



CALIFORNIA
ENERGY
COMMISSION

GRANT SOLICITATION

Research Projects on Climate Change of Relevance to California

Subject Area: Climate Change
PIER Environmental

APPLICATION
PACKAGE

March 2008



Arnold Schwarzenegger, Governor

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Grant Solicitation and Application Package

Research Projects on Climate Change of Relevance to California

Public Interest Energy Research (PIER) Climate Change Research Subject Area: Environmental

- 1. Release Date:** March 17, 2008
- 2. Proposal Due Date:** May 20, 2008 at 4:00 p.m. Pacific Daylight Time

3. Purpose

The purpose of this solicitation is to select the Applicants best qualified to carry out climate change-related research. Each of the six research topics covered in this solicitation represents a major variable in the overall picture of Greenhouse Gas (GHG) emissions and climate change in a California context. Research funded by this solicitation will contribute toward a more comprehensive understanding of the relationship between GHG emissions factors and climate change and how best to adapt to and/or mitigate its negative impacts.

4. Availability of Solicitation Documents and Information

This solicitation and all supporting documents and forms can be found at <http://www.energy.ca.gov/contracts/index.html> under "Current Solicitations." Interested parties may also register on the electronic mailing list on this webpage to receive notifications related to this solicitation.

For those parties without internet access, copies of solicitation documents and information can be obtained by contacting:

Elizabeth Keller, Administrative Assistant
Energy Systems Research
California Energy Commission
1516 Ninth Street, MS-43
Sacramento, CA 95814
Telephone: (916) 651-9381
Fax: (916) 654-4872
Email: ekeller@energy.state.ca.us

In addition, you may request to be added to the California Energy Commission mailing notification list to receive information regarding this solicitation.

5. Background: Climate Change and California

A growing body of research demonstrates that the climate is changing due to increasing atmospheric concentration of greenhouse gases mostly resulting from human activities. The changing climate is expected to profoundly impact California's public health, economy, and

environment, but efforts at understanding the nature and potential consequences of climate change on the State has only just begun. The projected consequences of climate change are generally negative and even catastrophic in some extreme cases. However, studies also suggest that the reduction of the rate of GHG emissions will reduce the level of negative climate change-related impacts.¹ In the overall nexus between GHG emissions and climate change, California presents a complex picture. Even though its per capita carbon dioxide² emissions from fossil fuel combustion is the second lowest in the nation,³ California is also the second largest emitter of GHG emissions in the United States and twelfth to sixteenth largest in the world.⁴ Within these rankings, electricity generation is the State's second largest category of GHG emissions after transportation from its use of fossil fuels that emit harmful GHGs into the atmosphere during combustion. Among fossil fuels, natural gas is the cleanest fuel type and all California power plants are powered by natural gas. However, its principal component, methane, is a potent GHG with an ability to trap heat almost 21 times more effectively than carbon dioxide.⁵ In addition, the enormous amounts of natural gas combusted in industrial facilities for process heating, in our homes and buildings, and for electricity generation and in other applications, bring the quantity of carbon dioxide emissions from the combustion of natural gas almost equal to the carbon dioxide emissions from the use of motor gasoline in California.

Responding to the increasing GHG emissions trend and the threat posed by the resultant climate change, on June 1, 2005 Governor Arnold Schwarzenegger issued Executive Order S-3-05 which called for specific emissions reductions and biennial updates on the state of climate change science and the emerging understanding of potential impacts on climate-sensitive sectors such as the state's water supply, public health, agriculture, coastal areas, and forestry. The Public Interest Energy Research (PIER) Program led the preparation of the 2006 science report and will continue its role for future reports.

The steady progression of climate change demands our vigilant efforts in understanding the phenomenon itself, a thorough exploration of mitigation/adaptation strategies, and foresighted and scientifically sound public policy to ensure the socioeconomic welfare of the State. In this interplay of public welfare, science, and policy, the California Energy Commission (Energy Commission) fosters cutting-edge research in order to provide policy-makers with the knowledge and tools they need to anticipate and plan for climate change-related impacts, and also to advance the science of climate change-related research and mitigation efforts, ultimately protecting the long-term interests of the State's utility ratepayers. The Energy Commission's Public Interest Energy Research (PIER) program is funded by electricity and natural gas

¹Franco, Cayan, Luers, Hanemann, Croes, 2005. *Scenarios of Climate Change in California: an Overview –FINAL REPORT*, (p.4). California Climate Change Center, Sacramento, CA. CEC-500-2005-186-SF. <http://www.energy.ca.gov/publications/displayOneReport.php?pubNum=CEC-500-2005-186-SF>

² CO₂ comprises about 80% of GHG. <http://www.energy.ca.gov/2006publications/CEC-600-2006-013/figures/FIGURE-6.PDF>

³ CO₂ emissions from fossil fuel combustion per capita. <http://www.energy.ca.gov/2006publications/CEC-600-2006-013/figures/FIGURE-6.PDF>

⁴ Bemis, 2006. *Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004*. (p.i). California Energy Commission. Sacramento, CA. CEC-600-2006-013-SF. <http://www.energy.ca.gov/2006publications/CEC-600-2006-013/CEC-600-2006-013-SF.PDF>

⁵ "Natural Gas and the Environment." NaturalGas.org., 2007. <http://www.naturalgas.org/environment/naturalgas.asp>

ratepayers. In addition to funding electricity and natural gas related research projects, PIER is also mandated to support transportation-related research. Given the broad mandate of the PIER program and due to the intimate linkage between the combustion of fossil fuels and climate change, the Energy Commission, in conjunction with other state agencies, is leading a robust climate change research program. The PIER program is the first state-sponsored climate change research program in the nation.

6. Eligible Projects

Proposals should reflect a comprehensive understanding of the current state of science in the chosen field of research. Successful proposals should clearly describe the research approach taken for their project and demonstrate how they can build upon and improve the existing body of work, especially the PIER-funded research, and clearly state what their contributions will be to the knowledge base.

Solicitation Research Topics

Research Topic 1: GHG Emission Reduction Strategies: In-depth Case Studies

Research Topic 2: N₂O Emissions from the Application of Fertilizers in Agricultural Soils

Research Topic 3: Adaptation Studies: Local to Regional Scales

Research Topic 4: Collection of Ecological Data for Climate Change Studies

Research Topic 5: Options to Reduce GHG Emissions in California by 2050

Research Topic 6: Contribution of Snowmelt to Underground Water Recharge

Please refer to the Exhibits A-1 through A-6 for further information and scope of work for each Research Topic. Proposals will be evaluated and scored on their scientific value, demonstrated expertise and ability of the research team by publications and past research, the cost merits of the proposal, and other factors specified in this manual. Each proposal must relate to only one of the six research topic areas.

Applicants may submit multiple proposals; however, they may submit only one proposal to each of the 6 research topic areas. Each proposal must be submitted separately, adhering to all the requirements contained in this application package. The Energy Commission will consider different departments and/or divisions of a single institution as separate and distinct Applicants.

7. Funding Information

A total of up to \$2,900,000 for the six research topics is available to fund projects under this competitive solicitation. Funding for this solicitation originates from the Energy Commission's 2007/08 PIER Electricity Research Program. Match funding is encouraged but not required for selection.

The Energy Commission reserves the right to condition, modify, or otherwise limit any and all PIER funding contained in and awarded pursuant to this solicitation.

Research Topic 1:	GHG Emission Reduction Strategies: In-depth Case Studies (\$600,000)
Research Topic 2:	N ₂ O Emissions from the Application of Fertilizers in Agricultural Soils (\$500,000)
Research Topic 3:	Adaptation Studies: Local to Regional Scales (\$600,000)
Research Topic 4:	Collection of Ecological Data for Climate Change Studies (\$400,000)
Research Topic 5:	Options to Reduce GHG Emissions in California by 2050 (\$400,000)
Research Topic 6:	Contribution of Snowmelt to Underground Water Recharge (\$400,000)

8. Eligible Applicants

This is an open solicitation seeking proposals from public and private entities and individuals actively involved in the climate change research. To be eligible, Applicants must present a team with demonstrated capabilities in successful completion of research projects.

California business entities as well as non-California business entities conducting intrastate business in California are required to register and be in good standing with the California Secretary of State to enter into an Agreement with the Energy Commission. If not currently registered with the California Secretary of State, Applicants are encouraged to contact the Secretary of State's Office as soon as possible to avoid potential delays in beginning the proposed project if your application is successful. For more information, contact the Secretary of State's Office via their website at www.sos.ca.gov.

9. Applicants' Responsibilities for Submitting a Proposal

Applicants must take responsibility to:

- Carefully read this entire solicitation and all applicable amendments/addendums.
- Ask the appropriate questions in a timely manner.
- Submit all required responses in a complete manner by the required date and time.
- Make sure that all procedures and requirements of the solicitation are followed and appropriately addressed.
- Carefully reread the entire solicitation and all applicable amendments/addendums before submitting a Proposal.

