Increasing restrictions on open burning, prescribed wildland fires, and waste disposal make biomass waste conversion and utilization an increasingly attractive option for California.

In Kern County alone, over 1.9 million BDT/year of biomass is currently available for thermal conversion in the following categories:

Figure II-4
Categories of BioMass Available in Kern County for Thermal Conversion (bone dry tons/year)



Source: California Biomass Collaborative

A total of about 280 MW of gross electrical output could be generated from these available sources.

Some waste biomass in California is already used for power generation. However, the larger quantities are still either disposed of in landfill sites or burned in open air. Disposal of biomass in landfills leads to the production of gases such as methane, a powerful GHG. Some of these produced gases are captured and used in heat or electric generation, but the remaining quantities contribute significantly to overall GHG emissions. In addition to CO_2, burning biomass waste onsite

[16] California BioMass Collaborative, "An Assessment of Biomass Resources in California, 2006," December 2006.

produces other pollutants such as particulates with significant negative impact on local air quality. The effect is such that some counties in California are planning to ban open air burning, creating a further potentially costly disposal challenge to farmers.

Using waste biomass in an IGCC with carbon capture and sequestration process efficiently disposes of the biomass while sequestering most of the produced CO_2. Methane and products of open-air burning are avoided. Landfill volumes, used currently to store large amounts of waste biomass, are preserved for other uses. Finally, a net negative carbon impact on a lifecycle basis results: CO_2 from the atmosphere that living organisms used to produce the original biomass itself is captured and stored.

2. Economic Benefits

In addition to the substantial environmental benefits discussed at length above, HECA enables California to utilize a significant local energy source (petroleum coke) that is currently exported primarily to Asia to produce 250 MW of low-carbon baseload power for the State. HECA also reduces California's reliance on foreign crude imports through increased crude production of an estimated 5 to 15 percent from EOR utilizing CO_2. In addition, HECA will provide fuel diversity and an alternative to California's large and increasing dependence on natural gas and additional direct benefits to California, such as increasing employment and oil production within the state. Indeed, as explained in detail below, HECA will provide additional tax revenue from income taxes (including EOR), property and sales taxes, as well as direct economic benefits such as an estimated 1,500 jobs associated with construction and 100 permanent positions associated with HECA operations in California. HECA will provide further indirect economic benefits through stimulating the local economy during construction and operation.

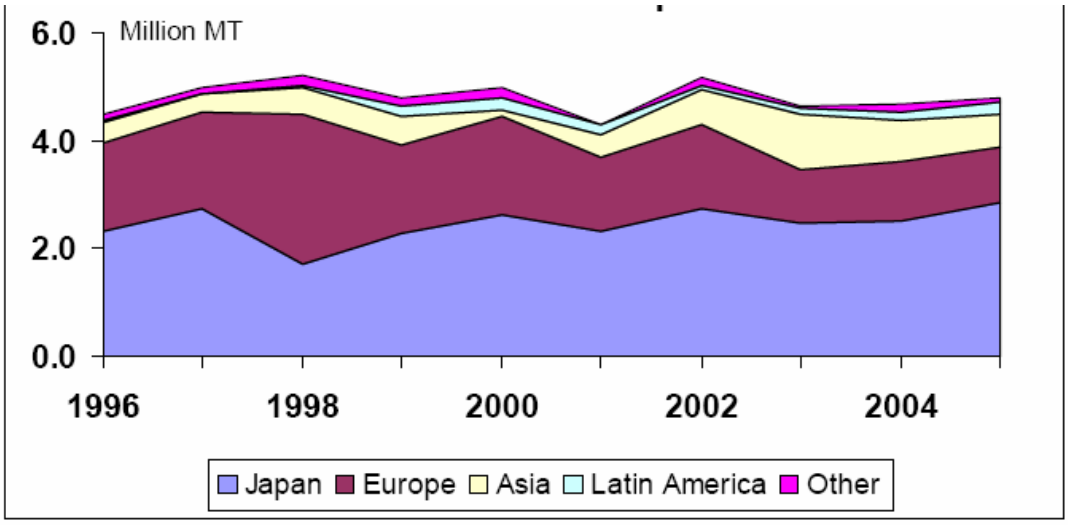
a) Local Use of Petroleum Coke

The U.S. West Coast petroleum coke market is dominated by exports. Excluding the petroleum coke used for calcining (a process to drive off the volatile matter in the petroleum coke), approximately 90% of all fuel-grade petroleum coke on the West Coast is exported. About 5.5 million tons/year (15,000 tons/day) of green (i.e., raw, unprocessed) petroleum coke has historically been exported from the Port of Long Beach. Japan has been the largest consumer of this petroleum coke,

with boiler applications constituting its largest use. The domestic market for West Coast, especially LA Basin, petroleum coke is currently limited, with few cement kilns and Independent Power Producers (IPPs) located within trucking distance of a coker.

HECA enables petroleum coke to be used within the State to generate low-carbon baseload power consistent with existing regulatory requirements while furthering California's long-term policy goals. HECA enables approximately 0.8 million tons per year of petroleum coke (2,300 tons/day), about 15% of total LA Basin exports, to be used to meet California consumers' energy needs rather than being sent to Asia for uncontrolled combustion. This in-state energy utilization could increase significantly in the future, producing up to 1,500 MW of power if all current exports were used.

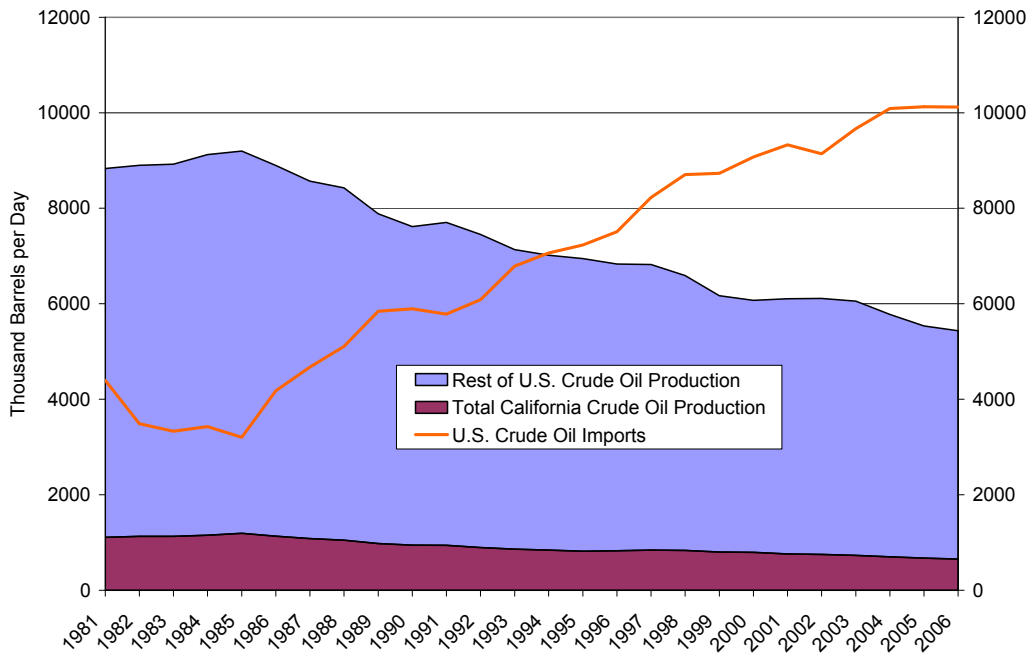
Figure II-5
Historical Los Angeles Green Petcoke Exports



b) Additional Oil Production in California

Oil production in California and the rest of the USA has decreased in recent years while demand has continued to grow, leading to a rise in imports.

Figure II-6
U.S. Oil Production and Imports 1981 – 2006

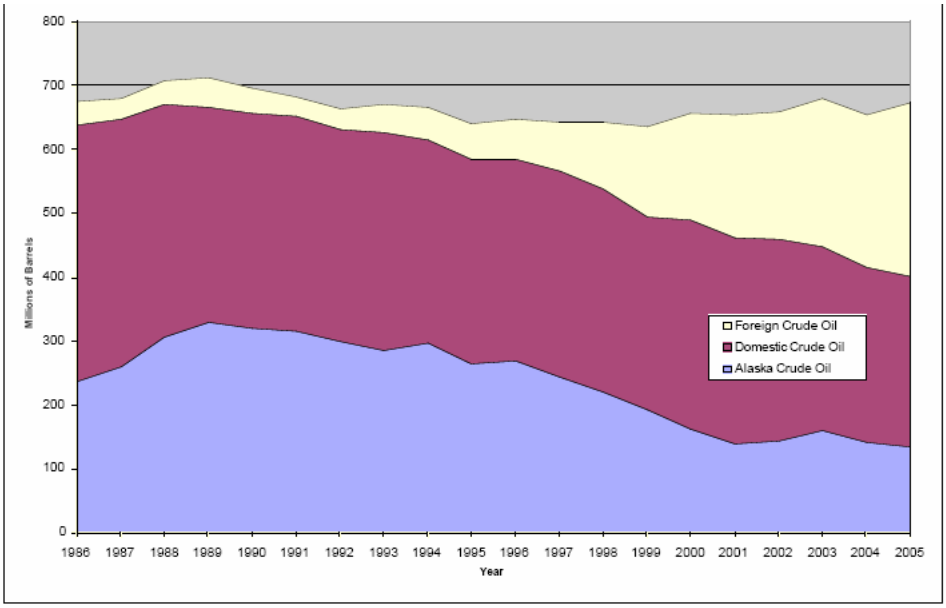


Source: Energy Information Administration, Petroleum Basic Statistics

U.S. oil production has declined from about 8.8 million barrels per day in 1981 to 5.4 million barrels per day in 2006. California production has declined more rapidly, declining over the same period from 1.1 million bbl/day to 0.6 million bbl/day, a level not seen since 1943. As a result of these trends, the U.S. and California have become increasingly dependent on foreign imports. U.S. crude oil imports have increased from about 4 million barrels per day in 1981 to about 10 million barrels per day in 2007.

Foreign imports now account for about 40% of input to California's own refineries compared with only about 3% in 1988. This trend towards increased import dependence is expected to continue as indigenous U.S. production continues to decline.

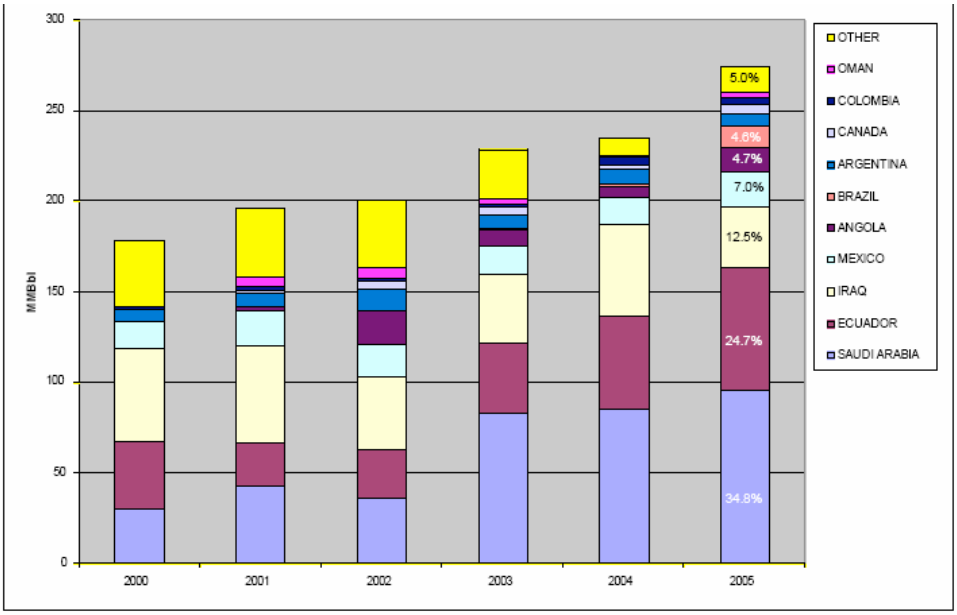
Figure II-7
Crude Oil Supply to California Refineries



Source: Petroleum Industry Information Reporting Act

The majority of the imports to California refineries are from the Middle East, Central America, and South America:

Figure II-8
California Refinery Receipts of Foreign Crude Oil



Source: Energy Information Administration

HECA would mitigate this trend towards dependence on foreign imports by utilizing the CO_2 produced by HECA to produce additional crude oil through EOR from existing fields in the Bakersfield area. HECA would enable the production of an estimated 5,000 – 10,000 barrels per day of additional crude oil for California.

