SW U.S. Solar Power Plants, Annotated Notes

The following notes provide sources and background information on 16 currently proposed and one constructed solar power plants, in the southwestern U.S. 13 of these projects are on the Bureau of Land Management's fast-track list (Bureau of Land Management, Fast-Track Renewable Energy Projects, August 13, 2010).

Where more than one official source of information is available, all information for the same subject is entered, whether discrepant or not. Discrepant entries within the same document also are noted.

It should be borne in mind that resource commitments for these projects are estimates only, and estimates for use of the same resource (e.g. water) vary widely for comparable projects (see Howard Wilshire, Solar Power Plants, Water, and Climate Change, this website, under Blogs).

Where estimates of expected annual power generation are provided, the resultant capacity factor is calculated (the annual power generated in MWh is divided by the number of hours in a year; the capacity factor is the resultant divided by the plant capacity as a percentage). Any power generated by fossil fuels must be subtracted from the total to assess solar production alone. These numbers are guesses and should be judged only as approximations.

The available documents do not always list the Preferred Alternative, so the information given in these notes represents the Proposed Project where no Preferred Alternative is identified.

The author would appreciate being notified of errors found in these notes (howardgw@comcast.net).

Solar Millennium Amargosa Farm Road project description

Sources: Bureau of Land Management, *DEIS for the Amargosa Farm Road Solar Energy Project*, DOI No. DES-10-10, BLM/NV/ES-10/16+1793, March 2010; Bureau of Land Management, *FEIS for the Amarosa Farm Road Solar Energy Project*, DOI No. FES 10-53, October 2010

Information in black from DEIS, Information in orange from FEIS, annotations in red by Wilshire

EPA comments (letter, U.S. Environmental Protection Agency, Draft Environmental Impact Statement for the Solar Millinneum Amargosa Farm Road Solar Energy Project, Nye County, Nevada, CEQ# 20100083, May 17, 2010
EPA rated DEIS EO-2, insufficient information—consider impacts to be of a magnitude of significant environmental concern, especially in an arid ecosystem. Also concerned about long-term availability of groundwater [this should be discussed re climate change also] given that future appropriations have already been curtailed. Lastly, concerned about indirect and

cumulative effects associated with the influx of at least 10 other large-scale solar energy projects proposed in the Amargosa Valley. FEIS should clarify extent of jurisdictional waters and demonstrate that the proposed project is the *Least Environmentally Damaging Practicable Alternative*.

Location: ~ 80 miles northwest of Las Vegas in the Amargosa Valley, ~ 5 miles south of U.S. HW 95 and 3 miles west of Nevada State Route 373, most of project north of Farm Road

Area: 6,320 ac. Project facilities loc. On ~ 4,350 ac. Disturbed area 4,350 ac.

Type of facility: Parabolic trough. Thermal storage (allows 4.5 hrs full load-equivalent operation after sundown and on cloudy days) consisting of three dual, two-tank molten salt systems. The freeze protection system keeps salt at minimum 500 deg F

Capacity: Two 232 [p. ES-8, 232 MW net output; 250 MW nameplate capacity; p. ES-10 says 242 MW net ouput]. MW for two fields, total 464 MW. p. 2-39 says two 242 MW fields for wet cooled option

Capacity Factor: No annual energy production estimated

Cooling: Dry cooled (pref. alt.). Uses a small wet-cooling tower to cool plant auxiliary equipment. Water use for operations under dry cooling = 146 afy [p. 2-28] [p. ES-11 Dry cooling generates ~5% less electricity avg. annually; cost 6-9% more than wet cooled]

Estimated Water Use: Dry cooling. Small auxiliary equipment wet cooling will use avg. 130,000 gal/day, max. 197,500 g/day on hot summer days. p., 2-25, Table 2-3: Total water usage, dry-cooled 400 afy. Water use for mirror washing, weekly in winter, twice weekly mid-spring thru mid-fall, or as needed, 200 afy

Supplemental fuel: Gas-fired heater to keep HTF fluid from freezing, expected use 50 hrs/yr.

Preconstruction character of land: dominated by Mojave Desert scrub habitats; project area dominated by creosote bush scrub, very little annual herbaceous growth except in wet years. Veg. communities creosote scrub either dominant or with codominant Burrobush or saltbush in saline areas; shrub interspaces gen. barren or with very sparse forbs, grasses. Washes mainly unvegetated. Various forbs, annuals; Only cacti in project area golden cholla and beavertail limited distribution—only 7 cholla and 2 beavertail found. Various non-natives, invasive species. No federally recognized threatened, endangered, proposed, or candidate species found. Wildlife in project area: 58 vertebrate species observed:, 13 reptile, 27 bird (but no nests seen), 18 mammal species. Only listed species is desert tortoise. 5 bird species classified as sensitive

Construction phase: 39 months. Site will be graded. Water use during construction: estimated 752,000 gal/working day (~2.3 af per working day). Total for 39 month construction period = "600 afy (1,950 over the 39 month construction period)" [for avg. 20 working days/month: 20 X

39 = 780 working days @ 2.3 af/working day = 1,740 af total (1,973 af) to 1,950 af @ 22 days/month]

Climate Change: p. 3-9: "The assessment of greenhouse gas emissions and climate change is in its formative phase, and the net impact to climate cannot yet be determined with absolute certainty. Predicting regional precipitation changes in precipitation due to climate change remains challenging, particularly because of uncertainty in regional projections of how precipitation changes [IPCC 2007 citation]. Currently, the BLM does not have operational tools to predict climate change impacts from potential GHG emissions." p. 3-10: "Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of greenhouse gases are likely to accelerate the rate of climate change" [as shown by a graph of temperature changes in latitudes 24-90 deg. N]. No attempt is made to assess the GHG emissions caused by this project. This section is simply a dodge against attempting some kind of assessment of potential effects of diminished precipitation increased and temperature both of which could have significant impacts on the particular solar project here proposed. No relevant scientific reports dealing with potential climate changes in the southwest post-2007 are cited.