10. California Environmental Quality Act (CEQA)

Some of the projects selected for funding may meet the definition of a "project" for purposes of CEQA (see Public Resources Code section 21000 et seq.). If this occurs, the Energy Commission's Legal Staff will review the projects to determine whether an exemption applies that would prevent further actions under CEQA. If no exemption applies, certain CEQA requirements (e.g., preparation of a negative declaration or environmental impact report) will have to be met prior to the Energy Commission approving the grant. The Applicant will have to pay the cost for these activities. Please refer to Title 20, California Code of Regulations, Chapter 6, Article 1, including section 2308.

11. Proposal Requirements

It is required that proposals contain the following elements. ***Failure to include these elements WILL result in your proposal receiving a lower score and MAY result in your proposal being rejected and not eligible for funding.***

1. Contact information, including: contact person's name, title, entity legal name, physical address, telephone number, fax number and email address.
2. A clear statement of which Research Topic, as defined under "Eligible Projects," is addressed by your proposal.
3. An Executive Summary of the project. The maximum length of the Executive Summary is two (2) pages. Project description; project objective; quantitative and measurable goals to be achieved; project duration and date of completion; amount of PIER funding requested; and total project budget.

4. Description of the state-of-the-science of the proposed research approach and the current status of the research in the area of your project, barriers to advancement of the science and why your project is the next logical step to advance the state-of-the-science. A Work Statement with a task-by-task description of your project. Include at least one goal for each task, a list of the activities to be performed, product(s) to be produced, and the duration of the task. See attached Work Statement template (Exhibit C).
5. Short biographies of the Principal Investigator (PI) and key research partners (individuals in your organization or subcontractors), emphasizing experience related to activities to be performed in the project. Please attach a list of relevant peer reviewed publication. Detailed project budget information, including the source(s) of match funding, if any. Include the forms in Exhibit D: 1) Category Budget; 2) Budget Details; 3) Summary Budget by Task; 4) PIER Funding by Task; and 5) Match Funding by Task. This budget form is an Excel spreadsheet. It is posted on the Energy Commission website at <http://www.energy.ca.gov/contracts/index.html> as part of this solicitation package.
6. Any other significant factors to enhance the value of the proposal, including highlights of the previous work and innovative features related to the proposed project.

12. Proposal Guidelines

Proposals should adhere to the following guidelines. ***Failure to adhere to these guidelines MAY result in your proposal being rejected and not eligible for funding.***

1. Limit proposals to a maximum length of twenty (20) pages, excluding resumes, contractual scope of work (Exhibit C), and budget (Exhibit D).
2. Provide hard copies of one (1) original and five (5) copies of the proposal and a CD containing all the documents related to the proposal. The documents do not need to be bound; binder clips are acceptable. The original must be signed by an authorized representative of your organization.
3. Use a standard 12-point font and 1-inch or larger page margins and number the pages.
4. Project duration cannot exceed the duration specified in the applicable Research Topic attachment included in this solicitation.
5. All project expenditures (match share and reimbursable) must be expended within the approved term of the funding agreement.
6. Maximum PIER funding requests per project cannot exceed the maximum funding amount specified in each Research Topic attached.
7. The budget should allow for the expenses of a Kick-off Meeting, at least one Critical Project Review meeting, and a Final Meeting. It is anticipated that meetings will be conducted at the Energy Commission located in Sacramento, CA or via WebEx or telephone conference. The Energy Commission may request

the researchers to present at or submit a poster to the PIER California Climate Change Conference (in Sacramento) and also to produce a project fact sheet. Budget should anticipate expenses to participate in one to two conferences and at least one fact sheet production.

8. The budgets should allow for the preparation and submission of quarterly progress reports (approximately 2-4 pages each) during the approved term of the agreement, and a final report that follows Energy Commission guidelines which can be found at <http://www.energy.ca.gov/contracts/pier/contractors/index.html>.
9. The purchase of equipment (items with a unit cost greater than \$5,000 and a useful life greater than one year) with PIER funds is discouraged due to disposition requirements associated with the equipment. There are no disposition requirements for equipment purchased with match share funding.
10. The budget must reflect estimates for **actual** costs to be incurred during the approved term of the project. The Energy Commission can only approve and reimburse expenditures for actual costs that are properly documented in accordance with the PIER Grant Terms and Conditions.
11. The budget must **NOT** include any profit from the proposed project, either as a reimbursed item or as match share. In accordance with the PIER Grant Terms and Conditions, **NO PROFIT IS ALLOWED UNDER GRANT AGREEMENTS**. Please review the PIER Grant Terms and Conditions for additional restrictions and requirements.

13. **Selection of Projects and Award Process**

The following process will be utilized to recommend project(s) for funding:

1. Based on the proposals submitted, a scoring committee will score the projects using the scoring criteria described in Exhibit B.
2. The scoring committee may conduct optional interviews for clarification purposes.
3. A minimum score of 70 (out of 100) is required to be eligible for funding.
4. Projects receiving a score of 70 or more will be ranked according to their overall score.
5. Passing project(s) in each research topic area will be recommended for funding starting with the highest ranked project until all funds allocated for that research topic area are exhausted.
6. The Energy Commission reserves the right to negotiate with the Applicant(s) to modify the project scope, level of funding, or both.
7. Once all proposals receiving passing scores have been funded in their respective research topic area, the Energy Commission reserves the right, at its sole discretion, to transfer excess funds to other research topic area(s) covered by this solicitation in order to fund additional proposals that have received a passing score.

8. If the Energy Commission is unable to successfully negotiate and execute a funding agreement with an Applicant, the Energy Commission, at its sole discretion, reserves the right to cancel the pending award and fund the next highest ranked eligible project proposal received under this solicitation.
9. A Notice of Proposed Awards will be released.
10. Project(s) recommended for funding will be scheduled and heard at an Energy Commission Business Meeting.

If approved at an Energy Commission Business Meeting:

11. Public agencies and non-profit organizations that receive funding under this solicitation must provide an authorizing resolution approved by their governing authority to enter into an Agreement with the Energy Commission.
12. A Grant Agreement, which includes applicable Terms and Conditions*, will be written and sent to the Recipient(s) for review, approval, and signature.
13. Once returned to the Energy Commission, the Energy Commission will fully execute the Grant Agreement. Recipient(s) are approved to begin the project only after full execution of the Grant Agreement.

* **The *PIER Grant Terms and Conditions* can be found at <http://www.energy.ca.gov/contracts/index.html> as part of this solicitation package. Please note, however, the Energy Commission reserves the right to modify the terms and conditions prior to executing grant agreements.**

14. Schedule of Proposal and Award Process

Release of Program Opportunity Notice	March 17, 2008
Proposal Workshop (via in-person participation, teleconference and WebEx)	April 11, 2008 10:00 a.m.
Deadline to Submit Questions	April 20, 2008
Post Questions and Answers to Website	April 30, 2008
Deadline to Submit Proposals	May 20, 2008 4:00 p.m. Pacific Daylight Time
Interview Applicants (if necessary)	Estimated June 5, 2008
Post Notice of Proposed Award	Estimated July 2008
Approval of Awards at Energy Commission Business Meeting	Estimated October - November 2008

15. Confidential Information

No confidential information will be accepted during the proposal and selection phase of this solicitation. If any confidential information is submitted, the entire proposal will be rejected and will not be eligible for funding. Proposals containing confidential information will be returned to the Applicant.

While discouraged, Applicants may **propose** to deliver confidential products during the course of the project if funded. If necessary, instructions on submitting confidential products will be provided by the Energy Commission prior to executing the Grant Agreement.

16. Proposal Workshop

A proposal workshop will be held through in-person participation, WebEx, and conference call. Participation by prospective Applicants is optional. Please call (916) 654-3962 or refer to the Energy Commission's website at <http://www.energy.ca.gov/contracts/index.html> to confirm the date and time.

Public participation may be done in-person, via WebEx, and/or conference call.

Date: April 11, 2008
Time: 10:00 AM, Pacific Daylight Time
Location: California Energy Commission
Hearing Room A, First Floor
1516 Ninth Street
Sacramento, California 95814

To join the WebEx meeting, click the following link and enter the meeting number and password provided below:

Topic: Climate Change Solicitation Proposal Workshop
Date: Friday, April 11, 2008
Time: 10:00 am, Pacific Daylight Time (GMT -07:00, San Francisco)
Meeting Number: 922 392 034
Meeting Password: [meeting@10am](#)

Please click the link below to see more information, or to join the meeting.

To join the online meeting

-
1. Go to <https://energy.webex.com/energy/j.php?ED=98967857&UID=1023663257>
 2. Enter your name and email address.
 3. Enter the meeting password: [meeting@10am](#)
 4. Click "Join".

To join the teleconference only

Provide your phone number when you join the meeting to receive a call back. Or, call the number below and enter the meeting number.

