

# *Call for Working Group Proposals*

## **The TomKat UC Carbon Neutrality Project**

*Advancing The University of California Carbon Neutrality Initiative*

A collaboration of the Institute for Energy Efficiency and the

National Center for Ecological Analysis and Synthesis

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**Request for Proposals Due Date: 18 April 2016, 9:00 am PDT**

For inquiries email [proposal@nceas.ucsb.edu](mailto:proposal@nceas.ucsb.edu)



## **About the Project**

The goal of the TomKat UC Carbon Neutrality Project is to support innovative multi-disciplinary research projects that will substantially accelerate progress of the [University of California's Carbon Neutrality Initiative](#). We are pleased to solicit proposals for Working Groups to address topics such as technology assessments (e.g. energy storage, pathways to transition off natural gas, integration of renewable energy), energy efficiency (both technological and financial issues), communications strategies (including field trials), economic incentives, behavior modification, and others that have high potential for advancing the University of California's system-wide goal to achieve zero net greenhouse gas emissions by 2025 (see [APPENDIX A](#)) for a description of specific research challenges and opportunities). Funding, made possible by a grant from the TomKat Charitable Trust, is available to support 2 projects of 15 months duration beginning May 2016. The project principal investigator (PI) must be a researcher at one of the ten University of California Campuses or its three affiliated National Laboratories.

The TomKat UC Carbon Neutrality Project is jointly administered by UC Santa Barbara [Institute for Energy Efficiency](#) and the [National Center for Ecological Analysis and Synthesis](#) (NCEAS). The initiative's overall Project Director is David Auston, former Executive Director of the Institute for Energy Efficiency, and currently UC Santa Barbara's campus representative of the UC Carbon Neutrality Initiative. IEE and NCEAS will provide skilled staff and meeting facilities, comprehensive in-house computing capabilities, and consultation and training for visiting scientists on computation, informatics, and in-person and virtual collaboration techniques.

This Project has many features that distinguish it from other approaches to address the challenge of climate change. First, it is directed at accomplishing a specific local goal – namely the UC Carbon Neutrality Initiative. It is not about directing others across the State, nation and globe to deal with climate change, but is about solutions that we ourselves, the members of the University of California community, must develop and deploy to achieve our goals. As such, it requires us to address the cost trade-offs, internal policy changes, behavior modifications, and other challenging tasks that we personally must confront and solve. These and other aspects of this Initiative introduce a hard reality that is too often lacking in studies that are aimed at national and global action plans. The UC Carbon Neutrality Initiative is a true living laboratory in which tough choices must be made, unavoidable compromises negotiated, and a consensus developed for a plan to accomplish the goal of carbon neutrality. The lessons learned from this experiment, both positive and negative, will benefit both the UC community and if scaled and adapted, can be exported to benefit the state, nation, and other jurisdictions. The benefits that will accrue are substantial: further strengthening of UC's reputation as a leader in sustainability; enhanced recruitment of students, faculty and staff; and most important, energy and cost savings. If scaled and adapted, the lessons learned from these and related experiences, both positive and negative, can benefit the state, nation and other jurisdictions.

An additional distinctive feature of this Project is its ability to draw on the exceptional intellectual resources of the ten campuses and three affiliated national laboratories of the University of California System. As the world's preeminent university system, UC is uniquely positioned to provide the necessary expertise to address the challenges of climate change mitigation. The UC Carbon Neutrality Initiative has already stimulated some important collaborations among the campuses and labs and this project will further tap this unique resource.

The complex and multi-faceted nature of climate change mitigation requires a diverse cross-disciplinary approach that is both synergistic and interactive. The big challenges such as transitioning off natural gas, introducing renewable energy, and electrification of transportation require an integrated approach by technologists, policy experts, economists, behavioral scientists, and communications specialists to work together as a team to forge solutions. Too frequently, these issues are treated separately within the confines of a single discipline, a practice that is especially prevalent in the academic community.

The TomKat UC Carbon Neutrality Project is also developing a new paradigm for how highly synergistic teams of diverse investigators can develop solutions to the extremely complex and challenging problems related to climate change mitigation. The central activity of the working groups will be to convene three to five times for up to five days each over the 15 month period of the Project. A highly skilled staff assisted by students and interns will work with the investigators to accomplish their goals. We consider these groups to be a prototype for a much larger effort that will develop solutions to a wider range of topics related to climate change mitigation and adaptation.

