

**DOCKET**

**08-AFC-5**

DATE APR 15 2010

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Tom Budlong  
3216 Mandeville Canyon Road  
Los Angeles, CA 90049-1016

STATE OF CALIFORNIA

Energy Resources Conservation and Development Commission

In the Matter of: )  
)  
)  
APPLICATION FOR CERTIFICATION )  
FOR THE IMPERIAL VALLEY SOLAR )  
PROJECT (FORMERLY SES SOLAR TWO) )  
\_\_\_\_\_ )

DOCKET NO. 08-AFC-5

OPENING TESTIMONY OF INTERVENOR TOM BUDLONG  
ON THE READY TOPICS DESIGNATED BY THE COMMITTEE'S APRIL 8, 2010  
EVIDENTIARY HEARING NOTICE

April 15, 2010

## INTRODUCTION

Pursuant to the Committee's Notice of Re-scheduled Evidentiary Hearing and Evidentiary Order, dated April 8, 2010, Intervenor Tom Budlong provides this opening testimony for the topics designated as "Ready" topics by the notice, with the list of exhibits, witness list and personal experience.

All of the testimony presented herein was prepared by me, Tom Budlong. I have provided a signed declaration and my resume.

I reserve the right to supplement and/or revise this testimony at any time prior to the close of proceedings on this project.

I seriously question the advisability of the Imperial Valley project. Major concerns exist which cannot be ignored or minimized. Some are apparent in the FSA/DEIS.

- The Stirling engine solution has no operating experience. The SES website (<http://www.stirlingenergy.com/technology.htm>) talks variously of having been "developed over nearly three decades by some of the world's top engineers and scientists" and being the "result of more than a decade of innovative engineering and validation testing". Yet I can find no evidence of operating history of the prototype installation, let alone commercial installation. The January 2010 press release ([http://tesseractosolar.com/north-america/pdf/2010\\_01\\_22.pdf](http://tesseractosolar.com/north-america/pdf/2010_01_22.pdf)) concerning the 60-unit demonstration facility in Arizona describes it as 'showcased', and talks of its 'opening', but does not state it is operating. This, plus the extended development time, shout skepticism and caution. To jump from this questionable status to a 30,000 unit (and more, if Calico is considered) full scale project would be called reckless by many professionals.
- The alternatives analysis is inadequate in many places. It does not appear to be a serious attempt for many alternatives, as the required by regulations. This is perhaps understandable from Tessera's viewpoint, since they are interested in implementing their SunCatcher solution, not alternative solutions. Regulations aside, the land owner (BLM and the public), and California, have no such interest other than Tessera's being one of many possible solutions. California and the BLM have no interest in Tessera's solution as being the only solution.
- The Mesquite Lake alternative appears superior. Except for perhaps transmission lines, it removes the public land complexity. The stated impediment is the 50 landowners. No attempt to address this problem is described. I strongly suspect there was no attempt.

California is looking for a solution. It has set aggressive goals. I am truly fearful that the rush to solution will produce hasty and unwise decisions. Having been a practicing engineer for a long time, I am used to such pressures. Too often we found ourselves cynically asking "Why was there not time to do it right, but we can make time to do it over." More positively, we learn by doing, and this solution has not been 'done' yet.

Concern with the 750MW characterization of the project is described in the comments. The actual output is one quarter of the 750MW. Though probably unintentional, when seen by laymen and the general public it is deception. Even when seen by most non-laymen involved in solar projects, the difference between capacity and actual is not understood or appreciated. The most glaring example of this is the geothermal alternative, which apparently incorrectly assumes equivalent outputs for the 750 MW proposed project and a 750 MW geothermal project, despite the much higher geothermal capacity factor.

For the reasons above, should CEC/BLM decide to continue with the project, I suggest the DEIS be rewritten, clearly describing the undeveloped nature of the proposed technology and correcting the 750 MW misconception, and applying rigor to alternatives analysis. It should be reissued as a second edition DEIS, with another full 90 day review period. I realize this would put the government guarantees and subsidies in jeopardy. These are not our responsibilities. Our responsibilities are to fairly present the project and alternatives, and to do the best to get the project done right. As I pointed out above, getting it right the first time may take a little more time, but is far better than devising corrections to fix it later.

Following is my specific testimony on the "Ready" topics. Following the specific testimony is my exhibit list, my resume and a declaration.

Declaration of Tom Budlong

RE: Testimony on Imperial Valley Solar Project (No. 08-AFC-5)

I, Tom Budlong, declare as follows:

I prepared the attached testimony. My relevant professional qualifications and experience are set forth in my attached resume. It is my professional opinion that the attached testimony is true and correct. I am personally familiar with the facts and conclusions set forth within the attached testimony. If I was called as a witness, I could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge.

Dated: April 15, 2010

/s/ Tom Budlong

Tom Budlong

At: Los Angeles, California

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## 1) The project is in basic violation of NEPA

Reference Exhibit 500 - NEPA - The National Environmental Policy Act of 1969.

NEPA's Title I, Section 101, details basic and fundamental goals. Following are quotes from this section, and then the full text of the section.

In relating the quotes to the proposed project, it is important to keep in mind that the proposed project will completely use up undeveloped, essentially virgin land. The land will convert from near pristine and virtually untouched to a high-intensity industrial zone. It will destroy essentially all of the property's plant and animal life, environmental benefits, and prehistoric cultural evidence. It will be a complete change in the visual impact, inconsistent with most visually adjacent lands. (The adjacent factory is the exception.)

Quote	Comment
The Congress recognizing the profound impact ... industrial expansion ... resource exploitation... recognizing further the critical importance of ... maintaining environmental quality...	Congress understands the deep importance of maintaining the environment.
... create and maintain conditions under which man and nature can exist in productive harmony ...	The phrase productive harmony is inapplicable for this project. Nature is effectively destroyed, and there can be no harmony with something that does not exist.
...fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.	We are trustees of the environment, responsible for the future. Destroying the environment violates this trust.
... assure...productive and aesthetically and culturally pleasing surroundings	The Imperial site as an industrial site is not aesthetically and culturally pleasing. The site may be productive, but is not both, as required.
...attain the widest range of beneficial uses of the environment without degradation...	The degradation mentioned would be complete.
Preserve...natural aspects, maintain..diversity ...	Both natural aspects and diversity would be entirely removed.
... each person has a responsibility to contribute to the preservation and enhancement of the environment.	The effect of the proposed project is exactly opposite of preserving and enhancing.

Here is the full text of NEPA's introduction, the source of the quotes:

### **TITLE I**

### **CONGRESSIONAL DECLARATION OF NATIONAL ENVIRONMENTAL POLICY**

#### **Sec. 101 [42 USC § 4331].**

(a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances

and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consist with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may --

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
4. preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
5. achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

## 2) Applicant Objectives

1) Two of the applicant's primary objectives are omitted from the DEIS and should be included:

- Profit At Minimal Risk

This objective is more fundamental than the objectives stated in the DEIS. To help understand that it is fundamental, consider that Tessera Solar / SES would not have conceived of and applied for the project without a low risk profit potential. Tessera Solar would not come to California for altruistic purposes.

That Tessera/Solar requires a profit is not a negative criticism. It is an enterprise which must be profitable to be viable, and so can only engage in ventures with a reasonable risk and reasonable profit potential. In this venture, subsidies from the US Government are apparently providing confidence for that potential.

- Use of SunCatchers

SES/Tessera's objective is to make power with SunCatchers, not by any other method. This is understandable, since Sun Catchers are their proprietary development, and the basis of the company's existence.

These two objectives should be first in the list, to bring focus and understanding to the participation of Tessera/SES.

2) Review of Applicant Objectives (A-10,11(64,65).

Objective	Comment
...the applicant has developed solar technology which <b>requires commercial-scale development to demonstrate its technical and commercial viability</b> ,...	This points out the experimental nature of the SunCatcher technology.

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...to build a solar project that generates 750 MW of renewable solar energy that will help the State meet its Renewable Portfolio Standard (RPS) goals...

- Provide up to 750 MW of renewable electric capacity under a 20-year PPA to SDG&E
  - Contribute to the 20% renewables RPS target set by California's governor and legislature
  - Assist in reducing greenhouse gas emissions from the electricity sector
  - contribute to California's future electric power needs
  - Assist the CAISO in meeting its strategic goals for the integration of renewable resources, as listed in its Five-Year Strategic Plan for 2008-2012 (CAISO 2007).
- 

The applicant has contracted to provide power to SDG&E.

It should be understood that helping the State meet its goals is a consequence of the contract. It is not a driving goal.

Note that only SES/Tessera has an obligation to SDG&E's power needs. Helping California meet its various energy goals is a side effect of its both its obligation to SDG&E and its profit incentive – it has no direct or contractual obligation to California. To illustrate, if for some reason SES/Tessera lost its contract with SDG&E, Tessera would be considering to continue or terminate. Should forecasts about the viability of the project turn negative, such a decision within Tessera would increase in importance. These decisions would be internal to Tessera and would not involve contracts with California with respect to California meeting its obligations.

### 3) BLM Purpose and Need. The Project is Out of Compliance

Page A-12 (66) of the DEIS lists authorities. Three are cited:

- 1) 'Executive order 13212 ... which mandates ...'

The full Executive Order is included as exhibit 501.

Use of the word 'mandate', and omission of mentions of environmental concerns in the executive order is a misrepresentation. The sense of the text of the EO is a priority, not a mandate. The order is sensitive to the environment, with the clauses '*environmentally sound manner*' and '*while maintaining ...environmental protections*'. The full text of the paragraphs with these excerpts is:

***Section 1. Policy.***

*The increased production and transmission of energy in a safe and environmentally sound manner is essential to the well-being of the American people. In general, it is the policy of this Administration that executive departments and agencies (agencies) shall take appropriate actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy.*

***Sec. 2. Actions to Expedite Energy-Related Projects.***

*For energy-related projects, agencies shall expedite their review of permits or take other actions as necessary to accelerate the completion of such projects, while maintaining safety, public health, and environmental protections. The agencies shall take such actions to the extent permitted by law and regulation, and where appropriate.*

- 2) 'The Energy Policy Act of 2005<sup>1</sup> (EPAct), which requires...10,000 MW of renewable energy...'

Use of the word 'requires' is incorrect.

The language of the act treats this as a Sense of Congress, not a requirement. It should not be listed as a need for the action:

The specific text is:

***SEC. 211. SENSE OF CONGRESS REGARDING GENERATION CAPACITY OF ELECTRICITY FROM RENEWABLE ENERGY RESOURCES ON PUBLIC LANDS.***

*It is the sense of the Congress that the Secretary of the Interior should, before the end of the 10-year period beginning on the date of enactment of this Act, seek to have approved non-hydropower renewable*

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<sup>1</sup> Exhibit 505, Energy Policy Act of 2005, is at: [http://www.epa.gov/oust/fedlaws/publ\\_109-058.pdf](http://www.epa.gov/oust/fedlaws/publ_109-058.pdf)

*energy projects located on the public lands with a generation capacity of at least 10,000 megawatts of electricity.*

What is Sense of Congress?

From About.com: US Government Info <http://usgovinfo.about.com/od/uscongress/a/senseof.htm>

*When members of the House, Senate or entire Congress want to "send a message," or state an opinion, they try to pass a "sense of" resolution. Since such resolutions do not create law, what good are they?*

*Simple or joint resolutions expressing the "sense of" the Senate, House or Congress merely express a majority opinion. They do not make law and are not enforceable. Only bills and joint resolutions create laws.*

- 3) 'Secretarial Order 3285 of March 11, 2009, which establishes the development of renewable energy as a priority for the Department of the Interior.' The order is included as Exhibit 502.

Please note that the order includes the clause '...while protecting and enhancing the Nation's water, wildlife and other natural resources.' Section 4, Policy, is:

***Sec. 4 Policy.***

*Encouraging the production, development, and delivery of renewable energy is one of the Department's highest priorities. Agencies and bureaus within the Department will work collaboratively with each other, and with other Federal agencies, departments, states, local communities, and private landowners to encourage the timely and responsible development of renewable energy and associated transmission while protecting and enhancing the Nation's water, wildlife and natural resources.*

Contrary to the impression in the DEIS, these show that Congress and the Interior Department are concerned with environmental and natural resources as well as energy sources, that they must co-exist, and that one does not trump the other. They do not 'mandate', and they do not 'require', and they are as specific about environmental protection as about encouraging renewable energy. One does not take priority over the other.

The proposed project, having unmitigable negative impacts to several aspects of the environment, is out of compliance with the orders. We must be more clever in designing renewable energy solutions.

#### **4) Economic Analysis**

The EIS must include economic analyses of the proposed project and alternatives.

- a) NEPA's Council of Environmental Quality is specific about this. Question 2a of the CEQ's 40 Most Asked Questions (Exhibit 507) requires economic analysis<sup>2</sup>:

***2a. Alternatives Outside the Capability of Applicant or Jurisdiction of Agency.*** *If an EIS is prepared in connection with an application for a permit or other federal approval, must the EIS rigorously analyze and discuss alternatives that are outside the capability of the applicant or can it be limited to reasonable alternatives that can be carried out by the applicant?*

*A. Section 1502.14 requires the EIS to examine all reasonable alternatives to the proposal. In determining the scope of alternatives to be considered, the emphasis is on what is "reasonable" rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or feasible from the **technical and economic standpoint and using common sense**, rather than simply desirable from the standpoint of the applicant. [Emphasis added]*

NEPA is concerned with ensuring only reasonable alternatives need be considered. The definition of reasonable alternatives is practicality and feasibility from:

- the technical standpoint,
- the economic standpoint,
- and using common sense.