Call-in toll-free number (US/Canada): 866-469-3239

Call-in toll number (US/Canada): 650-429-3300

Global call-in numbers:

<https://energy.webex.com/energy/globalcallin.php?serviceType=MC&ED=98967857&tollFree=1>

Toll-free dialing restrictions: http://www.webex.com/pdf/tollfree_restrictions.pdf

For assistance

1. Go to <https://energy.webex.com/energy/mc>
2. Click "Assistance".
3. Click "Support".

You can also contact Sarah Pittiglio at:

spittigl@energy.state.ca.us

1-916-654-3962

To update this meeting to your calendar program (for example Microsoft Outlook), click this link:

<https://energy.webex.com/energy/j.php?ED=98967857&UID=1023663257&ICS=MRS2&LD=1&RD=2&ST=1&SHA2=xAp64eU39Wc/Z14QQYy1rL012kqUf0RHh/5b8-4ZeGU=>

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<https://energy.webex.com/energy/meetingcenter/mcsetup.php>

The host requests that you check for compatibility of rich media players for Universal Communications Format (UCF) before you join the session. UCF allows you to view multimedia during the session. To check now, click the following link:

<https://energy.webex.com/energy/systemdiagnosis.php>

Sign up for a free trial of WebEx

<http://www.webex.com/go/mcemfreetrial>

<http://www.webex.com>

We've got to start meeting like this(TM)

IMPORTANT NOTICE: This WebEx service includes a feature that allows audio and any documents and other materials exchanged or viewed during the session to be recorded. By joining this session, you automatically consent to such recordings. If you do not consent to the recording, do not join the session.

17. Proposal Submission Requirements

Proposals must be **received** by the Energy Commission's Grants and Loans Office by **4:00 p.m. (PDT) on May 20, 2008**. Proposals must be mailed or delivered to:

California Energy Commission
Grants and Loans Office
Attn: PIER Climate Change Research Grant Program
1516 Ninth Street, MS-1
Sacramento, CA 95814

Postmark dates of mailing, electronic mail (E-mail), and facsimile (Fax) transmissions are not acceptable in whole or in part under any circumstances. The Energy Commission will reject all proposals not received by the Energy Commission's Grants and Loans Office by the stated due date and time.

18. Grounds for Rejection

1. Proposals **WILL** be rejected and not considered for funding if: The proposal is not received by the Energy Commission's Grants and Loans Office by the stated due date and time.
2. The proposal does not clearly state which Research Topic area, as defined under "Eligible Projects," is addressed by your proposal.
3. The proposal contains confidential information.
4. The proposal proposes a project that has already been addressed or is being addressed.
5. The proposal is not for a distinctly separate project from other proposals submitted by the same Applicant.
6. An applicant submits multiple proposals under a single research topic area. If this occurs, all of the applicant's proposals submitted under that research topic area will be rejected.
7. The proposal relates to more than one of the six research topic areas.

Proposals **MAY** be rejected and not considered for funding if:

1. The proposal does not address each element listed under "Proposal Requirements."
2. The proposal does not adhere to the guidelines listed under "Proposal Guidelines."

19. Amendment or Cancellation of this Solicitation

The Energy Commission reserves the right to do any of the following:

- Cancel this solicitation.
- Amend or revise this solicitation as needed. Reject any or all proposals received in response to this solicitation.

20. Questions

Additional questions about this solicitation must be submitted by 4:00 p.m. on April 20, 2008, and may be submitted by email or letter. The questions and answers will be posted on the Energy Commission's website by April 30, 2008. Questions may be directed to:

Guido Franco
PIER Environmental Area
California Energy Commission
1516 Ninth Street, MS-43
Sacramento, CA 95814
Email: Gfranco@energy.state.ca.us

For those parties without internet access, copies of the questions and answers can be obtained by contacting:

Elizabeth Keller, Administrative Assistant
Energy Systems Research
California Energy Commission
1516 Ninth Street, MS-43
Sacramento, CA 95814

Telephone: (916) 651-9381
Email: ekeller@energy.state.ca.us

21. Exhibits

- A. Research Topics 1 - 6
- B. Scoring Criteria
- C. Sample Work Statement Format and Instructions
- D. Budget Forms
- E. PIER Terms and Conditions with Payment Request Form
- F. Prevailing Wage Special Condition Template
- G. Prevailing Wage Compliance Certificate
- H. Prevailing Wage Compliance Qs & As

Exhibit A-1

Research Topic 1

GHG Emission Reduction Strategies: In-depth Case Studies

I. Background Information

The Global Warming Solutions Act of 2006 (AB 32) requires the State to reduce its greenhouse gas (GHG) emissions to the 1990 level by 2020. Furthermore, the Executive Order signed by the Governor on June 1, 2005 (S-3-05) establishes a GHG emission target for California designed to bring GHG emissions down by 80% from the 1990 levels by 2050. Thus far, there are only a few in-depth scientific evaluations of specific options available to the State to reduce net GHG emissions. Considering the State's tremendous economy and its highly diverse sectors that employ a vast array of different technologies, a thorough evaluation of plausible alternatives is an important step toward formulating a successful emissions reduction strategy.

II. Project Description

The Public Interest Energy Research (PIER) Program is soliciting proposals that will initiate or continue two or more in-depth studies of the options available to different sectors of the economy to reduce GHG emissions. Proposals should clearly demonstrate the importance of the case studies to inform policy formulation in the State. The case studies should involve an interdisciplinary group of researchers to make sure both the technical and economic aspects of the options considered are well covered. The proposals should also indicate how the researchers will identify implementation barriers as well as the available options to overcome these barriers. PIER was created to advance science and/or technology, which, in the case of climate change, is demonstrated by multiple publications of PIER-funded research results in scientific journals. The proposal should be clear on how the proposal would advance climate change science.

III. Relevance to the PIER Program

Changes in climate will affect every aspect of California's economy and its natural ecosystems. Since energy generation and consumption is the main contributor to GHG emissions in the State, the PIER program has been funding climate change research since 2001 to address the environmental implications (i.e., climate change impacts) of the energy system. The electric and natural gas sectors will be affected by the regulations and the plans developed to comply with AB32 but they may be allowed to offset their emissions by purchasing surplus emission reductions from other sectors of the economy. These transactions would occur if they result in lower costs when compared to other options available with the economic and environmental benefits accruing to the end users of energy. Therefore, identifying low cost emission reduction options could be an important channel for lower overall costs for the electricity and natural gas rate-payers.

IV. Project Term

Maximum of two years.

V. Maximum Amount of Funds Available

A total of \$600,000 is available under this research topic. Maximum requested funding for each proposed project is \$300,000.

VI. Budget Note

Applicants should indicate what percentage of the budget will be spent on what types of fieldwork. This can be done using Attachment D – the task level budget.

VII. Matching Funds and/or Shared Costs

Please include a brief write-up of any existing or potential matching funds and/or shared costs in the Budget Narrative section of the application. Indicate if the funds/costs are existing or potential.

VIII. References

Six, J., and R. Howitt, et al. 2008. *An Integrated Assessment of the Biophysical and Economic Potential for Greenhouse Gas Mitigation in California Agricultural Soils*. in press, PIER report.

Exhibit A-2

Research Topic 2

N₂O Emissions from the Application of Fertilizers in Agricultural Soils

I. Background Information

The Global Warming Solutions Act of 2006 (AB 32) requires the State to reduce its greenhouse gas (GHG) emissions to the 1990 level by 2020. The Executive Order signed by the Governor on June 1, 2005 (S-3-05) establishes a GHG emission target for California which is to bring GHG emission down by 80% from 1990 levels by 2050.

Nitrous Oxide (N₂O) emissions from the use of fertilizer in agricultural soils dominate the emissions from the agricultural sector but there is a high level of uncertainty in the emissions estimations. In a prior PIER project (Six, et al., 2008), researchers at University of California, Davis attempted to validate two agro-ecological models: DNDC⁶ and DayCent⁷. However, the lack of adequate data hampered the full validation of these models, with the sporadic nature of the N₂O emissions being one of the main problems. Improved and validated models are needed to estimate N₂O emissions from agricultural soils in order to improve the statewide inventory maintained by the Air Resources Board and also to potentially allow growers to trade N₂O emission reductions in the future.

II. Project Description

PIER is soliciting proposals that will measure N₂O emissions from the use of fertilizers in agricultural soils that could be used to both improve and validate existing models. For this project, laboratory and/or field measurement studies in California are required. The proposals must discuss how the measurements could be used to improve and/or validate existing models. Proposals that include validation of these models as part of the proposed work are encouraged. Simultaneous measurement of other GHG gases would be a plus.

III. Relevance to the PIER Program

Changes in climate will affect every aspect of the California's economy and its natural ecosystems. Since energy generation and consumption is the main contributor to GHG emissions in the State, the PIER program has been funding climate change research since 2001 to address the environmental implications (i.e., climate change impacts) of the energy system and to study options available to reduce GHG emission in California.

When the regulations go into enforcement, the electric and natural gas sectors will be affected by the plans developed to comply with AB32. However, under certain conditions they may be allowed to offset their emissions by purchasing surplus emission reductions (or credits) from other sectors of the economy. These transactions would occur if they result in lower costs when

⁶ DeNitrification-DeComposition model is a computer simulation model of carbon and nitrogen biogeochemistry in agro-ecosystems.

⁷ DayCent model is capable of simulating detailed daily soil water and temperature dynamics and trace gas fluxes (CH₄, N₂O, NO_x and N₂).

compared to other options available to them, with the economic and environmental benefits accruing to the end users of energy. Therefore, identifying low cost emission reduction options could be a pivotal channel for lower overall costs for the electricity and natural gas rate-payers.

