STATE OF CALIFORNIA

Energy Resources Conservation and Development Commission

In the Matter of:

APPLICATION FOR CERTIFICATION FOR THE IVANPAH SOLAR ELECTRIC GENERATING SYSTEM	DOCKET NO. 07-AFC-5

BRIEF
Basin and Range Watch

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BRIEF

The pubic has a large stake in this case, given that the Ivanpah Solar Electric Generating System ("project") is proposed on public land managed by the Bureau of Land Management, and that a large source of funding for construction of the project will come from the United States Treasury in the form of ARRA grants, as well as federal loan guarantees making the project possible. Therefore the public should be receiving the most practical, efficient, and useful power plant for these government subsidies. But it will not. There are much more efficient energy options that reduce greenhouse gases while using much less land, and that have a much smaller or even negligible impact on the desert ecosystems and recreational lands which are held in trust for the American public.

The cost to the environment, loss of visual splendor, and reduced recreational use of the Ivanpah Valley outweigh any slight benefits of reduced greenhouse gas emissions that the project may offset.

A. Significant Impacts. There would be many significant impacts if this project were to be built in this valley: most especially to Visual, Biological, and Water and Soil Resources. These cannot be mitigated, and therefore the project should avoid the impacts altogether. Making a "statement of overriding considerations" will not prevent significant avoidable damage to the environment. The specific benefits of the project do not outweigh its unavoidable environmental effects. This project is not environmentally responsible due to its very large footprint on a biodiverse functioning ecosystem, the productivity of which will not be maintained nor enhanced. Some of the best alternatives to avoid adverse impacts to the environment were not considered, such as much more efficient hybrids in cities.

B. Visual Resources. Cumulative impacts should be determined in the larger desert area, not just the basin.

Tens of thousands of tourists visit the California Desert each year, coming for the wide open spaces, history of exploration, mining, ranching, Old Route 66 experience, as well as viewing wildflower displays, rock-hounding, bird-watching, wildlife-watching, and star-gazing. Hiking and camping are very popular activities because of the open public lands with little private land barriers. There exist whole clubs that specialize in hiking desert peaks, and leading desert backpacking trips. Not only Americans visit the desert, but thousands of visitors come from Europe, Asia, and other continents to experience this unique landscape with its far vistas. They often fly into Las Vegas and rent a car to take a desert tour of Death Valley National Park, Joshua Tree National Park, and Mojave National Preserve, before returning to Las Vegas. Thus Interstate 15 is visited by many sightseers who are specifically looking at desert scenery. But also most other desert highways are also tourist corridors.

These visitors appreciate the Mojave Desert's vast natural viewscapes. Filling the desert basins between mountain ranges with thousands of acres of mirrors and accompanying industrial facilities would take away from this sense wildness and

remoteness that is yet so easily accessible from major cities. Few other places offer such a combination of wilderness, recreation, and history on such a scale in California. According to the Bureau of Land Management and the National Park Service, recreationists spend more than $230 million annually in the California desert, so scenery is important to local economies.

C. Biological Resources.

There are significant unmitigated impacts to Desert tortoise, rare plants, Desert bighorn sheep, Burrowing owls, Gila monster, and migratory birds. We support avoidance rather than complicated mitigation schemes that have been shown to have low success rates (such as tortoise translocation), or are experimental and unproven (in the case of rare plant mitigation).

Clark Mountain is an important breeding area for birds not found elsewhere in California, with monsoonal-influenced montane forests. No studies have been undertaken on how migrating birds would be affected by burning from the reflected solar radiation in the project. Since no information is available, no mitigation plan can be developed. A large project like this that could potentially impact small breeding populations of birds in the surrounding mountains, should not be located in this sensitive area.

Ignoring the genetic value and differences of populations of desert species, such as those on the Ivanpah Valley project site, by removing portions of populations or translocating them to other areas outside of genetic boundaries, as has been suggested for certain species, goes against modern principles of conservation biology. We would be supporting a backward step in conservation efforts if we ignore the varied population genetics of tortoise and plants, for example, by rushing to mitigate construction of this large solar project without fully studying the population density, genetic variation, species richness, and dispersal dynamics of species present. The Northeastern Desert tortoise population is the most unique genetically, and all efforts should be made to avoid die-offs and habitat fragmentation in this area. Rare plant genetics needs to be studied before management decisions are made, not afterwards.