Section 1502.14 continues, requiring as the basis for choice, a presentation that includes the proposal and the alternatives defined as reasonable.

***Nepa Sec. 1502.14 Alternatives including the proposed action.***

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<sup>2</sup> The CEQ 40 Most Asked Questions and the answers are at <http://ceq.hss.doe.gov/nepa/regs/40/40p3.htm>.  
The CEQ authorization memo (Exhibit 508) is at <http://ceq.hss.doe.gov/nepa/regs/40/40p2.htm>

*This section is the heart of the environmental impact statement. Based on the information and analysis presented in the sections on the Affected Environment (Sec. 1502.15) and the Environmental Consequences (Sec. 1502.16), it should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and **providing a clear basis for choice** among options by the decision maker and the public. [Emphasis added]*

Elsewhere in NEPA, Section 1501.2(b) requires comparison of environmental effects and values with economic and technical analyses, and that these documents and analyses be made available.

*Each agency shall:*

*(b) Identify environmental effects and values in adequate detail so they can be compared to **economic** and technical analyses. Environmental documents and appropriate analyses shall be circulated and reviewed at the same time as other planning documents.*

Clearly, NEPA intends economics be part of the decision process, parallel with technology and impacts to the environment.

Please also note that in violation of NEPA 1501.2(b), an economic analysis has not been circulated. This must be corrected.

- b) The Energy Commission requires that the project be done economically, and that its electricity be competitively priced, as stated on Page A-11(65) of the DEIS:

*The Energy Commission developed the following objectives for the project:*

*1. to safely and **economically** construct and operate an up to 750 MW, renewable power generating facility in California capable of selling **competitively priced** renewable energy consistent with the needs of California utilities;*

Fulfillment of the objective of economic construction and competitive price cannot be verified or judged without an economic analysis.

- c) The Alternatives Section, Summary of Conclusions, quite properly talks about costs of alternatives: Page B.2-1(125), concerning the impact of a bifurcated site:

*This would increase the cost of the project due to...*

Page B.2-2(126), related to rooftop solar:

*...increased deployment of distributed solar photovoltaics faces challenges in manufacturing capacity, cost, and policy implementation.*

It is impossible to consider alternatives and compare them to the Plaster City project without analyzing costs of each.

- d) USACE regulations require cost consideration:

Page B.2-8(132), when discussing USACE alternative requirements :

*(2) An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.*

Cost must be considered in determining the practicality of an alternative. An analysis is required.

- e) Evaluation of alternative sites requires consideration of cost:

Page B.2-20(144).

One of the site selection criteria is:

- *site should be located on property currently available at a reasonable cost.*

Again, cost must be considered when considering a bifurcated site:

*This would increase the cost of the project due to the need for additional infrastructure...*

- f) Page ES-7(13) considers the planned life of the project, the possibility that it could be operated for a longer or shorter period depending on its economic viability and competitiveness:

*The planned life of the SES Solar Two Project is 40 years; however, if the SES Solar Two Project is still economically viable, it could be operated longer. It is also possible that the SES Solar Two Project could become economically noncompetitive before 40 years have passed, resulting in early decommissioning.*



Without a current economic analysis of the project there is no way to tell if it is now, before the project is started, economically viable and competitive. It may not be, and should not be considered.

These examples demonstrate the requirements for an economic and cost analysis is an integral, necessary component of the “*basis for choice among options by the decision maker and the public*” (The quote is from NEPA, as quoted above.)

That economic considerations are mentioned in numerous places in the documentation is understandable, since the project probably would not exist without economic justification and a cost-to-benefit analysis. An economic analysis is necessary to evaluate the project, and to compare it with alternatives. Without an economic analysis we are forced into the qualitative terms ‘cost more’, or ‘cost less’. Intelligent decisions cannot be made with maximum confidence when based on unnecessary non-specific terms.

It is tempting to say that the project is necessary, no matter the cost, for the public good of reducing global warming, currently accepted as a necessary goal. As previously stated, this is not an ‘at all cost’ project.

Additionally, since the project is subsidized with public money and will use public land, transparency demands that the economics of the project be revealed to the public.

An economic analysis should include comprehensive details, including but of course not limited to:

- Cost of construction.
- Cost of financing the construction.
- Cost of land usage – purchase or lease.
- Operation costs when the facility is up and running.
- Cost of washing parabolic dish mirrors, compared to flat mirrors.
- Insurance costs.
- Revenues from electricity sales.
- Taxes
- Government subsidies
- Other costs and revenues.

## 5) Net Energy Analysis:

The DEIS is missing analysis of the net energy produced. It is impossible to judge if the project balances the environmental cost without knowing how well the project satisfies its basic purpose. It is even possible that energy used for construction and operation will exceed the total output over the project life. This balance cannot be estimated without an analysis. Common sense dictates that plans for a project intended to produce energy include analysis of the net energy that will be produced. I have not found in the documentation justification for the stated 40 year life, nor analysis to support the stated production of 1,620,000 KWh/year.

This analysis should compare net usable energy produced against the no-action alternative, which would neither use nor produce energy. It should also compare against the alternatives. It should include (but of course not be limited to):

- Energy delivered to the customer, after it has gone through transmission lines.
- Energy required to upgrade or make new transmission lines.
- Energy expended during construction – machinery fuel etc.
- Personnel commuting energy (gas for commuting vehicles), during construction and production.
- Energy to transport the plant machinery to the site.
- Life cycle analysis: Energy to make the SunCatchers and supports, exclusion fence, and all other facilities. This energy should be compared to the no-action alternative, which would use no materials, and so should include the energy required to mine the materials, through the manufacturing process to the finished product.
- Construction will advance construction machinery to its eventual end of life. The energy analysis should include the energy needed to either replace worn out machinery, or a percentage of life

used. Again, this should include total cost of replacement, from mine to finished product. (Without this project, these costs would be avoided.)

- Parasitic energy during production.
- Energy required for decommissioning at the end of the useful life of the power plant.
- Analysis sufficient to give confidence to the stated 1,620,000 KWh annual energy production, 25KW SunCatcher rating, and 40 year estimated project life.

## 6) Untested Technology - Reliability

Although the concept of a Stirling engine is old, the design has never been widely popular and the SES incarnation has not been commercialized. Tessera/SES apparently has no experience with industrial scale implementation of the system. Their experience is limited to engineering development and a recent 60-unit test installation in Arizona. Apparently (no data have been found) this facility has been running for a few months. A January 2010 press release announced it had been built, but did not say it was operating<sup>3</sup>. I found no statements in the SA/DEIS or on the web concerning operation experience with SunCatchers.

NEPA requires common sense be used in evaluating alternatives, and by extension, the proposed solution - SunCatchers. Information listed below invites skepticism that SunCatchers are ready for large scale deployment. Common sense dictates available alternatives with proven technology have far greater chance of success; SunCatchers are not the only alternative. Choosing SunCatchers is not a wise decision. Note that Tessera has the option of using private land at the Mesquite Lake alternative, using private funding, to remove the majority of public involvement in decision making.

- a) CEC staff has similar reservations. Under Power Plant Reliability, on page ES-35(41) of the DEIS:

*Staff cannot determine whether the applicant's availability goal is achievable and cannot predict what the actual availability might be, given the demonstration status of this Stirling engine and limited data on large-scaled deployments of Stirling engines.*

*Staff believes it possible that the project may face challenges from considerable maintenance demands, reducing its availability.*

The same concerns came up in scoping comments. (Section B.2.5(125), page B.2-14(138))

- b) Tessera claims SunCatcher availability will be 99%. The DEIS has no documentation to support this, and does not independently describe MTBF.

MTBF (Mean time between failures) and availability are not the same. A very low MTBF – a high failure frequency – can result in a high availability with intensive maintenance. Extensive maintenance is expensive, but the DEIS contains no economic analysis to evaluate this option. The DEIS reflects this:

*An expert familiar with the machines claims that the SunCatcher exhibits a Mean Time Between Failures (MTBF) of only 40 hours (Butler 2007). This means each machine, if operating continuously on long summer days, would need to be shut down and repaired approximately every 3 to 5 days, depending on expected average 8 to 12 hours operation in winter and summer, respectively. Shutting down and repairing several thousand SunCatchers each day would likely result in enormous maintenance demands and the project would likely face challenges in achieving the predicted 99 percent availability factor. It is believed by one expert that a MTBF of 2,000 to 10,000 hours must be proven before a technology is ready for incorporation into a utility grid (Butler 2007, Public 2009a; Conklin 2009).*

CEC staff is appropriately concerned. Page D.4-4 (1410):

*Staff conducted an online research to gather more information on the demonstration status of this Stirling engine on a large-scaled format, but no useful information was found. Due to the lack of sufficient information supporting the applicant's claim of an availability factor of 99 percent for the project, staff cannot determine whether the project would yield this availability factor.*

I did another on-line search to find more information about SunCatcher performance, with the same results as CEC staff related in the above excerpt. Tessera web pages are silent on the subject.

- c) SunCatchers use hydrogen as the working fluid in the Stirling engines. Hydrogen is the smallest of all molecules. It is very good at finding avenues of escape – it leaks easily – it's difficult to seal off. The

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<sup>3</sup> Exhibit 503 - 2010\_01\_22, 60 Press Release, 60 units in AZ. (Tessera Solar and Stirling Energy Systems Unveil World's First Commercial-Scale SunCatcher™ Plant, Maricopa Solar, with Utility Partner Salt River Project)  
[http://tesseractosolar.com/north-america/pdf/2010\\_01\\_22.pdf](http://tesseractosolar.com/north-america/pdf/2010_01_22.pdf)

engines require continuous replenishment – stated in the DEIS, and, unsupported by documentation, to be approximately one flush per year (top of page D.4-4 (1410). This requires a supply system feeding each SunCatcher.

Hydrogen is flammable. My high school science teacher emphasized dramatically that it combines with oxygen, given the right proportions, “with great enthusiasm”. The Hindenburg is an extreme example.

A system to generate and deliver flammable gas to 30,000 SunCatchers spread over thousands of acres, designed and installed with minimal field experience, is folly.

- d) That this is a young technology, unproven in large, commercial scale installations, is stated in the DEIS.

**APPLICANT OBJECTIVES (Page A-10(64))**

*The applicant’s project objectives are set forth below. The fundamental objective is to build a solar project that generates 750 MW of renewable solar energy that will help the State meet its Renewable Portfolio Standard (RPS) goals for new renewable electric generation. To assist in meeting the requirement for additional generating capacity, the applicant has developed solar technology which **requires commercial-scale development to demonstrate its technical and commercial viability**, and has entered into power purchase agreements to provide power from renewable sources into the California Independent System Operator (CAISO) system.*

The emphasis in the excerpt above is mine. Tessera/SES is using the Plaster City project as an experiment. Their 60 unit demonstration facility apparently may have been operating for a few months<sup>4</sup>. From this paucity of experience Tessera proposes to ramp up to a facility with 500 times as many - 30,000 SunCatchers.

I suspect Tessera/SES feels it can do this near instantaneous expansion while keeping an acceptable financial risk/reward status because they expect the project cost will be supported by US Government loan guarantees<sup>5</sup>, and reduced by US Government subsidies<sup>6</sup>. In effect, the project risk is being transferred to the US Government, which is in no better position to judge risk than a private company. Many of the alternatives rejected in the DEIS would be more prudent investments.

I strongly object to using public money and public land for a high risk project when other methods are available.

- e) The concept has been in development for over 30 years. Successful, well known firms with extensive engineering capabilities have been involved. Nevertheless, this is the first industrial scale field deployment of the dish-Stirling technology. The length of development time without conversion to commercial use seriously questions the viability of the concept, and reduces confidence that SunCatchers will be successful for this project.

Tessera’s website summarizes the 30 year effort. (Public-Private Partnerships | 30 Years of Collaboration: <http://www.tesseractosolar.com/north-america/technology.htm>)

*In 1978, engineers at Ford Motor Company began developing designs of a solar-powered Stirling engine. Through the years, companies like McDonnell-Douglas, Lockheed Martin and Boeing all worked to improve on the technology and design. In 1996, SES, our sister company, based in Phoenix, Arizona USA, was formed to develop this technology and has worked in a cooperative public-private partnership relationship with Sandia National Laboratories and US Department of Energy, to bring the SunCatcher™ to market. Following the NTR \$100 million investment in May 2008, the design and technology has been further optimized and perfected and now ready for low-cost, high-volume production and global scale deployment.*

- f) The same Tessera website relates testing and field experience:

*Today’s SES SunCatcher™ is the result of over a decade of innovative engineering and validation testing, with hundreds of thousands of hours of on-sun testing on each major sub-system, and over 50,000 hours on-sun testing for the complete system.*

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<sup>4</sup> Exhibit 503 - 2010\_01\_22, 60 Press Release, 60 units in AZ. (Tessera Solar and Stirling Energy Systems Unveil World’s First Commercial Scale SunCatcher™ Plant, Maricopa Solar, with Utility Partner Salt River Project)  
[http://tesseractosolar.com/north-america/pdf/2010\\_01\\_22.pdf](http://tesseractosolar.com/north-america/pdf/2010_01_22.pdf)

<sup>5</sup> Page B.2-11 of the DEIS states that SES has applied for a loan guarantee.

<sup>6</sup> Please also see the **Applicant Objectives**.