IV. Project Term

Maximum of three years.

V. Maximum Amount of Funds Available

A total of \$500,000 is available under this research topic. Maximum requested funding for each proposed project is \$500,000.

VI. Budget Note

Applicants should indicate what percentage of the budget will be spent on what types of fieldwork. This can be done using Form C-2 – the task level budget.

VII. Matching Funds and/or Shared Costs

Please include a brief write-up of any existing or potential matching funds and/or shared costs in the Budget Narrative section of the application. Indicate if the funds/costs are existing or potential.

VIII. References

Six, J., and R. Howitt, et al., *An Integrated Assessment of the Biophysical and Economic Potential for Greenhouse Gas Mitigation in California Agricultural Soils*. PIER report, in press, 2008.

Exhibit A-3

Research Topic 3

Adaptation Studies: Local to Regional Scales

I. Background Information

Intergovernmental Panel on Climate Change's Fourth Assessment Report states that adaptation is a necessary complement to reducing greenhouse gas emissions in order to address climate change at all levels. In California, the Executive Order signed by the Governor on June 1, 2005 (S-3-05) requires the State to conduct scientific studies on the potential impacts of climate change and on adaptation options. Accordingly, PIER has funded several statewide impacts and adaptation studies (e.g., Wilson, et al., 2003; Cayan, et al., 2006)⁸ that should be continuously improved upon. At the same time, in-depth adaptation studies at the local and regional levels are needed to inform policy making at these levels and to uncover potential limitations of statewide analyses which only in-depth local studies can discern.

II. Project Description

PIER is soliciting proposals to perform in-depth adaptation studies at the local and/or regional levels. These in-depth adaptation studies must involve detailed engineering/economic analyses of services, infrastructure, or a public good that could be severely affected by climate change. Proposed adaptation studies must use the climate, hydrology, and sea level scenarios being developed by PIER. For information about and the complete listings of the scenarios studies please go to:

http://www.climatechange.ca.gov/biennial_reports/2006report/index.html
http://www.climatechange.ca.gov/research/2008_assessment/index.html

For researchers, participation in local and/or regional agencies with in-kind contributions, participation in advisory committees, and any other form of meaningful participation is highly recommended to ensure the usefulness of the results in the preparation of adaptation strategies.

III. Relevance to the PIER Program

Changes in climate will affect every aspect of the California economy and its natural ecosystems. Since energy generation and consumption is the main contributor to greenhouse gas (GHG) emissions in the State, the PIER program has been funding climate change research since 2001 to address the environmental implications (i.e., climate change impacts) of the energy system and to study options available to reduce GHG emission in California. Adaptation studies will help the policy makers to choose the best options available for climate change-related risk management.

IV. Project Term

Maximum of two years.

⁸ For a complete of list of climate change PIER reports, please go to [http://www.energy.ca.gov/publications/searchReports.php?pier1=climate change](http://www.energy.ca.gov/publications/searchReports.php?pier1=climate%20change)

V. Maximum Amount of Funds Available

A total of \$600,000 is available under this research topic. Maximum requested funding for each proposed project is \$200,000.

VI. Budget Note

None.

VII. Matching Funds and/or Shared Costs

Please include a brief write-up of any existing or potential matching funds and/or shared costs in the Budget Narrative section of the application. Indicate if the funds/costs are existing or potential.

VIII. References

Wilson, T., et al., 2003. *Global Climate Change and California: Potential Implications for Ecosystems, Health, and the Economy*. California Energy Commission, Public Interest Energy Research Program, P500-03-058CF. http://www.energy.ca.gov/pier/final_project_reports/500-03-058cf.html

Cayan, D., et al., 2006. *Scenarios of Climate Change in California: An Overview*. California Energy Commission, Public Interest Energy Research Program, California Climate Change Center, CEC-500-2005-186-SF. http://www.climatechange.ca.gov/biennial_reports/2006report/index.html

Exhibit A-4

Research Topic 4

Collection of Ecological Data for Climate Change Studies

I. Background Information

California has a highly diverse landscape that ranges from cool, wet redwood forests in Northern California to hot, dry Mojave and Colorado deserts of Southern California, with many variations in between. As a result, California hosts more plant and animal species than any other state. Across the state, these species reside in approximately 300 natural plant and animal communities, 178 major habitat types (Schoenherr 1992), ten broad biological categories, or “bioregions” based on distinct and consistent climate zones, and 10 floristic provinces that are further divided into 24 sub-provinces (Hickman 1993). In the state, there are 5,057 native and nearly 1,000 exotic plant species and almost 1,000 native vertebrate species including 540 birds, 214 mammals, 77 reptiles, 47 amphibians and 83 freshwater fishes (Schoenherr 1992).

This rich abundance of flora and fauna is already threatened by forces such as land-use changes, invasive species, and air and water quality degradation. Climate change impacts, largely a result of greenhouse gas (GHG) emissions, will intensify these threats through increases in temperature, changes in precipitation levels, potential increases in extreme rainfall events, runoff, and evaporation; as well as from changing ecosystems, changes in snowpack levels and soil moisture, and sea level rise (USGCRP 2001, Cayan, et al., 2006).

The PIER program has funded three projects applying ecological models to investigate the potential changes of vegetation patterns under different climatic scenarios in California. Using future climate scenarios previously developed for PIER, the models employed mathematical formulae to explore how vegetation is likely to change over time and across different habitats. The projects were useful in broadening our understanding of the potential effects of climate change on state resources. However, modeling ecological change is very difficult for two key reasons: First, there is a lack of historical data regarding range shifts over the last century in California – an important baseline for predictions of future change. Second, nonlinear ecological effects can play critical roles in how species move. A recent study published in *Science* demonstrated that “species interactions strongly influence responses to changing climate, overturning direct climatic effects within 5 years”⁹ in a California grassland community where the rainfall levels were manipulated on several plots. The models also require updated ecological data for validation of their predictions.

On-the-ground monitoring is therefore critical for informing ecological models and our understanding of ecological impacts. A dynamic integrated model being developed for PIER by Lee Hannah at Conservation International, Frank Davis at UC Santa Barbara, and others, serves as a good example. This new ecological model incorporates many important variables including mobility and population structure of plants and animals, as well as physical factors. Incorporating these important factors greatly improves the model’s ability to make more realistic estimates of ecosystem change in response to climatic shifts. However, without a monitoring program to provide climate and ecology data for calibration and field validation of the model’s predictions, the ability of the model to predict future change will always remain in question.

⁹ “Species Interactions Reverse Grassland responses to Changing Climate,” KB Suttle, et al., *Science* 315, 640 (2007)

II. Project Description

PIER is soliciting proposals that will initiate or continue ecological monitoring programs that can provide data for modelers and others studying the ecological impacts of climate change. PIER is interested in resurvey-type studies in particular that can provide important information for the evaluation of models, climate change detection studies, and for climate impact studies (cf. <http://mvz.berkeley.edu/Grinnell/index.html>; Thorne, et al., 2007). These efforts may require only one or two field seasons to update historical data and observe shifts, whereas brand new surveys will require several years before clear signals of change emerge.

III. Relevance to the PIER Program

Changes in climate will affect the distribution and diversity of ecosystems at the global, national, and state levels. At the same time, these changes in ecosystems will affect the hydrological cycle and the climate itself. For example, changes in albedo may be as important as the climate forcing by greenhouse gases at the regional level (Dr. Margaret Torn, personal communication)¹⁰. Changes in ecosystem patterns, processes, and hydrology will, in turn, impact energy demand and the availability of hydropower. Understanding on-the-ground changes can discover potentially significant changes, highlight unexpected ecological factors, and enhance modeling efforts to predict climate change impacts.

This project is connected to other potential PIER projects dealing with the potential impact of climate change in forested areas, the carbon budget in California lands and its impacts in the state-wide inventory of greenhouse gases, forest fires, and ecosystems impacts. Ideally this monitoring program should be used with ecological models to study the link and feedback between climate and the biosphere.

IV. Project Term

Maximum of three years.

V. Maximum Amount of Funds Available

A total of \$400,000 is available under this research topic. Maximum requested funding for each proposed project is \$200,000.

VI. Budget Note

Applicants should indicate what percentage of the budget will be spent on what types of fieldwork. This can be done using Exhibit D - the task level budget.

¹⁰ Climate forcing refers to atmospheric modifications that 'force' the climate to change (e.g. increased concentrations of atmospheric greenhouse gases are generally assumed to warm the atmosphere). However, changes in the albedo of surface vegetation can also directly affect climate and hydrology. Albedo refers to the ability of a surface to reflect radiant energy. Changes to surface vegetation (by modifying species composition or structural characteristics) can modify the ability of vegetation to reflect radiant energy and thus alter the amount of radiation that reaches the underlying soil. This, in turn, will influence the amount of energy that is absorbed by the ground and re-radiated to the atmosphere as long-wave radiation. It is this re-radiated long-wave energy that is trapped by greenhouse gases and contributes to climatic warming.