#### **About the TomKat Foundation:**

Established in 2009 with funding from Tom Steyer and Kat Taylor, the [TomKat Foundation](#) creates and partners with innovative organizations that envision a world with climate stability, a healthy and just food system, and broad prosperity. They embrace the inherent interconnectedness of these complex systems. They believe that understanding the relationships between our financial practices, the impact of our energy usage, and the methods by which our food is raised and consumed is critical to the success of sustaining a healthy planet that is able to support generations to come. Working at every level, the TomKat Foundation is committed to supporting organizations and initiatives across the country that will take bold action on climate change.

# Proposal Guidelines

Proposals should meet the following requirements:

1. Proposed research topics must have high potential for advancing the University of California's system-wide initiative to achieve zero net greenhouse gas emissions by 2025. Proposals should clearly outline the expected impact of the project on the UC initiative as well as how the lessons learned might be scaled and adapted to impact the State of California's de-carbonization goals.
2. The work proposed may consist of analyses, technology assessments, pathways, data synthesis, policy and economic research, communications strategies, behavior modification, and other studies relevant to the UC Carbon Neutrality Initiative. Funding will not be provided for equipment or related laboratory research.
3. Each Project will be executed by a team (The Working Group) consisting of up to 15 researchers, the majority of whom are employed at one of the ten University of California Campuses or its three affiliated National Laboratories. In addition to ladder faculty and professional researchers, post-docs, graduate students, operations staff and others actively engaged in climate change mitigation studies are eligible to be members of a Working Group. Because this is a multi-campus initiative, we require that at least three UC Campuses or National Laboratories be represented in the Working Group. Proposed team members should be identified, each with a brief description of the specific expertise they bring to the project. In cases where the necessary expertise is not available within the UC System, one or more members of a Working Group might be drawn from other institutions including NGOs, non-UC universities, etc. Due to the focus of the Project on UC and the State of California, we expect that all members of the Working Group be familiar with the [de-carbonization goals of UC](#) and [the state of California](#). Please indicate whether the names of individuals have been confirmed or are proposed.
4. Each Working Group must identify a principal investigator (PI) who must be a faculty member or professional researcher at one of the ten University of California Campuses or its three affiliated National Laboratories.
5. Working Groups should be appropriately multi-disciplinary and include the range of skills and expertise needed to address the proposed research.
6. Work will consist of multiple Project Group meetings at NCEAS together with interim virtual meetings coordinated and supported by NCEAS. Reasonable travel, lodging, and per diem costs for participating in the on-site meetings will be reimbursed by the Project. On-site staff support and UCSB student interns will be provided by the project, but no funds will be allocated for work at the participants' home institutions or other locations.
7. A special note about the relationship of this project to other funded activities: The work proposed here must be distinctive and not duplicate other work that is currently under investigation at UC. This includes work funded by State and Federal agencies, other foundations and internal sources of funding by the University of California. It is especially important to be cognizant of the project funded by the Office of the UC President for work on the Carbon Neutrality Initiative ([APPENDIX B](#)). Proposals may address ways to compliment these UC funded projects, but should not be in conflict with them nor duplicate their effort.
8. Proposers are encouraged to consult informally with the David Auston ([auston@iee.ucsb.edu](mailto:auston@iee.ucsb.edu)) or other members of the Project Advisory Committee ([APPENDIX C](#)) regarding any of the above guidelines prior to submitting a proposal.

## Proposal Deadlines

Proposals for Working Groups should be submitted by 9:00 am Pacific on **Monday, April 18, 2016**. Decisions will be announced in mid-May.

## Who Should Apply

Proposals may be submitted by individuals of any nationality who hold a faculty or professional researcher position at a UC campus or affiliated laboratory. Working Group members should become familiar with the UC Carbon Neutrality Initiative.

## Budget

Working Group budget requests should not exceed \$55,000 for a 15-month period, unless the proposers can bring additional funds from other sources. This level of funding is generally adequate to support a Working Group of up to 12 individuals meeting three times per year for 5 days per meeting in Santa Barbara.