Notes:

Dry cooling tower 144 ft. tall; wet cooling, if used, tower 55 ft tall; 28 ac either option

4 4-acre evaporation ponds for blowdown water disposal

Wet cooling offers ~11 MW greater electrical output during peak summer ambient T.

p. 2-3 "The site should not be highly pristine or biologically sensitive (e.g. not within a designated wilderness area or Area of Critical Environmental Concern)" These characteristics are present in lands not included in designated wilderness or ACECs.

Site to be protected from off-site runoff by a continuous concrete-lined channel around the northern and western perimeter. Designed to intercept 100 yr storm event. Convey the concentrated runoff to SW corner of property. Will use spreaders to convert flow back to sheet flow prior to leaving property [but most of it will have been in ephemeral washes entering the property?]. Will also have concrete-lined channel along E side of facility to collect runoff from the E; will be released on the property in its historic location and energy-dissipation devices will return it to sheet flow when it leaves property. The four main channels crossing the property will be concrete-lined [see p. 2-35 for lots of nonsensical words]

p. 3-13, 14. Deal with climate change, but nothing on impact on facility ops—e.g., effects of higher T on dry cooling and need for supplementary water cooling; drought effects on water availability; or increased weather severity

---

Sources: California Energy Commission, Blythe Solar Power Project, Presiding Members' Proposed Decision, CEC-800-2010-009 PMPD, August 2010; Bureau of Land Management, Plan Amendment/Final EIS for the Blythe Solar Power Project, DOI Control No. FES 10-41, August 2010

Information in orange from BLM FEIIS; in black from CEC; annotations in red by Wilshire

Stopped 3.20-23, FEIS

Location: ~8 miles west of Blythe, 2 miles north of I-10; ~8 miles west of Blythe, 3 miles north of I-10

Area: Abstract: Agency Preferred Alternative covers ~7.025 ac.; p. ES-7: ROW application for 9,400 ac; 7,025 acres to be disturbed; p. 213: total area of disturbance ~7,250 ac (7,082 ac from activities related to Project site, and 123 ac in associated linear facility corridors and planned substation)

Type of facility: parabolic trough, four independent solar field systems

Capacity: nominal 1000 MW. p. 77: Blythe will produce power at rate of 1,000 MW net, and will generate energy at rate of 2,100,000 MW-hours net per year. Project would generate 1000 MW of electricity annually

Capacity Factor, Land-Use: anticipated to operate at 25% capacity factor. Parabolic trough: (1) Capacity 1,000 MW; (2) Footprint (ac) 5,950; (3) Annual energy production (p. 77-78): 2,100,000 MWh, Calculated capacity factor 24%; (4) Annual fuel consumption (MMBtu LHV) 172,272; (5) Land-use efficiency (Power-based MW/ac) 0.17; (6) Land-use efficiency (Energy-based MWh/acre-year) (6a) Total 353 (6b) solar only 349

Cooling: dry cooled; auxiliary cooling water systems use a wet cooling tower for cooling plant equipment; avg. of 146,000 g/d (160 afy) would be consumed; water consumption "no more than 600 afy"

Estimated Water Use: Table ES-20, p. ES-48: Water use during construction ~820 afy, during operation 600 afy. This rate of extraction exceeds recharge, placing basin in overdraft. Non-cooling water from one of two groundwater wells onsite; collectors to be washed once or twice weekly. Average total annual water usage estimated to be ~600 afy. water supplied from two new wells in each of the power blocks and two additional wells adjacent to central warehouse, 10 wells total.,p. 2-16 auxiliary equipment water cooling to consume an average of 146,000 gallons/.day (160 afy) with a maximum of 223,000 gallons/day in summer.

Supplemental fuel: natural gas auxiliary boiler and HTF heaters for each unit; new 10-mile 4" pipeline connecting to existing SCG main pipeline south of I-10. Project will use nominal rate of appx. 200,000 million Btu/y

Preconstruction character of land: Biological Resources Study Area of 24,593 ac. encompasses disturbed area and 1 mile-wide buffer zone has 5 vegetation communities: desert dry wash woodland, dominated by palo verde, honey mesquite, ironwood, and smoke tree, with understory of big galleta grass, desert starvine, creosote bush, russian thistle; vegetated ephemeral swales dominated by creosote bush, cheesebush and big galleta grass; unvegetated ephemeral dry wash either unvegetated or populated by creosote bush scrub; Sonoran creosote bush scrub dominated by creosote bush, white bursage, brittlebush, ocotillo, and cheesebush; and stabilized and partially stabilized desert dunes dominated by four-wing saltbush, desert croton, and Colorado Desert buckwheat. All 5 occur in project disturbance area. Several of these communities also encompass broad expanses of "desert pavement, a distinctive but largely unvegetated habitat." [This may be true for perennial vegetation, but not annual when it rains].

Project disturbance: 593 ac riparian (first 3 communities above); 6,423 ac of the other two communities; 4 ac agricultural land, 5 ac developed. Table ES-2, p. ES-12-13 indicates loss of 7,025 acres of vegetation communities, 592 acres of ephemeral drainages, and impacts to 6 special status plant species and 9 special status wildlife species

Construction phase: Construction over a total of 69 months [5.75 years]. Water use estimated at ~645,000 g/day. Total water use during construction estimated at ~4,100 af. Source: onsite wells. Table ES-20, p. ES-48: Water use during construction ~820 afy. At this rate, total water use during construction comes to 4,700 af. p. 3.20-23 water use assumed to be approximately 1,025 afy, or 5,890 af total for 5.75 yrs

Global Climate Change: p. 3.3-1 to 3, Focus is entirely on expected Greenhouse Gas (GHG) operational releases. Does not account for GHG releases resulting from land modifications. No consideration given to impacts of climate change on operations.