There may even by “cryptic species” present on the site, that look identical to described species, but have different genetic make-ups, qualifying as types new to science. This has been recently shown to be the case with certain Fringe-toed lizard (*Uma scoparia*) populations in the Mojave Desert. Like a rainforest, the desert may hold unique discoveries that will be lost with rapid development on the cumulative scale of renewable build-out.

The need to conserve biodiversity and functioning natural systems should be weighed with any climate-related greenhouse gas offset function of the project. Recently the European Commission has said that the loss of biodiversity beyond certain limits would have far-reaching consequences for the functioning of the planet. The European Union is supporting efforts to establish an Inter-Governmental Platform on Biodiversity and

Ecosystem Services to mirror the Inter-Governmental Platform on Climate Change. The European Commission said the current rate of biodiversity loss, from habitat destruction, fragmentation and degradation caused by land-use change, over-exploitation, invasive species, and pollution, puts the future well-being of citizens in the E.U. and worldwide at risk.

It is uncertain how much carbon will be offset by disturbing the vegetation and soils of the project area, and whether the amount offset is actually balanced by the very significant impacts to biodiversity and ecosystem sustainability.

Since conserving habitat is the single best way to conserve species, we recommend the project avoid Mojave Desert ecosystems altogether. Ivanpah Valley is a fully-functioning ecosystem with a high diversity of perennial shrubs, succulents, and forbs. It is only slightly disturbed, cattle and burro grazing is light and easily recoverable, and recreational off-roading activity is limited to a few roads. The abundance of biotic crusts in the soils indicates a lack of widespread disturbance. In contrast, if the project were built, and especially in the cumulative scenario of several projects, impacts to biodiversity would be severe and long-lasting, due to large areas of vegetation removal, cutting, topsoil erosion and compaction, invasion by weedy plants and predators, land fragmentation, industrial noise and glare effects on wildlife, and herbicide residues.

If cryptogamic soil crusts only re-grow one to two centimeters per year after a disturbance, then the project site would not recover fully in several human lifetimes. Certain native shrubs will pioneer disturbed sites within a few years, as can be seen on the Kern River natural gas pipeline adjacent to the project site, but this does not imply a mature species-rich ecosystem functioning within a range of natural variation.

Desert ecologist Robert Webb has stated that active restoration of severely disturbed Mojave Desert sites is expensive and often unsuccessful; natural restoration is often very slow. As few as 10 vehicle passes can significantly compact soils and disrupt the surface. High levels of soil compaction and disruption can lead to reduced seedbank in the soil and loss of biological soil crusts. This results in reduced water infiltration to the aquifer, and reduction in Carbon inputs. Studies have shown that if subsurface soil compaction occurs down to half a meter (about 1.5 feet), recovery can take over 1,000 years. Total cover of perennial vegetation may take 20 to 80 years to re-grow, but may be composed of only pioneering species; to restore the original density and diversity of species may take over 1,000 years as well. In other words, simply restoring some plant cover to a disturbed site does not necessarily restore the genetic diversity and number of species in a mature ecosystem. Narrow strips such as utility corridors recover more quickly than broad areas, owing to closer proximity of seed sources and dispersers.

Mowing and clipping vegetation will also release carbon into the atmosphere, as plant material is mulched and decays. Over time repeated mowing may kill many plants not adapted to such severe biomass reduction, further reducing the carbon-

storing ability of the plant community. Shading by mirrors will decrease carbon uptake by plants as photosynthesis is reduced. Desert plants on fans such as this are adapted to very bright full sun, and some plant species may decline in abundance over time due to shading.

To withstand natural perturbations such as droughts and floods, healthy ecosystems should be of large size with contiguous undeveloped land area. The project would fragment the valley fan into more isolated "islands" that less easily withstand perturbations, and could lead to extinctions of populations. This does not balance any slight offset of greenhouse gases that the project would provide.