VII. Matching Funds and/or Shared Costs

Please include a brief write-up of any existing or potential matching funds and/or shared costs in the Budget Narrative section of the application. Indicate if the funds/costs are existing or potential.

VIII. References

Cayan, Luers, Hanemann, Franco, Croes. "Scenarios of Climate Change in California: An Overview." Final report from the California Energy Commission, Public Interest Energy Research (PIER) Program, California Climate Change Center, publication # CEC-500-2005-186-SF, posted: February 27, 2006.

http://www.climatechange.ca.gov/biennial_reports/2006report/index.html

California Energy Commission, 2006. "Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004."

http://www.climatechange.ca.gov/policies/greenhouse_gas_inventory/index.html

Franco, Wilkinson, Sanstad, Wilson, Vine, 2003. "PIEREA Climate Change Research, Development, and Demonstration Plan." California Energy Commission, PIER Environmental Area. Draft. February 19, 2003. http://www.energy.ca.gov/pier/final_project_reports/500-03-025fs.html

Hickman, J. C., ed. 1993. "The Jepson Manual: Higher Plants of California." Berkeley: University of California Press. Natural Community Conservation Planning Web site. 2003. www.dfg.ca.gov/nccp/

Peterson, Ortega, Huerta, Bartley, Sanchez-Cordero, Sobrerón, Buddemeir, Stockwell. "Future projections for Mexican faunas under global climate change scenarios." *Nature*. 416: 626-629.

Schoenherr, A. A. 1992. "A Natural History of California." Berkeley: University of California Press. Shaw, Rebecca. 2002. "Ecological Impacts of a Changing Climate." Attachment III to Franco, G., R. Wilkinson, A. H. Sanstad, M. Wilson, E. Vine. 2003. *PIEREA Climate Change Research, Development, and Demonstration Plan*. California Energy Commission. PIER Environmental Area. Draft. February 19.

Suttle, KB, et al., 2007. Species Interactions Reverse Grassland responses to Changing Climate. *Science* 315: 640 (2007)

Thorne, J., et al., 2007. "The Development of 70-Year-Old Wieslander Vegetation Type Maps and an Assessment of Landscape Change in the Central Sierra Nevada." CEC-500-2006-107. <http://www.energy.ca.gov/publications/displayOneReport.php?pubNum=CEC-500-2006-107>

Margaret Torn. 2003. Personal communication.

USGCRP. 2001. "Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change". Overview: Our Changing Nation. U.S. Global Climate Change Research Program.

Exhibit A-5

Research Topic 5

Options to Reduce GHG Emissions in California by 2050

I. Background Information

The Executive Order signed by the Governor on June 1, 2005 (S-3-05) established an emission target for California representing an 80% reduction of greenhouse gas (GHG) emissions from the 1990 levels by the year 2050. Since the energy sector¹¹ is by far the most significant contributor of GHG emissions in California, this ambitious target will require a complete transformation of our energy system.

The California Energy Commission's Public Interest Energy Research (PIER) Program has been funding research on different options available to the State to reduce its long-term emissions but an integrated overall study is lacking. Some of these long-term studies include: 1) Energy efficiency potential in California by 2050; 2) Assessment of long-term electric energy efficiency potential in California's residential sector; 3) Potential for carbon sequestration in terrestrial and geological formations in California; and 4) Potential advanced energy pathways in the transportation system and its impacts on the electricity and natural gas systems.¹² In order to develop a comprehensive GHG emissions and abatement options portfolio of the State, a synthesized integration of these separate studies is needed. Such a study should be able to suggest the best emissions reduction options by considering innovative technological and behavioral solutions available.

II. Project Description

PIER is soliciting proposals for a study of GHG emissions reduction options in California to help accomplish the mandated 80% reduction from the 1990 levels by the year 2050. In preparing the proposal, researchers should consult Pacala and Socolow's study "Stabilization Wedges" to gain an understanding of what PIER is looking for in proposals. Proposals must also include an analysis of the potential for new technologies and programs. Each option included in the study must be well documented and special care must be taken in detailing the potential positive and negative interactions between the different options. Finally, proposals must use existing PIER studies¹³ as a starting point but the scope of investigation should be expanded to consider options not covered in the PIER studies.

III. Relevance to the PIER Program

Changes in climate will affect every aspect of the California economy and its natural ecosystems. GHG emissions is the driving force in climate change; therefore, developing efficient and cost effective emissions reduction options is of paramount importance in mitigating

¹¹ The term "energy sector" is used here to include the whole spectrum of energy-relevant sectors such as transportation, electricity generation, and natural gas, etc.

¹² A webpage will be established to obtain information about these and other related projects.

¹³ For complete list of PIER climate change reports, please go to <http://www.energy.ca.gov/publications/searchReports.php?pier1=climate%20change>. Other PIER studies should also be consulted.

the impacts of climate change. Since energy generation and consumption is the main contributor to GHG emissions in the State, the PIER program has been funding climate change research since 2001 to address the environmental implications (i.e., climate change impacts) of the energy system and to study options available to reduce GHG emission in California.

IV. Project Term

Maximum of two years.

V. Maximum Amount of Funds Available

A total of \$400,000 is available under this research topic. Maximum requested funding for each proposed project is \$400,000.

VI. Budget Note

None.

VII. Matching Funds and/or Shared Costs

Please include a brief write-up of any existing or potential matching funds and/or shared costs in the Budget Narrative section of the application. Indicate if the funds/costs are existing or potential.

VIII. References

Pacala, Stephen and Socolow, Robert. 2004. "Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies." *Science*. 305:5686 (968-972).

Exhibit A-6

Research Topic 6

Contribution of Snowmelt to Underground Water Recharge

I. Background Information

The Executive Order signed by the Governor on June 1, 2005 (S-3-05) requires the State to conduct scientific studies on the potential impacts of climate change and adaptation options. PIER has funded several statewide impacts and adaptation studies (e.g., Wilson, et al., 2003; Knowles, Dettinger, and Cayan, 2007)¹⁴ that should be continuously improved. The study by Wilson, et al., suggested that underground aquifers should be used to dampen the negative effects of increased variability in precipitation levels and the shift in runoff expected from the warming conditions in the Sierra Nevada. A recent study (Earman, et al., 2006) suggests that the relatively long life of snow in high elevation mountains create the conditions needed for the percolation of water to underground aquifers. It follows, then, an early melting of snow and a reduction of the duration of the winter season would reduce the recharge of underground aquifers in California, a condition not taken into account in previous climate change impact studies. These aquifers contribute to base flow in rivers and streams, so that a reduction in recharge would be translated in reduction of runoff and water availability in general.

II. Project Description

PIER is soliciting proposals for exploratory field studies to better understand the nature and potential scope of this problem. When preparing the proposal, consult the PIER climate change 2007 research roadmap <http://www.energy.ca.gov/2008publications/CEC-500-2008-006/CEC-500-2008-006.PDF> which identified research needs in this area.

III. Relevance to the PIER Program

Changes in climate will affect every aspect of the California economy and its natural ecosystems. Since energy generation and consumption is the main contributor to GHG emissions in the State, the PIER program has been funding climate change research since 2001 to address the environmental implications (i.e., climate change impacts) of the energy system and to study options available to reduce GHG emissions in California.

Reductions in runoff would affect water storage available for hydropower generation; especially in the summer season when electricity is needed the most to satisfy peak cooling demand. Findings of this project will help PIER to better understand the potential implication of climate change on water resources, and electricity generation in particular.

IV. Project Term

Maximum of two years.

¹⁴ For a complete of list of climate change PIER reports, please go to [http://www.energy.ca.gov/publications/searchReports.php?pier1=climate change](http://www.energy.ca.gov/publications/searchReports.php?pier1=climate%20change)

V. Maximum Amount of Funds Available

A total of \$400,000 is available under this research topic. Maximum requested funding per proposal is \$400,000.

VI. Budget Note

Applicants should indicate what percentage of the budget will be spent on what types of fieldwork. This can be done using Exhibit D task level budget.

VII. Matching Funds and/or Shared Costs

Please include a brief write-up of any existing or potential matching funds and/or shared costs in the Budget Narrative section of the application. Indicate if the funds/costs are existing or potential.

VIII. References

Earman, S., et al., 2006. "Isotopic exchange between snow and atmospheric water vapor: Estimation of the snowmelt component of groundwater recharge in the southwestern United States." *Journal of Geophysical Research* 111 (D09302).

<http://dx.doi.org/10.1029/2005JD006470>

Knowles, Dettinger, and Cayan., 2007. *Trends in Snowfall Versus Rainfall for the Western United States, 1949–2001*. California Energy Commission, PIER Energy Related Environmental Research Program. CEC-500-2007-032.

<http://www.energy.ca.gov/2007publications/CEC-500-2007-032/CEC-500-2007-032.PDF>

Wilson, T., et al., 2003. *Global Climate Change and California: Potential Implications for Ecosystems, Health, and the Economy*. California Energy Commission, Public Interest Energy Research Program. P500-03-058CF.

http://www.energy.ca.gov/pier/final_project_reports/500-03-058cf.html

Exhibit B

Competitive Climate Change Research Grant Solicitation PIER Environmental Area

Scoring Evaluation/Criteria

Proposal Scoring

Overview of the Technical Evaluation Scoring Process

Proposals must fully comply with the Proposal Requirements and follow the Proposal Guidelines to be eligible for the technical evaluation scoring by the Technical Evaluation Committee. The Technical Evaluation Committee may consist of Commission staff, staff of other agencies, private consultants and/or other designated representatives of the State to evaluate the proposals' technical merits. During the evaluation process, all proposals will be kept confidential.