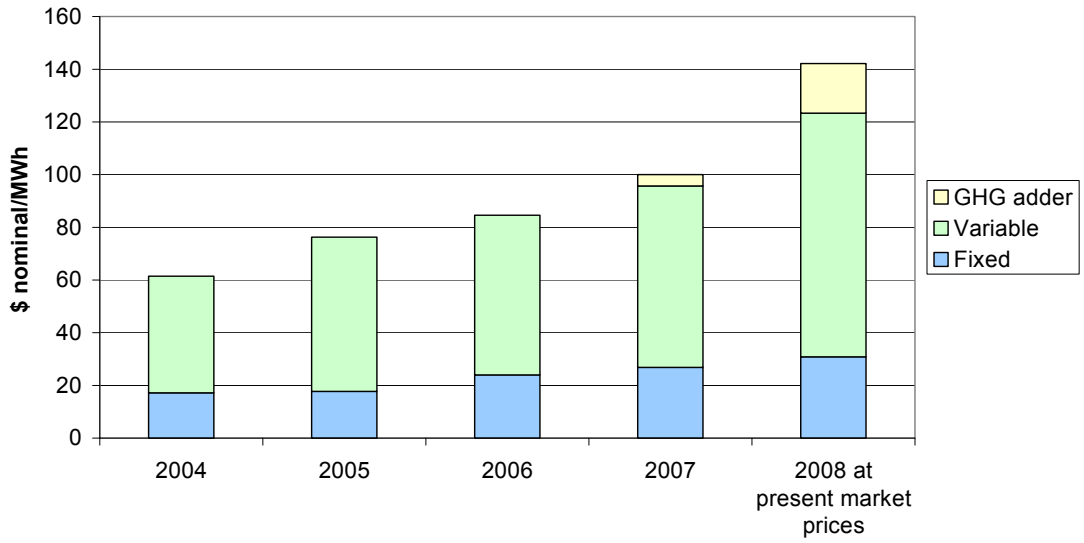
c) Providing an Alternative to Rising Natural Gas and Carbon Prices

California has significant exposure to natural gas prices because of the amount of generation from gas. Each $1/MMBtu increase in the natural gas price increases the cost of power from a modern CCGT by approximately $8/MWh. Increases in the costs of older, less efficient gas plants, which make up the majority of marginal capacity on the California system, are larger still.

The introduction of carbon pricing under a cap-and-trade scheme would also affect the cost of generation from gas plants. Each $10/ton CO_2 rise in the carbon price increases the cost of power from a gas plant by approximately $4/MWh.

As an illustration of the sensitivity of power prices to gas and carbon gas prices, the chart below shows the evolution of the Market Price Referent (MPR)[17] over the last few years. The changes largely reflect the rise in gas prices over the period and the inclusions of a carbon price. If MPR were revised to reflect recently prevailing market conditions, it would rise to approximately $140/MWh.[18]

Figure II-9
Evolution of MPR for 2008



HECA will use primarily petroleum coke; therefore, costs of generation will not directly vary with the natural gas price. There are some emissions of CO_2 from the plant, leading costs to vary with the carbon price. This variation in costs, however, will be less than the variation for a natural gas plant, whose carbon emissions are much greater. HECA thus can protect California from increasing natural gas and carbon prices.

[17] SB 1078 established the Market Price Referent (MPR) as a benchmark for the market-based price for long-term electric contracts.

[18] The gas price in the present market prices case is assumed to be $11/MMBtu. The carbon price is assumed to be $40/ton CO_2 (based on the price under the EU ETS, the only carbon price currently based on wide trading under an emission cap). Both are assumed to remain constant in real terms over the period of the calculation ($2008).

d) Additional Tax Revenues

HECA can provide millions of dollars in tax revenues annually from income, payroll, sales and property taxes, and EOR operations.

With a property tax rate of approximately 1.05 percent on the site itself and the new construction on the site, HECA could potentially provide substantial annual tax revenues for Kern County.

Sales tax revenues for Kern County will increase as a result of (1) local equipment and supply purchases for project construction and operation, and (2) construction and operation worker purchases (i.e., gas, food, and lodging).

HECA can generate millions in sales taxes during project construction. Most of this revenue will go to the State of California, with the remainder retained within Kern County.

HECA will generate millions in payroll taxes from the jobs created by the construction and operation of the facility as described below.

e) Increased Employment

The on-site construction workforce will consist of laborers, craftsmen, supervisory personnel, support personnel, and construction management personnel. The peak construction workforce will include over 1,200 craft workers (on site) and about 250 contractor staff. The average size of the workforce over the site preparation and construction period is estimated to be about 800 workers (including construction workers and contractor staff), with the majority of the workforce expected to be hired from within Kern County.

The total payroll for construction is currently projected to be approximately $350 million. An estimated $750 million will be spent within Kern County on materials and supplies.

Operation and maintenance (O&M) of HECA is estimated to require 100 skilled full-time employees, including 50 to 60 shift workers. In addition to the permanent staff, maintenance workers will be hired on contract for scheduled and unscheduled outages, maintenance activities, and the routine startup and shutdown of the gasifiers.

Operations payroll for HECA is estimated to be[19] approximately $15 million in the first year of operation. About $20 million in material and supply purchases will occur within Kern County. The labor income and materials spending related to HECA will represent a permanent economic benefit to Kern County.

f) Indirect Increases in Employment and Income

Construction activity will result in secondary economic benefits (indirect and induced) within Kern County. Secondary employment effects will include indirect employment due to the purchase of goods and services by firms involved with construction, and induced employment due to construction workers spending their income in their local area.

Estimated secondary effects of construction that will occur within Kern County are[20] over 4,000 jobs, over $200 million in labor income, and over $600 million in economic output. These beneficial effects of HECA will be temporary, occurring over the site preparation and construction period, and will lag behind the direct effects of construction by approximately six to 12 months.

Similar to construction, operation of HECA will result in indirect and induced economic impacts that will occur within Kern County. Unlike indirect and induced impacts from construction, indirect and induced impacts from operation will represent permanent increases in area economic variables, but will still lag behind direct effects by approximately six to 12 months.

Estimated indirect and induced effects of annual operation in Kern County will be approximately 55 additional jobs, $2 million in annual labor income, and $7 million in annual output, based on 2008 dollars. These economic effects will represent a long-term economic benefit to Kern County.

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[19] Estimates in 2008 dollars.

[20] Secondary impacts were estimated using IMPLAN® economic modeling software, an input/output model specific for Kern County.

E. California Leadership in Clean Energy Development

As a first-of-a-kind project, HECA will accelerate the wide-scale deployment of carbon capture and sequestration technologies. It will help lay the foundation for further projects and make California the leader in this important technology.

1. Technical Advancement

HECA would advance carbon sequestration through the capture and utilization of commercial-scale anthropogenic CO_2 streams for injection into deep oil reservoirs for EOR and sequestration. The advancement of these operations will help establish technical guidance for the development of future plant and sequestration siting parameters.

HECA would actively develop and promote sequestration protocols for:

- Geological integrity assurance.
- Mechanical integrity assurance.
- Storage and EOR potentials.
- Reservoir modeling.

HECA would also provide the opportunity to learn information to develop an emerging sequestration capability. It would establish expectations for plant and EOR site operator procedures, which could be accomplished through:

- Operational parameters including rate-ability, reliability, and availability.
- Sub-surface modeling.
- Appropriate well plugging and abandonment procedures.
- Monitoring, measurement, and verification (MMV) programs.
- Decommissioning and site closure expectations.

2. Defining the Carbon Capture and Sequestration Regulatory Framework

HECA will advance the development of a carbon capture and sequestration regulatory framework with the following characteristics:

- Regulations should be simple, streamlined, performance- and risk-based and grounded in sound science to facilitate rapid deployment and address long-term investment decisions.
- Regulations should protect the public interest.
- Regulations should not impede carbon capture and sequestration development.
- Performance- and risk-based protocols should be established for site operation, closure and beyond.
- Regulatory development should consider the key recommendations from interested stakeholders.

Progressing HECA will advance regulatory development more rapidly than would otherwise be possible. This will facilitate wider deployment across the U.S. and internationally.

3. Positioning for Federal Support

HECA will help define the role that state and federal governments should play in providing incentives for development and operation of this low-carbon technology.

Federal support will likely be available for early carbon capture and sequestration projects. Such support has been a feature of proposed cap-and-trade bills and other measures, including the Lieberman Warner Bill (S2191, Sec 3601 – 3605 and Sec 4402-4403), the Boxer amendment to that bill and, separately, Congressman Boucher's proposal for an Early Deployment fund (HR 6258).

Although the size and timing of support vary between the proposals, in each case the magnitude of the proposed support has been substantial, totaling tens or hundreds of billions of dollars. Furthermore, support is weighted towards early projects.

Although these particular measures have not been passed by Congress, future climate change legislation is likely to have similar features.

If California has an early permitted project, it should be well positioned to qualify for federal support, which could offset initial deployment costs of this low-carbon technology.

4. Commercial Advancement

HECA would help establish the types of commercial arrangements that can secure the integration of the complex value chains associated with carbon capture and sequestration and therefore enable projects to proceed in a timely manner.

F. The Opportunity for National and International Leadership

In July 2008, the G8, including the United States for the first time, agreed to reduce GHG emissions by 50 percent by 2050.[21] Five developing nations, including China and India, are insisting that the developed nations cut their emissions by 80 percent since they argue the developed nations are responsible for most of the CO_2 currently in the atmosphere.

Within the U.S., a number of bills have been placed before Congress aimed at reducing U.S. GHG emissions over the next few decades. It is expected that such measures will be taken further under the new Administration in 2009. The two main presidential candidates support measures to reduce GHG emissions, including cap-and-trade legislation.

California, as the largest economy in the U.S., the eighth-largest economy in the world, and the 17th largest producer of GHGs in the world, will be expected to continue leading the U.S. and the world in GHG reduction efforts. As previously discussed, California is providing this leadership by setting a state target of reducing GHG emissions to 80 percent below 1990 levels by 2050.

Reductions in global emissions of GHGs must be achieved to address climate change while demand for fossil fuels, the main current source of manmade GHG emissions,[22] is rising. IGCC with carbon capture and sequestration enables the alignment of these two seemingly irreconcilable issues. According to the International Energy Agency, fossil fuels (coal, oil, and natural gas) currently supply over 85 percent of the world's commercial energy, with consumption expected to continue to grow over the coming decades. Indeed, HECA could be the first commercial IGCC with carbon capture and

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[21] http://unfccc.int/meetings/items/4029.php

[22] Climate Change 2007 Synthesis Report, Intergovernmental Panel on Climate Change, available on the web at http://www.ipcc.ch/ipccreport/ar4-syr.htm. Emissions from agriculture and deforestation are also significant contributions to total GHG emissions.

sequestration power plant in the world and could thus help stimulate wider and critically needed international carbon capture and sequestration deployment. As such it could be a highly leveraged and effective instance of California leadership on GHG emissions reduction.

III.

THE COMMISSION SHOULD APPROVE SCE'S REQUEST WITHOUT DELAY

Action is urgently needed to both begin global carbon capture and sequestration deployment and, for HECA in particular, to ensure the most cost-effective project for ratepayers. Carbon capture and sequestration must begin to be deployed now for it to secure the worldwide emissions reductions required and to avoid the higher costs of widespread deployment that would result if such projects are delayed. For HECA in particular, the lowest cost for ratepayers would be secured by allowing project execution to progress without unnecessary delays to avoid turnover of highly qualified professionals and mitigate the risk of high escalation rates.

A. The Need to Deploy Carbon Captures and Sequestration Now

It is now widely recognized that carbon capture and sequestration has a central role to play in emissions reduction because it can help reconcile the continued use of fossil fuels with the need to reduce emissions. Numerous studies, including by the Electric Power Research Institute (EPRI), Massachusetts Institute of Technology (MIT), Princeton, and others,[23] have stressed the major role carbon capture and sequestration must play in meeting targets for GHG emissions reduction in California, the U.S. as a whole, and the world. Hundreds of plants with carbon capture and sequestration will need to be deployed in the next four decades to meet emissions reduction goals.

While both petroleum coke gasification and gas purification with carbon capture are fairly well established technologies on their own, the integration of the two technologies with sequestration on a

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[23] Electric Power Research Institute, 2007. The Power to Reduce CO_2 Emissions: The Full Portfolio. Available from http://mydocs.epri.com/docs/public/DiscussionPaper2007.pef.

MIT Joint Program on the Science and Policy of Global Change, 2007. Assessment of U.S. Cap and Trade Proposals. Report No. 146.

S. Pacala and R. Socolow, "Stabilization Wedges: Solving the Climate Problem for the Next 50 Years With Current Technologies," Science, 13 August 2004, 968-72.

commercial scale has not yet been performed. There are currently no solid-fueled IGCC with carbon capture and sequestration plants in operation in California or elsewhere in the world. There are only three operating IGCC plants in the U.S. (with an additional 12 worldwide), and all operate without carbon capture and sequestration. A synthetic natural gas plant operates in North Dakota that includes carbon capture and sequestration but does not generate electricity. In addition, of the approximately 15 IGCC power projects currently under design or development (but not yet operating) in the U.S., only the FutureGen project at Mattoon, Illinois (which recently lost support from the U.S. Department of Energy and is on hold until at least 2009) is being designed to include above 80% carbon capture and sequestration.[24] Indeed, none of the IGCC power projects currently being developed in the U.S. are including *any* level of carbon capture in their initial design (as opposed to being capable of being retrofitted to include carbon capture and sequestration, known as "carbon capture ready" designs).

If California acts now, HECA could be the first commercial IGCC with carbon capture and sequestration power plant in the world; moreover, in terms of GHG emissions, it would be cleaner than any conventional fossil-fueled power generation, including natural gas.[25] It could provide the technology and commercial demonstration to help stimulate wider international carbon capture and sequestration deployment. Early deployment of carbon capture and sequestration has the potential to lead to substantial reductions in cumulative worldwide GHG emissions totaling many billions of tons. It has been estimated that a delay of as little as seven years in deploying carbon capture and sequestration technology could increase atmospheric concentration of CO_2 by 10 ppm over the next 50 years.[26]

One of the main reasons for the large effect from delaying deployment of carbon capture and sequestration is the long life of power plants. American Electric Power (AEP), America's largest coal generator, noted in recent testimony to Congress that "we are still operating plants that were built during the Eisenhower, Kennedy, and Johnson administrations and plants built today will be operating during

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[24] SCE's CHPG study contemplates 80 to 90% carbon capture and geologic sequestration.

[25] *Id*.

[26] Shell presentation to Clean Coal Technologies & Strategies Forum, May 2008.

the term of the President who sits in the Oval Office in the 2050s."[27] During the same hearings, the National Resource Defense Council similarly noted that a new power plant without carbon capture and sequestration "carries with it a huge stream of CO_2 emissions that will likely flow for the life of the plant – 60 years or more."[28] This phenomenon is sometimes referred to as emissions lock-in. The sooner carbon capture and sequestration is available, the smaller the quantity of emissions that will be locked in this way.