Notes:

High winds common presenting risk of mirror damage [Note the 9 SEG plants replace about 3,000 mirrors per year due to wind damage]. However, being built to withstand wind loading; wind fencing around perimeter will reduce effects of wind [the effect of wind breaks is only about 10 horizontal feet per foot of wind break height]

Note GHG emissions, climate change addressed in Public Health and Safety section. A brief scan indicates they focus only on the benefits of solar in reducing GHG, not on potential effects of climate change on desert solar power plants, esp. availability of water

p. 2-10: Mirror washing once or twice a week, drive-by mode with no water collection

New 4" natural gas pipeline, 9.8 miles long

p. 2-11: 30 year planned, could be longer or shorter

HTF freeze point 54 deg F (12 deg C); requires auxiliary boiler heat at low temperatures

Genesis solar, description

Sources: California Energy Commission, Genesis Solar Energy Project, Presiding Members' Proposed Decision, CEC=800-2010-011 PMPD, August 2010; Bureau of Land Management, Plan Amendment/Final EIS for the Genesis Solar Energy Project, August 2010

Information in orange from FEIS; Annotations in red by Wilshire

Location: ~25 miles west of Blythe, north of Ford Dry L. and ~4 miles north of I-10

Area: ROW 4,640 ac (Proposed project), ~1,800 ac disturbed

Type of facility: Parabolic trough; two 125 MW units feed single power unit [in describing groundwater wells, say at least two wells adjacent to each unit's power block]; total of 1,760 collector assemblies; will occupy 7 ac/MW of power output [it is not clear whether this is actual generation or optimal]

Capacity: 250 MW

Capacity Factor, Land-Use: Capacity factor depends on solar insolation, but estimated to be ~27%, producing ~300,000 MWh/; **(1)** Capacity 250 MW (net); **(2)** Footprint (ac)1,800; **(3)** Annual energy production (MWh net) 600,000, calculated capacity factor 27%l **(4)** Annual fuel consumption (MMBtu LHV) 60,000; **(5)** Land-use efficiency (Power-based, MW/ac) 0.14; **(6)** Land-use efficiency (energy-based MWh/acre-year) **(6a)** Total 333 **(6b)** solar only 329

Cooling: dry-cooled, agency preferred alternative; general project description accompanying release of FEIS (http://www.blm.gov/ca/st/en/fo/palmsprings/Solar_Projects/Genesis_Ford_Dry_Lake.html) states the facility will be wet-cooled

Estimated Water Use: 0 for cooling. Dry cooling reduces operational water use to 202 afy; operational water use 218 afy (Table ES-2, Dry Cooling Alternative)

Proposed wet cooling does not comply with state water policies

Water source is onsite groundwater, minimum 2 wells at each unit's power block

Dry cooling to use ~ 100 ac ft/y for each unit, total ~200 ac ft/y. But can't assess magnitude of project impact on groundwater; might induce outflow from Colorado R. to replace groundwater withdrawn if wet cooling adopted.

Note, however it is proposed to use a "small Wet Surface Air Cooler" when it is too hot to use dry cooling—don't see any estimate of water use for this eventuality, but would be included in the 202 afy for total dry cooling??

annual average of blowdown wastewater discharged to evaporation ponds ~90.000 gallons/day for each unit, increasing to 140,000 g/d for each unit during peak summer conditions

Mirror washing once or twice weekly once weekly in winter

Supplemental fuel: natural gas auxiliary boilers for each unit thru new 6-mile 8" pipeline from gas pipeline N of I-10. Estimated use is 30 million Btu/hour (30 MMBtu/hr) or a total of 60 million for both units. Max usage expected to be 60,000 MMBtu/year

Preconstruction character of land: Study area supports four main upland natural communities. Largest area to be disturbed occupied by Sonoran creosote bush scrub (1,773 ac, 1,713 ac in site, 60 ac in linear disturbance area); eastern part has stabilized and partly stabilized dunes (~1 ac in linear); a small area (37 ac, >14 ac in project site, >23 ac in linear) of playa and sand drifts over playa. The larger study area supports chenopod scrub and desert wash woodland in addition to creosote scrub and dunes. All of these communities except Sonoran creosote scrub are considered sensitive according to NECO plan. Southern linear facility route has wash-associated microphyllous riparian woodland communities. 91 ac of waters of the state within Project disturbance area includes 16 ac of microphyllous riparian veg (desert dry wash woodland) and 74 ac of other ephemeral washes. Entire study area crossed by numerous ephemeral washes ranging from small to broad (>10 ft wide) channels. Scattered ironwood and palo verde sparsely throughout the Project area, associated with areas of heavier sheet flow. Dry wash woodland includes ironwood, palo verde, and honey mesquite. Dense palo verde (270 trees) in wash along linear disturbance area.

Construction phase: will span 39 months, disturb ~ 1,800 ac. 1,773 ac vegetation, 90 ac ephemeral drainages, and 196 ac of sand dune habitat lost (Preferred Alt, Table ES-2 Dry Cooling Alternative) Water use during construction: average during earthwork, months 1 to 5, 1.7 million g/d; average use Month 6 to 37, 0.55 million g/d. Total water use during construction ~2,440 af over 3 yrs

Approximately 1,727 ac within ROW will be used for the facility and 84 ac for linear facilities

Eliminates all of Sonoran creosote bush scrub and other native plant and wildlife communities within 1,880 ac site, including 91 acres of desert washes

Recognize negative impacts on downstream segments of washes obliterated within site (p. C.2-2)

Global climate change: p. 3.3-1 to 7. Federal and California laws/regulations relating to greenhouse gas (GHG) emissions, very general; also information on strategies for reducing GHG emissions, none relevant to solar power plants, let alone the Genesis project. General information on GHG gases and climate change, no specific application to Genesis project, either the effect of the project on GHG emissions or of climate change on the operation of the Genesis project.

Notes:

Cumulative impacts would be considerable and cannot be mitigated to less than significant levels. Therefore, if project approved, an override consideration will be necessary and appropriate

Project area overlaps with part of Chuckwalla Desert Tortoise Critical Habitat Unit; same for linears. Overall, project will destroy ~1,773 ac of desert tortoise habitat, including 23 ac of critical habitat

Water is cycled in the cooling tower until the concentration of chemical constituents rises to levels where it becomes unusable and it is blown down as a waste stream.