Tessera proposes to leverage 50,000 hours (5.7 years) of system operation to 30,000 SunCatchers for the forty year life<sup>7</sup> of the project (1,200,000 years), a 200,000-fold increase. The experience to date does not warrant this magnitude of expansion without vastly more field experience.

g) I am puzzled by the statement on page D.4-2 (1408) of the DEIS:

*...the responsibility for maintaining system reliability falls largely to the state's control area operators, such as the California Independent System Operator (California ISO)...*

System maintenance and reliability should be with the project owner and operator, not, for example, CAL-ISO. Something seems amiss. (When a part needs repair or replacement, will CAL-ISO do it?)

h) Dr. Barry Butler's May 2007 PUC testimony (Exhibit 504)<sup>8</sup> questions the feasibility and advisability of field implementation of SunCatchers. Salient quotes from this testimony follow. Bear in mind that this is three year old testimony. The 1MW pilot test mentioned has apparently been increased to 1.5 MW (60 SunCatchers), recently been built at Peoria, AZ, whose operational status is unknown.

- Dish-Stirling systems have demonstrated that they are capable of producing electricity for the grid and for remote power applications. Technology development needs are for low-cost components and systems that can operate unattended at very high levels of reliability.
- The (SES) systems are continuously monitored and repaired whenever a problem occurs. Consequently, they have demonstrated excellent availability, greater than 98%, during the most recent 1,000 hr of operation.
- A "mean time between failure" between 2,000 and 10,000 hours must be proven before dish/Stirling can be incorporated into utility-scale installations
- SDG&E has no experience with the operation of dish/Stirling technology, and is proposing to go straight from the prototype to a utility-scale installation. Few or none of the benefits of the 1 MW pilot test will be available to SES as it moves to full commercial scale production to satisfy the SDG&E contract(s), as the 1 MW pilot has not yet begun operation and full commercial production must begin in a matter of months if SES hopes to meet the 2010 deadline established in the SDG&E contract. This is neither prudent nor possible unless the technical risks of the operation and maintenance are quantified and then apportioned between the federal government, investors, SES and SDG&E. The SCE 1MW project is the way to quantify the risks, before moving to 10MW then on to 100MW. Without these risks quantified and apportioned, investors who are willing to shoulder all of the risks for a meager reward must be found.
- I concur with this assessment in the Potential for Renewable Energy in the San Diego Region. My opinion is that dish/Stirling technology holds much promise. By 2020, the technology could be a significant player on a commercial scale in the concentrated solar power category. However, there is no possible way that dish/Stirling solar can move from high cost prototype models with substantive reliability concerns to large-scale production of high reliability low-cost commercial models by 2008 and full operation of a 12,000 dish, 300 MW array by the end of 2010. An entire step wise development 1MW, 10MW, 100MW with installed cost, reliability and operation & maintenance costs assessed over a year of operation at each step is necessary to move from current prototypes to the large-scale commercial plants contemplated in the power purchase agreements between SDG&E and SES.

I independently agree with Dr. Butler's opinion. In the engineering world it is considered imprudent, almost folly, to expand as rapidly as Tessera plans without maturing the product with well planned gradually increasing field installations, each step learning valuable operating experience from the previous. Even careful and extensive review of plans, designs, and test results by qualified people would not suffice for actual, extended field experience.

As examples of more careful solar industrialization, consider the (unrelated) Solar One and Two near Barstow, and the SEGS series in the same general vicinity. Those technologies have been field tested for over 20 years, and are now in a position to more confidently move to larger scale.

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<sup>7</sup> Forty year project life: DEIS page ES-7 (13).

<sup>8</sup> Butler 2007 – Phase I Direct Expert Testimony of Dr. Barry Butler on Behalf of Conservation Groups, Before the Public Utilities Commission of the State of California, Dated 5/31/2007.

## 7) The 750MW rating is incorrect

The facility will generate approximately 185MW, not 750MW.

The table at the bottom of Page Air-1-6(382) lists the “Facility MWh per year” as 1,620,000, and footnotes that statement as being approximately 25% capacity factor. Indeed, dividing 1,620,000 MWh/year by the number of hours in a year (24x365) gives 185 MW, and 185/750 is 24.6%. This agrees with the footnote and is in line with capacity factors for CSP solar generators in general.

The actual output (1,620,000 MWh/year, or 185 MW), or the capacity factor, appears or is implied in just three places that I could discover.

Page Air-1.6(382)	As detailed above.
Page D.4-2(1408)	“The project is anticipated to operate at an annual capacity factor of approximately 25 percent.”
Page D.3-5(1395)	“The SES Solar Two Project would produce power at the rate of 750 MW net, and would generate energy at the rate of 1,620,000 MW-hours net per year.” Note that this statement is confused by using ‘net’ with both the 750 MW and the 1,620,000 MWh/year. The two numbers can both be net only with a capacity factor of 100%.

Compare these three statements, the last being incorrect, with the 750MW rating used repetitively in the DEIS.

This conflict in emphasis is a gross, misleading mischaracterization, and must be corrected. The number invites almost all readers to assume the plant will produce almost four times as much as it actually will produce. The misconception carries to media reports and to general public perception. It misleads the public, and probably many working on the project as well.

The difference between the oft-stated 750MW and actual production are not explained in the DEIS. In many places the DEIS uses the modifiers ‘net’, ‘nominal’ and ‘capacity’.

- Use of the modifier ‘nominal’. The dictionary definition of nominal is “Existing in name only; not real or actual” (Houghton Mifflin), and ‘without reference to actual conditions” (Merriam’s Webster’s).
- Use of the modifier ‘net’ when referring to the 750 MW rating. Of course, a net amount is the actual amount received. A common example is packaged foods and other goods. Use of this word here is incorrect.
- Capacity is a thin tool, requiring skepticism or experience to question it is not what you get. It is not explained.

This is important.

- Readers who are not aware of the discrepancy are misled. An extremely small number of people would think to question the 750 MW number. An even smaller number would be able to locate the infrequently mentioned actual output in the DEIS, understand the implication, and do the arithmetic to verify.
- Even the DEIS analysis of the geothermal alternative is misled. It makes the mistake of equating this ‘750 MW’ project with a 750 MW geothermal facility, despite the greatly different capacity factor, and hence actual output, of geothermal plants.
- People outside the project assume it generates 750 MW. This is evident in press reports. The result is feeding incorrect information to the public.

**EarthTechling, March 1, 2010<sup>9</sup>** (Exhibit 509)

*The first phase consists of building 12,000 SunCatchers arranged in 200 1.5MW solar groups of 60 SunCatchers per group, with a net generating capacity of 300MW. Phase II will see 18,000 SunCatchers added in 500-1.5-MW solar groups for a net of 750MW.*

**BLM web page<sup>10</sup>** (Exhibit 510)

*The Stirling Energy Systems Solar Two project is a 750 megawatt solar generation power plant proposal to be located in the Imperial Valley, Calif. near El Centro.*

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<sup>9</sup> Solar Two Concentrating Solar Power Tech Project May Rise Near San Diego  
<http://www.earthtechling.com/2010/03/solar-two-concentrating-solar-power-tech-project-may-rise-near-san-diego/>

<sup>10</sup> Fast-Track Renewable Energy Projects  
[http://www.blm.gov/ca/st/en/fo/cdd/alternative\\_energy/fast-trackfastfacts.print.html](http://www.blm.gov/ca/st/en/fo/cdd/alternative_energy/fast-trackfastfacts.print.html)

That this practice is common with most solar facility descriptions is not a reason or excuse to allow it to happen in this documentation. It is wrong and misleading to the point of being fraudulent. One responsibility of the documentation is to fairly describe the proposal, and 750 MW does not do that.

Because this is a common practice, the documents should explain the difference between maximum and average output, explain Capacity Factor, and explain that the output is commonly mis-stated. Because it is easy to miss a single explanation in such a large amount of documentation, or not understand its implication, or be seduced by repetition of the 750 MW number, all documentation connected with the project should be corrected. Perhaps both numbers should be used side-by-side, and when comparing Imperial Solar with other facilities the 750 MW number could be used, with explanation. The purpose is to avoid misleading readers who are innocent of this situation.

Here are example locations in the DEIS that refer to 750 MW with no reference to actual output and no use of the conditional 'net', 'capacity, or 'nominal' words.

Page	Quote
A-2(56)	SES Solar Two, LLC has executed Power Purchase Agreements and interconnection agreements with San Diego Gas and Electric (SDG&E) to deliver 750 megawatts (MW) of electricity to the California market.
A-10(64)	The fundamental objective is to build a solar project that generates 750 MW of renewable solar energy
B.2-5(129)	Distributed Solar Technology - While it will very likely be possible to achieve 750 MW of distributed solar energy over the coming years
B.2-5(129)	Biomass Energy - In addition, between 75 and 250 facilities would be needed to achieve 750 MW of generation, creating substantial adverse impacts
B.2-75(199)	allowing generation of 750 MW within a smaller space
B.2-113(237)	achieving 750 MW of distributed solar PV or solar thermal would depend on
C.2-3(403)	reduce energy production from 750 megawatts to 632 megawatts

To put it more bluntly, the DEIS is fooling most everybody with the 750MW number. That's wrong.

## 8) Dust from the Plaster City OHV Open Area

No consideration has apparently been given to dust from the Plaster City OHV Open area.

As shown on the map below, this OHV open area is immediately on the north boundary of the project, on the other side of highway S80. It's a large area – probably 3-4 times the project area. S80 is the access route, and most of the OHV activity will occur near the highway.

OHVs make dust. In an open area OHVs are allowed to travel anywhere. They are not restrained to existing roads and routes. New untraveled tracks break soil crusts, exposing looser soil to wind erosion. The dust can blow into the project area, reducing the efficiency of the mirrors and creating more need for washing them. This can be a significant source of airborne dust.

As an example of OHV caused dust, the San Luis Obispo Air Pollution Control District recently released a careful and extensive study of dust emission from OHV areas<sup>11</sup>. The study concluded:

*The open sand sheets subject to OHV activity on the SVRA emit significantly greater amounts of particulates than the undisturbed sand sheets at the study control sites under the same wind conditions.*

*OHV activity in the SVRA is a major contributing factor to the high PM concentrations observed on the Nipomo Mesa.*

*Offroad vehicle activity on the dunes is known to cause de-vegetation, destabilization of dune structure and destruction of the natural crust on the dune surface. All of these act to increase the ability of winds to entrain sand particles from the dunes and carry them to the Mesa, representing an indirect emissions impact from the vehicles. The data strongly suggests this is the primary cause of the high PM levels measured on the Nipomo Mesa during episode days.*

Once disturbed, this effect can occur at all times during the week. It is not limited to weekends when OHV activity is highest.

<sup>11</sup> Reference Exhibit 506 - South County Phase 2 Particulate Study, ExecSummary. Approximately 15MB of supporting documents are at <http://www.slocleanair.org/> under the heading *South County Phase 2 Particulate Matter Study*.



[illegible]

Exhibit 508 - CEQ Authorization Memo

Exhibit 509 - Solar Two Concentrating Solar Power Tech Project May Rise Near San Diego

Exhibit 510 - BLM Web Page Excerpt

## **10) Witnesses**

### **Dr. Barry Butler.**

Dr. Butler has extensive professional experience in solar power. Please see Exhibit 504 for his qualifications.

### **Eddie Harmon.**

Eddie will witness on water issues, if able. She was admitted to a hospital on April 13 (note that this is a different admission than mentioned in my March 30 Prehearing Statement), and so was unable to provide a resume or summary of experience. Eddie has extensive experience with regulatory water issues in Imperial and San Diego Counties over the last 30 years. If she is able to perform as a witness, she will provide a summary of experience and qualifications.

## **11) Tom Budlong**

3216 Mandeville Canyon Road  
Los Angeles, CA 90049  
310-476-1731 (land line)  
310-963-1731 (cell phone)  
[TomBudlong@RoadRunner.com](mailto:TomBudlong@RoadRunner.com)

Graduated from MIT in 1959. BS in Mechanical Engineering. Specialty was internal combustion engines. Currently retired.

## **Experience Summary**

### **Marquardt Corporation:**

Development of pneumatic based guided missile control systems.

### **Whittaker Gyro Corporation**

Design and development of gyroscopes and gyro based stable platforms for guided missiles.  
Investigation of solar flare activity by analyses of ballistic missile mounted solar sensors.

### **Spacelabs Corporation**

Design and development of breathing oxygen systems for lunar excursion astronaut backpacks.  
Development of biological monitoring systems for astronauts.

### **Computer Design Corporation / Compucorp**

Specification, design and implementation of functions and user interface of early hand-held scientific and business calculators.  
Specification, design and implementation of word processing software for proprietary personal computers. Word processors installed world-wide and at the Library of Congress, the White House, military installations.

### **Three D Graphic Corporation**

Implementation of PC based technical and business graphing software.



## **The National Environmental Policy Act of 1969, as amended**

(Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), Sept. 13, 1982)

An Act to establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Environmental Policy Act of 1969."*

### **Purpose**

#### **Sec. 2 [42 USC § 4321].**

The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

## **TITLE I**

### **CONGRESSIONAL DECLARATION OF NATIONAL ENVIRONMENTAL POLICY**

#### **Sec. 101 [42 USC § 4331].**

(a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consist with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may --

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
4. preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
5. achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

**Sec. 102 [42 USC § 4332].**

The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall --

(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;

(B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on --

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5, United States Code, and shall accompany the proposal through the existing agency review processes;

(D) Any detailed statement required under subparagraph (C) after January 1, 1970, for any major Federal action funded under a program of grants to States shall not be deemed to be legally insufficient solely by reason of having been prepared by a State agency or official, if:

(i) the State agency or official has statewide jurisdiction and has the responsibility for such action,

(ii) the responsible Federal official furnishes guidance and participates in such preparation,

(iii) the responsible Federal official independently evaluates such statement prior to its approval and adoption, and

(iv) after January 1, 1976, the responsible Federal official provides early notification to, and solicits the views of, any other State or any Federal land management entity of any action or any alternative thereto which may have significant impacts upon such State or affected Federal land management entity and, if there is any disagreement on such impacts, prepares a written assessment of such impacts and views for incorporation into such detailed statement.