The need for early deployment of carbon capture and sequestration is particularly pressing because of the long lead times in the power generation industry. Several years are required to design, permit and build a power plant, with HECA expected on line in California in late 2014 or 2015.

These long timescales mean that the time required to get the technology down its cost curve is correspondingly long. If the first carbon capture and sequestration projects are not begun now there will be reduced time for such cost reduction to occur. This will in turn lead to technology being less advanced with higher costs when large scale deployment is required in the future. Costs are thus likely to be higher for widespread deployment if the first deployment of carbon capture and sequestration is delayed.

B. The Need to Maintain Project Momentum

Continuity is a key value driver in today's tight engineering and construction market, a factor which is particularly relevant when developing a highly integrated, first-of-a-kind project. HECA is managed by an experienced team of interdisciplinary professionals working in close collaboration with a number of highly-qualified contractors and consultants to develop the information required to evaluate project feasibility.

Optimum value can be provided to ratepayers by maintaining HECA's management team and well-developed relationships with contractors and consultants. Delays in project implementation will result in significant personnel turnover, both within the management team and with contractors and

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27 AEP Testimony before the House Subcommittee on Energy and Air Quality, July 10, 2008.

28 NRDC Testimony before the House Subcommittee on Energy and Air Quality, July 10, 2008.

consultants. The loss of critical knowledge and experience caused by personnel turnover is significant for any major project and is particularly harmful given the need to fully and effectively integrate the project's many unique aspects.

Gaps in execution become increasingly harmful as the project execution proceeds, and a fundamental principle in HECA's Project Execution Plan is uninterrupted progression from FEED into detailed engineering, procurement, and construction. The overall impact to schedule caused by interruption is greater than the duration of the interruption itself. In today's market, the time required to recruit experienced personnel to fill key positions can add six to twelve months to project schedule in addition to the duration of the gap itself.

Gaps in execution also impact project cost, particularly in a market characterized by high rates of escalation. With a significant gap between completion of FEED and commencement of detailed design, procurement, and construction, placement of orders for equipment, material and services would be delayed until formal project approval. Delayed commitment to HECA will result in greater exposure to price escalation, thereby increasing the uncertainty around expected project cost. And not surprisingly, greater exposure to price escalation will almost certainly increase the ultimate cost of HECA.

C. The HECA Study Involves a Unique Collaboration

An unprecedented collaboration between the private and public sectors will be required in order to make a near-term IGCC with carbon capture and sequestration project a reality. As an instrument of the Commission uniquely positioned to implement vital environmental and energy security policy objectives, SCE has the experience, expertise, and ability to utilize the regulatory process to enhance the development of new energy and fuel resources with the support of its ratepayers. HEI, as a private sector company, brings the technical, subsurface, and large complex project integration expertise necessary to resolve the challenges inherent in integrating the new technologies in an IGCC with carbon capture and sequestration project. In addition, the HECA facility will also involve two industry leaders in BP as a member of HEI and Occidental Petroleum (Oxy), as a CO_2 purchaser. BP and Oxy collectively have over 40 years of experience in CO_2 EOR. Accordingly, the HECA project, as an opportunity for private entities to work collaboratively on an energy project with a regulated utility, and

with the Commission's review of this filing as well as possible future activities before the Commission, arguably represents the most effective and quickest way to meet California's regulatory and leadership goals described above.

Two important elements required for establishing the viability of carbon capture and sequestration are assessing the integrity of the storage formation and demonstrating a commercial and regulatory framework that supports carbon mitigation projects. An investment similar to that for an oil field, taking two to three years and tens of millions of dollars, is needed to demonstrate the CO_2 storage capabilities of a formation. Because HEI has completed these initial studies, moving forward with HECA provides cost savings and several years of schedule advantage over uncharacterized sites. Additionally, HEI has filed an Application for Certification (AFC) with the California Energy Commission (CEC) for preliminary siting and analysis of the plant to assess its permit requirements.[29] This required the development of significant technical, operational, and environmental information and illustrates another schedule advantage for HECA compared to other projects. The HECA study thus represents a timely, cost-effective means to advance an exciting technology and commercial demonstration opportunity for California.

Since IGCC with carbon capture and sequestration technology is in the early stages of deployment, its costs are at the high end of a cost curve that is expected to decline with technological advancements and wide-scale deployment. In addition, CO_2 emissions prices are at the low end of a curve that is expected to increase as carbon emissions become increasingly constrained. HECA, with a site already characterized for CO_2 EOR plus sequestration and with the ability to monetize the CO_2 to help offset high initial costs, is ideally placed to become the first operating IGCC with carbon capture and sequestration plant and lays the foundation for future projects.

D. Sharing Knowledge While Maintaining Confidentiality

Consistent with General Order 96-B, section 9.0 (adopted in Fourth Interim Decision D.07-01-024), SCE will strive to make information relevant to public policy developed by the HECA study

[29] Excerpts of the Application for Certification are included in Attachment 1 in Exhibit SCE-2.

publicly available. However, as detailed in this filing, the HECA study will address a unique combination of new and existing proprietary technologies in order to develop a new clean fuel source for electric generation from a byproduct of refining combined with carbon sequestration. Clearly, the development of such a new process and related technology requires confidential treatment for trade secret and other information related to HECA. New technology information is specifically the type of material recognized in statute, court rule, and prior Commission decisions as deserving of confidential treatment.

SCE anticipates that general information that does not involve a level of detail that will trigger the need for confidentiality will certainly be made available to the public. The detail of this Advice Filing, and the HECA CEC application attached hereto, provide significant HECA Project detail and the expected publicly-available sections of any final HECA study is expected to contain even further detail.

However, the HECA study will necessarily involve commercial relationships between the parties. This will include intellectual property of the parties and third parties with expected confidentiality and non-disclosure clauses and protections. Significant third party vendor engagement is also required for licenses and other proprietary and confidential equipment, designs and processes that are required to establish HECA feasibility.

Consistent with General Order 66-C, information obtained in confidence from other than a business regulated by this Commission, where the disclosure would be against the public interest, is maintained as confidential and not released under a "public records" request. This has traditionally included trade secrets, commercially sensitive and proprietary information, including intellectual property such as that contemplated for HECA.

It is currently anticipated that the HECA study will contain material that must be withheld from public scrutiny at this time. Therefore, pursuant to General Order 96-B, SCE requests advance approval to file the full material received as to the HECA study to the Energy Division, but to maintain the confidentiality of data as to which parties and vendors not subject to this Commission's jurisdiction require such confidentiality pursuant to license, confidentiality, or non-disclosure agreements. As the

extent of this data and information is not known at this time, SCE will submit a more detailed written request for confidential treatment with supporting documentation when the HECA study is completed.

IV.

RATEMAKING

Consistent with the requirements set forth in D.08-04-038, SCE requests Commission authority to establish the HECAMA to record, up to $30 million, SCE's share of HECA study costs, and to recover those costs in the appropriate consolidated rate proceedings after Commission approval of SCE's Advice Letter. The following cost categories will be recorded in the HECAMA.[30]

- Invoiced costs from outside consultants and vendors.
- SCE's incremental Operations and Maintenance (O&M) expenses.

The HECAMA will be an interim regulatory account for recording the initial $30 million of costs. SCE will present the entries to the HECAMA for Commission review in a future ERRA Reasonableness proceeding to determine that they were reasonably incurred in compliance with the resolution approving SCE's Advice Letter. If the results of the HECA study show that a HECA project is technically feasible and commercially reasonable, SCE expects that it would request additional HECA costs in a future Commission proceeding. Consistent with other Commission-authorized memorandum accounts, interest expense will accrue in the HECAMA using the three-month commercial paper rate as published by the Federal Reserve.

V.

CONCLUSION

SCE seeks expedited authority from the Commission to record, up to $30 million, SCE's share of HECA study costs and to recover those costs in the appropriate consolidated rate proceedings after Commission approval of SCE's Advice Letter. SCE will present the entries to the HECAMA for Commission review in a future ERRA Reasonableness proceeding to determine that they were reasonably incurred in compliance with the resolution approving SCE's Advice Letter. Given the

30 There are no HECA-related costs in SCE's currently authorized rate levels, nor are there any HECA-related costs forecast in SCE's 2009 Test Year General Rate Case proceeding (Application No. 07-11-011).

substantial potential benefits associated with advancing California IGCC technology with carbon capture and sequestration, SCE believes that its request is sound and reasonable and should be granted.

The relief sought in the Advice Letter will enable SCE to pursue HECA as a potential additional generation resource that could ultimately serve as a non-intermittent, baseload facility with carbon emissions reduced by approximately 90% during steady state operations. SCE asks that the Commission approve the Advice Letter without delay to permit it to continue with these efforts, to advance the opportunity for California to use this technology as one of a portfolio of options to reduce GHG emissions in accordance with California's environmental and policy objectives and to take a leadership position in the development of clean energy.

ATTACHMENT 1

Letter from Governor Schwarzenegger to President Peevey dated May 22, 2008 regarding CPUC support for low carbon generation project

ATTACHMENT 2

LIST OF ACRONYMS

AB	Assembly Bill
AEP	American Electric Power
AFC	Application for Certification
AGR	Acid Gas Removal
ASU	Air Separation Unit
BACT	Best available control technology
BDT	Bone dry ton
BVWSD	Buena Vista Water Storage District
CAISO	California Independent System Operator
CCGT	Combined cycle gas turbine
CCS	Carbon Capture and Sequestration
CEC	California Energy Commission
CHPG	Clean hydrogen power generation
CO	Carbon monoxide
CO_2	Carbon dioxide
CPCN	Certificate of Public Convenience and Necessity
Commission	California Public Utility Commission
EAP	Energy Action Plan
EOR	Enhanced Oil Recovery
EPC	Engineer, procure, construct
EPRI	Electric Power Research Institute
ES&H	Environmental safety & health
FEED	Front end engineering design
G8	Group of 8 of the world's major industrialized nations

GE	General Electric
GHG	Greenhouse gas
GIPR	Generation Interconnection Process Reform
H_2	Hydrogen
H_2S	Hydrogen sulfide
HECA	Hydrogen Energy California
HEI	Hydrogen Energy International LLC
HP	High pressure
HRSG	Heat Recovery Steam Generator
HSSE	Health, safety, security & environmental
IGCC	Integrated gasification combined cycle
IOU	Investor-owned utility
IP	Intellectual property
IPP	Independent Power Producer
lb	Pound
LP	Low pressure
MIT	Massachusetts Institute of Technology
MMscfd	Million scf per day
MPR	Market Price Referent
MW	Megawatt
MWh	Megawatt-hour
NO_x	Nitrogen oxides
O&M	Operation & maintenance
Oxy	Occidental Petroleum Corporation
PDP	Process design package
PM_{10}	Particulate matter smaller than 10 microns

PPA	Power purchase agreement
ppm	Parts per million
SB	Senate Bill
SCE	Southern California Edison
scf	Standard cubic foot
SCR	Selective catalytic reduction
SO_x	Sulfur oxides
SRU	Sulfur recovery unit
STG	Steam turbine generator
TGTU	Tail gas treating unit
Ton	Short ton = 2000 lb
Tonne	Metric ton = 2204.6 lb

ATTACHMENT 3

Qualifications of Authors

QUALIFICATIONS OF MARK E. NELSON

Mark Nelson is SCE's Director of Generation Planning and Strategy in the Generation Business Unit. My present responsibility includes the broad support of generation initiatives and regulatory efforts at SCE, and management of the Project Development Division.

Mr. Nelson earned a Bachelor of Science degree in Economics from Iowa State University with emphasis work in Chemical Engineering and Systems. He earned a Master of Science degree in Econometrics from Iowa State University with thesis work in electricity demand analysis. He first joined the Southern California Edison Company as a Planning Engineer in 1991 and held various management positions through 1996, including Manager of Real Time Pricing and Customer Software Systems.

In 1996, Mr. Nelson joined Edison Source and held a number of management positions including Director of Retail Energy Operations until his departure in 1999 following the cessation of energy marketing activities. From 1999-2003, he served as Managing Consultant of Commerce Venture Group LLC, with primary responsibility for energy sector consulting and analysis.

Mr. Nelson rejoined Southern California Edison in 2003 as Integrated Planning Manager and was subsequently promoted to Manager of Strategic Projects in the Resource Planning & Strategy Department prior to promotion to my current position. Prior to joining Southern California Edison, Mr. Nelson served as a Consultant for Midwest Solar, Inc., a leading national supplier of large scale solar thermal systems, with responsibility for economic and engineering analysis from 1980-83. From 1983-88, he held management and analysis positions with subsidiaries of MidAmerican Energy, with responsibility for generation and transmission projects, economic analysis, regulatory affairs and customer services. From 1988-91, he served as Vice President of Analysis for DATASSIST, where he was responsible for economic and statistical analysis of electric and gas utility projects.

Mr. Nelson is the author of a number of energy and business books and articles, including: An Econometric Study of Residential Electricity Demand (ISBN 1-56471-005-X), Fundamentals of Business Process Analysis (1-56471-009-2), and "Understanding Natural Gas Demand for Electric Utilities."

QUALIFICATIONS OF PHIL DURGIN

Phil Durgin is an SCE project manager in the Revenue Requirements and Forecasting Division of the Regulatory Policy & Affairs Department. He is responsible for the determination of the revenue requirements and associated ratemaking testimony for proceedings before the CPUC.