This applies to Bighorn sheep, which need migration corridors to move between mountain ranges. It especially applies to Desert tortoise: the cumulative impacts of renewable build-out in Ivanpah Valley could reduce the widespread tortoise population to small isolated fragments of populations that do not have gene flow between them. Such circumstances can led to extirpation of these small populations, as inbreeding increases and leads to reduced fitness and lack of resilience to natural disasters, disease, and climate change.

For the tortoise in Ivanpah there is actually a very small amount of habitat fully protected, as areas are impacted by off-road recreation, cattle grazing, and urbanization. Adding renewable energy projects will further reduce and fragment good habitat. For conservation biology to be successful, large contiguous areas of undisturbed habitat are always preferable to many small, unconnected and scattered habitat pieces.

Several models of potential climate change for the Mojave Desert show increasing rainfall, which could actually help tortoises with increased plant food and carrying capacity. Eliminating tortoise habitat with large renewable projects would reduce forage amounts and lower carrying capacities.

During the Thermal Maximum, mentioned by applicant witness Dr. Spaulding, a period about 4,000 to 6,000 years ago, North American temperatures apparently increased to levels higher than today, yet radio-carbon-dated pack rat plant remains show that in parts of the Southwest Deserts summer rainfall may have increased. No mass extinction of species occurred. Tortoises did not go extinct, but survived this climate change into our own time. Survival depends on resilience of the population to environmental fluctuations, and this is bolstered by large areas of habitat, movement corridors, and connectivity of genetic populations so that natural variation in the species can allow adaptation to changes. Resilience is reduced by habitat fragmentation, degradation, and competition from invasive species such as weedy plants increasing on lands disturbed by development (a new factor in desert ecosystems).

Mitigation for rare plants might be impossible during any climate change movement: fencing stands or individuals of rare plants within the heliostat field would not allow for any natural movement of plant stands and seed dispersal over

the 50-year span of the project. Populations do not remain static in time and space. The best alternative would be to leave the area undeveloped so that large habitat areas are available for any migration needed by plant populations during climate change, if this happens. Otherwise blockage of movement corridors by the project heliostat field, for populations both inside and outside the project boundary might cause extinctions. We agree with Dr. Bruce Pavlik that maintaining genetic diversity is a concern for plant species response to climate change, and much of this diversity may reside in the soil seedbank. Open habitat needs to be maintained so that plant populations can respond and disperse if necessary.

For these plants, a broad-view of conservation both across the landscape and several decades into the future needs to be taken in Ivanpah Valley, not just a focus on individual plants found during one or two seasons. Much discussion has been generated over theories of how the climate will change over the next century, but species and biological communities will also fluctuate and change over the landscape, responding in as-yet unknown ways to fluctuating climate. Fragmenting the landscape will only make conservation efforts more complex. Only avoidance will help maintain long-term viability of these rare plant populations.

D. Water and Soil Resources

We believe many "hidden" water uses by the project may still be an issue for this desert basin, a concern where cumulative groundwater-pumping may become a serious issue if more renewable projects are allowed.

There is still the question of how much make-up water will have to be added in a closed system; the steam system would have to be blown down (water drained to maintain chemical and solids levels in boilers). Dust problems may be underestimated, and mirrors may have to be washed more often to maintain optimal operating conditions. At some SEGS plants mirror washing had to be as much as once a week.

We maintain that the applicant has underestimated the amount of summer rainfall in Ivanpah Valley, a result of stronger influence by the Arizona monsoon in this part of the Mojave Desert. In addition to increased cloud cover from mid July into September, flash floods are more intense than in other parts of the Mojave Desert or Mediterranean-climate regime areas in California. Without a proven heliostat installation plan to secure poles against floodwaters when placed in washes, this project poses a risk of very high maintenance costs over time.