The procedures in this subparagraph shall not relieve the Federal official of his responsibilities for the scope, objectivity, and content of the entire statement or of any other responsibility under this Act; and further, this subparagraph does not affect the legal sufficiency of statements prepared by State agencies with less than statewide jurisdiction.

(E) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(F) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

(G) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(H) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

(I) assist the Council on Environmental Quality established by title II of this Act.

#### **Sec. 103 [42 USC § 4333].**

All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this Act and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this Act.

#### **Sec. 104 [42 USC § 4334].**

Nothing in section 102 [42 USC § 4332] or 103 [42 USC § 4333] shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

#### **Sec. 105 [42 USC § 4335].**

The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies.

## **TITLE II**

### **COUNCIL ON ENVIRONMENTAL QUALITY**

#### **Sec. 201 [42 USC § 4341].**

The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, manmade, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the Nation in the light of expected population pressures; (4) a review of the programs and activities (including regulatory activities) of the Federal Government, the State and local governments, and nongovernmental entities or individuals with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; and (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation.

#### **Sec. 202 [42 USC § 4342].**

There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve at his pleasure, by and with the advice and consent of the Senate. The President shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainments, is exceptionally well qualified to analyze and interpret environmental trends and information of all kinds; to appraise programs and activities of the Federal Government in the light of the policy set forth in title I of this Act; to be conscious of and responsive to the scientific, economic, social, aesthetic, and cultural needs and interests of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment.

#### **Sec. 203 [42 USC § 4343].**

(a) The Council may employ such officers and employees as may be necessary to carry out its functions under this Act. In addition, the Council may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this Act, in accordance with section 3109 of title 5, United States Code (but without regard to the last sentence thereof).

(b) Notwithstanding section 1342 of Title 31, the Council may accept and employ voluntary and uncompensated services in furtherance of the purposes of the Council.

#### **Sec. 204 [42 USC § 4344].**

It shall be the duty and function of the Council --

1. to assist and advise the President in the preparation of the Environmental Quality Report required by section 201 [42 USC § 4341] of this title;
2. to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information for the purpose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in title I of this Act, and to compile and submit to the President studies relating to such conditions and trends;

3. to review and appraise the various programs and activities of the Federal Government in the light of the policy set forth in title I of this Act for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the President with respect thereto;
4. to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation;
5. to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality;
6. to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes;
7. to report at least once each year to the President on the state and condition of the environment; and
8. to make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the President may request.

**Sec. 205 [42 USC § 4345].**

In exercising its powers, functions, and duties under this Act, the Council shall --

1. consult with the Citizens' Advisory Committee on Environmental Quality established by Executive Order No. 11472, dated May 29, 1969, and with such representatives of science, industry, agriculture, labor, conservation organizations, State and local governments and other groups, as it deems advisable; and
2. utilize, to the fullest extent possible, the services, facilities and information (including statistical information) of public and private agencies and organizations, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the Council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

**Sec. 206 [42 USC § 4346].**

Members of the Council shall serve full time and the Chairman of the Council shall be compensated at the rate provided for Level II of the Executive Schedule Pay Rates [5 USC § 5313]. The other members of the Council shall be compensated at the rate provided for Level IV of the Executive Schedule Pay Rates [5 USC § 5315].

**Sec. 207 [42 USC § 4346a].**

The Council may accept reimbursements from any private nonprofit organization or from any department, agency, or instrumentality of the Federal Government, any State, or local government, for the reasonable travel expenses incurred by an officer or employee of the Council in connection with his attendance at any conference, seminar, or similar meeting conducted for the benefit of the Council.

**Sec. 208 [42 USC § 4346b].**

The Council may make expenditures in support of its international activities, including expenditures for: (1) international travel; (2) activities in implementation of international agreements; and (3) the support of international exchange programs in the United States and in foreign countries.

**Sec. 209 [42 USC § 4347].**

There are authorized to be appropriated to carry out the provisions of this chapter not to exceed \$300,000 for fiscal year 1970, \$700,000 for fiscal year 1971, and \$1,000,000 for each fiscal year thereafter.

**The Environmental Quality Improvement Act**, as amended (Pub. L. No. 91- 224, Title II, April 3, 1970; Pub. L. No. 97-258, September 13, 1982; and Pub. L. No. 98-581, October 30, 1984.

**42 USC § 4372.**

(a) There is established in the Executive Office of the President an office to be known as the Office of Environmental Quality (hereafter in this chapter referred to as the "Office"). The Chairman of the Council on Environmental Quality established by Public Law 91-190 shall be the Director of the Office. There shall be in the Office a Deputy Director who shall be appointed by the President, by and with the advice and consent of the Senate.

(b) The compensation of the Deputy Director shall be fixed by the President at a rate not in excess of the annual rate of compensation payable to the Deputy Director of the Office of Management and Budget.

(c) The Director is authorized to employ such officers and employees (including experts and consultants) as may be necessary to enable the Office to carry out its functions ;under this chapter and Public Law 91-190, except that he may employ no more than ten specialists and other experts without regard to the provisions of Title 5, governing appointments in the competitive service, and pay such specialists and experts without regard to the provisions of chapter 51 and subchapter III of chapter 53 of such title relating to classification and General Schedule pay rates, but no such specialist or expert shall be paid at a rate in excess of the maximum rate for GS-18 of the General Schedule under section 5332 of Title 5.

(d) In carrying out his functions the Director shall assist and advise the President on policies and programs of the Federal Government affecting environmental quality by --

1. providing the professional and administrative staff and support for the Council on Environmental Quality established by Public Law 91- 190;
2. assisting the Federal agencies and departments in appraising the effectiveness of existing and proposed facilities, programs, policies, and activities of the Federal Government, and those specific major projects designated by the President which do not require individual project authorization by Congress, which affect environmental quality;
3. reviewing the adequacy of existing systems for monitoring and predicting environmental changes in order to achieve effective coverage and efficient use of research facilities and other resources;
4. promoting the advancement of scientific knowledge of the effects of actions and technology on the environment and encouraging the development of the means to prevent or reduce adverse effects that endanger the health and well-being of man;
5. assisting in coordinating among the Federal departments and agencies those programs and activities which affect, protect, and improve environmental quality;
6. assisting the Federal departments and agencies in the development and interrelationship of environmental quality criteria and standards established throughout the Federal Government;
7. collecting, collating, analyzing, and interpreting data and information on environmental quality, ecological research, and evaluation.

(e) The Director is authorized to contract with public or private agencies, institutions, and organizations and with individuals without regard to section 3324(a) and (b) of Title 31 and section 5 of Title 41 in carrying out his functions.

**42 USC § 4373.** Each Environmental Quality Report required by Public Law 91-190 shall, upon transmittal to Congress, be referred to each standing committee having jurisdiction over any part of the subject matter of the Report.

**42 USC § 4374.** There are hereby authorized to be appropriated for the operations of the Office of Environmental Quality and the Council on Environmental Quality not to exceed the following sums for the following fiscal years which sums are in addition to those contained in Public Law 91- 190:

- (a) \$2,126,000 for the fiscal year ending September 30, 1979.
- (b) \$3,000,000 for the fiscal years ending September 30, 1980, and September 30, 1981.
- (c) \$44,000 for the fiscal years ending September 30, 1982, 1983, and 1984.
- (d) \$480,000 for each of the fiscal years ending September 30, 1985 and 1986.

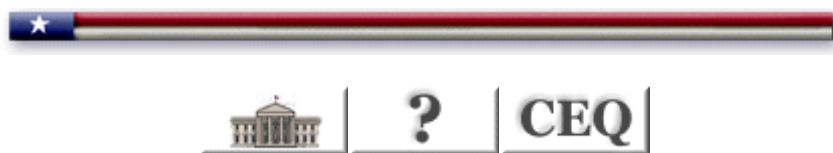
**42 USC § 4375.**

(a) There is established an Office of Environmental Quality Management Fund (hereinafter referred to as the "Fund") to receive advance payments from other agencies or accounts that may be used solely to finance --

1. study contracts that are jointly sponsored by the Office and one or more other Federal agencies; and
2. Federal interagency environmental projects (including task forces) in which the Office participates.

(b) Any study contract or project that is to be financed under subsection (a) of this section may be initiated only with the approval of the Director.

(c) The Director shall promulgate regulations setting forth policies and procedures for operation of the Fund.



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*To submit questions and comments about CEQ NEPANet,  
please use the [NEPANet Feedback System](#).*

Executive Order 13212: 66 FR 28357 (22 May 2001)  
**Executive Order 13212--Actions To Expedite Energy-Related Projects**

**May 18, 2001**

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to take additional steps to expedite the increased supply and availability of energy to our Nation, it is hereby ordered as follows:

Section 1. Policy.

The increased production and transmission of energy in a safe and environmentally sound manner is essential to the well-being of the American people. In general, it is the policy of this Administration that executive departments and agencies (agencies) shall take appropriate actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy.

Sec. 2. Actions to Expedite Energy-Related Projects.

For energy-related projects, agencies shall expedite their review of permits or take other actions as necessary to accelerate the completion of such projects, while maintaining safety, public health, and environmental protections. The agencies shall take such actions to the extent permitted by law and regulation, and where appropriate.

Sec. 3. Interagency Task Force.

There is established an interagency task force (Task Force) to monitor and assist the agencies in their efforts to expedite their review of permits or similar actions, as necessary, to accelerate the completion of energy-related projects, increase energy production and conservation, and improve transmission of energy. The Task Force also shall monitor and assist agencies in setting up appropriate mechanisms to coordinate Federal, State, tribal, and local permitting in geographic areas where increased permitting activity is expected. The Task Force shall be composed of representatives from the Departments of State, the Treasury, Defense, Agriculture, Housing and Urban Development, Justice, Commerce, Transportation, the Interior, Labor, Education, Health and Human Services, Energy, Veterans Affairs, the Environmental Protection Agency, Central Intelligence Agency, General Services Administration, Office of Management and Budget, Council of Economic Advisers, Domestic Policy Council, National Economic Council, and such other representatives as may be determined by the Chairman of the Council on Environmental Quality. The Task Force shall be chaired by the Chairman of the Council on Environmental Quality and housed at the Department of Energy for administrative purposes.

Sec. 4. Judicial Review.

Nothing in this order shall affect any otherwise available judicial review of agency action. This order is intended only to improve the internal management of the Federal Government and does not create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

George W. Bush

The White House,  
May 18, 2001.

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THE SECRETARY OF THE INTERIOR  
WASHINGTON

ORDER NO. 3285

Subject: Renewable Energy Development by the Department of the Interior

Sec. 1 **Purpose.** This Order establishes the development of renewable energy as a priority for the Department of the Interior and establishes a Departmental Task Force on Energy and Climate Change. This Order also amends and clarifies Departmental roles and responsibilities to accomplish this goal.

Sec. 2 **Background.** The Nation faces significant challenges to meeting its current and future energy needs. Meeting these challenges will require strategic planning and a thoughtful, balanced approach to domestic resource development that calls upon the coordinated development of renewable resources, as well as the development of traditional energy resources. Many of our public lands possess substantial renewable resources that will help meet our Nation's future energy needs while also providing significant benefits to our environment and the economy. Increased production of renewable energy will create jobs, provide cleaner, more sustainable alternatives to traditional energy resources, and enhance the energy security of the United States by adding to the domestic energy supply. As the steward of more than one-fifth of our Nation's lands, and neighbor to other land managers, the Department of the Interior has a significant role in coordinating and ensuring environmentally responsible renewable energy production and development of associated infrastructure needed to deliver renewable energy to the consumer.

Sec. 3 **Authority.** This Order is issued under the authority of Section 2 of Reorganization Plan No. 3 of 1950 (64 Stat. 1262), as amended, and pursuant to the provisions of Section 211 of the Energy Policy Act of 2005 (P.L. 109-58).

Sec. 4 **Policy.** Encouraging the production, development, and delivery of renewable energy is one of the Department's highest priorities. Agencies and bureaus within the Department will work collaboratively with each other, and with other Federal agencies, departments, states, local communities, and private landowners to encourage the timely and responsible development of renewable energy and associated transmission while protecting and enhancing the Nation's water, wildlife, and other natural resources.

Sec. 5 **Energy and Climate Change Task Force.** A Task Force on Energy and Climate Change is hereby established in the Department. The Deputy Secretary and the Counselor to the Secretary shall serve as Co-Chairs. The Task Force on Energy and Climate Change shall:

a. develop a strategy that is designed to increase the development and transmission of renewable energy from appropriate areas on public lands and the Outer Continental Shelf, including the following:

(1) quantifying potential contributions of solar, wind, geothermal, incremental or small hydroelectric power on existing structures, and biomass energy;

(2) identifying and prioritizing the specific locations in the United States best suited for large-scale production of solar, wind, geothermal, incremental or small hydroelectric power on existing structures, and biomass energy (e.g., renewable energy zones);

(3) identifying, in cooperation with other agencies of the United States and appropriate state agencies, the electric transmission infrastructure and transmission corridors needed to deliver these renewable resources to major population centers;

(4) prioritizing the permitting and appropriate environmental review of transmission rights-of-way applications that are necessary to deliver renewable energy generation to consumers;

(5) establishing clear roles and processes for each bureau/office;

(6) tracking bureau/office progress and working to identify and resolve obstacles to renewable energy permitting, siting, development, and production;

(7) identifying additional policies and/or revisions to existing policies or practices that are needed, including possible revisions to the Geothermal, Wind, and West-Wide Corridors Programmatic Environmental Impact Statements and their respective Records of Decisions; and

(8) working with individual states, tribes, local governments, and other interested stakeholders, including renewable generators and transmission and distribution utilities, to identify appropriate areas for generation and necessary transmission;

b. develop best management practices for renewable energy and transmission projects on the public lands to ensure the most environmentally responsible development and delivery of renewable energy;

c. establish clear policy direction for authorizing the development of solar energy on public lands; and

d. recommend such other actions as may be necessary to fulfill the goals of this Order.