Working Group costs may vary depending on group size, number of participants, number of in-person vs. virtual meetings, and meeting duration. Proposals may involve activities with partial support from other institutions or agencies, and co-funding is welcomed. The TomKat UC Carbon Neutrality Project does not provide funds for principle investigators, working group participants, or graduate student salaries.

Please download the [budget worksheet template](#) to estimate your Project budget.

## Submitting a Proposal

Proposals must be no more than 2000 words (excluding cover sheet, references, figures, budget worksheet and CVs), must include adequate information to allow for an accurate evaluation, and must include the following information:

### Cover Sheet

- Date of Submission
- Descriptive Title
- Short Title - Two or three words for use as a project name (25 characters max)
- PI Name(s) and complete contact information
- Project Summary - A brief abstract of your project

### Body of the Proposal

- Project Statement – Clear and concise statement of what is to be done, why it is important, and how it will be accomplished
- Anticipated Results and Impact
- Proposed Activities – Description and justification of methods
- Names of Participants and institution
  - Provide a brief description of the specific expertise each participant brings to the project
  - Indicate whether participants are confirmed
  - Identify a technical liaison with considerable analytic expertise to ensure that the requirement of the [NCEAS Data and Information Policy](#) are met
- Timetable of activities
- Budget (for Working Groups, maximum of 60 person-trips to NCEAS spread over 15 months – see [budget worksheet template](#))
- Literature Cited
- Curriculum Vitae for each Principle or Co-Principle Investigator – Two (2) page maximum for each.

# Reporting

The primary responsibility of project investigators is to fulfill their goals regarding the scholarly activities undertaken, but we will also ask for brief summaries of activities to be used on our website and in our reports to the TomKat Foundation. Details will be communicated in decision letters. We ask PIs on approved projects to provide an initial summary of research objectives, anticipated work, and desired outcomes. TomKat Project support should be cited in publications, and copies of articles accepted for publication should be sent to the NCEAS Communications Officer.

# Formatting and Submission Instructions

Proposals will be accepted in digital format only, as a Microsoft Word or PDF file. Proposals should be submitted as single, complete documents, formatted to standard letter size (8.5" W by 11" L) with graphics embedded directly in the document. Information to be included in the cover sheet and body of the proposal should be provided as described as above. Please address each question in the order it is presented. The body of the proposal should be less than 2000 words and follow the cover sheet. Do not send compressed collections of files, such as .ZIP files.

To submit your proposal, e-mail the final proposal document to [proposals@nceas.ucsb.edu](mailto:proposals@nceas.ucsb.edu). All those who submit proposals will receive an email confirming receipt within 24 hours of submission. If you do not receive a confirmation email, please call (805) 893-2500 with the first PI's name and proposal title and someone will follow up with you shortly. Please contact [proposals@nceas.ucsb.edu](mailto:proposals@nceas.ucsb.edu) if you have difficulty submitting your proposal, or if you have extenuating circumstances that would prevent you from emailing a digital version of your proposal by the deadline. For answers to questions not addressed on this Call for Proposals site, please email [proposals@nceas.ucsb.edu](mailto:proposals@nceas.ucsb.edu) or call (805) 893-2500.

# Proposal Review Process

Proposals will be reviewed by the Project Advisory Committee ([APPENDIX C](#)). Where needed, additional external reviewers will be consulted. The review process may result in suggestions for changes in the proposed work. A total of two proposals will be funded for work beginning in May 2016.

Proposals will be evaluated for their scientific merit, impact on the University of California Carbon Neutrality Initiative, and potential for impact on the state of California. Reviewers recuse themselves from proposal review when there might be a conflict of interest. At the request of the Advisory Committee, additional reviews may be requested from other individuals with expertise of special relevance to the proposed research.

A context statement and reviews written by reviewers (but not the actual scores given by reviewers) will be returned to the PI(s) without revealing the names of the individual reviewers. While reviews are provided to applicants, they may not reflect the full breadth of discussions that take place at the panel meeting. The final decision on which proposals to fund will be made by the Project Advisory Committee. Based upon reviewer comments, the committee may request modifications to the proposal (e.g., adjustments to Working Group size or composition, scope of work, etc.) before funding is awarded.