Small-mesh tortoise fences installed on the security fence will block debris flow during flood events, and eventually bend the fence or knock it down. In choosing the site, the applicant placed the project squarely below the steep slopes of Clark Mountain where maximum floodwaters rush down the fan to collect in the playa below the site. These floodwaters are not clear water, but sediment-laden with silt, stones, sticks, logs, and during strong storms, even boulders. Again, maintenance costs will increase beyond

expectations because of this risky location.

If the design must be later modified because of these problems, then electricity costs will increase as well because of maintenance cost over-runs.

Biological soil crusts as carbon sinks need much more study before they can be quantitatively assessed. The Wohlfahrt et a. (2008) study was not carried out in the eastern Mojave Desert, but another part, which may have lower summer precipitation levels, and therefore less biotic crusts. Estimates of land-atmosphere CO2 fluxes are still highly uncertain, and inter-annual variability in natural carbon sequestration may add to the overall uncertainty. In addition, soil crusts exist in different successional stages with differing species composition, and measurements may differ depending on age of the crusts. Carbon input to soils increase as crust biomass increases. Young pioneering crusts have more cyanobacteria species; old, mature crusts have more lichens and mosses, which fix more carbon. Sites in the Mojave Desert disturbed 82 years ago still do not have certain species of lichen re-colonizing yet.

It should be stressed that biological soil crusts do take up atmospheric carbon, but trying to assess how much exactly is still uncertain, so any comparisons with carbon offsets by the project should be taken as very rough estimates only, and subject to change with new research. Any quantitative estimates will be inaccurate until more studies are undertaken.

The larger point to be made is that disturbing any soils and vegetation in a mature functioning ecosystem will reduce carbon uptake, and the idea is to keep as much soils and vegetation intact as possible to help limit the impacts of changing climate in California.

F. Project Need, Reliability, Efficiency, and Alternatives

There exist many high-risk problems and assumptions associated with the project design. No power tower has ever been built on this scale, and the location presents several unresolved problems for operation and maintenance.

The applicant's witness Mr. Gilon admitted that parts of the project are experimental and little tested. In Ivanpah 3 with five towers, saturated steam transferred in very long pipes is experimental. A 6 MW pilot project in Israel would be used to simulate ISEGS 100 MW and 200 MW plants, and this is very risky for the public to support, on public land and with taxpayer subsidies.

The applicant may have underestimated the amount of summer cloud cover over Ivanpah Valley, compared to central and western Mojave locations that are not as influenced by the Arizona Monsoon. Two years of weather measurements would not pick up the variation over decades in cloud cover patterns in the area, which would include many El Nino wet events; in addition, some summers over any ten-year

period are well above-average for monsoonal activity in the east Mojave Desert. Problems have been encountered with the applicant's pilot project when clouds move over part of the heliostat field and become stationary, causing one side of the tower receiver to heat while the other side cools. This may cause damage to the receiver and necessitate placing the heliostats in the safety position. In addition, the superheater experiences problems when part of the heliostat field is covered with passing clouds, and must be put on standby mode. Twenty-five to 30% of rainfall occurs in the summer in the east Mojave Desert, where Ivanpah Valley is located, compared to 5 to 10% in the west Mojave, where Kramer Junction solar thermal power plants are located. This could significantly reduce plant efficiency and negate any benefits to greenhouse gas reduction that ISEGS might provide. In addition, clouds cause a further decrease in any slight dispatchability ISEGS would have during the sunlit hours. Cloud cover makes the solar field power generation untrustworthy, compared to natural gas. These types of solar thermal power plants will not compete with conventional power plants. Electricity prices from ISEGS may prove to be higher than anticipated.

When clouds obscure the field, the natural gas boilers will have to be used, and this increases carbon emissions with little actual power generation for the amount of land used. But the boilers cannot be stopped and re-started quickly for clouds passing over in a few minutes. The boilers will be used only at partial load, inefficiently. Using the boilers during cloud clover would generate lower pressure steam, thus generating less electricity. Much more benefit could be gained from simply using natural gas at maximum efficiency with fully modern combined cycle natural gas plants and hybrid power plants in load centers, combined with distributed generation.