Dry Cooling Alternative. Approximately 18 ACC fans would be required for cooling each 125 MW power block when the ambient temperature is above 50 degrees Fahrenheit (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f).
However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the cooling units and they would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days

Power-based efficiency: 250 MW divided by 1,800 ac = 0.14 MW/ac or 7.2 ac/MW

Energy-based efficiency: 600,000 MWh/y divided by 1,800 ac = 333 MWh/acre-year

This is the CEC Proposed Decision (19 August 2010), not the final

Two evaporation ponds with total area of ~ 24 ac; 6.5 mile access road from I-10 at Wiley Wells exit; natural gas pipeline; transmission connector ~ 25 miles to east, initial segment to be 6.5 miles long

Alternative section addresses distributed solar in the usual way—but gives a kind of summary statement that can be useful

Simplified closure requirements given in these docs in case of need

Note rely on depth to groundwater 70-90 ft bgs as protection against contamination [not likely!]; state chance of significant impacts during construction, but depth and hazardous materials handling protocols protect groundwater, and “soils” are highly permeable alluvium

Use Wind Erosion Prediction System for estimating wind erosion

Solar array construction will involve mass grading that will require drainage to be intercepted up-gradient and routed around the arrays to the down-gradient side of the facility to continue flow

Definition of distributed solar technology: There is no single accepted definition of distributed solar technology. The *2009 Integrated Energy Policy Report* (IEPR) defines distributed generation resources as "grid-connected or stand-alone electrical generation or storage systems, connected to the distribution level of the transmission and distribution grid, and located at or very near the location where the energy is used."

Distributed solar meets most Genesis project objectives (except not necessarily sited in areas of high insolation)

Solar Millennium Palen project description

Source: Staff Assessment and Draft Environmental Impact Statement, Palen Solar Power Project, Bureau of Land Management and California Energy Commission, (09-AFC-7), CEC-700-2010-007, March 2010

Annotations in red by Wilshire

Location: 0.5 mi. N of I-10, ~10 mi. east of Desert Center, CA

Area: 2,970 ac disturbed footprint

Type of facility: Parabolic trough

Capacity: 500 MW in 2 independent adjacent 250 MW facilities

Capacity factor, Land-use: **(1)** Capacity 500 MW; **(2)** Footprint (ac) 2,970; **(3)** Annual energy production 1,000,000 MWh, calculated capacity factor 22.8%; **(4)** Annual fuel consumption (MMBtu LHV) 89,636; **(5)** Land-use efficiency (Power-based (MW/ac) 0.17; **(6)** Land-use efficiency Energy-based (MWh/acre-year) **(6a)** Total 337 **(6b)** solar only 332

Cooling: dry cooling for steam cycle heat rejection system; closed, water cooling for ancillary equipment cooling. Latter uses small wet cooling towers. p. B.1-6: "The water picks up heat from the various equipment items being cooled and rejects the heat to the cooling tower." This cooling system would allow critical equipment…to operate at their design ratings during hot summer months…An average of 73,000 gallons of water per day (82 afy) would be consumed by the auxiliary cooling water system; the maximum rate of consumption is 112,000 gallons per day (125 afy) in summer. Not clear if summer-level water use included in total estimated water requirement. Not clear what sets limit on summer water use.

Estimated water use: ~300 afy avg. total water requirement; source: groundwater pumped from one of two onsite wells; mirror washing ~114 afy

Supplemental fuel: propane for auxiliary boiler for startup

Preconstruction character of land: p. B.2-12. For the proposed project, it is concluded that impacts to the sand transport corridor and sand dune habitat cannot be mitigated to less than significant levels. Proposed project also includes construction in desert tortoise critical habitat. The direct, indirect, and cumulative impacts to the Mojave fringe-toed lizard..are also significant and unmitigable. Reconfigured and Reduced Acreage alternatives would reduce these and other impacts. The site is within the WWII Desert Training Center (D.V. Prose, Map Showing Areas of Visible Land Disturbances Caused By Two Military Training Operations in the Mojave Desert, California, U.S. Geological Survey Map MF-18556, 1986), but whether the site proper sustained any impacts from military activities is not clear from the site description. If any such damages were incurred, they have had more than 60 years to recover, which would be undone and replaced by much more severe and permanent impacts by the proposed project.

Construction phase: ~39 months duration. Water use would be steady throughout construction period at ~440,000 allons (1.3 af) per working day; total construction water use estimated at ~1,500 af

Climate Change: No assessment of climate change

Notes:

Solar collectors to be cleaned once or twice per week at night, drive-by washing, no reuse; expect one washing/week in winter, two from mid Spring through mid Fall

Seasonal surveys should be performed for sensitive plant species [Note this does not appear to be a requirement for (many??) of the fast-track projects]

Planned operational life is 30 years. Could be longer or shorter, depending on economics

p. C.12-30. Construction of the SCE Red Bluff substation "would require temporary disturbance during construction (i.e. heavy equipment and grading)." The impacts described are not temporary—as amply demonstrated in the scientific literature, such impacts are very long-term and may be permanent.

Ridgecrest solar project description

Source: California Energy Commission and Bureau of Land Management, Staff Assessment and Draft Environmental Impact Statement and Draft California Desert Conservation Area Plan Amendment, Application for Certification (09-AFC-9), Kern County, March 26, 2010
See also Bristle Cone Chapter http://www.bristleconecnps.org/creosote_ring/index.php

Annotations in red by Wilshire

NOTE, no longer on fast track (as of May 2010), but not dead. Solar Millennium requested a suspension of application for two years on 6/30/10

Location: Located on BLM land in NE Kern Co. along HW 395, just west of the China Lake Blvd. exit, approximately 5 mi SW of Ridgecrest, CA. 3,995 ac ROW, 1,994 ac disturbed; avoids El Paso Wash

Area: 3,995 ac (p. B.1-2); facility to occupy 1,944 ac, (p. B.1-1); ~1,760 ac of disturbance

Type of facility: Parabolic trough

Capacity: Nominal output 250 MW

Capacity factor: **(1)** Capacity 250 MW; **(3)** Annual energy production 550,000 MWh, calculated capacity factor 25%

Cooling: dry cooling

Estimated water use: (p. C9-3 to 4) Total plant use approximately 150 afy of groundwater to be supplied by Indian Wells Valley Water District via new 16" pipeline 5 mi. long installed in Brown Road and China Lake Blvd. ROWs. Total operating water use over 30 year project life about 4,700 af. Auxiliary cooling for plant equipment is water-cooled, consuming an average of 40 afy, maximum 63 afy in summer. Permit should specify permitted uses and cap water consumption

Supplemental fuel: propane for keeping HTH thin in cold weather. Permit should specify uses and maximum fuel consumption

Preconstruction character of land:

North-sloping alluvial fan; (p. C.2-6 to 8) undisturbed Mojave Desert Wash Scrub (sensitive vegetation community); Mojave Creosote Bush Scrub (dominant)

(p. 19-20; C.2-1) CEC biological staff believe proposed project is "to be constructed on land featuring unique habitat for sensitive species and biological resources. The project site supports one of the highest concentrations of desert tortoise (DT) in the western United States and represents an important geographic area which supports connectivity and genetic linkage between populations of endangered Mohave ground squirrel (MGS). The unique qualities of the site…are irreplaceable and cannot be fully mitigated….staff…cannot recommend that the RSPP be approved. Staff believes this site should be protected because of its importance to the DT population and its unique and critical benefits to the MGS." Visual effects also deemed unmitigable.