Proposals received after the deadline will be returned without review. Proposals that are clearly inappropriate for funding (e.g., those that do not impact the UC Carbon Neutrality Initiative, requests for equipment, funds to be spent at the investigator's home institution, or funds intended to support investigators' salaries, etc.) will also be returned without review.

# Proposal Tips

To help you develop a successful proposal, here are some pointers to guide its preparation:

- Proposals are evaluated primarily on the significance and novelty of the idea(s) under consideration and should be question-driven (i.e., not purely descriptive).
- Provide a clear rationale for why this should be, or can only be, done by the TomKat Project.
- Be clear and concise. Give brief examples of major points you are making and/or approaches you are using.
- Include a diverse array of members of your Working Group who are committed to the project, including a good number of participants from the ten UC Campuses and three affiliated National Laboratories (note: you need not, however, be inclusive of all ten campuses and three labs). Pay attention to gender balance and include individuals from underrepresented groups. For each participant, specify the expertise brought to the project and whether he/she has agreed to participate.
- If you intend to draw on existing data, indicate where they will come from and their availability.

# Effective Working Groups

Based on twenty years of experience at NCEAS, we have identified a few characteristics of Working Groups that contribute to their success:

- Groups of 8-15 scientists (15 maximum) work at the NCEAS for 3-7 days, with a clear focus and a shared understanding of the goals. Each Working Group typically meets 2-3 times a year. It has been the experience at the Center that Working Groups of 12 or fewer individuals meeting for 5 days are the most productive.
- Working Group proposals must designate at least one Working Group member as the liaison with the NCEAS technical staff to address any concerns related to data management and computing.
- It is expected that all Working Groups will involve a diverse group of participants, including gender diversity, diversity in career stages, and members of underrepresented communities.
- An analysis of NCEAS Working Group productivity was published in: Hampton, S.E., and J.N. Parker. 2011. [“Collaboration and productivity in scientific synthesis”](https://www.nceas.ucsb.edu/system/files/HamptonParker_BioSci_2011.pdf), ([https://www.nceas.ucsb.edu/system/files/HamptonParker\\_BioSci\\_2011.pdf](https://www.nceas.ucsb.edu/system/files/HamptonParker_BioSci_2011.pdf)) (PDF), BioScience 61: 900-910.

# APPENDIX A

## Five Grand Challenges of the UC Carbon Neutrality Initiative

This document summarizes the key features of the University of California's Carbon Neutrality Initiative and points to some important challenges that provide opportunities for faculty research. Launched by President Napolitano in November 2014, the Initiative's goal is to achieve zero net scope 1 and scope 2 greenhouse gas emissions<sup>1</sup> by 2025 and scope 3 emissions by 2050. The University aim is to be the first University System in the world to decarbonize and to export what we learn from this bold experiment for the benefit of the State of California, the U.S., and other nations. In addition to further strengthening the University's standing as a leader in climate change mitigation and adaptation, we will also reap the benefits of energy and cost savings, enhanced recruitment of faculty, staff and students---and perhaps most important---develop cross-campus collaborations that mobilize the intellectual resources of the ten Campuses and three affiliated National Laboratories<sup>2</sup> working as one institution to address the most important issue facing our planet this century.

### **Grand Challenge #1: On-Site Combustion of Natural Gas for Electricity Generation and Heating Must Be Replaced by Renewable Sources of Energy.**

Approximately 70% of the total scope 1 and 2 GHG emissions by the ten UC Campuses are due to the combustion of natural gas. A very large share of this arises from the use of on-site gas-fired turbines for generating heat and electricity. These co-generation facilities have enabled six of the ten Campuses to become almost energy independent, but their reliance on natural gas poses a major challenge. All Campuses, including the four who chose to not invest in co-generation require natural gas for heat and hot water that must also be addressed to achieve carbon neutrality. Although potential renewable alternatives exist, including biomethane from organic waste or algae, hydrogen (from hydrolysis), or other biofuels, none are yet at a point in their development where deployment is feasible and a substantial amount of both basic and applied research is needed to explore these and other options. In addition, there is a need to substantially increase our investments in energy efficiency to reduce the demand for fossil fuel energy and to capture waste heat such as in the use of air cooling towers. The electrification of heating is also an important option that has not been fully explored. Although heat pumps have the potential for meeting part of this need, their efficacy has not been evaluated for large buildings in moderate climates. This grand challenge has important financial and policy dimensions as well as behavioral challenges (e.g., incentives to use energy more efficiently).