Alternatives such as Integrated Solar Combined Cycle (ISCC) plants in cities, or Biomass hybrid plants in the Central Valley close to biomass sources should be included in Alternatives discussions. As an example of a more efficient proposal, the Palmdale Hybrid Power Plant owned by the City of Palmdale would be a nominal 617 MW ultra-high efficiency natural gas fired combined cycle turbine integrated parabolic trough solar thermal design. The generation plant would be baseload and occupy only 377-acres of city-owned land in the midst of Palmdale. Therefore no long transmission lines would have to be built across the desert. The combined-cycle equipment utilizes two natural gas-fired combustion turbine generators, two heat recovery steam generators, and one steam turbine generator. The solar thermal input will provide approximately 10 percent of the peak power generated by this hybrid during the daily periods of highest energy demand. The steam turbine will be wet cooled (allowing more efficient generation than dry-cooling) using reclaimed water (treated effluent) from local wastewater treatment plants, another advantage of placing the plant within the city.

Power tower technology can be used with ISCC plants. If California is serious about reducing greenhouse gases while increasing energy production, then city-based ISCC plants like these should be considered as alternatives to remote desert solar plants,

which use no natural gas or burn it inefficiently. Since ISEGS has no thermal storage, natural gas must be inefficiently burned in boilers instead of a gas turbine when the sun does not shine. A natural gas boiler has an efficiency of 33-37% to generate electricity. A Gas Turbine Combined Cycle has an efficiency of 56% and can be integrated with solar in a more efficient manner than ramping up and down a separate natural gas boiler.

Peaking plants operate when the need for electricity is greatest and the utility's usual designated summer peak period is 12-6 pm. Solar is suited for peaking but solar energy peaks about 1-2 pm and utility demand usually peaks around 4-5 pm, therefore the need for some fossil fuel. But solar power plants cost two to three times the cost of conventional plants and can only provide power 25-30% of the time. Because of this low efficiency, ISEGS would not be economically feasible to build without generous Federal incentives and subsidies. Instead, these incentives should be given to distributed generation, Feed-In-Tariffs, and programs that allow homeowners and businesses to install advanced rooftop thin-film photovoltaic systems at much less relative cost.

The trend in the rest of the world is away from large stand-alone power plants, such as ISEGS, to add-ons or augmentation to existing generation.

Transmission costs and electricity loss also cancel any benefits from the project. The green house gas Sulfur Hexaflouride (SF6) is emitted in especially large amounts during construction of new lines – and is 24,000 times as potent as CO2 in its global warming impacts. The Environmental Protection Agency has declared that the electric power industry uses roughly 80% of all SF6 produced worldwide. Ideally, none of this gas would be emitted into the atmosphere. In reality significant leaks occur from aging equipment, and gas losses occur during equipment maintenance and servicing. With a global warming potential 23,900 times greater than CO2 and an atmospheric life of 3,200, one pound of SF6 has the same global warming impact of 11 tons of CO2. Using distributed generation in load centers instead of remote solar power plants needing long transmission lines, would greatly reduce this problem for climate change.

More CO2 emissions would be released from construction and transport activities beyond the site: cement manufacture, labor travel to and from the work site, shipping, train, and truck transport of materials like heliostats from distant places such as Europe. No life cycle calculations were included in the project analysis. Any question of the benefits of a project toward reducing the effects of climate change must consider these construction impacts to the climate over the several years of building.

Distributed generation should be given much more full analysis. As Bill Powers' testimony indicated, it is a completely viable alternative. ISEGS will need just as much dispatchable baseload behind it, and also does not have storage. But environmental costs are negligible with distributed generation, compared with the ISEGS project. Distributed generation cannot be "done overnight," but neither can large transmission lines across hundreds of miles from remote central station plants to load centers. Most importantly, distributed generation will not reduce the natural

carbon-storing ability of healthy desert ecosystems, will not disturb biological soil crusts, and will not degrade and fragment habitats of protected, sensitive, and rare species.

Alternatives should be looked at that are in load centers, not closest to the project site. There is a need to consider the "macro" picture, the entire state, to look at maximum efficiency.