## **Sec. 6 Responsibilities.**

a. Program Assistant Secretaries. Program Assistant Secretaries overseeing bureaus responsible for, or that provide assistance with, the planning, siting, or permitting of renewable energy generation and transmission facilities on the public lands and on the Outer Continental Shelf, are responsible for:

(1) establishing and participating in management structures that facilitate cooperation, reporting, and accountability across agencies, including the Task Force on Energy and Climate Change;

(2) establishing joint, single-point-of contact offices that consolidate expertise to ensure a coordinated, efficient, and expeditious permitting process while ensuring appropriate siting and compliance with the National Environmental Policy Act, the Endangered Species Act, and all other applicable laws; and

(3) working collaboratively with other departments, state, and local authorities to coordinate and harmonize non-Federal permitting processes.

b. The Assistant Secretary - Policy, Management and Budget is a member of the Task Force and shall:

(1) ensure that investments associated with Interior managed facilities meet Federal standards for energy efficiency and greening applications; and

(2) coordinate with the Energy and Climate Change Task Force, as appropriate.

c. Bureau Heads. Each bureau head is responsible for designating a representative to the Task Force on Energy and Climate Change.

**Sec. 7 Implementation.** The Deputy Secretary is responsible for ensuring implementation of this Order. This responsibility may be delegated as appropriate.

**Sec. 8 Effective Date.** This Order is effective immediately and will remain in effect until its provisions are converted to the Departmental Manual or until it is amended, superseded, or revoked, whichever comes first. The termination of this Order will not nullify implementation of the requirements and responsibilities effected herein.



Secretary of the Interior

Date: 3/11/2009



FOR IMMEDIATE RELEASE

Janette Coates, SES and Tessera Solar  
(602) 773-4931, [Janette.Coates@tesseractosolar.com](mailto:Janette.Coates@tesseractosolar.com)  
Patty Garcia-Likens, SRP  
(602) 236-2500, [Patty.Likens@srpnet.com](mailto:Patty.Likens@srpnet.com)

**Tessera Solar and Stirling Energy Systems Unveil World's First Commercial-Scale SunCatcher™ Plant, Maricopa Solar, with Utility Partner Salt River Project**  
***Arizona Governor Jan Brewer and the U.S. Department of Energy Commemorate Milestone***

PEORIA, AZ (January 22, 2010) –Only four months after breaking ground, Tessera Solar and Stirling Energy Systems (SES) showcased the highly anticipated Maricopa Solar power plant today at a special event for key partners, stakeholders and media. Maricopa Solar is the first commercial project for the SunCatcher™ concentrating solar power (CSP) technology designed and manufactured by SES. Joining in the celebration were Arizona Governor Jan Brewer and officials from Salt River Project (SRP), local and state government, the U.S. Department of Energy, Sandia National Laboratories, utility customers, suppliers and NTR plc, Tessera Solar and SES's majority shareholder.

"The opening of Maricopa Solar is a significant milestone for our companies and for the solar industry," said Bob Lukefahr, Tessera Solar North America CEO. "Maricopa Solar represents a genuine breakthrough in solar energy and demonstrates that Dish Stirling solar power is now ready for commercial deployment in the US and around the world. With this milestone now behind us we look forward to breaking ground on our initial 1,500 megawatts of projects in California and Texas later this year."

Maricopa Solar is comprised of 60 SunCatcher™ dishes and will provide 1.5 megawatts of renewable energy to SRP customers in Greater Phoenix, Arizona.

"Through partnerships such as Maricopa Solar, we will be able to learn a great deal about this emerging solar technology while helping to create green jobs, economic development opportunities and clean energy for SRP and our customers," said SRP Associate General Manager Richard Hayslip. "The Maricopa Solar project is just one example of SRP's commitment to building a renewable energy portfolio that is beneficial to our environment and customers."

The innovative and highly-efficient SES SunCatcher is a 25-kilowatt solar power system which uses a 38-foot, mirrored parabolic dish combined with an automatic tracking system to collect and focus the sun's energy onto a Stirling engine to convert the solar thermal energy into grid-quality electricity.

"The SunCatcher represents the next generation of grid-quality solar power technology providing clean, reliable and cost-effective solar power to address global climate change and reduce our planet's carbon emissions," said Steve Cowman, Stirling Energy Systems CEO.

SunCatcher has a number of advantages including the highest solar-to-grid electric efficiency, zero water use for power production, a modular and scalable design, low capital cost, and minimal land disturbance. SunCatcher was designed and developed in America, through a public-private partnership with the U.S. Department of Energy. The SunCatchers unveiled at Maricopa Solar were manufactured and assembled in North America, mostly in Michigan by automotive suppliers.

-more-



High-volume manufacturing of the SunCatcher begins in Summer 2010 and Tessera Solar breaks ground on utility-scale projects late this year in California and Texas. Imperial Valley is a 750 MW project with the first 300 MW contracted under a power purchase agreement with San Diego Gas & Electric near El Centro, California; Calico is a 850 MW project with Southern California Edison near Barstow, California; and Western Ranch is a 27 MW project with CPS Energy in West Texas. Manufacturing of SunCatcher components and construction of these projects will create up to 4,000 jobs in the near term, both in the Midwest, where SES's automotive supply chain base originates, and in the Southwest where projects will be developed.

**PHOTOS AND VIDEO ARE AVAILABLE AT [www.srpnet.com/maricopasolar](http://www.srpnet.com/maricopasolar).**

#### **About Stirling Energy Systems (SES Inc.)**

*Stirling Energy Systems (SES) is the global supplier of the SunCatcher™ solar dish engine system, the latest innovation in modular Concentrating Solar Power (CSP), and next generation of grid-quality, solar-electric power generation. The SES SunCatcher™ combines a mirrored concentrator dish with a high-efficiency Stirling engine to track, collect and convert the sun's thermal energy to grid-quality electricity. The SunCatcher™ technology has significant advantages over other CSP technology including zero water use for power production, minimal impact to the environment, the highest electric efficiency and cost competitiveness. Founded in 1996, the company maintains corporate headquarters in Scottsdale, Arizona, and engineering and test site operations at Sandia National Laboratories in Albuquerque, New Mexico. NTR owns a controlling stake in SES Inc.*

#### **About Tessera Solar**

*Tessera Solar is the exclusive developer/owner/operator of utility-scale solar power facilities using the SunCatcher™ solar power system, manufactured by our sister company Stirling Energy Systems (SES Inc.), headquartered in Scottsdale, Arizona. Tessera Solar North America is headquartered in Houston, Texas, with offices in Scottsdale, Arizona and Berkeley, California. Tessera Solar International is headquartered in London, England. NTR plc is the parent company of Tessera Solar and SES.*

#### **About NTR plc**

*NTR plc, the international renewable energy group, builds and runs green energy and resource-sustaining businesses. Founded in 1978, NTR has evolved from being a developer and operator of infrastructure in Ireland to an international developer and operator of renewable energy (wind, solar and ethanol) and sustainable waste management businesses in the USA, UK, and Ireland. The company employs over 4,100 people.*

#### **About Salt River Project (SRP)**

*Salt River Project is the third-largest public power utility in the country and serves more than 930,000 electric customers through a variety of resources including solar, wind, biomass, geothermal and hydroelectricity. In 2004, SRP's Board of Directors voted to require that 15 percent of the energy generated comes from sustainable resources by 2025. Today, SRP's sustainable portfolio is 6.5 percent of the total power provided to our customers.*

For more information, visit [www.stirlingenergy.com](http://www.stirlingenergy.com), [www.tesseractosolar.com](http://www.tesseractosolar.com), [www.ntrplc.com](http://www.ntrplc.com) and [www.srpnet.com](http://www.srpnet.com).

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**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**

In the Matter of the Application of San Diego Gas & Electric Company (U 902-E) for a Certificate of Public Convenience and Necessity for the Sunrise Powerlink Transmission Project	Application 06-08-010 (Filed August 4, 2006)
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**PHASE I DIRECT TESTIMONY  
OF DR. BARRY BUTLER  
ON BEHALF OF CONSERVATION GROUPS**

Justin Augustine  
Steven Siegel  
Center for Biological Diversity  
San Francisco Bay Area Office  
1095 Market St., Suite 511  
San Francisco, CA 94103  
Telephone: 415-436-9682 ext. 302  
Facsimile: 415-436-9683  
E-Mail: [jaugustine@biologicaldiversity.org](mailto:jaugustine@biologicaldiversity.org)

Dated: June 1, 2007

## Testimony of Dr. Barry Butler on Dish/Stirling Solar Technology

### **1. INTRODUCTION**

My name is Barry L. Butler, PhD. As more fully outlined in my resume, Appendix A, I have a PhD in Materials Science and am the former vice president and manager of SAIC's Solar Energy Products Division. I joined the Solar Energy Research Institute, the predecessor to the National Renewable Energy Laboratory, in 1978, soon after it began operations. Prior to that time I worked at Sandia National Laboratory specializing in solar optical materials. I wrote the chapter on cooperative solar thermal commercialization activities in the book "Implementation of Solar Thermal Technology" published by MIT Press in 1996. I have written or co-authored over 10 technical papers on all aspects of dish/Stirling solar technology development. I was the president of the Concentrating Solar Power Division of the Solar Energy Industries Association from 1998 to 2002, and I am the owner of Butler Sun Solutions, a firm specializing in the design and sales of solar hot water heating systems.

### **2. BACKGROUND**

San Diego Gas and Electric (SDG&E), a company owned by Sempra Energy, has filed an application to the CPUC claiming a 150 mile, 1000 MW transmission line is needed to import energy into San Diego County to ensure the reliability of the regional transmission system on peak demand days, and has further suggested the transmission line is needed to encourage the development of renewable power in Imperial Valley. SDG&E has signed a power purchase agreement (PPA) with Stirling Energy Systems (SES), Phase I of which is for a 300 MW dish/Stirling array, a total of 12,000 of their 25

## Testimony of Dr. Barry Butler on Dish/Stirling Solar Technology

kW dish/Stirling systems, in Imperial County that must be delivered in increments between 2008 and 2010, as is stated in the CPCN (p. III-11):

The Agreement with SES contemplates the purchase by SDG&E of up to 900 MW of new solar related energy from SES in three phases. Phase 1 consists of 300 MW scheduled for delivery in the 2008 to 2010 timeframe. While the first phase will provide 300 MW when all construction is completed, the capacity will be added in increments over the 2008 through 2010 period. Phase 2 project consists of an additional 300 MW in the 2011 to 2012 timeframe. SDG&E also has a right of first refusal for a third phase for another 300 MW phase.

According to the SDG&E, commercial production is expected to begin in 2008. The economic terms of the contract, specifically the \$/kwh price that SDG&E will pay SES for the power, is unknown.

There are currently six prototype 25 kW Stirling dishes in operation at Sandia National Laboratory. I have been asked to opine on the reliability and cost of SES dish technology and whether it is feasible or realistic to expect that SES can meet the contract schedule defined by SDG&E.

### **3. DEVELOPMENT HISTORY OF DISH STIRLING TECHNOLOGY**

I co-authored a 2003 paper that includes a brief history of the development of dish Stirling technology.<sup>1</sup> I have excerpted the following summary of dish Stirling technology from that paper.

Over the last 20 years, eight different Dish-Stirling systems ranging in size from 2 to 50 kW have been built by companies in the United States, Germany, Japan, and Russia. The first of the historical systems, the 25-kW Vanguard system built by ADVANCO in Southern California, achieved a reported world record net solar-to-electric conversion efficiency of 29.4%. In 1984, two 50-kW Dish-

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<sup>1</sup> T. Mancini, P. Heller, B. Butler, B. Osborn, W. Schiel, V. Goldberg, R. Buck, R. Diver, C. Andracka, J. Moreno, *Dish-Stirling Systems: An Overview of Development and Status*, Journal of Solar Energy Engineering, Vol. 125, pp. 135-151, May 2003.



## Testimony of Dr. Barry Butler on Dish/Stirling Solar Technology

Stirling systems were built, installed, and operated in Riyadh, Saudi Arabia, by Schlaich-Bergermann und Partner of Stuttgart, Germany.

A third Dish-Stirling system was built by McDonnell Douglas Aerospace Corporation (MDAC) in the mid 1980s and, when MDAC discontinued development of the technology, the rights to the system were acquired by the Southern California Edison Company (SCE). SCE operated the system from 1985 to 1988. Stirling Energy Systems (SES) of Phoenix, Arizona, acquired the technology rights and system hardware in 1996 and have continued development of the system. In 1991, Cummins Power Generation, working under costshared agreements with the U.S. Department of Energy and Sandia National Laboratories, started development of two Dish-Stirling systems: a 7-kW system for remote applications and a 25-kW system for grid-connected power generation. Cummins was innovative in its Dish-Stirling systems, incorporating advanced technologies into the designs. . . The two Cummins programs made progress, but were terminated in 1996 when Cummins' parent company, Cummins Engine Company, realigned business along its core area of diesel engine development.

Dish-Stirling systems have demonstrated that they are capable of producing electricity for the grid and for remote power applications. Technology development needs are for low-cost components and systems that can operate unattended at very high levels of reliability.