Technical Evaluation Committee

Proposals that pass the initial screening according to the Proposal Requirements and Proposal Guidelines will be scored by a minimum of three technical evaluators with recognized expertise in the proposed subject area. Technical evaluators may be from academia, environmental organizations, industry, or government. The identity of the evaluators will be kept confidential during the selection process.

Scoring and Selection Process

Each proposal will be scored by the Technical Evaluation Committee utilizing the following process:

1. Each Committee Member will independently score each proposal from zero (0) to ten (10) for each criterion described in the next section, based upon the information provided by the Applicant's proposal.
2. Each criterion score will then be multiplied by the specified weighting factor to obtain the weighted points for that criterion.
3. The weighted points for each proposal will be summed to provide each Committee Member's total weighted score.
4. The final score for each proposal will be the average score of all Committee Members.

Out of 100 total possible points, a Proposal must garner a minimum of 70 points to pass technical evaluation. The passing Proposals will then rank-ordered by their scores within each research topic area and the list will be submitted to the Energy Commission Research and Development and Demonstration (RD&D Committee) for funding recommendation. Recommended awards must be approved by the full Energy Commission at an Energy Commission Business Meeting.

Scoring Scale

Each proposal will be scored on the degree to which it meets each of the Technical Evaluation Criteria, as shown in the table below.

0	Not responsive to the criterion
1-2	Response is minimal
3-4	Responds only marginally to relevant considerations under the criterion
5-6	Responds satisfactorily to most relevant considerations under the criterion
7-8	Responds satisfactorily to all relevant considerations under the criterion
9	Responds completely, accurately, and convincingly to all relevant considerations under the criterion
10	Response is complete, specific, and superior, both quantitatively and qualitatively

Technical Evaluation Criteria

The Technical Evaluation Committee will score each Proposal based on the following five Technical Evaluation Criteria:

- 1) **Proposal Responds to the Specific Overall Scope of Work as Described in the Applicable Research Topic Attachment.** (Weighting Factor: 1.5; Maximum Weighted Score: 15)
 - Proposal contains a thorough survey of the previous work in the literature, especially of the PIER-sponsored research.
 - Proposal’s scope of research is adequate and methodology is appropriate for the chosen Research Topic.
 - Proposal convincingly justifies the significance of the proposed research/case study. Proposal identifies technological and/or policy barriers and options to overcome these barriers.

- 2) **Proposed Research Identifies Clear, Meaningful, and Measurable Objectives.** (Weighting Factor: 1.5; Maximum Weighted Score: 15)
 - The proposal lists and describes clear, meaningful, and measurable objectives that will achieve the tasks required in addressing the applicable Research Topic.
 - The research method is appropriate for achieving the project’s objectives and goals.

- 3) **The Project Description, Products and Due Dates, Budget are Reasonable and Appropriate.** (Weighting Factor: 2.0; Maximum Weighted Score: 20)
 - Project Description and Task Budgets demonstrate a clear, reasonable, appropriate and complete effort.
 - Project Description and Task Budgets are composed of a series of interconnected, logical, and discrete tasks.
 - Project Description and Task Budgets lay out an approach and plan that is practical and feasible for accomplishing the stated objectives. The Work Schedule reasonably appropriates time and funds with respect to the sequences of tasks, level of effort allocated per task, and the use of labor, equipment, and facilities. If the research involves a particular environmental aspect – the schedule fits the necessary time of year to conduct the research.

- Each item of the budget is appropriate considering: (1) the significance of the barriers, issues, and/or knowledge gaps being addressed, (2) the project's objectives and goals, and (3) the level of effort described in the Project Narrative.
- The budgets show that key personnel will be committed to the project for the appropriate number of hours and functions to accomplish the tasks and products, and for the activities described in the Project Narrative.
- Availability of matching funds, if any.

4) The Principal Investigator and the Project Team are Well Qualified to Conduct the Project. (Weighting Factor: 2.5; Maximum Weighted Score: 25)

- The Applicant describes in detail, with substantiation, the Applicant's past and current work in the research subject area. Accomplishments (not just activities) are described.
- The Proposal demonstrates the Applicant's awareness of current and prior work by others in the proposed research area.
- Publishing track record in peer-reviewed journals.
- The proposal convincingly demonstrates, based on education, training, and past experience that the applicant and project team are capable of conducting all technical, administrative, and budgetary functions and responsibilities, including the ability to control cost, maintain the schedule, and report results and accomplishments in an effective manner.
- Degree to which the proposal is clearly written and internally consistent.

5) Overall technical merit and degree to which the project is likely to succeed, including a consideration of the degree to which the proposal goes beyond the basic requirements described in the applicable Research Topic Area attachment. (Weighting Factor: 2.5; Maximum Weighted Score: 25)

- Originality of the research idea and methodological approach.
- Importance of the study within the context of the overall scientific advancement in the given subject.
- The Proposal's research scope expands on what is suggested in the Research Topic description, thereby exploring/providing preliminary answer(s) to the next logical step for future research. To the reviewer's understanding, the likelihood that this project is feasible and is likely to succeed in terms of satisfactory completion within the project timeframe and budget, and producing scientifically meaningful as well as policy-relevant results.

Exhibit C

Work Statement Template

[Insert Title of Project]

Introduction: [Insert Brief Introduction]

Project Description: [Insert Brief Description of Project]

Project Goals: [Insert Project Goals]

TASK LIST SUMMARY

Task #	CPR	Task Name
1		Administration
2		[Insert Task Names]
3		
4		
5		
6		

TASK 1.0—ADMINISTRATION

Task 1.1—Attend Kick-off Meeting

- The goal of this task is to establish the lines of communication and procedures for implementing this Agreement. The Recipient shall attend a “kick-off” meeting with the Commission Project Manager, the Grants Officer, and a representative of the Accounting Office. The Recipient shall bring their Project Manager, Contracts Officer, Accounting Officer, and others designated by the Commission Project Manager to this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting. Prior to the kick-off meeting, the Commission Project Manager will provide an agenda to all potential meeting participants. The administrative portion of the meeting shall include, but not be limited to, the following: Terms and Conditions of the Agreement
- CPRs (Task 1.2)
- Match Fund Documentation (Task 1.6)
- Permit Documentation (Task 1.7)

The technical portion of the meeting shall include, but not be limited to, the following:

- The Commission Project Manager’s expectations for accomplishing tasks described in the Scope of Work; An updated Schedule of Products An updated Gantt Chart Progress Reports (Task 1.4)
- Technical Products (Special Conditions)
- Final Report (Task 1.5)

The Commission Project Manager shall designate the date and location of this meeting.

Products:

- Schedule of Products
- Gantt Chart
- List of Match Funds
- List of Permits, if applicable

Due Date: *[Insert Due Date]*

Task 1.2—CPR Meetings

The goal of this task is to determine if the project should continue to receive Commission funding to complete this Agreement and if it should, are there any modifications that need to be made to the tasks, products, schedule or budget. CPRs provide the opportunity for frank discussions between the Commission and the Recipient. CPRs generally take place at key, predetermined points in the Agreement, as determined by the Commission Project Manager and as shown in the Technical Task List above and in the Schedule of Products. However, the Commission Project Manager may schedule additional CPRs as necessary, and any additional costs will be borne by the Recipient. Participants include the Commission Project Manager and the Recipient, and may include the Commission Grants Officer, the PIER Program Team Lead, other Commission staff and Management as well as other individuals selected by the Commission Project Manager to provide support to the Commission.

The Commission Project Manager shall:

- Determine the location, date and time of each CPR meeting with the Recipient. These meetings generally take place at the Commission, but they may take place at another location.
- Send the Recipient the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion on both match funding and permits.
- Conduct and make a record of each CPR meeting. One of the outcomes of this meeting will be a schedule for providing the written determination described below.
- Determine whether to continue the project, and if continuing, whether or not to modify the tasks, schedule, deliverables and budget for the remainder of the Agreement, including not proceeding with one or more tasks. If the Commission Project Manager concludes that satisfactory progress is not being made, this conclusion will be referred to the Energy Commission's Research, Development and Demonstration Policy Committee for its concurrence.
- Provide the Recipient with a written determination in accordance with the schedule. The written response may include a requirement for the Recipient to revise one or more product(s) that were included in the CPR.

The Recipient shall:

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work of the projects. This report shall be submitted along with any other products identified in this Scope of Work. Submit these documents to the Commission Project Manager and any other designated reviewers at least 15 working days in advance of each CPR meeting.
- Present the required information at each CPR meeting and participate in a discussion about the Agreement.

