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07-AFC-5
DATE 01/03/10
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California Energy Commission
Attn: John Kessler, Project Manager
1516 Ninth Street, MS-15
Sacramento, CA 95814
Email: jkessler@energy.state.ca.us

George Meckfessel
Planning and Environmental Coordinator
1301 South US Highway 95
Needles, CA 92363
Email: CA690@ca.blm.gov

Dear Mr.Kessler and Mr. Meckfessel,

Re: Ivanpah

Please accept the following comments concerning the Final Staff Assessment / Draft Environmental Impact Statement for the Ivanpah Solar Electric Generating System (07-AFC-5) dated 11/04/09.

Sincerely,

Tom Budlong
310-476-1731
TomBudlong@RoadRunner.com

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MANAGEMENT
2009 JAN -5 AM 11:56
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1) The 400MW rating is incorrect

The facility will generate approximately 110 MW, not 400MW as stated throughout the documentation. This is closely in line with capacity factors for CSP solar generators in general. The 400 MW number is highly misleading, and should be changed to reflect the true output.

The table at the bottom of page 2-2 of the AFC (not the FSA/DEIS) shows 400 MW total 'Capacity, Net (MW)', implying the electricity generated will net out at 400MW. But it also shows the annual production will be 960,000 MWh per year. Since there are 365x24 = 8,760 hours in a year, dividing the 960,000 MWh per year by 8,760 hours per year gets 110 MW, nowhere near the 400 MW used to characterize the facility.

The difference is Capacity Factor, the ratio of the facility's maximum power output to its average over time. Wikipedia has a succinct definition:

> *The net **capacity factor** of a power plant is the ratio of the actual output of a power plant over a period of time and its output if it had operated at full nameplate capacity the entire time.*

Capacity Factor is commonly on the order of 25% for CSP solar facilities, due to nights, short winter days, low morning and evening sun angles, cloudy days, etc. The number for Ivanpah works out to 110/400 = 27%, consistent with other solar facilities.

This 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 400MW and actual production are not explained in the AFC or the FSA. An extremely small number of people would think to question the 400 MW number. An even smaller number would be able to locate the real output in the AFC and do the arithmetic.[1]

That this is common with most solar facility descriptions is not a reason or excuse to allow it to happen in the Ivanpah documentation. It is wrong and misleading to the point of being fraudulent. One responsibility of the documentation is to fairly describe the proposal, and 400 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 400 MW number, all documentation connected with the project should be corrected. Perhaps both numbers should be used side-by-side, and when comparing Ivanpah with other facilities the 400 MW number could be used, with explanation. The purpose is to alert and avoid misleading readers who are innocent of this situation.

Despite this gross discrepancy and the importance of facility output in judging benefit, it appears this concept is effectively missing from the documentation.

Here is a list of some locations in the early chapters of the FSA that mention 400 MW. There are weak hints to the discrepancy.

Page	Quote
1-1	The Ivanpah Solar Electric Generating System (ISEGS) project is a proposal to construct a 400- megawatt concentrated solar power tower, thermal-electric power plant.
1-25	The Ivanpah Solar Electric Generating System (ISEGS), if constructed and operated as proposed, would generate 400 megawatts (MW) (maximum net output) of electricity. ('maximum net' is not explained, and the term appears inconsistent – maximum and net are different except when the value is constant over time.)
1-3	designed to generate a total of 400 MW of electricity
2-2	deliver 400 MW of electricity to the California market by the year 2013.
2-2	produce a nominal 400 MWs of electricity (Nominal is not defined.)

[1] I searched the FSA, and some of the AFC, without finding an explanation, or data other than on the AFC page 2-2, and on page 7.2-6 of the FSA. Capacity Factor is not listed in the Acronym section of the AFC. If the documentation has an explanation, it is not easy to find.