SES acquired the intellectual and technology rights to the McDonnell Douglas concentrator and the license to manufacture the USAB (now Kockums) 4-95 Stirling engine based power conversion unit (PCU) in 1996.

The (SES) systems are continuously monitored and repaired whenever a problem occurs. Consequently, they have demonstrated excellent availability, greater than 98%, during the most recent 1,000 hr of operation.

I was the SAIC project manager for a dish/Stirling design that was in competition with the SES design. By 2002, SAIC had also demonstrated relatively high availability of the system for periods of time. However, the "mean time between failure" was approximately 40 hours. Major reliability problems with the SAIC Stirling engine included hydrogen leakage through joints and seals, internal engine seal leakage, swashplate actuator stalls, and heater head braze joint hydrogen leaks. That means that

## Testimony of Dr. Barry Butler on Dish/Stirling Solar Technology

on average once every 40 hours a problem of some type required shut down and maintenance. Nearly continuous maintenance was necessary to keep the system “available” to generate electricity. SES has also demonstrated very high availability, though this has been achieved by a program of continuous maintenance. In 2002, SES and SAIC both had dish/Stirling units operating at the University of Nevada – Las Vegas. Power output was greater for SES than SAIC. Both SAIC and SES conducted maintenance on a nearly continuous basis to keep the units available for electricity production.

Dish/Stirling is not cost-competitive with conventional power generation, or other forms of renewable power generation such as wind and solar, at this time. Wind and geothermal are fully commercial renewable energy technologies with a cost of energy of approximately 5¢ US/kWhr each.<sup>2</sup> As noted in the 2003 Journal of Solar Energy Engineering paper I co-authored:<sup>3</sup>

In the U.S., niche markets for Dish-Stirling power generation depend on federal or state government subsidies, required to close the gap between the current cost of power from these systems (~30¢ US/kWhr) and the price that the market is willing to pay (~6¢ US/kWhr), a difference of 24¢ US/kWhr.

Even at the relatively low production rate of 50 MW/yr (~2,000 25-kW systems or 5,000 10-kW systems) and at an O&M cost of 1–2¢/kWhr, the cost of electricity from Dish-Stirling systems will be 15–20¢/kWhr enabling entry into some village and remote-power markets. As system costs fall and reliability improves, it is reasonable to expect levelized energy costs of less than 10¢

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<sup>2</sup> R. Caputo, B. Butler, *Solar 2007: The Use of “Energy Parks” to Balance Renewable Energy in the San Diego Region*, accepted for publication, American Solar Energy Society, 2007 Annual Conference, Cleveland, July 2007.

<sup>3</sup> T. Mancini, P. Heller, B. Butler, B. Osborn, W. Schiel, V. Goldberg, R. Buck, R. Diver, C. Andracka, J. Moreno, *Dish-Stirling Systems: An Overview of Development and Status*, Journal of Solar Energy Engineering, Vol. 125, pp. 135-151, May 2003., p. 139.

## Testimony of Dr. Barry Butler on Dish/Stirling Solar Technology

US/kWhr, which will expand the markets to distributed generation and demand-side applications.

A “mean time between failure” between 2,000 and 10,000 hours must be proven before dish/Stirling can be incorporated into utility-scale installations.<sup>4</sup> The current “mean time between failure” is a few hundred hours. This means a great deal of time, effort, and money must be spent on maintenance. This drives up the cost of operating a dish/Stirling unit. The commercial viability of the Stirling system is unproven at this time.

### **4. PILOT INSTALLATION IS NEXT LOGICAL STEP IN DISH/STIRLING DEVELOPMENTAL PROGRESSION**

The 1 MW pilot project being developed by SES for SCE is a good example of a necessary and prudent incremental step to ensure all the technical deficiencies in the first generation production model are worked-out before scaling-up to arrays involving many 1,000s of individual dishes. It is also instructive that SCE, a company with extensive experience with dish/Stirling technology and the company that sold the technology to SES, is requiring the successful deployment of a 1 MW pilot project before scaling-up to a utility-scale installation.

SDG&E has no experience with the operation of dish/Stirling technology, and is proposing to go straight from the prototype to a utility-scale installation. Few or none of the benefits of the 1 MW pilot test will be available to SES as it moves to full commercial scale production to satisfy the SDG&E contract(s), as the 1 MW pilot has not yet begun operation and full commercial production must begin in a matter of months if SES hopes

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<sup>4</sup> R. Caputo, B. Butler, *Solar 2007: The Use of “Energy Parks” to Balance Renewable Energy in the San Diego Region*, accepted for publication, American Solar Energy Society, 2007 Annual Conference, Cleveland, July 2007.

### Testimony of Dr. Barry Butler on Dish/Stirling Solar Technology

to meet the 2010 deadline established in the SDG&E contract. This is neither prudent nor possible unless the technical risks of the operation and maintenance are quantified and then apportioned between the federal government, investors, SES and SDG&E. The SCE 1MW project is the way to quantify the risks, before moving to 10MW then on to 100MW. Without these risks quantified and apportioned, investors who are willing to shoulder all of the risks for a meager reward must be found.

### **5. DISH/STIRLING IS A PRE-COMMERCIAL TECHNOLOGY**

The San Diego Regional Renewable Energy Study Group addressed dish/Stirling in its August 2005 *Potential for Renewable Energy in the San Diego Region*.<sup>5</sup> Several of the co-authors of this report are SDG&E staff. Dish/Stirling is identified as pre-commercial in this study, based primarily on analyses conducted by the National Renewable Energy Laboratory and Black & Veatch.

I concur with this assessment in the *Potential for Renewable Energy in the San Diego Region*. My opinion is that dish/Stirling technology holds much promise. By 2020, the technology could be a significant player on a commercial scale in the concentrated solar power category. However, there is no possible way that dish/Stirling solar can move from high cost prototype models with substantive reliability concerns to large-scale production of high reliability low-cost commercial models by 2008 and full operation of a 12,000 dish, 300 MW array by the end of 2010. An entire step wise development 1MW, 10MW, 100MW with installed cost, reliability and operation & maintenance costs assessed over a year of operation at each step is necessary to move

Testimony of Dr. Barry Butler on Dish/Stirling Solar Technology

from current prototypes to the large-scale commercial plants contemplated in the power purchase agreements between SDG&E and SES.

I declare under penalty of perjury this testimony and attachment are, to the best of my knowledge, true and correct.

Signed: 

Date: 5/31/2007

Barry L. Butler, PhD  
811 Academy Dr.  
Solana Beach, CA 92075  
858-259-8895

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<sup>5</sup> San Diego Regional Renewable Energy Study Group, *Potential for Renewable Energy in the San Diego Region*, August 2005 ([www.renewablesg.org](http://www.renewablesg.org)).

PUBLIC LAW 109-58—AUG. 8, 2005

ENERGY POLICY ACT OF 2005

**Docket 08-AFC-5**

**Exhibit 505, Energy Policy Act of 2005**

**Cover page only. The full act is 551 pages. It  
is available at**

**[http://www.epa.gov/oust/fedlaws/publ\\_109-058.pdf](http://www.epa.gov/oust/fedlaws/publ_109-058.pdf)**

**SOUTH COUNTY PHASE 2  
PARTICULATE STUDY**

**San Luis Obispo County  
Air Pollution Control District**

**EXECUTIVE SUMMARY**

**February 2010**

## EXECUTIVE SUMMARY

Historical ambient air monitoring on the Nipomo Mesa has documented atypical concentrations of airborne particulate matter compared to other areas of San Luis Obispo County and other coastal areas of California. These historical measurements show that the California health standard for PM<sub>10</sub> (airborne particles with a mean aerodynamic diameter of 10 microns or less) is regularly exceeded in many locations on the Nipomo Mesa. Population-based studies in hundreds of cities in the U.S. and around the world have demonstrated that both short-term and long-term exposure to elevated particulate levels can cause significant increases in hospital admissions, emergency room visits, asthma attacks and premature deaths. Groundbreaking long-term studies of children's health conducted in California have also shown that particle pollution may significantly reduce lung function growth in children.

To better understand the extent and sources of these unusually high concentrations of particulate pollution on the Nipomo Mesa, the San Luis Obispo County Air Pollution Control District (SLO APCD) has conducted comprehensive air monitoring studies in that region. The Phase 1 South County Particulate Matter (PM) Study began in 2004 and utilized filter-based manual particulate samplers measuring both PM<sub>10</sub> and PM<sub>2.5</sub> (particles 2.5 microns in diameter or less) concentrations at 6 monitoring sites located throughout the Mesa. Samples were collected over a one year period and analyzed for mass and elemental composition; meteorological measurements of wind speed and direction were also performed at numerous locations in the study area.

Data from the Phase 1 study showed air quality on the Nipomo Mesa exceeds the state 24-hour PM<sub>10</sub> health standard at one or more monitoring locations on over one quarter of the sample days. Elemental analysis of PM<sub>2.5</sub> filter samples demonstrated that on these high particulate days, the largest fraction of particles are composed of the wind blown crustal material containing silicon, iron, aluminum, and calcium. Meteorological data showed that high wind events entraining crustal particulate from the dune fields at the Oceano Dunes State Recreational Vehicle Area (SRVA) upwind of the Nipomo Mesa area and transporting them inland as the likely cause; data from a directional PM<sub>10</sub> sampler on the Mesa that only operated on high wind days strongly supported this conclusion. Further analysis of Phase 1 study data was unable to provide a conclusive determination on whether off-road vehicle (OHV) activity in the SVRA played a role, either direct or indirect, in the particulate pollution observed on the Nipomo Mesa.

The Phase 1 Study Report was presented to the SLO APCD Board of Directors in March of 2007. The Board directed staff to design and conduct a follow-up study with the primary goal of determining if OHV activity on the SVRA played a role in the high particulate levels measured on the Nipomo Mesa; a secondary goal of the study was to determine what, if any, particulate impacts on the Mesa are due to fugitive dust from the petroleum coke piles at the ConocoPhillips Refinery complex. To help design and conduct the Phase 2 study, the SLO APCD retained the services of the Delta Group, an affiliation of scientists, mostly from the University of California at Davis (UCD), dedicated to the detection and evaluation of aerosol transport. The Great Basin Unified Air Pollution Control District (GBUAPCD), a recognized leader nationwide in understanding and mitigating wind blown particulate pollution, also lent their considerable expertise to the design and implementation of the study. Scientists from the Santa Barbara County APCD, the California Air Resources Board (CARB) and the California State Parks Department also provided significant input in the design phase of the study.



The Phase 2 Study design involved three independent investigations using a broad array of technologies and measurement techniques to better understand the source(s) and activities responsible for the observed particulate pollution problem on the Nipomo Mesa. Determining the role of OHV activity on the SVRA was a key focus of the study, so it was important to conduct measurements and analyses both within and downwind of the dunes at the SVRA, as well within and downwind of “control site” dunes north and south of the SVRA where offroad vehicles are not allowed, to evaluate the differences between them. PM and meteorological measurements downwind of the refinery coke piles and agricultural fields on the Mesa were also a necessary design element to determine potential contributions from those areas. Further, since the Phase 1 study showed that high PM concentrations on the Mesa occur primarily on high wind days, it was critical to ensure that study measurements captured the high wind events that typically occur during the early spring and late fall months.

The field measurement phase of the study was conducted from January 2008 through March 2009. The portion of the study performed by the SLO APCD entailed the deployment and use of real-time particulate monitors and wind sensors at a variety of locations downwind of both the SVRA and the control sites, as well as downwind of the coke piles and agricultural fields. These measurements were designed to assess the relative levels of airborne particulate coming from those areas, particularly on high wind days.

The portion of the study directed by the GBUAPCD involved measuring the amount of sand movement at different wind speeds, both in the SVRA and a control site, to better understand the mechanism and potential source location responsible for wind blown emissions. The Delta Group was responsible for deploying and operating sophisticated research sampling instruments designed to measure the mass, size distribution and elemental composition of the particulate pollution. These samplers were located downwind from the SVRA and a number of control sites that currently do not allow OHV activity. The samplers were also used to look for tracer elements to assess if petroleum coke from the ConocoPhillips refinery facility was being entrained by winds and impacting ambient PM levels in the area. The Delta Group also collected and analyzed soil samples upwind from each monitoring station.

The 3-pronged field investigation effort for the Phase 2 study gathered well over two million data points, requiring nearly a year to review, validate and analyze the data and compile the results. The data analysis was performed by the three independent research groups involved in designing and implementing the study, followed by peer review of the draft study report by a diverse and respected group of scientists with expertise in this field. This wealth of data and critical review of the results by numerous independent experts, combined with the results from the Phase 1 study, provides a much more complete understanding of the particulate pollution problem in the area, leading to the following major findings:

- The airborne particulate matter predominantly impacting the region on high episode days does not originate from an offshore source.
- Neither the petroleum coke piles at the ConocoPhillips facility nor agricultural fields or activities in and around the area are a significant source of ambient PM on the Nipomo Mesa.
- The airborne particulate matter impacting the Nipomo Mesa on high episode days predominantly consists of fine sand material transported to the Mesa from upwind areas under high wind conditions.

- The primary source of high PM levels measured on the Nipomo Mesa is the open sand sheets in the dune areas of the coast.
- The open sand sheets subject to OHV activity on the SVRA emit significantly greater amounts of particulates than the undisturbed sand sheets at the study control sites under the same wind conditions.
- Vegetated dune areas do not emit wind blown particles; the control site dunes have significantly higher vegetation coverage than is present at the SVRA.