Construction phase: 28 months duration with estimated total water use of 1,470 af at 1.7 af per working day

Climate Change: Appendix Air-1-Greenhouse Gas Emissions. p. C.1-81 to 94. proposed project; p. C.1-88 discusses natural carbon uptake reduction resulting from vegetation clearing, not based on any site-specific data. Does not account for GHG emissions from disturbance of soils. Considers effects negligible compared to fossil fuel generation of same amount of electricity. Discussion of construction and operations effects focused, amid pages of boiler plate, dominantly on GHG emissions, failing to assess effects of climate change—increased air temperatures and diminished precipitation—on plant operations.

Notes:

Requires new 230 kV connecting to a new substation connecting to S. CA Edison existing 230 kV transmission line west of site. In addition, requires relocation of ~1.6 mi of the two existintg SCE lines.

Ivanpah solar project description

Sources: California Desert Conservation Area Plan Amendment / Final Environmental Impact Statement for Ivanpah Solar Electric Generating System, FEIS-10-31, BLM/CA/ES-2010-010+1793 2010; California Energy Commission, Presiding Member's Proposed Decision, CEC-800-2010-004 PMPD, August 2010

Annotations in red by Wilshire

Location: 4.5 miles southwest of Primm, Nevada and 0.5 mi west of the Primm Valley Golf Club, west of Ivanpah Dry Lake and west of I-15

Area: Proposed: p. 3-27. Mitigated Ivanpah 3 Alternative [Preferred alternative]. Total area 3,564.2 acres (Ivanpah 1 same as proposed; Ivanpah 2 increased 176.3 ac; Ivanpah 3 reduced 609.3 ac). Area of permanent disturbance 3,290.8 ac. Bio Resources Assessment, p. 1:Permanent + temporary disturbance: ~3,582 ac. Modification of Proposed project, reduces disturbed area by 542 ac. This alternative moves north boundary of Ivanpah 3 southward, eliminating 433 ac from ROW; eliminates need to grade ~109 ac within the 377 ac Construction Logistics Area.

Type of facility: 3 separate power tower facilities consisting of heliostat arrays and receiver unit at top of 459-foot towers [+ 10 ft strobe and lightning rod]. One power tower each for Ivanpah 1 and 2, 5 power towers for Ivanpah 3. p. 3-29, Preferred alternative reduces number of power towers to 3 (replacing the 5 towers in Ivanpah 3 to 1 tower).

Capacity: Phased in with Ivanpah 1 and 2, each designed for 100 MW, then Ivanpah 3, 200 MW "Nominal 400 MW" p. 3-13, 14: "The nominal generation values for power plants are general estimates that can represent a class or size of generators without referring to a specific model and design specification." Actual energy output influenced by amount of cloud cover, sun angle as influenced by time of year, condition of mirrors, and plant-related electrical loads [i.e. amount of power needed to run the plant]. The gross generation is amount of power at the generator

terminals. Does not account for electrical loads needed to run plants. Gross generation is an estimate of the maximum amount of generation that can be generated at the generator terminals without considering plant electrical needs. Net generation is the amount of power that can be sent over the transmission system. The estimate of the house power for each of the units is ~5.5 MW, so total estimated net capacity is 375.5 MW

Capacity factor and Land-use **(1)** Capacity: 400 MW; **(2)** Footprint: 3,744 ac; **(3)** Annual energy production: 960,000 MWh , calculated capacity factor 27%; **(4)** 432,432; **(5)** Land-use efficiency (Power-based MW/ac) 0.11; **(6)** Land-use efficiency (energy-based) MWh/ac/yr: **(6a)** Total: 256; **(6b)** Solar only: 238

Cooling: Dry cooling.

Estimated Water Use: maximum 100 afy for all three plants for non-cooling use and make-up water to replace blowdown water. Water provided from one of two wells. Mirror washing "on a rotating basis" every two weeks.

Supplemental fuel: natural-gas to heat a partial load steam boiler when solar conditions are insufficient; natural gas-fired start-up boiler and for cloud cover. p. 3-13 FEIS: "The [gas-fired] boiler would also be operated during transient cloudy conditions. The natural gas-fired boilers would not be big enough to allow operation for sustained periods of reduced sunlight (i.e., on cloudy days or at night). Heat input from natural gas would not exceed 5% of heat input from the sun on an annual basis [for each of the 3 units or total? so what is 5% of the heat input from the sun on an annual basis?]. The natural gas-fired boiler use would not exceed four hours on any given day, and average use would be less than one hour per operating day." This wording opens the door for substantial night time power generation using wet cooling. No assessment of potential water use is provided.

Preconstruction character of land: Undisturbed land, dominant creosote scrub vegetation community accompanied by Mojave yucca-Nevada ephedra scrub and Mojave wash scrub communities. Area characterized by unusually high diversity and density of native succulents and relatively low noxious weeds. ~2,000 ephemeral washes in project area. Barrel cactus census recorded 2,869 individual CA barrel cactus and 3,501 individuals of clustered barrel cactus, unusual for bajada environment. Support high diversity of wildlife. 16 special status plant and wildlife species identified, probably more present.