Mr. Durgin is a graduate of California State University, Los Angeles, where he received a Bachelor of Science degree in Business Administration, with an emphasis in Accounting. He is a Certified Public Accountant, licensed in the State of California. Mr. Durgin has been employed by Southern California Edison Company since 1978. From 1978 to 1984 he held several positions in the Audits and Accounting Systems Divisions of the Controllers Department. Since joining the Regulatory Policy & Affairs Department in 1984, he has been responsible for the development and preparation of both fuel-related and base rate-related revenue requirements and associated ratemaking testimony in proceedings before the CPUC.

QUALIFICATIONS OF JONATHAN BRIGGS

Jonathan Briggs is a Regional Director of the Americas for Hydrogen Energy International LLC (HEI), a joint venture between BP Alternative Energy North America Inc. (BP Alternative Energy) and Rio Tinto Hydrogen Energy LLC (Rio Tinto). He is responsible for all of HEI's activities in the Americas. He also holds a directorship on the board of Hydrogen Energy International Limited (Hydrogen Energy), an affiliate of HEI and joint venture between BP Alternative Energy Holdings Limited (BPAE) and Rio Tinto Energy Limited based in Weybridge. Together, HEI and Hydrogen Energy have over 100 employees based worldwide.

Mr. Briggs graduated with a Masters Degree in Chemical Engineering from Imperial College at London University in 1989 with a Membership of the City & Guilds of London Institute, and then spent 5 years as a field engineer with Schlumberger working in the North Sea, Norway, Central Europe and Algeria. He completed an MBA from INSEAD (Institut European d'Administration des Affaires in Fontainebleu, France) in 1995 and is an Associate of the Institution of Chemical Engineers, a UK-based organization. After earning an MBA, he joined ARCO working on the giant Prudhoe Bay and Kuparuk fields in Alaska, and then the $3 billion Tangguh Liquefied Natural Gas (LNG) project now nearing completion in Indonesia. He has also held a variety of positions within BP in the LNG industry, spending 5 years in Asia, in Indonesia, Singapore, and Japan. More recently Mr. Briggs was involved in developing BPAE's hydrogen power business in the UK and Europe. He is currently located in California with responsibility for managing HEI's California project, and developing other HEI business opportunities in North America.

Attachment C

Exhibit No.: SCE-2
Author: Hydrogen Energy International LLC

Report on the Benefits SCE will Obtain in Support of Advice Letter for Authorization to Incur and Recover Costs Necessary to Determine Feasibility of a Central California Integrated Gasification Combined Cycle Plant with Enhanced Oil Recovery and Carbon Sequestration

October 10, 2008

Report on the Benefits SCE Will Obtain in Support of Advice Letter for Authorization to Incur and Recover Costs Necessary to Determine Feasibility of a Central California Integrated Gasification Combined Cycle Plant with Enhanced Oil Recovery and Carbon Sequestration

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I.

INTRODUCTION

In its Advice Letter filing, Southern California Edison Company (SCE) requests that the California Public Utilities Commission (Commission) approve a modification to SCE's tariff schedules to establish a new memorandum account and to authorize recovery of up to $30 million in costs necessary to co-fund a feasibility study related to the development of an integrated gasification combined cycle (IGCC) facility with carbon capture for use in Enhanced Oil Recovery (EOR) with sequestration called Hydrogen Energy California (HECA), to be recorded to this memorandum account. SCE will participate in the HECA study with Hydrogen Energy International LLC (HEI).

The purpose of this report is to provide a more detailed description of the HECA study.

II.

DETAILED DESCRIPTION OF HECA

The HECA facility being studied will produce baseload low-carbon electricity by gasifying petroleum coke (or a blend of petroleum coke and other solid fuels such as coal or biomass) to produce hydrogen for baseload low-carbon electric generation in an IGCC, and capturing CO_2 and transporting it for EOR and sequestration in the Elk Hills Oil Field Unit near Kern County, California. Petroleum coke is a by-product created through the refining process of crude oil. As explained in SCE-1, turning a low-value refinery by-product into much needed baseload low-carbon power has significant environmental and energy-independence benefits for California.

A. Specific Features

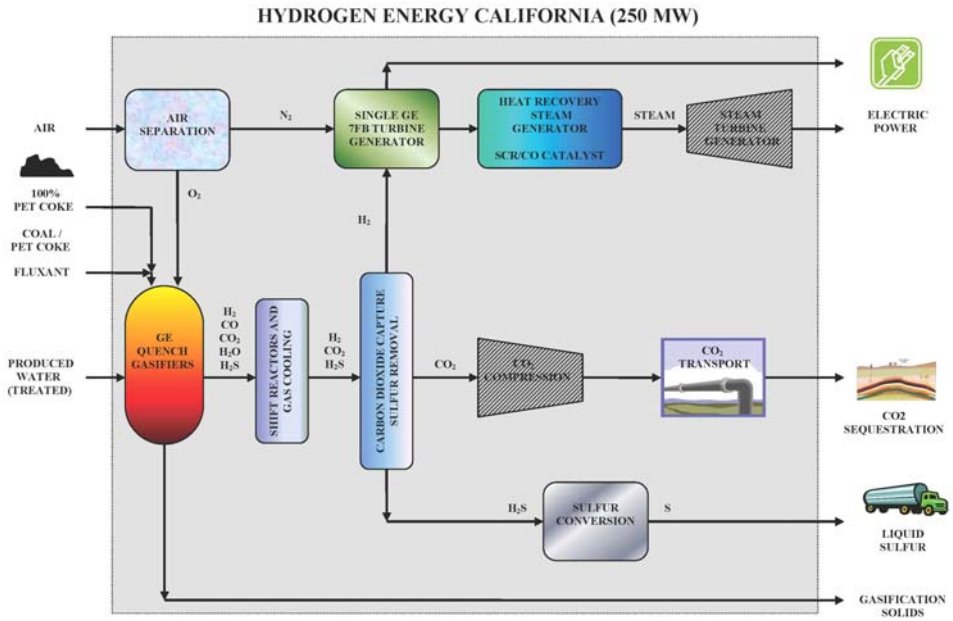
Specific features of HECA include the following.

- HECA is designed to operate with up to 100 percent petroleum coke from California refineries, and has the flexibility to operate with up to 60 percent western bituminous coal as needed.
- The feedstock is gasified to produce a synthesis gas (syngas) that is further processed and purified to produce a hydrogen-rich gas, which is used to fuel the combustion turbine for baseload low-carbon electric power generation. A portion of the product (hydrogen-rich

gas) is also available for other hydrogen uses including additional power or transportation opportunities.

- Approximately 90 percent of the carbon in the raw syngas is captured in a high-purity CO_2 stream during steady-state operation, which is compressed and transported by pipeline off site for injection into deep underground oil reservoirs for EOR and sequestration.
- HECA GHG emissions (e.g., primarily CO_2) and sulfur emissions are reduced through state-of-the-art emission-control technology and CO_2 sequestration. The power produced by HECA would have a low-carbon emission profile significantly lower than would otherwise be produced by traditional fossil-fueled sources, including natural gas.
- The net electrical generation output from HECA would provide approximately 250 megawatts (MW) of low-carbon baseload power to the grid, feeding major load sources to the north and to the south.
- The water source for HECA is brackish groundwater treated on site to meet HECA standards. Potable water would be supplied by West Kern Water Bank for sanitary purposes.
- The HECA gasification process would feature near zero sulfur emissions during steady-state operation.

Figure II-1
HECA Block Diagram



B. Technology Description

The technology and processes used in HECA achieve low levels of emissions by converting petroleum coke (and petroleum coke/coal blends as needed) into hydrogen that is then supplied as fuel gas for low-carbon power generation in efficient, advanced combined cycle combustion turbines.

In the IGCC process, solid feedstocks are ground with water to form a slurry. The slurry is combined with high purity oxygen that has been separated from the air and is injected into gasifiers. The slurry chemically reacts with the oxygen in the gasifiers to form syngas, composed mostly of hydrogen and carbon monoxide. The high temperature ensures complete gasification of the feedstock and traps inorganic matter in a glassy matrix material. Based on the projected composition and existing industry experience, this material, referred to as gasification solids, is anticipated to be a saleable product. The gasification solids are continuously removed from the gasifiers. The syngas leaving the gasifiers is cooled in an efficient heat recovery system and cleaned in preparation as feedstock to the gas turbine.

Post-gasification treatment for syngas includes removal of entrained particulates, shift conversion of carbon monoxide and water to CO_2 and hydrogen, mercury removal, and acid gas removal. The sulfur in the syngas is recovered and converted into elemental sulfur for sale into agricultural and other markets.

1. The Gasification Block

HECA uses GE's quench gasification technology. The GE quench gasifier feeds petroleum coke (or petroleum coke/coal blends) as a water slurry along with oxygen into a refractory-lined reactor vessel. The gasifier operates between 2,400 and 2,700°F.

Hot syngas, along with ash, fluxant, and unconverted carbon from the gasifier reaction chamber, flow down into the water-filled quench chamber located below the gasifier. The syngas is cooled in this water pool, and exits the quench chamber to be further washed. The carbon monoxide and water in this stream are converted to CO_2 and hydrogen in the shift process. The shift process unit also cools the shifted syngas by generating steam for additional power production and for internal plant consumption.

Sulfur-containing gases and CO_2 are removed from the shifted syngas to produce the hydrogen-rich fuel for the power block. Approximately 90 percent of the carbon in the raw syngas will be captured by the acid gas removal unit in a high purity CO_2 stream during steady-state operation.

The CO_2 is transported by pipeline to be used for EOR and sequestration in the existing Elk Hills Oil Field Unit.

Sulfur in the gas stream from the acid gas removal unit is directed to a Sulfur Recovery Unit and a Tail Gas Treatment Unit where sulfur is recovered.

2. The Power Block

The combined cycle portion of the power block is similar to a state-of-the art combined cycle power plant. Major equipment consists of a heavy duty gas turbine, a steam turbine, and an HRSG. Power is produced by the consumption of hydrogen-rich fuel to meet the load for the accompanying gasification plant and for export to the PG&E electrical grid. The power block is also designed to use natural gas when hydrogen-rich fuel is not available. The power block integrates the

process heat generated within the gasification plant by the exothermic water-gas shift reaction and the SRU hydrogen sulfide oxidation reaction. Boiler feedwater from the power block deaerator is used to generate high pressure (HP) and low pressure (LP) saturated steam. This steam and that generated in the HRSG with gas turbine exhaust heat and duct burner heat release is superheated in the HRSG before being admitted to the reheat steam turbine generator (STG).

The power block may also include a single natural gas fired auxiliary gas turbine, an aeroderivative simple cycle machine, to provide backup power to the gasification plant during forced outage periods and to provide beneficial spot market power production to the grid.

Both the heavy duty and aeroderivative gas turbines incorporate diluent injection and post combustion control technologies to meet the stack emissions Best Available Control Technology (BACT) requirements.

A more detailed description of the technology used in this project is given in Attachment 1 in Exhibit SCE-2 in the project description from the AFC.

C. Several Parties Will Bring Substantial Expertise and Experience to HECA

An unprecedented collaboration between the private and public sectors will be required in order to make a near-term IGCC with carbon capture and sequestration project a reality. A first-of-its kind project such as HECA requires complex project execution, technology integration, CO_2 EOR, subsurface, and power market and regulatory expertise. The HECA project participants bring these industry- and world-leading capabilities, as well as a commitment to low-carbon technologies and businesses.

1. HEI

HEI is jointly owned by BP Alternative Energy North America Inc. and Rio Tinto Hydrogen Energy LLC and is focused on developing alternative energy solutions in the form of decarbonized energy projects.[1] HEI builds on the complementary skills of its parent companies – BP's

[1] BP has been in business since 1909 and employs over 96,000 people with operations in 100 countries worldwide. Rio Tinto employs over 106,000 people, operating in more than 40 countries around the world. With capital expenditures totaling approximately $15 billion per year for BP and $5 billion per year for Rio Tinto, both parent companies are highly experienced in developing, constructing, permitting, and operating large, complex energy projects. BP also owns (*Continued*)

leading position and expertise in chemical processing and low-carbon power generation and carbon capture and storage and Rio Tinto's expertise and world-class assets in energy and minerals and metals extraction and supply. Both parent companies are committed to technologies and businesses that reduce carbon emissions, and are using their combined skills to accelerate the deployment of hydrogen-fueled power plants and carbon capture and sequestration projects.

HEI brings a California-based, diverse, experienced team of interdisciplinary professionals with engineering, project management, gasification, operations, construction, health, safety, security & environmental (HSSE), commercial, policy, and communications expertise backed by considerable additional resources and expertise located in its Weybridge, UK headquarters outside London. HEI also has access to the substantial resources and expertise of its parent companies.

BP brings considerable subsurface expertise. In 1996, BP became a participant in the successful CO_2 saline aquifer storage project in the Sleipner field offshore Norway, which reinjects over one million tons per year of CO_2. In 2000, BP was instrumental in setting up the CO_2 Capture Project, a partnership of leading energy companies focused on investigating carbon capture and sequestration technology and developing new technologies to reduce the cost of capture. In the same year the company established the Carbon Mitigation Initiative (CMI), which also involves the Ford Motor Company, at Princeton University with the mission of finding sustainable solutions to the climate change problem. In 2004, CO_2 capture and injection began at the BP-operated In Salah gas field in Algeria, a pioneering project where over one million tons of CO_2 continue to be reinjected each year into a deep geological formation below the Sahara desert, avoiding its release to the atmosphere.