The major findings resulting from detailed analysis of the diverse and comprehensive data sets generated during the Phase 1 and Phase 2 South County PM Studies clearly lead to a definitive conclusion: OHV activity in the SVRA is a major contributing factor to the high PM concentrations observed on the Nipomo Mesa.

There are two potential mechanisms of OHV impact. The first is direct emissions from the vehicles themselves, which includes fuel combustion exhaust and/or dust raised by vehicles moving over the sand. Elemental analysis of study data shows combustion exhaust particles are not a significant component in the samples during high concentration periods. However, analysis of SVRA vehicle activity data does show a weak relationship between high PM10 concentrations and high vehicle activity. This indicates a very small direct emissions impact from OHV activity caused by wind entrainment of dust plumes raised by vehicles moving across the open sand. While significant, the study data shows this is not the major factor responsible for the high PM levels downwind from the SVRA.

The second potential mechanism of impact from OHV activities involves indirect emission impacts. Offroad vehicle activity on the dunes is known to cause de-vegetation, destabilization of dune structure and destruction of the natural crust on the dune surface. All of these act to increase the ability of winds to entrain sand particles from the dunes and carry them to the Mesa, representing an indirect emissions impact from the vehicles. The data strongly suggests this is the primary cause of the high PM levels measured on the Nipomo Mesa during episode days.

## NEPA's Forty Most Asked Questions

### Questions 1-10

1a. Range of Alternatives. What is meant by "range of alternatives" as referred to in Sec. 1505.1(e)?

A. The phrase "range of alternatives" refers to the alternatives discussed in environmental documents. It includes all reasonable alternatives, which must be rigorously explored and objectively evaluated, as well as those other alternatives, which are eliminated from detailed study with a brief discussion of the reasons for eliminating them. Section 1502.14. A decisionmaker must not consider alternatives beyond the range of alternatives discussed in the relevant environmental documents. Moreover, a decisionmaker must, in fact, consider all the alternatives discussed in an EIS. Section 1505.1(e).

1b. **How many alternatives** have to be discussed when there is an infinite number of possible alternatives?

A. For some proposals there may exist a very large or even an infinite number of possible reasonable alternatives. For example, a proposal to designate wilderness areas within a National Forest could be said to involve an infinite number of alternatives from 0 to 100 percent of the forest. When there are potentially a very large number of alternatives, only a reasonable number of examples, covering the full spectrum of alternatives, must be analyzed and compared in the EIS. An appropriate series of alternatives might include dedicating 0, 10, 30, 50, 70, 90, or 100 percent of the Forest to wilderness. What constitutes a reasonable range of alternatives depends on the nature of the proposal and the facts in each case.

2a. Alternatives Outside the Capability of Applicant or Jurisdiction of Agency. If an EIS is prepared in connection with an application for a permit or other federal approval, must the EIS rigorously analyze and discuss alternatives that are outside the capability of the applicant or can it be limited to reasonable alternatives that can be carried out by the applicant?

A. Section 1502.14 requires the EIS to examine all reasonable alternatives to the proposal. In determining the scope of alternatives to be considered, the emphasis is on what is "reasonable" rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.

2b. Must the EIS analyze alternatives outside the jurisdiction or capability of the agency or beyond what Congress has authorized?

A. An alternative that is outside the legal jurisdiction of the lead agency must still be analyzed in the EIS if it is reasonable. A potential conflict with local or federal law does not necessarily render an alternative unreasonable, although such conflicts must be considered. Section 1506.2(d). Alternatives that are outside the scope of what Congress has approved or funded must still be evaluated in the EIS if they are reasonable, because the EIS may serve as the basis for modifying the Congressional approval or funding in light of NEPA's goals and policies. Section 1500.1(a).

3. No-Action Alternative. What does the "no action" alternative include? If an agency is under a court order or legislative command to act, must the EIS address the "no action" alternative?

A. Section 1502.14(d) requires the alternatives analysis in the EIS to "include the alternative of no action." There are two distinct interpretations of "no action" that must be considered, depending on the nature of the proposal being evaluated. The first situation might involve an action such as updating a land management plan where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed. In these cases "no action" is "no change" from current management direction or level of management intensity. To construct an alternative that is based on no management at all would be a useless academic exercise. Therefore, the "no action" alternative may be thought of in terms of continuing with the present course of action until that action is changed. Consequently, projected impacts of alternative management schemes would be compared in the EIS to those impacts projected for the existing plan. In this case, alternatives would include management plans of both greater and lesser intensity, especially greater and lesser levels of resource development.

The second interpretation of "no action" is illustrated in instances involving federal decisions on proposals for projects. "No action" in such cases would mean the proposed activity would not take place, and the resulting environmental effects from taking no action would be compared with the effects of permitting the proposed activity or an alternative activity to go forward.

Where a choice of "no action" by the agency would result in predictable actions by others, this consequence of the "no action" alternative should be included in the analysis. For example, if denial of permission to build a railroad to a facility would lead to construction of a road and increased truck traffic, the EIS should analyze this consequence of the "no action" alternative.

In light of the above, it is difficult to think of a situation where it would not be appropriate to address a "no action" alternative. Accordingly, the regulations require the analysis of the no action alternative even if the agency is under a court order or legislative command to act. This analysis provides a benchmark, enabling decisionmakers to compare the magnitude of environmental effects of the action alternatives. It is also an example of a reasonable alternative outside the jurisdiction of the agency which must be analyzed. Section 1502.14(c). See Question 2 above. Inclusion of such an analysis in the EIS is necessary to inform the Congress, the public, and the President as intended by NEPA. Section 1500.1(a).

4a. Agency's Preferred Alternative. What is the "agency's preferred alternative"?

A. The "agency's preferred alternative" is the alternative which the agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors. The concept of the "agency's preferred alternative" is different from the "environmentally preferable alternative," although in some cases one alternative may be both. See Question 6 below. It is identified so that agencies and the public can understand the lead agency's orientation.

4b. Does the "preferred alternative" have to be identified in the Draft EIS and the Final EIS or just in the Final EIS?

A. Section 1502.14(e) requires the section of the EIS on alternatives to "identify the agency's preferred alternative if one or more exists, in the draft statement, and identify such alternative in the final statement . . ." This means that if the agency has a preferred alternative at the Draft EIS stage, that alternative must be labeled or identified as such in the Draft EIS. If the responsible federal official in fact has no preferred alternative at the Draft EIS stage, a preferred alternative need not be identified there. By the time the Final EIS is filed, Section 1502.14(e) presumes the existence of a preferred alternative and requires its identification in the Final EIS "unless another law prohibits the expression of such a preference."

4c. Who recommends or determines the "preferred alternative"?

A. The lead agency's official with line responsibility for preparing the EIS and assuring its adequacy is responsible for identifying the agency's preferred alternative(s). The NEPA regulations do not dictate which official in an agency shall be responsible for preparation of EISs, but agencies can identify this official in their implementing procedures, pursuant to Section 1507.3.

Even though the agency's preferred alternative is identified by the EIS preparer in the EIS, the statement must be objectively prepared and not slanted to support the choice of the agency's preferred alternative over the other reasonable and feasible alternatives.

5a. Proposed Action v. Preferred Alternative. Is the "proposed action" the same thing as the "preferred alternative"?

A. The "proposed action" may be, but is not necessarily, the agency's "preferred alternative." The proposed action may be a proposal in its initial form before undergoing analysis in the EIS process. If the proposed action is [46 FR 18028] internally generated, such as preparing a land management plan, the proposed action might end up as the agency's preferred alternative. On the other hand the proposed action may be granting an application to a non-federal entity for a permit. The agency may or may not have a "preferred alternative" at the Draft EIS stage (see Question 4 above). In that case the agency may decide at the Final EIS stage, on the basis of the Draft EIS and the public and agency comments, that an alternative other than the proposed action is the agency's "preferred alternative."

5b. Is the analysis of the "proposed action" in an EIS to be treated differently from the analysis of alternatives?

A. The degree of analysis devoted to each alternative in the EIS is to be substantially similar to that devoted to the "proposed action." Section 1502.14 is titled "Alternatives including the proposed action" to reflect such comparable treatment. Section 1502.14(b) specifically requires "substantial treatment" in the EIS of each alternative including the proposed action. This regulation does not dictate an amount of information to be provided, but rather, prescribes a level of treatment, which may in turn require varying amounts of information, to enable a reviewer to evaluate and compare alternatives.

6a. Environmentally Preferable Alternative. What is the meaning of the term "environmentally preferable alternative" as used in the regulations with reference to Records of Decision? How is the term "environment" used in the phrase?

A. Section 1505.2(b) requires that, in cases where an EIS has been prepared, the Record of Decision (ROD) must identify all alternatives that were considered, ". . . specifying the alternative or alternatives which were considered to be environmentally preferable." The environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources.

The Council recognizes that the identification of the environmentally preferable alternative may involve difficult judgments, particularly when one environmental value must be balanced against another. The public and other agencies reviewing a Draft EIS can assist the lead agency to develop and determine environmentally preferable alternatives by providing their views in comments on the Draft EIS. Through the identification of the environmentally preferable alternative, the decisionmaker is clearly faced with a choice between that alternative and others, and must consider whether the decision accords with the Congressionally declared policies of the Act.

6b. Who recommends or determines what is environmentally preferable?

A. The agency EIS staff is encouraged to make recommendations of the environmentally preferable alternative(s) during EIS preparation. In any event the lead agency official responsible for the EIS is encouraged to identify the environmentally preferable alternative(s) in the EIS. In all cases, commentors from other agencies and the public are also encouraged to address this question. The agency must identify the environmentally preferable alternative in the ROD.

7. Difference Between Sections of EIS on Alternatives and Environmental Consequences. What is the difference between the sections in the EIS on "alternatives" and "environmental consequences"? How do you avoid duplicating the discussion of alternatives in preparing these two sections?

A. The "alternatives" section is the heart of the EIS. This section rigorously explores and objectively evaluates all reasonable alternatives including the proposed action. Section 1502.14. It should include relevant comparisons on environmental and other grounds. The "environmental consequences" section of the EIS discusses the specific environmental impacts or effects of each of the alternatives including the proposed action. Section 1502.16. In order to avoid duplication between these two sections, most of the "alternatives" section should be devoted to describing and comparing the alternatives. Discussion of the environmental impacts of these alternatives should be limited to a concise descriptive summary of such impacts in a comparative form, including charts or tables, thus sharply defining the issues and providing a clear basis for choice among options. Section 1502.14. The "environmental consequences" section should be devoted largely to a scientific analysis of the direct and indirect environmental effects of the proposed action and of each of the alternatives. It forms the analytic basis for the concise comparison in the "alternatives" section.

8. Early Application of NEPA. Section 1501.2(d) of the NEPA regulations requires agencies to provide for the early application of NEPA to cases where actions are planned by private applicants or non-Federal entities and are, at some stage, subject to federal approval of permits, loans, loan guarantees, insurance or other actions. What must and can agencies do to apply NEPA early in these cases?

A. Section 1501.2(d) requires federal agencies to take steps toward ensuring that private parties and state and local entities initiate environmental studies as soon as federal involvement in their proposals can be foreseen. This section is intended to ensure that environmental factors are considered at an early stage in the planning process and to avoid the situation where the applicant for a federal permit or approval has completed planning and eliminated all alternatives to the proposed action by the time the EIS process commences or before the EIS process has been completed.

Through early consultation, business applicants and approving agencies may gain better appreciation of each other's needs and foster a decisionmaking process which avoids later unexpected confrontations.

Federal agencies are required by Section 1507.3(b) to develop procedures to carry out Section 1501.2(d). The procedures should include an "outreach program", such as a means for prospective applicants to conduct pre-application consultations with the lead and cooperating agencies. Applicants need to find out, in advance of project planning, what environmental studies or other information will be required, and what mitigation requirements are likely, in connection with the later federal NEPA process. Agencies should designate staff to advise potential applicants of the agency's NEPA information requirements and should publicize their pre-application procedures and information requirements in newsletters or other media used by potential applicants.

Complementing Section 1501.2(d), Section 1506.5(a) requires agencies to assist applicants by outlining the types of information required in those cases where the agency requires the applicant to submit environmental data for possible use by the agency in preparing an EIS.

Section 1506.5(b) allows agencies to authorize preparation of environmental assessments by applicants. Thus, the procedures should also include a means for anticipating and utilizing applicants' environmental studies or "early corporate environmental assessments" to fulfill some of the federal agency's NEPA obligations. However, in such cases the agency must still evaluate independently the environmental issues [46 FR 18029] and take responsibility for the environmental assessment.

These provisions are intended to encourage and enable private and other non-federal entities to build environmental considerations into their own planning processes in a way that facilitates the application of NEPA and avoids delay.

9. Applicant Who Needs Other Permits. To what extent must an agency inquire into whether an applicant for a federal permit, funding or other approval of a proposal will also need approval from another agency for the same proposal or some other related aspect of it?

A. Agencies must integrate the NEPA process into other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts. Specifically, the agency must "provide for cases where actions are planned by . . . applicants," so that designated staff are available to advise potential applicants of studies or other information that will foreseeably be required for the later federal action; the agency shall consult with the applicant if the agency foresees its own involvement in the proposal; and it shall insure that the NEPA process commences at the earliest possible time. Section 1501.2(d). (See Question 8.)

The regulations emphasize agency cooperation early in the NEPA process. Section 1501.6. Section 1501.7 on "scoping" also provides that all affected Federal agencies are to be invited to participate in scoping the environmental issues and to identify the various environmental review and consultation requirements that may apply to the proposed action. Further, Section 1502.25(b) requires that the draft EIS list all the federal permits, licenses and other entitlements that are needed to implement the proposal.