2-5	The fundamental objective is to build a solar project that generates 400 MW of renewable solar energy
2-5	To safely and economically construct and operate a nominal 400-MW, solar generating facility (Again, nominal is not explained.)
2-7	determine and disclose the environmental impacts of the 400 MW ISEGS proposal
3-3	The applicant proposes to develop the ISEGS project as three power plants in separate and sequential phases that are designed to generate a total of 400 megawatts (MW) of electricity.
Section 4, Alternatives	The section talks of 400MW alternatives. (I presume the alternatives would have the same characterization error as Ivanpah).
7.2-6	The confusion is clearly illustrated in the following excerpts, taken from the same sentence, which states ISEGS produces 400 MW net, and then 106.8 MW net: • ...would produce power at the rate of 400 MW net... • ...would generate energy at the rate of 960,000 MW-hours net per year [= 109.6 MW net, using 365 days per year, and 24 hours per day.]
4-62	Please see the comment on Rooftop Solar, later in this comment document. The arithmetic describing area needed for rooftop solar is off by a factor of approximately four. Is the difference due to capacity factor? There is not enough evidence to conclude. The two measures of output cause unnecessary confusion.

Here are some media quotes. I googled 'Ivanpah Solar' to find them:

*BrightSource Energy, Inc. plans to provide **400 MW** of renewable power to the California electric grid from three solar thermal power plants to help meet the state's renewable portfolio standard (RPS) goal of 20% renewable power by the year 2010.* Worley Parsons Resources and Energy http://www.worleyparsons.com/Projects/Pages/IvanpahSolarElectricGeneratingSystem.aspx
*Once construction on the **440-megawatt** Ivanpah Solar...* LA Times: http://latimesblogs.latimes.com/money_co/2009/12/bechtel-unions-pair-with-brightsource-to-staff-construction-on-ivanpah-solar-project.html
*Bechtel will develop the **440MW** solar facility, which will consist of three solar thermal power plants* New Energy World Network.com http://www.newenergyworldnetwork.com/renewable-energy-news/by_technology/solar-by_technology-new-news/brightsource-energy-selects-bechtel-to-develop-its-440mw-ivanpah-solar-electricity-generating-system.html
*US - The California Energy Commission is calling for final comments on the plans for a **400MW** solar plant in the Ivanpah Valley.* Global Bioenergy Industry News: http://www.thebioenergysite.com/news/4873/comment-called-on-ivanpah-solar-thermal-project
*The Ivanpah Solar Power Facility is a proposed **440 megawatt** (MW) solar power facility* Wikipedia http://en.wikipedia.org/wiki/Ivanpah_Solar_Power_Facility
*By a vote of 4-0, the CEC determined that the proposed **400-megawatt** (MW) Ivanpah Solar Electric Generating System* HIS (A news service?) http://energy.ihs.com/news/renewable-energy/2007/solar-thermal-california-plant-110907.htm

2) BLM Purpose and Need:

Page 2-7 of the FSA/DEIS states the need for the action is based in Federal orders and laws that:

- require government agencies to evaluate energy generation facilities
- facilitate development of renewable energy sources.

Three authorities are cited:

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

  Please note that the order includes the clause :...while maintaining ... environmental protections.'
- The Energy Policy Act of 2005 (EPAct), which requires...10,000 MW of renewable energy...'

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

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 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 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.

- Secretarial Order 3285 of March 11, 2009, which establishes the development of renewable energy as a priority for the Department of the Interior.

Please note that the order includes the clause '…while protecting and enhancing the Nation's water, wildlife and other natural resources.'

The two valid authorities are very specific about environmental protection. Since the proposed project would essentially destroy 4000 acres of desert environment, the project is out of compliance with the orders.

3) The project is in basic violation of NEPA:

NEPA'sTitle 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 pristine, virtually untouched, to a high-intensity industrial zone. It will destroy all life and environmental benefits of the property. It will be a complete change in the visual impact, completely inconsistent with visually adjacent lands.

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. 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	Ivanpah as an industrial site is not aesthetically and culturally pleasing. The site may be productive, but it cannot be 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 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.

4) Economic Analysis:

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

Economic considerations are mentioned in numerous places in the documentation. This 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. We are forced into the terms 'cost more', or 'cost less', with no quantification, without economic analysis. Intelligent opinions and decisions cannot be made based on such non-specific terms.