The steps involved in carbon capture and sequestration – separating CO_2, transporting it by pipeline, and storing it in underground formations – are all existing areas of expertise in BP's energy business. BP has the required know-how in chemical processing, power generation, pipeline

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Continued from the previous page

or has part ownership in 19 refineries worldwide with an operating share of 2.8 million barrels of crude oil per day distillation capacity. Of these refineries, five are in the United States with about 1.5 million barrels a day; nine are in Europe with about 900,000 barrels a day; and five are in other parts of the world with about 400,000 barrels a day.

transportation of gases and liquids and, in particular, leading-edge understanding of the geological subsurface. While the technologies required for power generation with carbon capture and sequestration are understood individually, they have not yet been integrated together on a large commercial scale. Although this may appear to be a major challenge, the scale of operations involved is of the same order of magnitude as its existing oil and gas operations.

The reduction of CO_2 emissions from fossil fuels is a global challenge requiring a worldwide solution from producers and technology owners across the value chain. HEI has a global alliance with GE Energy, leaders in gasification and turbine technologies, to develop power plants that can dramatically reduce emissions of CO_2 from electricity generation. GE Energy is one of the world's leading suppliers of power generation and energy delivery technologies, with 2006 revenue of $19 billion. Based in Atlanta, Georgia, GE Energy works in all areas of the energy industry including coal, oil, natural gas and nuclear energy, renewable resources such as water, wind, solar, and biogas, and other alternative fuels.

In addition, HEI brings its experience and learning from concurrent and past studies related to HECA. In Abu Dhabi, HEI is developing a project called Hydrogen Power Abu Dhabi (HPAD) where hydrogen will be used to fuel gas turbines and generate 420 MW of low-carbon electricity. This project alone would provide more than 5% of all Abu Dhabi's current power generation capacity. The CO_2 will be transported and injected into a producing oil field and used to replace natural gas that is currently being injected into the oil field to maintain pressure. This natural gas could then be used either domestically or for export. The CO_2 injected into the oil field could also enable previously unrecoverable oil to be produced. As the oil is forced out, the CO_2 would remain stored securely and permanently beneath the oil field's natural impervious seal.

HEI's international focus has allowed HPAD to use its experience and "know how" from an earlier project in Peterhead, Scotland. The project was designed for about 100 million cubic feet per day of natural gas feedstock to be reformed into hydrogen and CO_2, with the hydrogen used to generate 475 MW of power. About 2 million tons per year of CO_2 (more than 90% of the carbon in the natural gas) would have been transported some 150 miles offshore to be injected two and a half miles

underground into the Miller oil field for sequestration. The CO_2 would also have enabled the recovery of 50-60 million barrels of additional oil that would not otherwise have been recovered. While the Peterhead project reached a technically and commercially sound proposal that was fully permitted and ready for the final investment decision, the timescale could not be aligned with the government policy development process, requiring work on the project to stop. This experience highlights the need for early and sustained commitments, regulatory certainty and stakeholder financial participation to make a near-term IGCC with carbon capture and sequestration project a reality and set the stage for wider carbon capture and sequestration deployment.

2. Occidental Petroleum

The CO_2 from HECA would be transported for use in EOR and sequestration in the Elk Hills Oil Field Unit, which is majority owned by Occidental Petroleum (Oxy). Oxy is a Los Angeles-based oil and gas exploration and production company with operations in the United States, Middle East/North Africa and Latin America regions. Oxy is an industry leader in applying EOR techniques to mature oil fields to recover additional reserves or prolong production after primary recovery methods have run their course. Approximately 60 percent of Oxy's Texas Permian Basin oil production is from fields that actively employ the application of CO_2 flood technology, an EOR technique. This involves injecting CO_2 into oil reservoirs where it acts as a solvent, causing the oil to flow more freely into producing wells. These CO_2 flood operations make Oxy a world leader in the application of this technology.

3. SCE

SCE has demonstrated its ability to both advance and put into operation new technologies, as shown through its successes with programs such as energy efficiency, renewables, electric vehicles, and advanced metering. As a public utility, SCE is uniquely positioned to be an instrument of the Commission to advance this technology so that it can be brought to realization on a commercial scale.

In addition to this project, SCE continues to pursue a wide range of activities to reducing GHG emissions. In particular:

- SCE is currently demonstrating a broad range of new low- and non-GHG emitting generation technologies to help California reach its climate change goals. Among these technologies, SCE made a bold commitment to renewables (such as solar, wind, and waste-to-energy) before any other electricity provider and continues to be a leader in renewables today. SCE sees undertaking an early IGCC-carbon capture and sequestration project as a natural extension of its leadership in this area.
- SCE is working to develop additional options to help its customers and California reduce GHG emissions through energy efficiency and demand response programs, advanced metering, electric vehicles, etc.
- Through its renewables and energy efficiency programs, SCE has reduced its GHG emissions to below 1990 levels. However, the challenge of achieving continued reductions in GHGs is enormous and SCE believes that it is essential that it invests in developing hydrogen power generation with carbon capture and sequestration now to achieve those goals.

SCE is already contributing towards the State's GHG reduction goals in several ways while continuing to meet and manage the growing energy demands of its customer base. First, SCE is operating and maintaining its existing fleet of generation, which consists largely of its non-GHG emitting nuclear and hydroelectric facilities, along with the relatively new Mountainview gas-fired CCGT plant. Second, SCE continues to pursue and sign contracts with renewable plants (mostly wind and solar). Third, SCE continues to support the aggressive use of energy efficiency and demand response programs at levels that are cost-effective, feasible, and realistic. Fourth, SCE is investigating the development of other low/non-GHG emitting generation resources. These potential resources include HECA as described here.

D. Scope of HECA Study

The HECA Study is divided into two phases. While the phases are generally organized in chronological order by time of implementation, certain aspects of the phases may be implemented on a parallel basis.

Phase I: Phase I shall consist of reports and documents developed for HECA on the following subjects:

- Technology appraisal.
- Feedstock and water.
- Process and system configuration.
- EOR and carbon sequestration.
- Environmental safety and health (ES&H).
- Operations, maintainability and constructability.
- Water treatment.
- Acid gas removal (AGR).
- CAISO interconnection.
- Value engineering.
- Process design package (PDP).

Phase II: Phase II shall consist of the Front End Engineering Design (FEED) reports and documents developed for HECA.

Prior to commencing Phase II, SCE and HEI intend to negotiate and execute agreements related to the development of HECA including, but not limited to, the purchase of hydrogen through a fuel supply agreement (FSA), the purchase of electricity through a PPA, and/or a development agreement for HECA. If SCE and HEI determine to enter into agreement on the terms of either an FSA or PPA, including whether to apply for a CPCN, (a) SCE will require additional co-applicants, and (b) HEI will require reasonable commercial certainty regarding HECA implementation contracts and commercial structures. SCE and HEI recognize, if they agree to continue development of HECA after completion of Phase I of the HECA Study, that additional funding for HECA would be required. SCE and HEI

anticipate that such additional funding will need to include public and/or private sources. Should such support to ensure commercial reasonableness not be forthcoming, HEI and SCE will not be required to commence Phase II.

Technology appraisal provides screening of technologies for the production of low-carbon electricity primarily from petroleum coke feedstock. Example evaluations include gasifier and gas turbine technology selections and gas processing technology studies.

Feedstock and water refers to an evaluation of feedstock (petroleum coke, coal, and potentially biomass) supply and procurement as well as evaluation of cooling system design (dry, hybrid, or wet), water supply and raw water treatment options.

Process and system configuration refers to the evaluation of the design and integration of the individual technology and process "blocks" that comprise HECA. Examples include plant capacity selection, development of basis of design, and CO_2 capture system configuration.

EOR and carbon sequestration evaluation consists of identifying the technical, commercial and regulatory issues associated with CO_2 offtake at commercial scale, utilization of the CO_2 in EOR and sequestration operations, and assessment of the overall carbon balance for HECA.

ES&H refers to the evaluation of environmental, safety, and health issues including emissions and permitting strategies including flaring minimization studies, safety studies, hazard management plans, health studies, as well as project health, safety, security, and environmental (HSSE) reports.

Operations, maintainability and constructability refers to activities such as development of the operations and maintenance (O&M) philosophy and labor and equipment market surveys as well as constructability assessments.

Water supply refers to the development of a process design package containing an optimized raw water conveyance infrastructure and water plant configuration to develop, among other things, equipment and plot requirements, capital and operating cost, parasitic load and wastewater effluent rates and composition to be integrated into the HECA plant.

Acid gas removal (AGR) refers to the evaluation of appropriate carbon and sulfur removal technology required to establish project cost, emission capabilities, and a basis for FEED. This includes

review and analysis of prospective licensors to confirm the technical feasibility of the proposed design, including relevant prior experience and provision of information to enable the engineering contractor to generate a capital cost estimate so that lifetime costs and technical feasibility can be compared and the most favorable licensor selected.

CAISO interconnection refers to analysis and submission of an interconnection request (IR) with CAISO per FERC's Order No. 2003 to determine network upgrades and estimated cost and time to construct facilities required to connect to the ISO controlled grid.

Value engineering is an examination of HECA sub-systems including their integration to optimize and improve the performance, reliability, and life-cycle cost of HECA.

The process design package (PDP) is the continued development of the gasification system design including heat and mass balances, equipment sizing data, and other process information used as a basis for FEED activities.

FEED includes heat and mass balances, process flow diagrams, P&IDs, equipment and line lists, preliminary datasheets for major equipment and long lead items, electrical and civil diagrams and drawings, environmental, health and safety review, project schedule, and a project capital cost estimate.

In addition to these studies, HECA will also develop detailed schedules and budget for work activities and resources needed to execute a well-defined project.

III.

HEI CONTRIBUTION TO HECA STUDY

In developing HECA, HEI brings an experienced team of interdisciplinary professionals working in close collaboration with a number of highly-qualified contractors and consultants to develop the information required to evaluate project feasibility. The California-based team is backed by additional resources from the parent companies of Rio Tinto and BP with access to their experience, expertise, previous studies, and know how. HEI provides the following specific organizational capabilities that are important for achieving a thorough evaluation of the feasibility for establishing a HECA low carbon energy center in California:

- 10-15 project professionals and energy industry engineers with direct responsibility for creating a properly characterized opportunity. Responsibilities include creating an optimal and technically sound design with a thorough review of the economics, capacity, feedstock viability, operability, and policy requirements that form the cornerstone of the feasibility study.
- Numerous subsurface engineers and geoscientists with 30 plus years of experience including extensive subsurface experience with CO2 in the Permian Basin. These professionals utilize fluid dynamics modeling tools and other evaluation methodologies in characterizing the subsurface.
- Major project capabilities and expertise to prepare cost and schedule work products that incorporate technical, commercial, regulatory, operability, and constructability reviews. These activities are being led by individuals with world class design, procurement, construction, and commissioning experience.
- Development of significant scientific and intellectual property associated with HECA including executed license agreements for additional highly specialized and protected trade secret information.

From all this, HEI is well placed to effectively perform the complex project integration required for this first-of-a-kind project.

Phase I:

HEI will develop approximately 28 reports and documents for Phase 1 in total. This will require the evaluation and integration of intellectual property and know how from about 14 third party owners, including HEI and its affiliates. Upon receiving information from third parties, HEI directs its team and other contractors and consultants as necessary to develop and integrate this information into the HECA design.

Phase II: Phase II shall consist of the Front End Engineering Design (FEED) reports and documents developed for HECA.

In addition to these studies, HECA will also develop detailed schedules and budget for work activities and resources needed to execute a well-defined project. This will include but not be limited to negotiation of third party commercial agreements, contracting strategy development and strategy for Emission Reduction Credit (ERC) acquisition. As explained in Exhibit SCE-1, subject to the Commission's approval of the Advice Letter, SCE anticipates paying HEI for the HECA study as follows:

Payment Schedule	**Payment Amount**
Phase I	
Within thirty (30) days of an acceptable Commission decision approving SCE Advice Letter	$10 million
Within thirty (30) days of HEI Notice of Execution of GE PDP contract	$3.5 million
Within thirty (30) days of HEI's Notice of Completion of GE PDP	$3.5 million
Total Phase I	**$17 million**
Phase II	
Within thirty (30) days of HEI notifying SCE of total Phase II spending of $20 million	$10 million
Within thirty (30) days of delivery of FEED reports and documents to SCE	$3 million
Total Phase II*	**$13 million**
Total Phases I and II*	**$30 million**
*** SCE's total payment amount in Phase II will be approximately $13 million, less SCE's incremental costs (as may be approved by the Commission) associated with the process of applying for and obtaining a Commission decision on a CPCN, FSA or PPA relating to HECA.**	

IV.

CONCLUSION

HECA will gasify petroleum coke or a petroleum coke blend to produce hydrogen for baseload low-carbon electric generation, and will reduce GHG emissions by capturing CO_2 and transporting it for EOR with sequestration in a deep underground oil reservoir. For the reasons explained in SCE-1, SCE seeks expedited authority from the Commission to record, up to $30 million, SCE's share of the costs needed for the HECA Study, which includes engineering, technical, geological, legal/regulatory, and economic assessments of the viability of HECA. As explained in its Advice Letter and supporting reports, SCE believes that its request is sound and reasonable and should be granted.

ATTACHMENT 1

Executive Summary and Project Description from HECA AFC

ATTACHMENT 2

Qualifications of Author

QUALIFICATIONS OF JONATHAN BRIGGS

Jonathan Briggs is a Regional Director of the Americas for Hydrogen Energy International LLC (HEI), a joint venture between BP Alternative Energy North America Inc. (BP Alternative Energy) and Rio Tinto Hydrogen Energy LLC (Rio Tinto). He is responsible for all of HEI's activities in the Americas. He also holds a directorship on the board of Hydrogen Energy International Limited (Hydrogen Energy), an affiliate of HEI and joint venture between BP Alternative Energy Holdings Limited (BPAE) and Rio Tinto Energy Limited based in Weybridge. Together, HEI and Hydrogen Energy have over 100 employees based worldwide.