☐ These provisions create an affirmative obligation on federal agencies to inquire early, and to the maximum degree possible, to ascertain whether an applicant is or will be seeking other federal assistance or approval, or whether the applicant is waiting until a proposal has been substantially developed before requesting federal aid or approval.

Thus, a federal agency receiving a request for approval or assistance should determine whether the applicant has filed separate requests for federal approval or assistance with other federal agencies. Other federal agencies that are likely to become involved should then be contacted, and the NEPA process coordinated, to insure an early and comprehensive analysis of the direct and indirect effects of the proposal and any related actions. The agency should inform the applicant that action on its application may be delayed unless it submits all other federal applications (where feasible to do so), so that all the relevant agencies can work together on the scoping process and preparation of the EIS.

10a. Limitations on Action During 30-Day Review Period for Final EIS. What actions by agencies and/or applicants are allowed during EIS preparation and during the 30-day review period after publication of a final EIS?

A. No federal decision on the proposed action shall be made or recorded until at least 30 days after the publication by EPA of notice that the particular EIS has been filed with EPA. Sections 1505.2 and 1506.10. Section 1505.2 requires this decision to be stated in a public Record of Decision.

Until the agency issues its Record of Decision, no action by an agency or an applicant concerning the proposal shall be taken which would have an adverse environmental impact or limit the choice of reasonable alternatives. Section 1506.1(a). But this does not preclude preliminary planning or design work which is needed to support an application for permits or assistance. Section 1506.1(d).

When the impact statement in question is a program EIS, no major action concerning the program may be taken which may significantly affect the quality of the human environment, unless the particular action is justified independently of the program, is accompanied by its own adequate environmental impact statement and will not prejudice the ultimate decision on the program. Section 1506.1(c).

10b. Do these limitations on action (described in Question 10a) apply to state or local agencies that have statutorily delegated responsibility for preparation of environmental documents required by NEPA, for example, under the HUD Block Grant program?

A. Yes, these limitations do apply, without any variation from their application to federal agencies.

# **MEMORANDUM FOR FEDERAL NEPA LIAISONS, FEDERAL, STATE, AND LOCAL OFFICIALS AND OTHER PERSONS INVOLVED IN THE NEPA PROCESS**

**Subject:** Questions and Answers About the NEPA Regulations

During June and July of 1980 the Council on Environmental Quality, with the assistance and cooperation of EPA's EIS Coordinators from the ten EPA regions, held one-day meetings with federal, state and local officials in the ten EPA regional offices around the country. In addition, on July 10, 1980, CEQ conducted a similar meeting for the Washington, D.C. NEPA liaisons and persons involved in the NEPA process. At these meetings CEQ discussed (a) the results of its 1980 review of Draft EISs issued since the July 30, 1979 effective date of the NEPA regulations, (b) agency compliance with the Record of Decision requirements in Section 1505 of the NEPA regulations, and (c) CEQ's preliminary findings on how the scoping process is working. Participants at these meetings received copies of materials prepared by CEQ summarizing its oversight and findings.

These meetings also provided NEPA liaisons and other participants with an opportunity to ask questions about NEPA and the practical application of the NEPA regulations. A number of these questions were answered by CEQ representatives at the regional meetings. In response to the many requests from the agencies and other participants, CEQ has compiled forty of the most important or most frequently asked questions and their answers and reduced them to writing. The answers were prepared by the General Counsel of CEQ in consultation with the Office of Federal Activities of EPA. These answers, of course, do not impose any additional requirements beyond those of the NEPA regulations. This document does not represent new guidance under the NEPA regulations, but rather makes generally available to concerned agencies and private individuals the answers which CEQ has already given at the 1980 regional meetings. The answers also reflect the advice which the Council has given over the past two years to aid agency staff and consultants in their day-to-day application of NEPA and the regulations.

CEQ has also received numerous inquiries regarding the scoping process. CEQ hopes to issue written guidance on scoping later this year on the basis of its special study of scoping, which is nearing completion.

NICHOLAS C. YOST  
General Counsel



## **Solar Two Concentrating Solar Power Tech Project May Rise Near San Diego**

by David Craddock, March 1st, 2010

Is there any sun brighter or more potent than that of the desert sun at high noon? The California Energy Commission (CEC) and the national Bureau of Land Management (BLM) don't seem to think so. In mid-February the two released an environmental impact statement for the Solar Two project, which assessed the impact that the construction of 42,000 dish/Stirling systems – to be built by Stirling Energy Systems (SES) and Tessera Solar – on 10 square miles of desert located 100 miles east of San Diego.

The systems, called SunCatchers, are one form of concentrating solar power (CSP) technology, which, as explained by the U.S. Department of Energy, “generally involves concentrating the sun’s heat with some form of mirror, and then converting that heat into electricity.” The SunCatcher employs parabolic trough systems, which in turn use trough-shaped mirrors. Details regarding the SunCatcher’s functionality can be found on Stirling Energy’s How-It-Works website. In terms of impact on the construction site, the impact statement mentioned no major impediments, only an inevitable visual impact, as well as measures to be taken for protecting desert species, such as the flat-tailed horned lizard.

According to the CEC, construction of the Solar Two project will be completed in two phases. The first phase consists of building 12,000 SunCatchers arranged in 200 1.5MW solar groups of 60 SunCatchers per group, with a net generating capacity of 300MW. Phase II will see 18,000 SunCatchers added in 500-1.5-MW solar groups for a net of 750MW.



BLM web page excerpt, available at:

[http://www.blm.gov/ca/st/en/fo/cdd/alternative\\_energy/fast-trackfastfacts.print.html](http://www.blm.gov/ca/st/en/fo/cdd/alternative_energy/fast-trackfastfacts.print.html)

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### **Stirling Energy Systems Solar Two Project (CACA-47740)**

- The Stirling Energy Systems Solar Two project is a 750 megawatt solar generation power plant proposal to be located in the Imperial Valley, Calif. near El Centro.
- The project is proposed on 6,140 acres of BLM-administered public lands, along with 360 acres of private lands.
- Technology utilized will be the Stirling Energy Systems Suncatcher solar dish.

STATE OF CALIFORNIA  
State Energy Resources  
Conservation and Development Commission

In the Matter of: ) 08-AFC-5  
 )  
Imperial Valley Solar, LLC ) **DECLARATION OF SERVICE**  
 )  
\_\_\_\_\_ )

I, Tom Budlong, declare that on April 15, 2010 I served and filed copies of the attached ***Opening Testimony of Intervenor Tom Budlong on the ready topics designated by the committee's april 8, 2010 Evidentiary Hearing Notice***, accompanied by a copy of the most recent *Proof of Service* list (most recent version is located on the proceeding's web page) with the Docket Unit OR with the presiding committee member of the proceeding. The document has been sent to the Commission AND the applicant, as well as the other parties in this proceeding (as shown on the *Proof of Service* list), in the following manner:

**(Check all that Apply)**

**FOR SERVICE TO THE APPLICANT AND ALL OTHER PARTIES:**

☒ sent electronically to all email addresses on the Proof of Service list;

☒ by personal delivery or by depositing in the United States mail at Los Angeles, CA 90049 with first-class postage thereon fully prepaid and addressed as provided on the *Proof of Service* list above to those addresses **NOT** marked "email preferred."

**AND**

**FOR FILING WITH THE ENERGY COMMISSION:**

☒ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (preferred method);

**OR**

\_\_\_\_\_ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION  
Attn: Docket No. 08-AFC-5  
1516 Ninth Street, MS-4  
Sacramento, CA 95814-5512

-or-

CALIFORNIA ENERGY COMMISSION  
Presiding Member \_\_\_\_\_  
1516 Ninth Street  
Sacramento, CA 95814-5512  
Re: Docket No. [08-AFC-5]

[docket@energy.state.ca.us](mailto:docket@energy.state.ca.us)

I declare under penalty of perjury that the foregoing is true and correct.

/s/ Tom Budlong. Mailed copy has original signature.  
Name

April 25, 2010  
Date



**BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT  
COMMISSION OF THE STATE OF CALIFORNIA  
1516 NINTH STREET, SACRAMENTO, CA 95814  
1-800-822-6228 – WWW.ENERGY.CA.GOV**

***APPLICATION FOR CERTIFICATION FOR THE  
IMPERIAL VALLEY SOLAR PROJECT  
(formerly known as SES Solar Two Project)  
IMPERIAL VALLEY SOLAR, LLC***

**Docket No. 08-AFC-5  
PROOF OF SERVICE  
(Revised 4/12/10)**

**APPLICANT**

Richard Knox  
Project Manager  
SES Solar Two, LLC  
4800 N Scottsdale Road.,  
Suite 5500  
Scottsdale, AZ 85251  
[richard.knox@tesseractosolar.com](mailto:richard.knox@tesseractosolar.com)

**CONSULTANT**

Angela Leiba, Sr. Project  
Manager URS Corporation  
1615 Murray Canyon Rd.,  
Suite 1000  
San Diego, CA 92108  
[Angela\\_Leiba@urscorp.com](mailto:Angela_Leiba@urscorp.com)

**APPLICANT'S COUNSEL**

Allan J. Thompson  
Attorney at Law  
21 C Orinda Way #314  
Orinda, CA 94563  
[allanori@comcast.net](mailto:allanori@comcast.net)

Ella Foley Gannon, Partner  
Bingham McCutchen, LLP  
Three Embarcadero Center  
San Francisco, CA 94111  
[ella.gannon@bingham.com](mailto:ella.gannon@bingham.com)

**INTERESTED AGENCIES**

California ISO  
[e-recipient@caiso.com](mailto:e-recipient@caiso.com)

Daniel Steward, Project Lead  
BLM – El Centro Office  
1661 S. 4<sup>th</sup> Street  
El Centro, CA 92243  
[daniel\\_steward@ca.blm.gov](mailto:daniel_steward@ca.blm.gov)

Jim Stobaugh,  
Project Manager &  
National Project Manager  
Bureau of Land Management  
BLM Nevada State Office  
P.O. Box 12000  
Reno, NV 89520-0006  
[jim\\_stobaugh@blm.gov](mailto:jim_stobaugh@blm.gov)

**INTERVENORS**

California Unions for Reliable  
Energy (CURE)  
c/o Tanya A. Gulesserian  
Loulana Miles, Marc D. Joseph  
Adams Broadwell Joseph &  
Cardozo  
601 Gateway Blvd., Ste. 1000  
South San Francisco, CA 94080  
[tgulesserian@adamsbroadwell.com](mailto:tgulesserian@adamsbroadwell.com)  
[lmiles@adamsbroadwell.com](mailto:lmiles@adamsbroadwell.com)

Tom Budlong  
3216 Mandeville Canyon Road  
Los Angeles, CA 90049-1016  
[TomBudlong@RoadRunner.com](mailto:TomBudlong@RoadRunner.com)

\*Hossein Alimamaghani  
4716 White Oak Place  
Encino, CA 91316  
[alimamaghani@aol.com](mailto:alimamaghani@aol.com)

\*Tom Beltran  
P.O. Box 501671  
San Diego, CA 92150  
[cnpssd@nyms.net](mailto:cnpssd@nyms.net)

\*California Native Plant Society  
Greg Suba & Tara Hansen  
2707 K Street, Suite 1  
Sacramento, CA 5816-5113  
[gsuba@cnps.org](mailto:gsuba@cnps.org)

**ENERGY COMMISSION**

JEFFREY D. BYRON  
Commissioner and Presiding  
Member  
[jbyron@energy.state.ca.us](mailto:jbyron@energy.state.ca.us)

ANTHONY EGGERT  
Commissioner and Associate  
Member  
[aeggert@energy.state.ca.us](mailto:aeggert@energy.state.ca.us)

Raoul Renaud  
Hearing Officer  
[rrenaud@energy.state.ca.us](mailto:rrenaud@energy.state.ca.us)

Kristy Chew, Adviser to  
Commissioner Byron  
[kchew@energy.state.ca.us](mailto:kchew@energy.state.ca.us)

Caryn Holmes, Staff Counsel  
Christine Hammond,  
Co-Staff Counsel  
[cholmes@energy.state.ca.us](mailto:cholmes@energy.state.ca.us)  
[chammond@energy.state.ca.us](mailto:chammond@energy.state.ca.us)

Christopher Meyer  
Project Manager  
[cmeyer@energy.state.ca.us](mailto:cmeyer@energy.state.ca.us)

Jennifer Jennings  
Public Adviser  
[publicadviser@energy.state.ca.us](mailto:publicadviser@energy.state.ca.us)

### DECLARATION OF SERVICE

I, \_\_\_\_\_, declare that on \_\_\_\_\_, I served and filed copies of the attached, \_\_\_\_\_ . The original documents, filed with the Docket Unit, are accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:  
[\[http://www.energy.ca.gov/sitingcases/solartwo/index.html\]](http://www.energy.ca.gov/sitingcases/solartwo/index.html)

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

*(Check all that Apply)*

#### FOR SERVICE TO ALL OTHER PARTIES:

- \_\_\_\_\_ sent electronically to all email addresses on the Proof of Service list;
- \_\_\_\_\_ by personal delivery;
- \_\_\_\_\_ by delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses **NOT** marked "email preferred."

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- \_\_\_\_\_ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (*preferred method*);

**OR**

- \_\_\_\_\_ depositing in the mail an original and 12 paper copies, as follows:

#### **CALIFORNIA ENERGY COMMISSION**

Attn: Docket No. 08-AFC-5  
1516 Ninth Street, MS-4  
Sacramento, CA 95814-5512  
[docket@energy.state.ca.us](mailto:docket@energy.state.ca.us)

I declare under penalty of perjury that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

\_\_\_\_\_