Don't know long-term effects of trimming shrubs to 12 to 18" heights for heliostat movement

Indirect impacts on plants: soil compaction, modification of soil structure by dust suppressants, changes in distribution of rainfall by concentration of runoff from drip-line of heliostats, habitat segmentation

Shading by heliostats inhibits growth and reduces competitive ability of plants with crassulacean acid meabolism (CAM)-include many succulents. To be moved to unshaded storage areas

Total of 1,726 ephemeral washes mapped in project area, categorized by width—most (1,263) in smallest category of 1-4 ft wide

Construction phase: p. 4.10-17: Duration 24 months for each phase (unit), total duration 72 months [6 years] as the units are to be built sequentially. p. 4.10-5, Table 4.10-2 Groundwater to be used daily for dust suppression, vehicle washing, average 99,333 g/day each for Ivanpah 1 and 2, 194,000 g/day for Ivanpah 3. Up to 47,000 g during hydrostatic testing. Assuming 6 work-days/week for a total 312 weeks of construction = 1,872 days X total g/d for the three units of 392,666 g/day = 735,070,752 gallons = 2,255 af construction water consumption.

Soil (to 8" depth) to be removed, stockpiled from construction areas; upper thin layer may be separately stockpiled for biocrusts.[If there is any example of this having worked, it is not cited]

Climate change: p. 4.2-1 to 16. Greenhouse Gas (GHG) emissions evaluated within context of emissions caused by project construction and operation, elimination of GHG sequestration by project construction and operation, and GHG emissions avoided by displacement of fossil-fuel generation. The first of these focuses solely on emissions, failing to consider the effects of increasing air temperature and reduced precipitation resulting from climate change on operations. The discussion of sequestration provides no data for assessment of specific project impacts. The last of these is not permissible because of other, unconsidered, alternatives to solar generation. Interspersed in the discussion are pages of boiler plate not relevant to the specific project proposed.

Notes:

Max. number of 7.2-feet high X 10.5 feet wide heliostats; overall height of heliostats = 12 ft: 55,000 each for Ivanpah 1,2 and 104,000 for Ivanpah 3 = 214,000 heliostats. Controlled by computer system through communication cables connecting heliostats. p. 3-28 to 3-29 Mitigated Ivanpah 3 alternative. Uses 40,000 fewer heliostats, total 173,500

Each separate plant to have power block including air-cooled condensers "

6 mile long natural gas pipeline, 4-6"

Perimeter 8' chain link fence with barbed wire top + tortoise fence. Activities needed outside of ROW: perimeter road for maintenance of fence, underground utility repairs, maintenance of drainage systerms and installation of new stormwater drainage systems. [how many acres??]

Project designed for 50 years operational life

Note authorized to clip vegetation interfering with mirror movements—so, apparently will not grade whole site

Because heliostats in circular arrays, solar collection efficiency varies with position: those in northern part of array have highest solar collection efficiency because sun mainly in southern horizon; those in southern part lowest; the eastern sector is more valuable than western because afternoon energy collection during partial-peak or off-peak hours is more valuable than morning energy collection

p. 3-22 FEIS. Vegetation would be removed only in the power block areas, long term access roads, and areas where topography modification is necessary for access or construction. In other areas, vegetationj may be cut to facilitate access, but existing root systems would remain in place. Additional cutting during ops to avoid interference with mirror movement

Storm water management involves construction of erosion protection features, diversion channels, detention ponds, and culverts. Limited to diversion channels around the power block areas and installation of erosion protection or culverts at channel crossings of roads.

p. 3-22 to 3-23 Construction. Note says nothing about water use during construction

---

CEC Presiding Members' Proposed Decision, Summary: p. 1 "Although the project, even with the mitigation measures described in this Decision, will have remaining significant impacts on the environment, the Commission has found that the benefits the project would provide override those impacts."

Rice Solar project description

Source: California Energy Commission and Department of Energy, Staff Assessment and Draft Environmental Impact Statement, CECV-700-2010-016-SA-DEIS, DOE/EIS-439, October 2010

Annotations in red by Wilshire

Location: ~32 mi. west of Parker, AZ and ~ 40 miles northwest of Blythe, CA, adjacent to State Route 62, south side, near abandoned town of Rice.

Area: p. 1-2: 1,410 ac of a 2,560 ac parcel of private land, and 99 ac of federal land under BLM jurisdiction. p. 1-9: it is stated that the project would result in permanent land use conversion of approximately 1,770 ac of habitat and affect all plant and animal species, including special status species. p. 2-5: Project site would occupy approximately 1,410 ac on a private land parcel of 3,324 ac; the part of the generation tie line to be located on BLM lands comprises approximately 163.64 ac of long-term (life of facility) disturbance, and approximately 218.18 ac of temporary disturbance. [Note discrepancies with numbers provided by the CEC and the DEIS; note also the number of significant figures for approximate estimates of disturbance areas is absurd]

Type of facility: Power tower, with molten salt storage

Capacity: p. 1-2: 150 MW, production design 450,000 MWh/yr

Capacity factor, Land-use: **(1)** Capacity 150 MW; **(2)** Footprint (ac) 1,410; **(3)** Annual energy production 450,000 MWh/yr, calculated capacity factor 34%; **(4)** Annual fuel consumption (MMBtu LHV) 0; **(5)** Land-use efficiency (Power-based MW/ac) 0.11; **(6)** Land-use efficiency (Energy-based MWh/acre-year) **(6a)** Total 319 **(6b)** solar only 319

Cooling: p. 1-3: 20 cell air-cooled condenser

Estimated water use: Two on-site wells; p. 3-8, Table 2, maximum annual water use 180 afy; p. 3-14: heliostat washing ~5 days/week. Soil & Water Table 2, p. 6.9-11 gives a maximum annual water use of 150 af for the proposed project. p. 6.9-22, maximum operational consumptive use of water estimated to be approximately 150 afy, with an average use estimated at 118 afy.

Supplemental fuel: p. 3-7: either propane or natural gas used prior to plant startup in two boilers for initial salt melting; the heating and melting is to operate continuously 24-7 until the plants total inventory of 35,000 tons of salt has been melted. This would take approximately 140 days.