### **Grand Challenge #2: Energy Storage is Required to Replace 100% of Electricity Generated by Fossil Fuels with Renewable Technologies.**

Despite great progress in renewable energy technology and continued reductions in cost, especially for solar and wind, widespread deployment of these to achieve 100% renewable electricity is not yet viable. Limited use of renewable technologies up to 30% and perhaps even 50% of total electricity needs is possible--- but to go beyond that level, the intermittent character of these technologies requires some form of energy storage to match the supply with the demand. All options – electro-chemical (i.e., batteries), compressed air, hydrogen, inertial, and gravitational storage technologies – require further research to improve performance and reduce cost. A further research opportunity is the challenge of integrating and balancing the energy flow when multiple sources of renewable energy are deployed together with storage in combination with possible purchase of renewable energy from the grid.

### **Grand Challenge #3: Replace Petroleum with Clean Energy Sources of Energy for Transportation.**

Although the target date to reduce scope 3 GHG emissions arising from commuting and air travel is set at 2050, the challenge is sufficiently great that research is needed now to ensure that the goal is met. The research opportunities are numerous. Recent advances in electric and hydrogen fuel cell vehicles are

promising but not yet at the point where widespread deployment is possible due to a lack of supporting infrastructure, government policies, financial incentives, and other factors. Air travel related to conferences and other business meetings is an especially challenging issue since it is a significant contribution to UC greenhouse gas emissions and is deeply imbedded in the academic culture. Although the development of renewable biofuels may replace some of the fossil fuel used for air travel in the future, this is not likely to be a rapid transition and other solutions will need to be developed in the interim, such as behavior changes that encourage virtual meetings. Even the tenure and performance reviews of faculty would seem to encourage travel. Some key questions here are: can virtual meeting technology be improved to the point where it can replace a large share of current air travel; is verbal communication of research results (i.e. conference presentations) more effective than written communication (i.e., publications); are there alternative ways to accomplish the valuable networking feature of in-person conference attendance; what influence do frequent flyer programs have on travel; can the federal research agencies do more to address this challenge ?

**Grand Challenge #4: Communicate the Urgency, Impact, and Benefits of the UC Carbon Neutrality Initiative.**

This is crucially important to the success of the Carbon Neutrality Initiative. Although some activities are currently underway, such as the Cool Campus Challenge campus Charettes, a far greater effort is needed to both inform and engage the many diverse constituencies of the University about the Carbon Neutrality Initiative. Communications strategies for each specific target audience, field trials, and assessments of various approaches need to be developed and deployed. The path to carbon neutrality requires some difficult choices be made, many of which have trade-offs with respect to cost and behavior, short-term investments versus longer-term savings, and a clear understanding of the value of achieving carbon neutrality relative to the other goals of the University. The opportunity for communications research is substantial. It is also has a unique “personal” character since each of us must confront these questions and decide for ourselves whether the trade-offs, costs, benefits, and related behavioral changes make it a worthy goal.

**Grand Challenge #5: Integrate the goals of the Carbon Neutrality Initiative into the decision-making processes and the long range strategic planning of each campus.**

This task is closely linked to the communications challenge and hopefully would be one outcome of a successful communications initiative. Currently, it is fair to say that the campuses do not fully integrate the carbon neutrality goal into decision-making processes both with respect to current appropriations and strategic planning. Research, especially management and organizational behavioral studies, could greatly accelerate the needed transformation. Possible topics include case studies of what other organizations have done, guidelines for setting priorities, evaluating cost trade-offs with tools such as life-cycle analysis, resolving competition for scarce capital, introducing green revolving funds for energy efficiency investments, etc.



# APPENDIX B

## Carbon Neutrality Research Projects Funded by the UC Office of the President

The following projects have been approved for funding by the UC Office of the President. One of the projects, Deep Energy Efficiency, was funded last year and is nearing completion. The others have been approved for funding and are beginning now (March 2015) and will run through to approximately March 2017. There is no option for renewal of these projects, although some may secure alternative funding to continue and extend their work.