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Attachment D

Exhibit No.: SCE-3
Author: Douglas H. Cortez,
Hensley Energy Consulting LLC

Independent Assessment of the Benefits SCE will Obtain in Support of Advice Letter for Authorization to Incur and Recover Costs Necessary to Determine Feasibility of a Central California Integrated Gasification Combined Cycle Plant with Enhanced Oil Recovery and Carbon Sequestration

October 10, 2008

Independent Assessment of the Benefits SCE will Obtain in Support of Advice Letter for Authorization to Incur and Recover Costs Necessary to Determine Feasibility of a Central California Integrated Gasification Combined Cycle Plant with Enhanced Oil Recovery and Carbon Sequestration

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I.

INTRODUCTION

A. Summary

In its Advice Letter filing, Southern California Edison Company (SCE) requests that the California Public Utilities Commission (Commission) approve a modification to SCE's tariff schedules to establish a new memorandum account and to authorize recovery of up to $30 million in costs necessary to co-fund a feasibility study related to the development of an integrated gasification combined cycle (IGCC) facility with carbon capture for use in Enhanced Oil Recovery (EOR) with sequestration called Hydrogen Energy California (HECA), to be recorded in this memorandum account.

SCE will participate in the HECA study with Hydrogen Energy International LLC (HEI).

Hensley Energy Consulting LLC (Hensley) has been retained by SCE to review documents provided to Hensley by HEI regarding the HECA project and express its independent and professional assessment of the reasonableness of the project design, scope of the development program to be supported by SCE, proposed budgets and schedules, and consistency with industry practice for developing projects of this nature.

Hensley has performed its investigation and analysis of the HEI documents and plans and this assessment reports on our findings.

Based on our review of the project documents, we would conclude the following:

1. HEI has accumulated a substantial amount of documentation, reports, know-how and expertise which fully prepares them to continue the development of the HECA Project under its Phase I and II program.
2. The Design and Configuration of the HECA project, including the rationale for selection of the core technologies and plant size, are based on sound analysis and decisions.
3. The Phase I and II plans, budgets, and schedules are reasonable, based on third party verifications, and consistent with industry practice.
4. SCE's investment in the HECA Study (Phase I and II) represents fair and good value and represents a minority share of the total Phase I and II budget.

5. If Phase I and II are successfully completed and the HECA project is constructed, it can be reasonably expected to deliver the benefits claimed by HEI and SCE.

6. The payment schedule in the SCE/HEI Letter of Intent[1] is reasonable.

B. Background and Qualifications

Hensley is an independent consulting firm whose principal member is Douglas H. Cortez. Dr. Cortez has 40 years experience in the energy industry, principally the oil refining, petrochemical, electric power, and coal processing industries. Prior to starting his consulting practice 3 years ago, he was employed by Fluor Corporation, the nation's largest engineering and construction firm, and Tosco Corporation, a developer of synthetic fuels technology, oil shale and oil and gas properties, and petroleum refining and marketing facilities. Dr. Cortez's career has focused on advanced and alternative technology development, project development and financing, and engineering and construction. Exhibit A is a curriculum vitae (CV) providing more details on his qualifications and experience including recent expert testimony before State environmental and utility commissions.

C. Summary of Documents Examined

Under Non-Disclosure Agreements with HEI and its technology suppliers, I examined numerous documents developed by HEI relating to the HECA project. These documents included reports and investigations developed by HEI, its technology suppliers, engineering contractors, equipment suppliers, and specialized engineering consultants. I also examined the SCE/HEI Letter of Intent.[2]

HEI operates under a gated project development process that has been developed and tested by its parent companies, BP and Rio Tinto. This process is highly disciplined and requires careful consideration of a wide range of factors, including technology maturity, commercial practicability, constructability and operability, health, safety, and environmental standards, and many other factors. Under this process, HEI is currently in the initial "Appraise" phase. Some of the documents were created as part of the development of other projects that have provided necessary base information that

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[1] *See* Attachment E to Advice Letter, Letter of Intent, p. 7.

[2] *See* Attachment E to Advice Letter, Letter of Intent.

the HECA project utilizes and has built upon. However, most of the documents we reviewed were developed in the past 18 months for the HECA project.

The documents can be summarized as follows:

1. Technology Evaluation and Selection

HEI conducted a thorough investigation of the core technologies required to produce hydrogen fuels and electric power with gasification technology and with capture of most of the carbon in the petroleum coke or coal fuel for sale as carbon dioxide to EOR operations. These studies included evaluation of the major solids gasification technologies that are commercially proven on the scale of the HECA project. These studies were completed with significant input from Fluor and competitive proposals from the major gasification technology licensors. Based on these efforts, HEI selected GE Energy's quench gasification technology for the HECA project.

In addition, similar investigations were completed of the major suppliers of hydrogen-rich fuel fired gas turbines. This investigation led to HEI selecting GE 7FB turbines for the HECA project.

The HECA project requires integrating the gasification process with the power generation process using hydrogen-rich decarbonized fuel gas. With the selection of GE Energy as the core solids gasification technology and power generation equipment supplier, HEI was then able to develop an optimized configuration for the HECA project.

2. Value Engineering and Configuration Studies

An IGCC power plant with carbon capture requires the integration of many process steps and unit operations. HEI analyzed a wide range of options and configuration, or "line up," of process steps and technology options. Some of the most significant studies we observed in the documents provided to us included:

a. Plant Size – HEI considered two plant sizes based on one or two GE 7FB combined cycle power blocks (a nominal 250 MW and 500 MW net capacity). These studies considered such factors as economy of scale, life cycle cost of electricity, fuel supply logistics, CO_2 EOR values, and water supply. HEI's investigation led to the decision

to construct a 250 MW facility with a plant arrangement that could, in the future, potentially allow expansion of HECA.

b. Sour Gas Shift – Converting the carbon in the raw gasifer synthesis gas to hydrogen requires a chemical conversion called the "water gas shift reaction." This process can be carried out before or after the sulfur compounds are removed from the gas (Sour Shift is with sulfur present, and Sweet Shift is without sulfur present). There are complex advantages and disadvantages to both approaches. The HEI investigations pointed decisively to the use of Sour Shift technology.

c. Acid Gas Recovery – The choice of Acid Gas Recovery (AGR) technology is also a complex evaluation of the options and the type of gasifier and shift technology. The AGR step also is energy intensive and impacts the environmental performance of the plant, the quality of the CO_2 and fuel gas products, and plant economics. Working with Fluor, HEI obtained competitive proposals from the major AGR technology licensors. The cost and performance of each alternative was factored into the project economic model. Based on these studies, HEI selected the Rectisol process, which has been widely used in the petrochemical and power industries for many years.

d. Sulfur Recovery – The sulfur-rich gas stream that is recovered in the AGR unit must be converted to a marketable product with minimum environmental impact. The options are the Claus process for production of elemental sulfur and one of several processes for producing sulfuric acid. Both have been widely used and refined over many decades. More recently there have been improvements in environmental controls and integration with IGCC technology. Based on comprehensive studies of the options and integration issues, HEI elected to use the Claus process with recovery and recycle of tail gas and recovery of CO_2 for sale.

e. Duct Burners with Hydrogen Fuel – An IGCC plant provides a unique opportunity to burn hydrogen fuel gas in the heat recovery steam generators (HRSGs) that drive the bottoming cycle in a combined cycle power plant. The HECA plant is based on

specific standard sizes of gas turbines and gasifiers. This means that additional clean hydrogen rich fuel is available for sale or to produce additional power. HEI, with input from its engineering consultant and equipment vendors, investigated the use of duct burning to utilize this fuel. The use of hydrogen gas duct burning has been practiced for many years in large industrial combined cycle plants in the petrochemical industry. Since combustion of hydrogen fuel may produce more NO_x emissions, HEI investigated the use of selective catalytic reduction (SCR) technology to mitigate this effect. The HEI study established that hydrogen could be burned in the ducts to the HRSG without any increase in criteria air emissions above those generated with a natural gas fuel.

f. Auxiliary Combustion Turbine – The HECA project will require short term power supply during start-up or during short term outages. HEI investigated the cost and economics of constructing a simple cycle gas turbine to supply this capacity instead of purchasing short term capacity from the utility. The leading models of combustion turbines were evaluated and the analysis pointed to selection of one of the larger, efficient aero-derivative models.

Other configuration studies were performed that are not reported here. Together these studies enabled HEI to decide on a near optimal configuration for the HECA project. As engineering advances through the gated development process, HEI will continue to evaluate additional variations and alternatives during the remaining "Select" and "Define" phases. The studies and reports competed at this time, together with those planned for the Select phase, provide a body of significant work and know-how that provide a sound foundation for efficient execution of the front end engineering and design (FEED) phase.

3. Environmental Engineering and Studies

HEI retained Fluor to develop a comprehensive air emissions profile for the Application for Certification (AFC) application to the California Energy Commission (CEC). The data included steady state emissions at various ambient conditions and start-up and shut-down emissions. A

preliminary best available control technology (BACT) analysis was also performed. These data are part of the "feasibility study" discussed below.

HEI has also focused on the design of HECA with respect to its carbon footprint. Each process unit operation in the HECA facility has been designed to minimize the emissions of CO_2 with the goal of recovering 90% of the carbon in the raw synthesis gas in downstream equipment.

4. Water Supply and Management Studies

HEI retained water supply and engineering consultants to evaluate the best source of water for the HECA project. The study evaluated a wide range of non-potable water sources in Kern County and the water clean-up and demineralization technology options and costs for each water source. These studies also evaluated the use of brackish water cooling towers and dry cooling to minimize water use. These studies recommended a source and water supply clean-up plan which is the current plan for the HECA project.

5. Fuel Supply Investigations

The HECA project will be designed to process petroleum coke as the primary fuel with supplemental supplies of bituminous coal from Utah. HEI surveyed the sources, quality and pricing of petroleum coke from refineries in the central valley and the Los Angeles and San Francisco areas. Rail and truck transportation studies for delivering petroleum coke to the HECA project site were also performed. Similar investigations of coal supply and transportation from Utah were completed. These studies resulted in a fuel procurement plan based on local petroleum coke as the primary supply with coal as the supplemental supply. In addition, HEI reports that it is currently reviewing the potential to include biomass waste as a partial (5-10%) feedstock for HECA.

6. Project Feasibility Studies

HEI retained Fluor and GE Energy to perform detailed feasibility studies for the HECA project. The GE Energy study focused on the front-end fuel preparation, gasification, slag removal, and raw gas scrubbing system licensed by GE. The Fluor study embraced the entire plant based on the GE technology study.

a) GE Energy

The GE Feasibility Study provided plant performance and cost data for the HECA plant processing 100% petroleum coke and a blend of 40% petroleum coke and 60% coal. The study includes major equipment lists, spare equipment recommendations, plant heat and material balances, flow diagrams, utility requirements, construction cost estimates, and other information required to complete a feasibility study.

b) Fluor

The Fluor Feasibility Study was a comprehensive effort to address many issues. In addition to the standard system-wide process design, equipment lists, heat and material balances, utility balances, etc., Fluor also developed emissions data in sufficient detail to file the AFC permit with the CEC, completed value engineering studies, such as spare gasifer, hot or cold spare gasifier, preliminary operations and maintenance information, labor surveys, health, safety and environmental assessment, feasibility of build out of second train, etc.

7. Project Definition, Cost, and Scheduling

HEI has developed a preliminary (Pre-FEED) project specifications document with cost and scheduling information for the entire HECA facility including the Fluor and GE Energy scope documents. These documents include a Basis of Design Specification including permitting requirements and emissions standards, codes and standards, health, safety and environmental standards, civil engineering and geotech data, noise standards, major vendor lists, fuel and product specifications, air separation specifications, steam and water utilities, buildings, off-sites and infrastructure, operating staff estimates, turndown and ramp up requirements, interface and interconnection points, plot plans, and space requirements, strategy and plans for studying the feasibility of adding a second unit, and other specifications.

A pro forma FEED package scope of work and deliverables list has also been developed for the purpose of costing and scheduling the FEED phase.

8. Operations and Maintenance Studies and Plans

HEI has developed, with input from suppliers and contractors, a preliminary operations and maintenance plan and philosophy. This plan addresses start-up and shutdown procedures, plant commissioning strategy, maintenance facilities, supplies and materials, start-up and permanent spare parts, labor and subcontract requirements, maintenance and inspection schedules, safety, health and environmental issues, and other O&M issues that impact plant design.

9. Project Development Plans

HEI has developed a detailed plan for advancing the HECA project through the next phase during which SCE would participate and share a portion of the costs. This phase, referred to as the "The HECA Study" is divided into two phases.

- Phase I will further refine and define the design and configuration of the HECA project building on the extensive work HEI has completed to date. A major activity in Phase I will be the completion of the Process Design Package (PDP) by GE Energy. The PDP will include detailed engineering and specifications for the GE supply of gasification section technology and equipment. The PDP is needed before the major effort on FEED work can begin. In addition to the GE PDP, HEI and its engineering contractors will also complete additional work on technology appraisal, acid gas recovery and other gas processing technology, feedstock sourcing, water supply and treatment, environmental, safety and health programs, O&M strategy, constructability, CO_2 transportation and sequestration by EOR operator, additional value engineering studies, power and utility interconnection arrangements including CAISO applications. Building on the work already completed, HEI will advance the HECA project in Phase I to a final configuration with key technologies and suppliers either selected or remaining options highly defined to set the basis of design for the project to enter FEED.
- Phase II shall consist of the FEED reports and other documents developed for HECA. FEED includes all of the technical and engineering work product in

HEI's pro forma scope of work and deliverables document, as well as environmental, health and safety review, project engineering, procurement and construction schedule, and a project construction cost estimate. In addition to the FEED activities, HEI has defined the owner's activities required to bring the HECA project to the point where it is ready to seek approvals for funding and construction.