- The discussion of the CDCA plan amendment on page 2-12 specifically includes as one of the required determinations that the DEIS do economic evaluation:

  *This DEIS acts as the mechanism for **evaluating the economic** and social **impacts** of granting the right-of-way and the Plan Amendment.*

- The Alternatives section, on page 4-1, recognizes the validity of economic analysis:

  *Although selection of the 22 additional alternatives evaluated within this section is not within the agency's jurisdiction and they have not been proposed by the applicant as alternatives to the proposed project, they do constitute sites, technologies, site configurations, and management strategies that are **potentially feasible technically and economically**.*

- The Project Objectives section on page 4-4 includes economics in construction, operation and competitive pricing:

  *To safely and **economically** construct and operate a nominal 400-MW, solar generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities*

- Page 4-11, in the Site Selection Criteria discussion in the Alternatives section recognizes economic viability as one of the criteria:

*to locate the project in an area that will allow it to be **economically** viable and competitive with other renewable technologies including wind, geothermal, and solar.*

- NEPA requires that alternatives be **practical and feasible** from the technical and **economic standpoint** (emphasis added). . As referenced on page 4-1 of the FSA, NEPA guidance is:

  *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.*

- The bottom of page 4-79, in the Alternatives section, requires an economic analysis to support the conclusion. By stating only that lower PV costs are needed, the reader must accept without analysis that this is true, is not told of the magnitude of the cost difference, and is not told of the expected future PV costs. Note that the popular press commonly talks of rapidly decreasing PV panel costs, and increasing efficiency.

  ...that achieving 400 MW of distributed solar PV would depend on additional policy support, manufacturing capacity, and lower cost than currently exists...

- Page 4-65 discusses the reasons for elimination of rooftop solar as an alternative. One reason given is the uncertainty of subsidies for rooftop solar. With no economic analysis it is impossible to compare the subsidy status of rooftop solar with the subsidy status for the proposed CSP technology.

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. But it is still a matter of degree. If the project provided only enough power to keep a 100 watt bulb lit, the balance would not justify the environmental cost. Or if it provided enough energy for all of California for the next 50 years, the balance would easily justify the environmental cost.

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:

- Cost of construction.
- Cost of financing the construction.
- Cost of land usage – purchase or lease.
- Operation costs when the facility is up and running.
- 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.

This analysis should compare net usable energy produced against the no-action alternative, which would neither use or produce energy. It therefore should include:

- 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.

- Energy to make the mirrors and supports, power plant (turbine, boilers, ..), 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 processs 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 from natural gas required between periods of operation.
- Energy required for decommissioning at the end of the useful life of the power plant.

6) **Who monitors compliance?:**

There is a telling and unfortunate incident in Rose Valley, Inyo County, that provides guidance.

In 2009 Coso Geothermal received permission, fully compliant with NEPA process, to construct a water pipeline over approximately six miles of BLM managed land. The project approval very specifically mandated:

- Vegetation along the pipeline path was to be trimmed and crushing was allowed, but the path was not to be bladed or scraped.
- A tortoise fence was to be constructed on either side of the 50-foot wide pipeline path.
- The edges of the 50-foot pipeline path were to be bordered by stakes at 50-foot intervals, painted a bright color on top.

Inspection shortly after construction started revealed that:

- The pipeline path had been bladed to bare dirt.
- The 'tortoise fence' was a 1-1/2 to 2' high flexible plastic curtain, supported by short stakes ten feet apart. It had been laid flat in many places by dirt from the scraping, and was totally absent in a few places.
- The painted stakes at 50' intervals were not installed.

The project was in its beginning stages when BLM discovered the lack of compliance. Despite the obvious disregard for the BLM's carefully specified stipulations, the contractor paid a small fine and was permitted to continue.

This incident is an example of why compliance monitors and biologists must be completely independent of the contractor, the BLM, and managing agencies. BIO-5, p 6.2-101, gives substantial authority to the Designated Biologist and Monitor.

The CM must be able to act independently when violations occur, without fear of job loss or other retribution. Complete independence is required. In addition, there must be a sufficient number of independent monitors to handle the workload demanded by such a large project.

Instead, BIO-1 of the FSA (p.6.2-98) requires no more than one Designated Biologist, assigned by the project owner. The mitigation measures, p.6.2-98, talks of Biological Monitors. I could not find in the FSA a specification of how many Biological Monitors are required, or qualifications, or a statement that they would be working solely under the supervision of the biologist. Please identify these, if I missed them in the documentation. Problems:

- One biologist is completely inadequate for this six square-mile project with as many as 1000 workers at a time, potentially working multiple shifts.
- It appears (BIO-1, p.6-2.98) that the biologist will be selected by and work for the contractor. This invites, does not avoid, conflict of interest. Instead, for complete avoidance of conflict of interest, and so the biologist can perform duties completely independently of the contractor, the contractor must have no part in selection of biologists. If the contractor pays for the biologist, the contractor must have no control over the biologist's continued employment or timely payment for services.
- There is no specification for Biological Monitors (that I found).