It is important that proposers for the TomKat Project be aware of these projects. Some may provide an opportunity for synergistic and complementary work in collaboration – others may have a direct overlap with potential TomKat proposals and should be avoided. Any questions regarding these should be addressed to the director of the TomKat Project, David Auston ([auston@iee.ucsb.edu](mailto:auston@iee.ucsb.edu)).

**Deep Energy Efficiency:** This project was funded last year and is nearing completion. It chose to emphasize the opportunity for energy efficiency savings at full campus scale for advanced lighting systems consisting of LED and smart lighting controls to monitor occupancy. Participating institutions are UC Berkeley (lead), UC Davis, UC Riverside, and UC Santa Barbara. The project will soon file its final report.

**University/Industry Workshop on Batteries:** This project will bring key UC battery researchers together with leading representatives of the California Battery industry to develop opportunities for collaboration and networking. It is in the early planning stages and is expected to take place in the fall of 2016 at the Lawrence Berkeley National Laboratory.

**University/Industry Workshop on Hydrogen, Compressed Air, and Other Storage Technologies:** This workshop will be similar to the aforementioned one on batteries, but will focus on energy storage technologies other than batteries. Although approved for funding, this project has not yet been launched.

**Dynamic Dispatch and Control to Enable Carbon Neutrality in UC Campuses with Co-Generation:** This project will develop implementable suites of energy conversion and storage technologies and dynamic dispatch and control algorithms to enable carbon neutrality in the six UC campuses with co-generation. Topics to be addressed include: energy storage by batteries, chilled water, or hydrogen; renewable fuel use; and dynamic dispatch of energy resources.

# APPENDIX C

## Advisory Committee

### The TomKat UC Carbon Neutrality Project

**David Auston** is the former Executive Director of the UCSB Institute for Energy Efficiency. He is currently a research professor in the Institute for Energy Efficiency and Director of the TomKat UC Carbon Neutrality Project. Auston is actively engaged in the UC Carbon Neutrality project as a member of the UC President's Global Climate Leadership council and Co-chair of its subcommittee on Applied Research.

**Steven R. Gaines** is Dean of the Bren School of Environmental Science & Management at UCSB. His research focuses on marine ecology and conservation, sustainable fisheries, the design of marine reserves, and the impact of climate change on ocean ecosystems. Gaines currently serves as a principal investigator for the Sustainable Fisheries Group, which seeks scalable solutions for the world's fisheries through partnerships among UCSB researchers, industry leaders, NGOs, and governments.

**Frank Davis** is Director of the National Center for Ecological Assessment and Synthesis at UCSB. His research focuses on the landscape ecology of California plant communities, the design of protected-area network, rangeland and farmland conservation, and the biological implications of regional climate change. Davis brings conservation science and geographical analysis to bear in land use planning and the conservation of wild species.

**Dorothy Miller** is Interim Deputy, Vice President Of Research & Graduate Studies, Director, System-wide Programs & Initiatives, and Director of Innovation Impact of the University of California Office of the President. Miller has previously worked at EPA and was a Christine Mirzayan Science and Technology Policy Fellow in the Office of Science and Technology Policy and contributed to the National Academy report "America's Energy Future".

**Roger Bales** is Professor, School of Engineering, and Director, Sierra Nevada Research Institute, University of California, Merced. The Sierra Nevada Research Institute (SNRI) conducts basic and applied research on competition for natural resources, air, water and soil pollution, climate change and competing land uses, using the San Joaquin Valley and the Sierra Nevada as their "outdoor laboratory".

**Ann E. Carlson** is the Shirley Shapiro Professor of Environmental Law and the inaugural Faculty Director of the Emmett Institute on Climate Change and the Environment at the UCLA School of Law. She is also on the faculty of the UCLA Institute of the Environment. Carlson is one of the country's leading scholars of climate change law and policy.

#### Others (TBA)

<sup>1</sup> Scope 1: All direct GHG emissions, such as the combustion of fossil fuels & on-site transportation. Scope 2: Indirect GHG emissions from consumption of purchased electricity, heat or steam. Scope 3: Other indirect emissions, such as commuting & business air travel, outsourced activities, waste disposal, etc.

<sup>2</sup> Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, and Los Alamos National Laboratory.