10. Phase I and II Budgets and Schedules

HEI has developed a detailed schedule and budget for Phase I and II. The budget is constructed from a detailed list of activities, including third party contractors, internal staff and expenses, and some pre-construction procurement activities. The budget includes such activities as home office staff and expenses, permitting and licensing consultants, engineering to support permitting, FEED and PDP preparation, cost estimating, commercial contract activities, policy and communications, outside counsel, and other project services. The budget is estimated over the approximate three-year program and is projected on a monthly basis.

D. Documents Not Reviewed

Hensley's review of the HEI confidential documents was limited to those relating to the technology, engineering, environmental, plans, budgets and schedules described above. Hensley did not examine any documents relating to the commercial or business arrangements between HEI and its partners or suppliers, HEI's economic or financial analysis of the HECA project or environmental permitting and regulatory approvals.

II.

PRINCIPAL FINDINGS

Based upon the documents reviewed, Hensley's knowledge of the HECA project history and Hensley's experience and knowledge of other IGCC projects, we are able to make the following findings:

A. Background Developments and Data

HEI has invested a significant amount of time and money in advancing the HECA project to its current state of maturity. We believe the efforts by HEI on previous projects and the current design of HECA represents the most advanced IGCC project in the U.S. where carbon capture and sequestration features are included in the initial facility to be constructed.

The knowledge and expertise acquired by HEI in connection with the HECA project could not be readily duplicated by others without a similar and probably larger investment in time and money.

The HEI project development staff is highly qualified and experienced to develop all aspects of a project of this complexity.

B. HECA Project Design

The current design and configuration of the HECA project is the result of extensive studies of alternative technologies, capacities, configurations, fuel supplies, water supplies and other key factors that impact project technical, economic feasibility and environmental permitting. The selection of core technologies and remaining candidates represent reasonable and prudent choices based on Hensley's experience with many IGCC and other gasification projects and major suppliers, licensors, and contractors in the industry.

C. HECA Project Development Plan and Schedule

The project plan and schedule for the Phase I and II activities is comprehensive and consistent with other plans we have seen in the industry. It appears to address all of the key activities required to successfully complete Phases I and II. The schedule for Phases I and II is based on proposals from third party contractors which are similar and consistent with other proposals with which Hensley has experience in other gasification and IGCC power projects.

At the conclusion of the HECA Study, HEI and SCE will have adequate design and engineering detail and cost projections to make an investment decision to proceed with construction of the project, provided the required permits and regulatory approvals are issued.

The schedule assumes timely approval of key regulatory decisions from agencies such as the CPUC and CEC. In addition, the schedule includes management decisions by HEI, SCE or other project

participants. Assuming the project owners and critical state and local agencies make timely decisions, HEI should be able to perform the Phase I and II work on the schedule proposed.

D. HECA Project Development Budget

The HEI budget for the Phase I and II tasks appears to be adequate provided the project team maintains the schedule and timely decisions are made at key decision points. The total HECA project budget for Phase I and II is substantial but consistent with our experience with other IGCC projects and conventional large coal fired power plants. In addition, the SCE investment for Phase I ($17 million) and Phase II ($13 million) represents a small share of the total investment which is substantially below 50% at all times during the duration of the HECA Study.

E. Project Benefits

Based on Hensley's knowledge of many IGCC projects under development in the U.S., the HECA project is unique with respect to its maturity, reduction in carbon footprint, economic benefits from beneficial use of CO_2, commercial demonstration of high levels of carbon capture and sequestration, stringent environmental standards, support from experienced and financially strong sponsors, and participation by sizable companies who will supply services, equipment, and technology.

In our judgment, the benefits claimed by HEI and SCE are reasonable and can be achieved if the project is approved and constructed.

F. Reasonableness of Payment Schedule

The payment scheduled in the SCE/HEI Letter of Intent[3] is reasonable since, (1) at each payment point, HEI will have a significantly higher investment in the study than SCE; and (2) the product study is reasonable as discussed above.

[3] Attachment E to Advice Letter.

III.

CONCLUSIONS

Based on our review of the project documents, we would conclude the following:

1. HEI has accumulated a substantial amount of documentation, reports, know-how, and expertise which fully prepares them to continue the development of the HECA project under its Phase I and II program.
2. The Design and Configuration of the HECA project, including the rationale for selection of the core technologies and plant size, are based on sound analysis and decisions.
3. The Phase I and II plans, budgets and schedules are reasonable, based on third party verifications, and consistent with industry practice.
4. SCE's investment in the HECA Study (Phase I and II) represents fair and good value and represents a minority share of the total Phase I and II budget.
5. If Phase I and II are successfully completed and the HECA project is constructed, it can be reasonably expected to deliver the benefits claimed by HEI and SCE.
6. The payment schedule in the SCE/HEI Letter of Intent[4] is reasonable.

IV.

DISCLAIMER

This document was prepared by Hensley Energy Consulting LLC (Hensley) and is based in part on information not within the control of Hensley. Hensley has not made an analysis, verified, or rendered an independent judgment of the validity of the information provided by others. While it is believed that the information contained herein will be reliable under the conditions and subject to the limitations set forth herein, Hensley cannot guarantee the accuracy of the information or this document. Use of this report or any information contained therein shall constitute a release and agreement to defend and indemnify Hensley from and against any liability (including but not limited

[4] *See* Attachment E to Advice Letter, Letter of Intent, p. 7.

to liability for special, indirect, or consequential damages) in connection with such use. Such release from and indemnification against liability shall be effective to, and only to, the maximum extent, scope or amount allowable by law and shall apply regardless of whether or not such liability arises in contract, tort (including negligence of such party, whether active, passive, joint or concurrent), strict liability or other theory of legal liability.

ATTACHMENT A

QUALIFICATIONS OF DOUGLAS H. CORTEZ

Douglas H. Cortez, ScD, PE
Managing Director
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Laguna Beach, CA 92651

Office: 949-715-5509
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Email: HensleyEnergy@POBox.com

Qualifications and Experience:

Dr. Douglas Cortez has over 35 years experience in the electric power, petroleum refining, chemical production, and synthetic fuels industries. During his career, he has focused on the clean fuels, clean power and alternative and synthetic fuels energy industries. He has held leadership positions in the fields of technology research and development, project development, project financing, and engineering and construction.

Hensley Energy Consulting LLC

In early 2006, he formed Hensley Energy Consulting LLC, an independent technology and management consulting company specializing in providing professional services to the clean energy and electric power industries and financial and government institutions.

He is currently an advisor to the FutureGen Industrial Alliance, and Excelsior Energy (Mesaba IGCC). He also serves on the Scientific Advisory Committee for Range Fuels, Inc. a developer of cellulosic ethanol technology. He was previously an advisor to the Carson Hydrogen Power Project (BP Alternate Energy).

Other active clients include private equity funds, utilities, major oil companies, private developers of alternative energy projects and non-government environmental organizations. In the past two years, he has provided expert testimony in several power plant licensing cases. A representative list of testimony is provided below.

Fluor Corporation

From 1984 to 2005, he was an executive with Fluor Corporation, the nation's largest publicly held engineering and construction company. At Fluor, he was Vice President, responsible for project development, project finance, and technology development serving a wide range of clients, including regulated utilities, independent power

companies, coal mining, petroleum refining, and technology licensing companies. He contributed to the development and deployment of hundreds of power, cogeneration and clean coal and alternative energy projects, including coal, coke and heavy oil gasification projects, coal to liquids, substitute natural gas, integrated gasification combined cycle (IGCC) and coal to chemicals projects. His experience also includes carbon capture technologies for reducing the production of climate change gases.

In the power sector, he was active in developing, designing and financing a wide range of projects for regulated utility and independent power companies, including IGCC and conventional pulverized coal plants, complex refinery polygeneration plants, coal to chemicals and synthetic fuels facilities.

During his years with Fluor, he was active in technology evaluation, project development and finance in North America, Latin America, the Caribbean, Asia and Europe.

Tosco Corporation

From 1973 to 1983, he was an executive with Tosco Corporation (now part of ConocoPhillips). He was responsible for developing, financing and constructing cogeneration facilities at Tosco refineries and EOR fields, development of Tosco technologies for coal and petroleum coke utilization, development and licensing of Tosco's shale oil production, coal processing and petroleum refining related technologies. He was also a member of the management team that completed the acquisition of refining and marketing assets, as well as private and public oil and gas, coal and oil shale properties.

Other Experience

From 1969 to 1973, he was employed by an independent engineering consulting company that specialized in petroleum refining and geothermal energy production. During that period, he developed and constructed geothermal power plants, and petroleum refinery projects. He also consulted with the Plan Organization in Iran and developed the 10 year expansion plan for the NIOC refining and products distribution system.

Employment History:

2006- Present	Managing Partner, Hensley Energy Consulting, LLC
1984 - 2005	Vice President, Fluor Enterprises
1973 - 1984	General Manager, Tosco Corporation
1970 – 1973	Project Manager, Ben Holt Company
1969 – 1970	Research Engineer, TRW Systems

Education:

ScD Chemical Engineering, Massachusetts Institute of Technology
MS Chemical Engineering, Massachusetts Institute of Technology
BS Chemical Engineering, University of California, Berkeley

Professional Engineer: Registered Chemical Engineer, State of California

Industry Participation:

American Institute of Chemical Engineers
Gasification Technologies Council (Industry Representative, Workshop Speaker, Communications Committee)
Coal Utilization Research Council (Industry Representative)
FutureGen Industrial Alliance – Technical Advisory Committee

Recent Expert Testimony:

The following testimony addressed only technology and economic issues in coal power plant cases where gasification combined cycle technology is being considered. HEC does not advocate a public utility policy position.

1. On behalf of Wisconsin Energy, Public Service Commission of Wisconsin Docket No. 05-CE-130.

2. On behalf of Wisconsin Energy, Wisconsin Electric Power Permit 03-RV-166, Case No.IH-04-03, Wisconsin Division of Hearings and Appeals.

3. On behalf of Excelsior Energy, Minnesota Office of Administrative Hearings for the Minnesota Public Utilities Commission, MPUC Docket No. E-6472-/M-05-1993, OAH Docket No. 12-2500-17260-2. (Phase 1 -2006)

4. On behalf of Environmental Defense, Southern Environmental Law Center, and Southern Alliance for Clean Energy, in the matter of Duke Power Co. LLC for approval of an Electric Generation CPCN to construct two 800 Mw Coal Units for Cliffside Project, North Carolina Utilities Commission, Docket No. E-7, Sub. 790

5. On behalf of Clean Air Task Force And Indiana Wildlife Federation, in the matter of the Duke Energy Indiana for approval of Edwardsport IGCC project, before the Indiana Utility Regulatory Commission, Cause No. 43114.

6. On behalf of Environmental Defense, in the matter of Applications of TXU Generation Co. LP for State Air Quality Permits and PSD Permits, before the Texas State Office of Administrative Hearings, SOAH Docket No. 582-07-0614.

7. On behalf of Excelsior Energy, Minnesota Office of Administrative Hearings for the Minnesota Public Utilities Commission, OAH Docket No. 4-2500-17260-2, MPUC Docket No. E-6472/M-05-1993, In the Matter of a Petition by Excelsior Inc. for Approval of a Power Purchase Agreement under Minn. Stat. § 216B.1694, Determination of Least Cost Technology and Establishment of a Clean Energy Technology Minimum Under Minn. Stat. § 216B.1693.

8. On behalf of the Southern Environmental Law Center, in the matter of the Application of Virginia Electric and Power Company for a Certificate of Public Convenience and Necessity to Construct and Operate an Electric Generation Facility in Wise County, VA, before the Virginia State Corporation Commission, Case No. PUE-2007-00066

9. On behalf of National Parks Conservation Association, in the matter of the Application of Virginia Electric and Power Company for a PSD Air Permit before the Virginia Department of Air Quality, "Report Comparing Alternative Technologies for The Virginia City Hybrid Energy Center"

Attachment E

LETTER OF INTENT

This non-binding Letter of Intent ("LOI"), dated September 10, 2008, is entered into by and between Southern California Edison Company ("SCE") and Hydrogen Energy International LLC ("HEI"). SCE and HEI may hereinafter be referred to individually as "Party" and collectively as "Parties."

RECITALS:

A. It is the policy of the State of California to investigate and develop low carbon electricity, which could include the use of hydrogen with carbon capture and sequestration as a clean fuel. See Assembly Bill ("AB") 32, AB 1925, Senate Bill 1368, Executive Order S-3-05 and Executive Order S-7-04.

B. SCE is a regulated utility participating in studies to evaluate the merits and feasibility of producing low emissions and low greenhouse gas ("GHG") electric power from solid hydrocarbon fuels with carbon capture and sequestration. SCE has prior experience with the development and operation of the Coolwater Integrated Gasification Combined Cycle plant, which operated in the 1980s.

C. HEI has expertise and technology related to the production of fuel grade hydrogen ("hydrogen"). HEI has been evaluating the feasibility of developing an integrated gasification combined cycle ("IGCC") plant, consisting of a low carbon fuel block that will gasify petroleum coke and coal, as needed, capture the carbon for use in nearby oil fields for enhanced oil recovery ("EOR") with sequestration, and produce hydrogen for use in a power block for electric generation within the confines of the IGCC process.

D. HEI has spent considerable resources and made substantial progress on certain project feasibility studies. SCE seeks to obtain and review the studies and, thereby, to explore the clean generation opportunities provided by HEI's development of a new IGCC facility with carbon capture and sequestration located in the State of California called Hydrogen Energy California ("HECA").

E. Operation of HECA is expected to provide low GHG energy, as well as environmental, tax revenue and other benefits to the State of California.