Preconstruction character of land: p. 6.2-21, 22. Vegetation on the solar generation site has largely recovered from removal or crushing during use as an airfield, but shrubs tend to be smaller and overall diversity is lower on the airfield area. Soils in much of the airfield area remain somewhat compacted and remnants of pavement, tar, or oil coatings on soil surfaces are evident throughout much of the site. Linear patches of smoke tree woodland along ephemeral channels downstream from breaches in the airfield levees post-date abandonment of the airfield in 1942. Creosote bush scrub covers most of the project site. It is dominated by creosote bush and white bursage. Other shrubs include burrobrush, brittlebush, and white rhatany; a number of species in the herb layer. 5 acres of smoke tree woodland; blue palo verde also present along with white bursage and creosote occur adjacent to the generator site. Two special status plants were observed, and 4 have moderate potential for occurrence. Project construction would not directly affect smoke tree woodland [the 5 acres outside of the generator site, but what about the woodland strips below breaches in the airfield levees?].The project area supports a broad diversity of wildlife despite the military degradation of habitat. Four special status animal species were observed, and 9 have high to moderate potential for occurrence.

Construction phase: p. 3-14: construction duration 30 months. p. 6.9-21, 22: "Water use during the grading phase of construction is supposed to be approximately 35 af/month," equating to approximately 637 afy during the first 10 months of construction and about 253 afy during the remainder of construction, total water use 890 af. Soil & Water Table 5: 1st year of construction to use 420 af; remaining 1.5 years to use 240 af per year or total of 360 af, Total construction water use 780 af.

Climate change: Appendix AIR-1 – Greehouse Gas Emissions. This whole discussion barely touches on climate change, says nothing about the impact of climate change on operations. p. 6.1-88: Repeats the boiler plate statement on effects of vegetation removal on carbon sequestration, without mention of soil disturbance.

Notes:

Central tower 653 feet high, three evaporation ponds for process waste water; two storm water detention basins; p. 3-3: up to 17,500 heliostats, each 24 X 28 feet, mounted on 12 feet tall posts.

p. 6.9-17, 18. On-site drainage (drainage within the peripheral berm) collected at south end of solar field in shallow unlined 30-acre detention pond. Allowed to infiltrate or released via a pipe. Two proposed soil-cemented drainage channels intercept storm water run-on from the north and convey it around the project through the channels. Channels designed to handle 100 year storm flows. A few pages on vague reference is made to a "dispersive device," perhaps to spread overflow from the detention pond.

p. 1-6: CEC finds substantial and unmitigable impacts after implementing the proposed conditions of certification: Loss of scenic character; contributes substantially to cumulative land use and visual/scenic character impacts; and, p. 1-17: loss of a National Register eligible historic resource (Rice Army airfield); also violates various Riverside Co. LORS

p. 1-18: Four proposed solar energy projects, including Rice, would affect over 50 miles of the most scenically intact portions of State Highway 62, altering it from a natural, scenically intact desert landscape into one characterized by the strong visual influence of these industrial facilities.

p. 1-10, 11: based on study of a smaller power tower site, operation of the project is expected to result in bird collisions with the heliostat mirrors and incineration at or near focused solar heat at the central tower. p. 1-13: burrowing animals—badgers and kit foxes occur throughout the project area and are vulnerable to crushing or entombment by construction activities.

p. 1-19: Total capital costs of project estimated to be $750-850 million

Table 1, p. 3-2: Permanent stream channel diversions 35-60 ac

p. 3-12: stormwater management will utilize a design like that of the Rice Airfield—runoff from the north would be diverted outward and away from the site's eastern and western boundaries, by constructing perimeter road along northern half of heliostat field as a raised feature (i.e. berm). Onsite runoff, except in areas exposed to contamination, will be allowed to discharge freely.

p. 3-15: vegetation in heliostat field to be kept trimmed to near ground level

p. 3-15: dust controlled by soil binders and weighting agents [gravel?]

Project Description – Figure 9: Note that project area encompasses entire Rice Airfield. No commentary on how existing concrete tarmac to be dealt with.

Project Description – Figure 10: Areas noted as "sheet flow" and "existing stormwater, sheet flow path does not enter the project site" involve substantial channelized flow in ephemeral channels (as demonstrated in Biological Resources – Fig. 5A). The effect of strongly channelized flow (channelized by sawtooth levees upslope (north) of aqueduct) will be redirected by the proposed peripheral road. Since the base photograph of this figure reveals that the effects of post-breaching of the airfield levee pass through the entire proposed solar field, project diversion by the road berm will transfer those effects back to the outlet used when the airfield was active. This as well as diversion and channelization of runoff along the western side of the peripheral berm and detention basin outlets will have significant effects on downslope vegetation. Long-term degradation of vegetation denied runoff is vividly illustrated by the effects of the sawtooth levees immediately north of the project site (Howard Wilshire and others, The American West at Risk: Science, Myths, and Politics of Land Abuse and Recovery (New York, Oxford University Press, 2008), chapter 5; see also W. H. Schlesinger and C.S. Jones. 1984. The Comparative Importance of Overland Runoff and Mean Annual Rainfall to Shrub Communities of the Mojave Desert. *Botanical Gazetteer* 145:116-124). These effects are not adequately assessed.

p. 6.9-12: "After the dikes (north of the Rice Airfield) were breached, it is presumed that the historical natural drainage network re-established itself." This clearly is not the case as many drainages were obviously captured by Airfield constructs such as runways and other structures and diverted from natural patterns.

Sonoran Solar project description
http://www.blm.gov/wo/st/en/prog/energy/renewable_energy/fast-track_renewable.html

Source: Bureau of Land Management, Sonoran Solar Energy Project Draft Environmental Impact Statement, April 2010.

Annotations in red by Wilshire

Location: West end of Little Rainbow Valley, south of the Buckeye Hills, Maricopa Co., AZ

Area: p. 1-1: ROW application 14,759.39 ac; project footprint approximately 3,700 ac. p. 2-6: plant facilities located in approximately 3,520 graded acres in the primary project footprint. p. 2-7: Proposed project has power blocks and arrays of solar troughs occupying 2,300 ac; evaporation ponds, access roads, administration buildings, other support facilities, a land-treatment unit, drainage control, and open areas occupying approximately 1,300 ac, for a total disturbance area of approximately 3,600 ac. p. 4-41 indicates that vegetation will be permanently removed from 3,569 ac.