7) **Energy Commission Compliance Project Manager:**

The FSA has many references to the Energy Commission Compliance Project Manager (CPM). I cannot find in the FSA where this position is defined. Is it missing, or did I miss it?

8) **CDCA Plan Amendment**

The title page identifies the document as:

Final Staff Assessment and

Draft Environmental Impact Statement

and

Draft California Desert Conservation Area Plan Amendment

I was unable to find the Draft California Desert Conservation Area Plan Amendment. It is not in the table of contents. Page 2-8 states that a plan amendment is required, but does not show the amendment.

Please identify its location or provide the text.

9) **Project Objectives:**

Page 4-4 states: "Eight objectives are set forth by BrightSource in its AFC.' They are then listed.

Missing is the basic and fundamental underlying BrightSource objective, company profit. Without profit, BrightSource would not be here.

Profit to BrightSource should be listed as an objective.

10) **Alternatives:**

A major objective of alternatives is reducing environmental impact.

Page 7.2-1 states that this project uses twice as much land as other technologies:

The ISEGS, if constructed and operated as proposed would occupy over nine acres per MW of power output, a figure about double that of some other solar power technologies.

Page 7.2-6, bottom, realistically states:

While the Energy Commission customarily requires full mitigation for such impacts, such mitigation is generally regarded as less effective in protecting resources than avoiding the impact entirely. A solar power project that occupies twice as much land as another project holds the potential to produce twice the environmental impacts.

Later on page 7.2-1:

ISEGS would utilize solar energy potential from a site that is currently not being harnessed for power production. Thus from an efficiency perspective, ISEGS would not result in a less efficient utilization of the site's solar energy potential than is occurring currently.

To paraphrase, ISEGS efficiency is better than nothing (the current state), and so implies acceptability. This is not reasonable or acceptable justification. Any number of other methods, each less efficient and than the next, would be better than nothing. Better than nothing does not confirm acceptability.

Considering that land area usage is probably the major impact factor, as indicated on p.7.2-6, it is incumbent on the impact evaluation process to very thoroughly examine all other possibilities. That the project may use twice as much land as others is a strong clue that a better solution exists.

Site Selection Criteria, page 4-10

The applicant's AFC restricts alternatives to areas with high solarity. I appreciate that the DEIS considers other areas and non-solar technologies, as required by NEPA.

Siberia East Alternative, page 4-12

This looks like it is in Senator Feinstein's California Desert Protection Act of 2010, introduced in late December, 2009. The bill precludes solar installations. The site should not be considered until the bill is resolved, and because it may not be available if the provision in the bill as introduced becomes law.

Broadwell Lake Alternative, page 4-12

As with Siberia East, this looks like it is in Senator Feinstein's California Desert Protection Act of 2010, and should not be considered until the bill is resolved.

Private Land Alternative, Daggett Area

Something seems amiss here.

- **I-15, south side adjacent:** Figures 5A and 5B show the site, adjacent to I-15, on the south side.
- **I-40 north side adjacent:** Text on p. 4-20 identifies the site as the location of the 'first two power-tower facilities', presumed to be SEGS I and SEGS II, and says the site is too close to the Barstow-Daggett airport. But SEGS I and SEGS-II are adjacent to I-40, on the north side. As stated on page 4-20. SEGS I and II are indeed close to the airport.

What, then, are the sites shown in figures 5A and 5B? Which is the evaluated alternative.

The confusion makes evaluation and comment of the alternative difficult. It's possible that proximity to the airport is not a consideration.

Parabolic Trough Technology, p 4-55

Disturbed area seems inconsistent:

Approximately 2000 to 3200 acres would be required ... permanent loss of desert habitat

Next paragraph:

... somewhat greater acreage may be required ...

Greater than the proposed ISEGS, or greater than the 2000-3200 acres?

Linear Fresnel Technology

The technology is eliminated because it is proprietary to Ausra. The statement on p 4-60:

This technology ... it is not available to the ISEGS applicant

is not supported by evidence or a statement that Ausra has refused to supply Ivanpah. It seems reasonable that Ausra would be willing to expand their business by supplying technology. Please provide evidence that BrightSource has made good effort to use Ausra as a supplier, has been refused, and why Ausra would be unwilling.