F. Based on the foregoing, HEI and SCE intend to evaluate the feasibility of HECA and commercial reasonableness of off-take agreements whether for fuel or low GHG power, and intend to take certain actions as set forth in this LOI.

INTENTIONS:

Subject to the foregoing, the parties confirm their mutual, non-binding intentions as follows:

1. **Advice Letter Filing.** As soon as possible after the execution of this LOI, SCE will use good faith efforts to file and process an Advice Letter with the California Public Utilities Commission ("CPUC") that will seek to establish a memorandum account for recovery of up to $30 million with respect to the payment for a feasibility study of HECA ("HECA Study") generally described in Attachment A, and to pay for the incremental costs associated with the process of applying for, and obtaining, a CPUC decision on a Certificate of Public Convenience and Necessity ("CPCN") and either a Fuel Supply Agreement ("FSA") or Power Purchase Agreement ("PPA") relating to HECA. The Advice Letter will have the general form of Attachment B and will be supported by testimony in the general form of Attachment C. SCE will determine the content of the Advice Letter and supporting testimony; *provided, however*, any material modifications of the supporting testimony will be agreed to by the Parties and each Party retains the right to terminate this LOI if a mutual agreement on those material modifications is not reached, after the Parties have met and conferred in good faith concerning the material modifications. While SCE is preparing and processing the Advice Letter, HEI will provide SCE with commercially reasonable support.

   - If either Party determines, in its respective sole discretion, that the CPUC's decision on the Advice Letter is unacceptable, the Parties shall meet and confer in good faith to discuss potential courses of action.

   - Provided both SCE and HEI each determine, in their respective sole discretion, (i) the CPUC's approval of the Advice Letter is consistent with the terms of the request in the Advice Letter and acceptable, or (ii) that SCE and HEI are willing to go forward notwithstanding that the CPUC decision is not consistent with the terms of the request in the Advice Letter or acceptable, then SCE and HEI will use good faith efforts to negotiate the terms and conditions of, and execute a definitive agreement (the "HECA Study Agreement") whereby SCE would make one or more payments to HEI, the total of which will not exceed $30,000,000 ("SCE Payments"), and HEI would provide the HECA Study to SCE, in accordance with the HECA Study Agreement and the schedule set forth in Attachment A hereto. The Parties contemplate that the payment and delivery terms contained in the HECA Study Agreement will be contingent upon each Party's respective determination that the CPUC's approval of the Advice Letter is acceptable. The Parties will use good faith efforts to complete the negotiations of the HECA Study Agreement within sixty (60) days after the Advice Letter is filed.

   - Prior to executing the HECA Study Agreement, SCE will use commercially reasonable efforts to enter into confidentiality agreements with third parties and seek confidential treatment from the CPUC in the Advice Letter as necessary to obtain access to the HECA Study. HEI will provide SCE with commercially reasonable support in this regard. If SCE is unable to reach agreement on any such confidentiality agreements ("Third Party NDAs"), HEI will have no obligation to share the HECA Study reports and documents to the extent that such

HECA Study reports and documents contain confidential references that would be subject to Third Party NDAs (the "Confidential References"). If requested by either party, the parties will modify the HECA Study Agreement to remove the Confidential References and, if appropriate, reduce the amount of the SCE Payments.

- Upon receipt by HEI of the SCE Payments pursuant to the schedule set forth in Attachment A and the execution of necessary and appropriate confidentiality agreements, HEI will provide SCE with copies of the HECA Study reports and documents as agreed upon by the Parties in the HECA Study Agreement.

- SCE will have the opportunity to review the HECA Study reports and documents on the confidential basis provided herein. HEI will not be required to commence Phase II of the HECA Study and will not be required to complete Phase II if HEI, in its sole discretion, determines it is not commercially reasonable to do so.

- Unless the Parties, in their respective sole discretion, enter into a license or other agreement under which SCE may acquire some interest in the HECA Study, SCE will have no ownership interests in the HECA Study or any other materials or intellectual property produced in conjunction with the work undertaken therein as a result of this LOI and any future definitive agreements.

- SCE will have no other cost-sharing or payment obligations other than providing the SCE Payments.

2. Additional Funding. The Parties recognize, if they agree to continue development of HECA after completion of Phase I of the HECA Study, that additional funding for HECA would be required. The Parties anticipate that such additional funding would include public and/or private sources.

3. Additional Agreements. SCE and HEI will also use good faith efforts to negotiate and execute agreements defining the rights and obligations of the Parties with respect to the development of HECA which may include, but are not limited to, the purchase of hydrogen through a FSA, the purchase of electricity through a PPA, and/or a development agreement for HECA. Such discussions will take place in a commercially reasonable manner and time frame. The Parties intend to use good faith efforts to complete such agreements prior to commencing Phase II of the HECA Study.

4. Implementation Conditions. If the Parties determine to enter into any agreements on the terms of either the FSA or PPA, including a determination by SCE as to whether SCE will apply for a CPCN, (a) SCE will require additional co-applicants and (b) HEI will require reasonable commercial certainty regarding HECA implementation contracts and commercial structures.

5. Confidentiality. SCE and HEI confirm that all information relating to this LOI is subject to the August 4, 2007 Confidentiality Agreement between the Parties, or such

subsequent confidentiality agreement as may be required by one Party or the other; *provided, however*, the Parties agree to the disclosure of non-confidential information that is not subject to the intellectual property rights, including trade secrets, of either Party or a third party, if such information and results of the HECA Study are required by the CPUC to be made public; *provided, however*, that either Party will have the right to terminate this LOI in lieu of providing such information to the public. Furthermore, the Parties understand that HEI is prohibited from disclosing certain third-party confidential information unless the recipient of such information executes confidentiality agreements with such third parties or with HEI as permitted by the third-party agreements.

6. Termination Rights. Either Party may terminate this LOI for convenience and without liability, effective upon written notice to the other Party. The Parties contemplate the HECA Study Agreement will provide that termination shall not affect the Parties' rights and obligations arising prior to the effective termination date. Upon termination, if HEI requests SCE to return any HECA Study reports and documents to HEI, SCE will return the reports and documents unless a license or other ownership interest is otherwise acquired that permits retention of same by SCE.

7. Relationship of the Parties. It is understood that while this LOI constitutes a summary of the current intentions of SCE and HEI with respect to HECA, this LOI is not intended to, and does not (i) constitute an agreement of SCE or HEI to consummate any transaction or to enter into any binding agreement concerning HECA, (ii) create an exclusive relationship between SCE and HEI with respect to HECA or otherwise, (iii) contain all matters upon which agreement must be reached with respect to HECA, or (iv) create any rights or obligations in favor of either Party.

8. Amendments. This LOI may only be amended in a written amendment signed by both Parties.

9. Governing Law. This LOI shall be governed by and construed in accordance with the laws of the State of California.

Dated: 9/18/, 2008

SOUTHERN CALIFORNIA EDISON COMPANY

by: Akbar Jazayeri

title: VICE PRESIDENT

Dated: 9/10, 2008

HYDROGEN ENERGY INTERNATIONAL LLC

by:

title: REGIONAL DIRECTOR, AMERICAS

APPROVED
STEPHEN E. PICKETT
Sr. Vice President and
General Counsel
By W. A. Matthews
September 18 Attorney
,20 08

ATTACHMENT A

HECA Study Phases, Scope and Payment Schedule

The HECA Study is divided into two phases. While the phases are generally organized in chronological order by time of implementation, certain aspects of the phases may be implemented on a parallel basis. HEI shall deliver reports and documents in the subject areas defined under each phase pursuant to the second bullet point of section 1 of this LOI and SCE shall pay for such reports and documents pursuant to the schedule and in the amounts set forth below, and as further agreed upon by the Parties in accordance with this LOI.

Definition of HECA Study Phases

Phase I: Phase I shall consist of reports and documents developed for HECA on the following subjects:

(a) **Technology appraisal:** Screening of technologies for the production of low-carbon electricity primarily from petroleum coke feedstock. Example evaluations include gasifier and gas turbine technology selections and gas processing technology studies.

(b) **Feedstock and water:** Evaluation of feedstock (petroleum coke, coal, and potentially biomass) supply and procurement as well as evaluation of cooling system design (dry, hybrid or wet), water supply and raw water treatment options.

(c) **Process and system configuration**: Evaluation of the design and integration of the individual technology and process "blocks" that comprise HECA. Examples include plant capacity selection, development of basis of design, and CO_2 capture system configuration.

(d) **EOR and carbon sequestration:** Identification of the technical, commercial and regulatory issues associated with CO_2 offtake at commercial scale, utilization of the CO_2 in EOR and sequestration operations, and assessment of the overall carbon balance for HECA.

(e) **Environmental, Safety & Health (ES&H):** Evaluation of environmental, safety and health issues including emissions and permitting strategies including flaring minimization studies, safety studies, hazard management plans, health

studies, as well as project health, safety, security and environmental (HSSE) reports.

(f) **Operations, maintainability and constructability:** Development of the operations and maintenance (O&M) philosophy, labor and equipment market surveys as well as constructability assessments.

(g) **Water treatment:** Development of a design package containing an optimized raw water conveyance infrastructure and water plant configuration to develop, among other things, equipment and plot requirements, capital and operating cost, parasitic load and wastewater effluent rates and composition to be integrated into the HECA plant.

(h) **Acid Gas Removal (AGR):** Evaluation of appropriate carbon and sulfur removal technology required to establish project cost, emission capabilities, and a basis for FEED. Review and analysis of prospective licensors to confirm the technical feasibility of the proposed design, including relevant prior experience and provision of information to enable the engineering contractor to generate a capital cost estimate so that lifetime costs and technical feasibility can be compared and the most favorable licensor selected.

(i) **CAISO Interconnection:** Analysis and submission of an interconnection request (IR) with CAISO per FERC's Order No. 2003 to determine network upgrades and estimated cost and time to construct facilities required to connect to the ISO controlled grid.

(j) **Value Engineering:** Examination of HECA sub-systems including their integration to optimize and improve the performance, reliability, and life-cycle cost of HECA.

(k) **Process design package (PDP):** Continued development of the gasification system design including heat and mass balances, equipment sizing data, and other process information used as a basis for FEED activities.

Phase II: Phase II shall consist of the Front End Engineering Design ("FEED") reports and documents developed for HECA. FEED includes heat and mass balances, process

flow diagrams, P&IDs, equipment and line lists, preliminary datasheets for major equipment and long lead items, electrical and civil diagrams and drawings, environmental, health and safety review, project schedule, and a project capital cost estimate.

HECA Study Payment Schedule

SCE shall pay HEI for the HECA Study in the amounts and per the schedule listed below:

Payment Schedule	**Payment Amount**
Phase I	
Within thirty (30) days of an acceptable CPUC decision approving the SCE Advice Letter	$10 million
Within thirty (30) days of HEI Notice of Execution of GE PDP contract	$3.5 million
Within thirty (30) days of HEI's Notice of Completion of GE PDP	$3.5 million
Total Phase I	**$17 million**
Phase II	
Within thirty (30) days of HEI notifying SCE of total Phase II spending of $20 million	$10 million
Within thirty (30) days of delivery of FEED reports and documents to SCE	$3 million
Total Phase II*	**$13 million**
Total Phases I and II*	**$30 million**

*** SCE's total payment amount in Phase II will be approximately $13 million, less SCE's incremental costs associated with the process of applying for, and obtaining, a CPUC decision on a CPCN, FSA or PPA relating to HECA**

ATTACHMENT B

Advice Letter

ATTACHMENT C

Advice Letter Supporting Documentation

SOUTHERN CALIFORNIA EDISON
An *EDISON INTERNATIONAL* Company

Lisa Vellanoweth
Manager of Tariffs

February 27, 2009

California Public Utilities Commission
505 Van Ness Avenue, Room 4005
San Francisco, CA 94102

Attn: Honesto Gatchalian
Energy Division

Re: Substitute Sheet for Advice 2274-E

Dear Mr. Gatchalian:

Enclosed are an original and four copies of Attachment A and Substitute Sheet Number 44296-E* for Advice 2274-E. This substitute sheet is necessary to update Preliminary Statement N, Section Number (7) from "Advanced Metering Infrastructure Memorandum Account (AMIMA)" to "Not Used" in order to reflect currently effective information. In addition Section Number (22) has been changed from "Not Used" to "Energy Efficiency Memo Account (EEMA)." Also, Section Number (31) has been changed from "New System Generation Memorandum Account (NSGMA)" to "Not Used." This substitute sheet ensures that all appropriate, approved information is contained within the affected tariff sheet.

Please include the enclosed sheets in your master Advice 2274-E. If you have any questions, please contact Betty Bell at (626) 302-4858.

Sincerely,

Lisa Vellanoweth

Enclosures
2274-ESub1.doc

* Denotes a filed substitute sheet.

SOUTHERN CALIFORNIA EDISON
An *EDISON INTERNATIONAL* Company

Lisa Vellanoweth
Manager of Tariffs

March 23, 2009

California Public Utilities Commission
505 Van Ness Avenue, Room 4005
San Francisco, CA 94102

Attn: Honesto Gatchalian
Energy Division

Re: Substitute Sheet for Advice 2274-E

Dear Mr. Gatchalian:

Enclosed are an original and four copies of Attachment A and Substitute Sheet Number 44296-E** for Advice 2274-E. This substitute sheet is necessary to update Preliminary Statement N, Section Number (23) to reflect approved and effective language due to Advice 2303-E becoming effective out of order. This substitute sheet ensures that all appropriate, approved information is contained within the affected tariff sheet.

Please include the enclosed sheets in your master Advice 2274-E. If you have any questions, please contact Lisa Foulds at (626) 302-2010.

Sincerely,

Lisa Vellanoweth

Enclosures
2274-ESub2.doc

* Denotes a filed substitute sheet.