A Master comprehensive plan should exist before large expensive inefficient solar plants are sited and built out in the wildlands. This plan should carefully analyze the recreational and biodiversity resources of the California Desert. A list of assumptions should be included detailing the plan for integrating various fuels mixes and technologies into each utility's plan, an overall state plan, and a national plan. Loads should be carefully analyzed to determine whether additional capacity is needed for peaking, intermediate, or baseload purposes. Unit size, which impacts capital and operating costs and unit capacity factors, has a direct bearing on the relative economics of one technology over another. A plan might recommend that smaller units built in cities and spaced in time offer a less risky solution than one large unit built immediately.

Right now there is no utility plan, no state plan, and no national plan. Large-scale central station solar plants have been sited very far from load centers out in remote deserts, with the only criterion being nearness to existing transmission lines and natural gas lines. Very little thought has been given to the richness of biological resources, the cumulative impacts on visual scenery to tourists, the proximity to ratepayers, or the level of disturbance of the site.

The California Energy Commission says there will be a need to build many new efficient natural gas peaker or baseload plants to back up the renewables planned. Instead, the renewables should be distributed generation in load centers, which will provide much more efficiency, rather than inefficient remote central station plants that reduce biodiversity and require expensive transmission lines. This reduces the risk, as distributed generation is a known technology and has been proven in countries like Germany where incentive programs have been tested. Incentive programs can be designed in an intelligent manner to vastly increase distributed generation. Incentives for large remote projects like ISEGS are unproven to lower risk and may actually raise debt levels with runaway costs associated with poor siting and higher-than-anticipated operating and maintenance costs.

G. Conclusion

The small amount of uncertain electrical generation that the project would produce does not outweigh the large number of unmitigable impacts to visual, water, and biological resources. The project should not be certified. No overriding considerations should be given.

Because of the low energy generation potential from the 28% capacity factor, transmission loss, and risky and unknown operation and maintenance factors of such an experimental project, associated with a giant footprint on the landscape, the project does not justify the great disturbance to a healthy, diverse, functioning ecosystem. The project will not offset enough carbon production from other sources to help the desert ecosystem during any climate change events. Desert ecosystems store carbon in soils, biological soil organisms, and vegetation. Project benefits do not outweigh impacts. This project will not mitigate any climate change impacts to the species present in Ivanpah Valley. No desert species of plant or animal would be helped by building this project, as large intact habitats are needed for species movement, gene flow, and adaptation during any climate change occurrences. Maintaining large desert ecosystems as they are under protective management will be a much better alternative to reducing the local and global impacts of climate change.

Human management intervention to help tortoises should not be in the form of building large development projects on habitat, such as the ISEGS project, which have doubtful climatic benefits, but rather conservation biology would recommend removing disturbances from the desert ecosystem, managing for maximum genetic connectivity, and increasing carrying capacity by preserving large, contiguous, intact natural landscapes.

Even if the project could reduce the amount of climate change by a small amount, it would be very difficult to counter the loss of large blocks of healthy mature ecosystems and desert tortoise habitat. Loss of habitat is a crucial factor in elevating the level of protection given to a species. Preserving intact ecosystems is the best way to conserve listed species, rare plants, ecological interactions such as plants and their pollinators, and migration corridors.

California Energy Resources Conservation

and Development Commission

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DECLARATION OF SERVICE

I, Laura Cunningham, declare that on February 4, 2010, I served and filed copies of the attached Preliminary Preconference Hearing Statement, dated February 4, 2010. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [www.energy.ca.gov/sitingcases/ivanpah]. The document has been sent to 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:

__X__ sent electronically to all email addresses on the Proof of Service list;
__X__ by personal delivery or by depositing in the United States mail at 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:
__X__ 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
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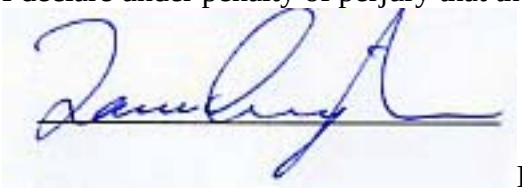
I declare under penalty of perjury that the foregoing is true and correct.



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