Recipient Products:

- CPR Report(s)
- CPR products identified in the Scope of Work

Commission Project Manager Products:

- Agenda and a List of Expected Participants
- Schedule for Written Determination
- Written Determination

Due Date: *[Insert Due Date]*

Task 1.3—Final Meeting

The goal of this task is to closeout this Agreement.

The Recipient shall meet with the Commission to present the findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

This meeting will be attended by, at a minimum, the Recipient, the Commission Grants Officer, and the Commission Project Manager. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be two separate meetings at the discretion of the Commission Project Manager.

The technical portion of the meeting shall present findings, conclusions, and recommended next steps (if any) for the Agreement. The Commission Project Manager will determine the appropriate meeting participants.

The administrative portion of the meeting shall be a discussion with the Commission Project Manager and the Grants Officer about the following Agreement closeout items:

- What to do with any equipment (Options)
- Commission’s request for specific “generated” data (not already provided in Agreement products)
- Need to document Recipient’s disclosure of “subject inventions” developed under the Agreement
- “Surviving” Agreement provisions, such as repayment provisions and confidential products Final invoicing and release of retention

The Recipient shall prepare a schedule for completing the closeout activities for this Agreement.

Products:

- Written documentation of meeting agreements and all pertinent information
- Schedule for completing closeout activities

Due Date: *[Insert Due Date]*

Task 1.4—Quarterly Progress Reports

The goal of this task is to periodically verify that satisfactory and continued progress is made towards achieving the research objectives of this Agreement.

The Recipient shall prepare progress reports which summarize all Agreement activities conducted by the Recipient for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Each progress report is due to the Commission Project Manager within 5 working days after the end of the reporting period. The terms and conditions of this Agreement provide the recommended specifications.

Products: Quarterly Progress Reports

Due Date: By the 10th day of each quarter during the approved term of this Agreement or until submission of the final report, whichever comes first.

Task 1.5—Final Report

The goal of this task is to prepare a comprehensive written Final Report that describes the original purpose, approach, results and conclusions of the work done under this Agreement. The Commission Project Manager will review and approve the Final Report. The Final Report must be completed on or before the termination date of the Agreement. The terms and conditions of this Agreement provide the recommended specifications.

The Final Report shall be a public document. If the Recipient has obtained confidential status from the Energy Commission and will be preparing a confidential version of the Final Report as well, the Recipient shall perform the following subtasks for both the public and confidential versions of the Final Report.

Task 1.5.1—Final Report Outline

The Recipient shall:

- Prepare a draft outline of the Final Report. Submit the draft outline of Final Report to the Commission Project Manager for review and approval. The Commission Project Manager will provide written comments back to the Recipient on the draft outline within 5 working days of receipt. Once agreement has been reached on the draft, the Recipient shall submit the final outline to the Commission Project Manager. The Commission Project Manager shall provide written approval of the final outline within 2 working days of receipt.

Products:

- Draft Outline of the Final Report
- Final Outline of the Final Report

Due Date: [Insert Due Date]

Task 1.5.2—Final Report

The Recipient shall:

- Prepare the draft Final Report for this Agreement in accordance with the approved outline.
- Submit the draft Final Report to the Commission Project Manager for review and comment. The Commission Project Manager will provide written comments within 10 working days of receipt. Once agreement on the draft Final Report has been reached, the Commission Project Manager shall forward the electronic version of this report to the Commission Project Manager for final editing. Once final editing is completed, the Commission Project Manager shall provide written approval to the Recipient within 2 working days.
- Submit one bound copy of the Final Report with the final invoice.

Products:

- Draft Final Report
- Final Report

Due Date: [Insert Due Date]

Task 1.6—Identify and Obtain Matching Funds

The goal of this task is to ensure that the match funds planned for this Agreement are obtained for and applied to this Agreement during the term of this Agreement. The costs to obtain and document match fund commitments are not reimbursable through this Agreement. While the PIER budget for this task will be zero dollars, the Recipient may utilize match funds for this task. Match funds shall be spent concurrently or in advance of PIER funds during the term of this Agreement. Match funds must be identified in writing, and the associated commitments obtained, prior to the Energy Commission providing reimbursement for any costs incurred under this Agreement.

The Recipient shall prepare a letter documenting the match funding committed to this Agreement and submit it to the Commission Project Manager at least 2 working days prior to the kick-off meeting. The letter shall include a list of the match funds that identifies the:

- Amount of each cash match fund, its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied. Amount of each in-kind contribution, a description, documented market or book value, and its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient shall identify its owner and provide a contact name, address and telephone number, and the address where the property is located.

Recipient shall provide a copy of the letter of commitment from an authorized representative of each source of cash match funding or in-kind contributions that these funds or contributions have been secured.

Recipient shall discuss match funds and the implications to the Agreement if they are significantly reduced or not obtained as committed at the kick-off meeting. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings. Recipient shall provide the appropriate information to the Commission Project Manager if during the course of the Agreement additional match funds are received.

Recipient shall notify the Commission Project Manager within 5 working days if during the course of the Agreement existing match funds are reduced. Reduction in match funds may trigger an additional CPR.

Products:

- A letter documenting Match Funds
- A copy of each Match Fund commitment letter

Due Date: *[Insert Due Date]*

Product: Letter documenting change in match share and copy of commitment letter (if applicable)

Due Date: As necessary, within 10 days of change in match share commitment.

Task 1.7— Identify and Obtain Required Permits

The goal of this task is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track. Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement. While the PIER budget for this task will be zero dollars, the Recipient shall show match funds for this task. Permits must be identified in writing and obtained before the Recipient can incur any costs related to the use of the permits for which the Recipient will request reimbursement.

The Recipient shall prepare a letter documenting the permits required to conduct this Agreement and submit it to the Commission Project Manager at least 2 working days prior to the kick-off meeting:

1. If there are no permits required at the start of this Agreement, then state such in the letter.
2. If it is known at the beginning of the Agreement that permits will be required during the course of the Agreement, provide in the letter:
 - Type(s) of permit(s)
 - Name, address and telephone number of the permitting jurisdictions or lead agencies
 - Schedule the Recipient will follow in applying for and obtaining these permits

The list of permits and the schedule for obtaining them will be discussed at the kick-off meeting and a timetable for submitting the updated list, schedule and the copies of the permits will be developed. The implications to the Agreement if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in the progress reports and will be a topic at CPR meetings.

If during the course of the Agreement additional permits become necessary, then provide the appropriate information on each permit and an updated schedule to the Commission Project Manager. As permits are obtained, send a copy of each approved permit to the Commission Project Manager.

If during the course of the Agreement permits are not obtained on time or are denied, notify the Commission Project Manager within 5 working days. Either of these events may trigger an additional CPR.

Product: Letter documenting the Permits or stating that no Permits are required
Due Date: [Insert Due Date]

Product: Updated list of permits as they change during the approved term of the Agreement
Due Date: As necessary, within 10 days of change

Product: A copy of each approved Permit
Due Date: As necessary, within 10 days of receipt of each permit

TECHNICAL TASKS

[Insert the Technical Tasks to be accomplished following the same format as above]

Task n (last task): Technical Presentations, Fact Sheets, and Webpage Development

The researcher(s) will be available for at most two presentations, which may include presentations at the PIER annual conferences on climate change. The researchers will also prepare a fact sheet and other materials that the Energy Commission can utilize to develop a webpage for this project.

The Recipient shall:

- Attend the PIER Annual Conference(s) on Climate Change
- Prepare materials needed for the presentations
- Present project results at the conference(s)
- Prepare a fact sheet and provide materials that the Energy Commission can utilize to develop a webpage for this project.

Products:

- As needed, materials for conference presentation(s)
- Draft text, graphs, and/or pictures for the fact sheet and webpage.

Due Date: [Insert Due Date]

Exhibit D

Budget Exhibit

[Note: Please see Microsoft Excel file posted at www.energy.ca.gov/contracts in conjunction with this solicitation package]

Exhibit E

PIER Terms and Conditions

[Note: Please see the PIER Terms and Conditions (.pdf) file posted at www.energy.ca.gov/contracts in conjunction with this solicitation package]

Exhibit F

Prevailing Wage Special Condition Template

PREVAILING WAGE

For purposes of this paragraph, “public works” means construction, alteration, demolition, installation, repair or maintenance work over \$1,000; and “Contractor” means all contractors that provide public works activities for the Project.

A. Recipient/General Requirements

1. Recipient shall comply with state prevailing wage law, Chapter 1 of Part 7 of Division 2 of the Labor Code, commencing with Section 1720; and Title 8, California Code of Regulations, Chapter 8, Subchapter 3, commencing with Section 16000, for any public works activities performed on the Project funded by this Agreement. For purpose of compliance with prevailing wage law, the Recipient shall comply with provisions applicable to an awarding body. Compliance with state prevailing wage law includes without limitation: payment of prevailing wage as applicable; overtime and working hour requirements; apprenticeship obligations; payroll recordkeeping requirements; and other obligations as required by law.
2. Recipient shall certify to the Energy Commission on each Payment Request Form, that prevailing wages were paid to eligible workers who provided labor for work covered by the payment request and that the Recipient and all contractors complied with prevailing wage laws. Prior to the release of any retained funds under this Agreement, the Recipient shall submit to the Energy Commission a certificate signed by the Recipient and all contractors performing public works activities stating that prevailing wages were paid as required by law.