The enticing advantage is the substantial reduction (approx ½) in disturbed land described in the Linear Fresnel discussion. This advantage warrants a more intensive investigation and analysis.

Solar Photovoltaic

Solar voltaic appears to be eliminated for insufficient reason. Instead, the explanatory text makes it sound like photo voltaic could be a better alternative.

Page 4-62 states solar photovoltaic was eliminated from consideration because it would not reduce major impacts to several characteristics of the alternative. These reasons are stated with no analysis and are not supported by the descriptive text preceding the elimination opinion.

Reasons given for elimination of photo voltaic (p.4-62, Rationale for Elimination):

1. **Visual prominence.**

The reasoning is invalid.

The proposed technology has vastly greater visual prominence: It has light collector towers, each 450 feet high – as tall as a 45 story building - and each bright as the sun. It has several thousand acres of bright heliostat mirrors.

The photovoltaic field visual prominence would be insignificant by comparison. "*Glare would not be created* (p. 4-65, 6th para)", and the tallest component mentioned is the transmission line interconnection.

Although not stated in this solar voltaic section, the distributed solar section confirms that PV glare has less visual impact. Page 4-64:

> *Because most PV panels are black to absorb sun, rather than mirrored to reflect it, glare would not create visual impacts as with the power tower, Fresnel, and trough technologies.*

To eliminate this alternative based on visual prominence is wrong.

2. **Extent of land and roads required.**

No analysis is given for this opinion. Instead, the explanatory text indicates more land might not be required.

Page 4-60, next to last paragraph:

> *Because PV technologies vary, the acreage required per MW of electricity produced from a large solar PV power plant is wide ranging and likely to change as technology continues to develop. The land requirement varies from approximately 3 acres per MW of capacity for crystalline*

silicon to more than 10 acres per MW produced for thin film and tracking technologies (NRDC 2008c). Therefore, a nominal 400-MW solar PV power plant would require between 1,600 and 4,000 acres.

- This indicates photo voltaic area requirement could be as low as 1600 acres, 40% of the proposed power tower. This is very significant, and ignored in the elimination conclusion.
- Technology is changing. The promise is not analyzed. New technology would most likely result in lower land area needed.

3. **More extensive grading.**

Page 4-61, last paragraph:

"Because solar PV facilities require land with only 3 percent slope and the solar panels are grouped more densely together, it is likely that more grading would be required for a solar PV facility than for a solar power tower facility to establish manmade stormwater conveyance channels."

- No explanation is given as to why the different drainage grading applies to the proposed and photo voltaics.
- No analysis is given to determine the amount of 'more grading'.
- The 3% slope requirement used as the basis for more grading is invalid since the slope of the proposed site is approximately 1.5% (as scaled from the USGS Mesquite Lake 1:100,000 map).

4. **More extensive storm water management**

Again, no explanation or analysis is given.

Distributed Solar Technology -- Rooftop Solar

Page 4-62: Something is wrong.

In order to be a viable alternative to this project, there would have to be a sufficient number of panels to provide 400 MW of capacity. California currently has 441 MW of distributed solar PV systems which cover over 40 million square feet (CPUC 2008b).

The proposed 400 MW project covers 174 million square feet (4000 acres). California gets a few more MW from 23% of the area -- 441 MW from 40 million sq ft.

Maybe the 441 MW is the actual power output – average over a year – not the maximum instantaneous output, the rating method for the proposed CSP. The 23% is in the range of capacity factors for CSP solar installations.

Distributed Solar Thermal Systems

The proposed CSP technology uses 4000 acres to generate 400MW – 10 Ac/MW. The three alternatives discussed use less:

4 Ac/MW	eSolar 5MW	20 ac / 5 MW
3.5 Ac/MW	eSolar 46 MW	160 ac / 46 MW
2.5 Ac/MW	Andasol 1	127 ac / 50 MW
Compare with		
10 Ac/MW	Ivanpah proposed	4000 ac / 400 MW

Although not mentioned in the FSA, I suspect the two eSolar and the Andasol facilities use wet cooling, which reduces efficiency and increases the Ac/MW figure. But, it's a big jump from 2.5 – 4 Ac/MW to 10 Ac/MW. This potential efficiency level should not be discarded lightly.

eSolar is characterized as a distributed technology, probably because of the relatively small 20 ac size of their demonstration facility. But eSolar facilities are modular, as explained by the company. The single, small facility is one configuration. Multiple modules at the same site can achieve characteristics of larger installations, since the modules can share the same infrastructure.

eSolar appears to be a viable alternative and should be not be restrained to consideration as distributed only.