B. Flowdown Requirements

Recipient shall ensure that all agreements with contractors for public works activities for the Project contain the following provisions:

1. Contractor shall comply with state prevailing wage law, Chapter 1 of Part 7 of Division 2 of the Labor Code, commencing with Section 1720; and Title 8, California Code of Regulations, Chapter 8, Subchapter 3, commencing with Section 16000, for all construction, alteration, demolition, installation, repair or maintenance work over \$1,000 performed under the contract. Contractor’s obligations under prevailing wage laws include without limitation: pay not less than the applicable prevailing wage for public works activities performed on the Project; comply with overtime and working hour requirements; comply with apprenticeship obligations; comply with payroll recordkeeping requirements; and comply with other obligations as required by law. 2. Contractor shall ensure that the above requirements are included in all subcontracts for public works activities for the Project.

Exhibit G

Prevailing Wage Compliance Certificate

This certificate is to be completed by the Recipient, signed by the Recipient and all construction subcontractors, and submitted to Energy Commission Project Manager after completion of construction. This certificate must be completed and submitted to the Energy Commission *prior to the release of any retained funds under this Agreement.*

Recipient: _____

Energy Commission Agreement Number: _____

Date Construction Completed: _____

Recipient hereby certifies as follows:

1. All construction subcontracts to perform work funded by the above-referenced Agreement contained requirements that the construction subcontractor and all its subcontractors comply with prevailing wage law and pay prevailing wages in accordance with the requirements of the Labor Code.
2. Prevailing wages have been paid as required by law.
3. The construction subcontractor and all its subcontractors have maintained labor records as required by the Labor Code and such records shall be made available upon request.
4. The undersigned Recipient acknowledges that disbursement of the retention by the California Energy Commission is expressly made in reliance upon the representations made in this certification.

Recipient:

Signature of Authorized Representative: _____

Printed/Typed Name: _____

Title: _____

Date: _____

Each contractor performing construction, alteration, demolition, installation, repair or maintenance work for the project must sign below. Include additional pages if necessary.

Construction Contractor hereby certifies as follows:

1. The contract with the Recipient to perform work funded by the above-referenced Agreement contained requirements that the construction contractor and all its subcontractors comply with prevailing wage law and pay prevailing wages in accordance with the requirements of the Labor Code.
2. Prevailing wages have been paid as required by law.
3. Construction Contractor and all its subcontractors have maintained labor records as required by the Labor Code and such records shall be made available upon request.
4. The undersigned Construction Contractor acknowledges that disbursement of the retention by the California Energy Commission to the Recipient is expressly made in reliance upon the representations made in this certification.

Construction Contractor #1

Company Name: _____

Signature of Authorized Representative: _____

Printed/Typed Name: _____

Title: _____

Date: _____

Construction Contractor #2

Company Name: _____

Signature of Authorized Representative: _____

Printed/Typed Name: _____

Title: _____

Date: _____

Construction Contractor #3

Company Name: _____

Signature of Authorized Representative: _____

Printed/Typed Name: _____

Title: _____

Date: _____

Construction Contractor #4

Company Name: _____

Signature of Authorized Representative: _____

Printed/Typed Name: _____

Title: _____

Date: _____

Exhibit H

Prevailing Wage Compliance Questions and Answers

1. Is Payment of Prevailing Wage Required?

Some projects under this solicitation might be considered public works pursuant to the California Labor Code. If the project is a public work, prevailing wage is required.

2. Does prevailing wage apply to private entities?

Yes, a private entity can be required to pay prevailing wage under California law, if the project is considered to be a public work.

3. How do I know if my project involves public works?

California Labor Code sections 1720 and 1771 define public works as work done under contract and paid for in whole or in part out of public funds. Examples of public works activities include:

- Construction (includes work performed during the design and preconstruction phases of construction including but not limited to, inspection and land surveying work)
- Alteration
- Demolition
- Installation
- Repair work
- Maintenance work

These Labor Code sections can be found at: <http://www.leginfo.ca.gov/calaw.html>.

If your project involves construction, alteration, demolition, installation, repair or maintenance work, it probably would be considered a public work under Labor Code sections 1720 and 1771. The types of activities that would probably lead to finding that the project involves public works include:

- cement work such as pouring a cement pad
- site preparation such as grading
- surveying
- electrical work such as wiring
- carpentry work
- limited inspection activities

4. What kind of trades or workers must be paid prevailing wage?

The California Department of Industrial Relations (DIR) Division of Labor Statistics and Research (DLSR) maintains a list of the covered trades/workers that are entitled to prevailing wage for public works commercial construction projects. The list also includes the prevailing wage that must be paid for the particular worker. See www.dir.ca.gov/dlsr/statistics_research.html or call the DLSR Prevailing Wage Hotline (415) 703-4774 for more information about these trades. Workers such as the following would be covered trades:

- Operating engineer (heavy equipment operator)
- Surveyor
- Carpenter
- Cement Mason
- Electrician
- Laborer

But the following types of workers usually would NOT be covered trades entitled to prevailing wage:

- Engineer
- Project superintendent / construction manager / project manager
- Architect
- Planner
- Computer programmer

5. What if I am unsure whether my project involves public works and prevailing wage must be paid? How Should I Budget if I am Unsure About Prevailing Wage?

You are encouraged to determine if your project involves public works as soon as possible. On the budget, please indicate whether your budget includes prevailing wage. It is preferable if you know whether prevailing wages must be paid before you submit your proposal, so you can budget accordingly. However, if you do not know whether the project involves public works, you can choose to budget with or without prevailing wage. If you do not budget for prevailing wage, and it is later determined that the project involves public works and prevailing wage must be paid, you cannot later increase your budget if it is determined that prevailing wages apply and project costs are higher than expected. The amount requested in your proposal is the maximum that will be paid. Any increased costs for payment of prevailing wage must be paid with match funds. The Energy Commission’s grant award amount does not change or increase if the applicant’s costs increase for whatever reason.

6. How do I get assistance in determining whether the project involves public works?

First, call the DLSR Prevailing Wage Hotline, (415) 703-4774. The Prevailing Wage Hotline can frequently give advice quickly on routine questions. If the Prevailing Wage Hotline is unable to answer your question, you will need to write to the Director of DIR for a coverage determination on whether your project involves public works. You would include all the relevant facts and

documents related to the project. DIR regulations, Title 8 California Code of Regulations, section 16001(a)(1), provide that any interested party may file a request with the Director of DIR to determine coverage under the prevailing wage laws. The request can be either for a specific project or type of work to be performed that the interested party believes may be subject to or excluded from coverage as public works under the Labor Code. The full text of DIR's regulations can be found at: <http://ccr.oal.ca.gov> (Title 8, Division 1, Chapter 8, Subchapter 3, Article 2). Send requests for a coverage determination to:

Department of Industrial Relations
Office of the Director
455 Golden Gate Avenue
San Francisco CA 94102

7. How long will it take to get an answer?

We do not know, but hope that the question can be asked and answered informally and quickly through the Prevailing Wage Hotline. If you need to submit a request to the Director of DIR, it will take longer to get an answer.

8. What happens if I make a request to DIR but do not have a decision, or am still unsure whether prevailing wage must be paid, by the time the Energy Commission makes an award at a business meeting, or by the time I execute the grant agreement?

We can request approval of the grant at an Energy Commission business meeting, and can execute the grant agreement, even if the issue of paying prevailing wage is undetermined. In this case, we would require a special condition in the grant providing that you must either agree to pay prevailing wage or must get a determination from DIR before construction work can begin. You can begin other tasks in the project, but will not be able to perform any construction tasks until the issue is resolved.

9. What if I submit a proposal to the Energy Commission with a project that I say is not a public work, and the Energy Commission believes that it might be a public work? How would we resolve our differences?

We would request that you first call the Prevailing Wage Hotline. If you do not receive an answer, we would request that you write a letter to DIR and ask DIR to make the decision. If DIR says the project is a public work, then you will need to pay prevailing wages.

10. If my project is a public work, how do I know what prevailing wages are required in order to prepare a budget?

If your project is a public work, please submit your budget with the applicable prevailing wage for each trade entitled to prevailing wage as determined by DLSR. For prevailing wage rate information for commercial projects, see www.dir.ca.gov/dlsr/statistics_research.html or call the Prevailing Wage Hotline (415) 703-4774. If your project involves residential construction, the rates are not listed on DIR's website, and you must call the DLSR Prevailing Wage Hotline.

11. What do I do if workers will be used who do not fit neatly into one of the categories on the DIR website?

Contact DLSR and describe the type of trade you anticipate will be required in your project and ask whether there is an existing prevailing wage already set by DLSR.

12. Does prevailing wage apply to a public entity that performs project work with its own employees?

No.

13. If my project is considered a public work, then are there any special requirements?

Yes. The grantee must make sure that covered workers are paid prevailing wage. There are other requirements also, such as keeping payroll records, complying with working hour requirements, and apprenticeship obligations. See the sample terms and conditions, Special Condition regarding Prevailing Wage.