Rationale for Elimination (starting page 4-64)

The reasons for elimination appear invalid.

- … require even more aggressive deployment of PV…

This is not a reason to eliminate. Aggressive deployment is not to be feared. The current CSP proposal is aggressive, but is not eliminated for that reason.

- Additional legislation … may be required.

With no further explanation, the 'may be' has no meaning.

The implication is that requiring new legislation is enough to eliminate the alternative. I have a more optimistic view, that if new legislation is warranted, it will happen. The California legislature has shown deep interest in energy. If a new idea is warranted, they would not shy away because new legislation would be required.

- Subsidies

The discussion reviews subsidies and their positive effects on the technology. The last sentence talks of the uncertainty of continued subsidies. Since this discussion is in the Rationale for Elimination section, I presume the opinion is that the uncertainty outweighs the positive effects sufficiently to discard the alternative.

I disagree with this basically negative opinion. Also, since the FSA presents no economic analysis of the proposed project, it is impossible to evaluate the extent and uncertainty of subsidies for the proposed project.

- Feed-in Tariffs

The discussion describes feed-in tariffs. It does not state, or imply, how FITs are cause for elimination of the technology. There does not appear to be a reason to put this discussion in the Rationale for Elimination section.

- Manufacturing and Installation Costs

As with FITs, there is a short, general discussion. It then concludes "*...would require a large number of retrofit installations.*" (Page 4-65, bottom), without explaining the conclusion, or why the conclusion is cause for elimination of the technology.

The next sentence:

> *No matter how it is installed, relying heavily on PV greatly increases the total cost of meeting state renewable energy and GHG targets.*

Again, there is no explanation of the 'greatly increased cost'. There is no way to evaluate the validity of the conclusion. And with no economic analysis of either technology, there is no way to compare.

- Manufacturing Scaleup, and the final paragraph in the Rationale for Elimination section

The discussion says the technology is increasing rapidly, and that PV manufacturing is ramping up fast. There must be something good going on here. The FSA makes no attempt to discover, or participate.

Money and materials has to grow fast. Page 4-66:

> *the availability of financing and raw material supply would need to increase proportionally to match an increased demand.*

This is far from an insoluble problem. New, viable technologies very often ramp up fast to satisfy demand. Often the result lowers manufacturing costs and expands supply to meet more than demand, further lowering costs. We should not ignore such efficiencies.

11) Air Quality during Reclamation:

Page 6.2-35 indicates that the applicant had not provided staff with acceptable reclamation plans in time for inclusion in the FSA.

A reclamation plan must include description of fugitive dust control after closure. All machinery will be removed, leave bare ground which will not be revegetated for a very long time. How will dust be controlled?

12) Grading

It's understood that the amount of grading is perhaps most responsible for and has the most impact on site degradation, in consideration of the complete or near complete or total loss of desert life, and the almost permanent degradation. (The FSA describes this as permanent in several places.) I could not find a specific description of the grading that would be required. I found various places indirectly indicating complete grading would not be needed. Page 4-61, in the section on photovoltaics:

> *... more severe effect on biological resources than the ISEGS project, which would not require grading over the entire site.*

Descriptions of many of the alternatives claim lower acreage requirements for the same power output, but that the acreage would be completely graded.

Reasonable comparison of these alternatives is not possible without knowing the grading characteristics of the proposed technology. Please guide me to the grading description in the FSA, or provide a description. Of course, the primary question is how much surface disturbance. A corollary question is the survival rate of undisturbed or damaged / trimmed plants in the changed environment of less sun and surrounding plants, animals and insects.

There is some implication in the FSA that plants under heliostats will be trimmed, not removed (by grading or other means). If this is planned, then the discussion should analyze the expected plant reaction to both trimming and continuous shading, including effects on photosynthesis, pollination and flowering, symbiotic insects, root growth, resistance to disease, shelter for other plant species that grow in the umbrella of creosotes, for instance, and perhaps other plant characteristics that a qualified biologist would consider to be of concern.

End