Type of facility: Parabolic trough

Capacity: 375 MW, two units, 125 MW plant producing approximately 290,000 MWh/yr and a 250 MW unit producing approximately 580,000 MWh/yr. Total expected production: 870,000

MWh/yr. p. 4-43 states expected production, using 25% gas co-firing, to be 1,155,000 MWh per year, or 866,250 MWh/yr solar generated only—close enough to 870,000 MWh/yr

Capacity factor, Land-use: **(1)** Capacity 375 MW; **(2)** Footprint (ac) 3,700 **(3)** Annual energy production 870,000 MWh, calculated capacity factor 26.5%

Cooling: p. 2.6 (see also p. 2-32). Proposed project to use wet cooling, water supplied by on-site wells in a well field located approximately 1.2 miles east of power plant area consisting of 4 wells, pump station access and pipeline facilities. Discussion refers to "a cooling tower," so presumably only one for both arrays.
p. 2-38: Alternative A: Reduced Water Use [Note in this DEIS, no Preferred Alternative is identified]: dry cooling, reducing operational water uses to approximately 116 to 151 afy

Estimated water use: p, 2-21, 31: estimated total water demand of 2,305 to 3,003 afy, (wet cooling assumed), depending on amount of thermal storage and gas co-firing used. p. 2-31, Table 2.6, 2,305 afy assumes solar production only, 3,003 afy assumes 25% energy production from gas-cofiring. Mirror washing done by drive-by spraying, none collected and reused. Water use for mirror washing 11.8 afy.
Alternative A, Reduced Water Use, operational water use 116 to 151 afy, latter figure assumes 25% energy production by gas co-firing (p. 2-40). Note p. 2-39 says dry cooling will reduce total solar generation by 9%, and the amount of allowable gas-generation is reduced by same amount (9%).

Supplemental fuel: p. 1-3: project would use natural gas boilers for additional power generation and HTF freeze protection heaters. Would use thermal energy storage—molten salt—providing approximately 3 (p. 2-5) hours of storage for each plant. Purpose of gas backup and thermal storage is to increase daily hours of operation and make up production during periods of extended cloud cover. p. 2-15, 16: One of two co-firing methods—co-fired boilers, or HTF process heaters—to be used to augment solar heating and allow the plant to operate at its full load if the solar resource varies or is insufficient to reach desired plant output. Natural gas co-firing production limited to up to 25% of annual electrical production. Three co-firing boilers to be used: one for the 125 MW unit, two for the 250 MW unit. Maximum annual natural gas consumption expected to be 3,900 million standard cubic feet, for a maximum of 3,982,000 million Btu.

Preconstruction character of land:

Construction phase: p. 2-24, duration of construction expected to be 39 months. No water use stated

Climate change: p. ES-9: Project would result in reduced CO2 sequestration by removal of vegetation, and increased GHG emissions from construction and operation. However, project would have a net lifetime GHG emissions level of less than zero via project displacement of non-renewable grid electricity by renewable electricity. This is not permissible because alternative methods of reducing production of electricity by fossil fuel power plants are not considered nor compared with the actual expectable GHG releases from the project construction and operation.

p. 3-16 to . The opening statement under Climate Change is behind the times; the scientific literature contains much information on abrupt changes in climate on short time intervals, certainly short enough to encompass the lifetime of the proposed project (see for example, U.S. Geological Survey with contributions from National Oceanic and Atmospheric Administration, National Science Foundation, *Abrupt Climate Change*, Final Report, Synthesis and Assessment Product 3.4, U.S. Climate Change Science Program And the Subcommittee on Global Change Research, 2008). The literature is full of accounts of current rapid climate change, in particular referring to global warming.
p. 3-17 to 20. Discussion of carbon sequestration in project area vegetation is, admittedly, based on very thin data (an average from an unidentified site and one from China), and nothing relating to the project site. Further, no mention is made of GHG releases resulting from soil disturbance in addition to stripping of vegetation.
p. 4-38: This discussion is almost entirely focused on GHG emissions, except for the loss of CO2 sequestration by plants, which is treated as an emission along with emission of methane from the vegetation disposed in a landfill. There is no treatment of potential impacts of climate change on the operations of the proposed power plant.
The calculation of negative net lifetime GHG emissions summarized in Table 4.29 is not permissible in this DEIS for the reasons given above.
Notes:

p. 2-44: "The largest water consumers in a wet-cooled facility are the cooling towers, where a great deal of water is evaporated (greater than 85% of a plant's use)"

p. 2-30: natural gas pipeline, 50-foot wide temporary disturbance zone.

p. 2-6 refers to Map 2 and Figure 2.1, neither of which could be found. Since no length of the proposed gas pipeline is given on p. 2-30 and other references, the length is not known (the time required for construction—3 to 6 months, p. 2-29) suggests the length is substantial.

p. 2-39. Under dry cooling, Alternative A, "Total solar generation would be approximately 9% less than the anticipated generation under the Proposed Alternative. The allowable gas-fired generation (no more than 25%) would drop proportionally (about 9%)…"

Abengoa Project Description

Source: California Energy Commission, Abengoa Mojave Solar Project, Presiding Member's Proposed Decision, CVEVC-800-2010-008 PMPD, August 2010

Annotations in red by Wilshire

Location: Harper Dry lake, Accessed on Harper Lake Road, ~20 mi east of Barstow HW 58. Project is ~6 mi north Harper Lake Road/HW 58 intersection. Existing NextEra Solar Generating Stations (SEGS) VIII and IX facilities immediately northwest of Abengoa site. ~9 miles NW of

Hinkley

Area: 1,765 acres.

Type of facility: Parabolic trough, single axis tracking. Twin independently operable arrays, each feeding a 125 MW power island. Alpha site (NW part of site) will occupy 884 ac, Beta site 800 ac; remaining 81 ac shared activities

Capacity: Combined nominal output of 250 MW, production 630,000 MWh/yr

Capacity factor, Land-use: **(1)** 250 MW Capacity; **(2)** Footprint (ac) 1,684; **(3)** Annual energy production 630,000 MWh, calculated capacity factor 28.8%; **(4)** Annual fuel consumption (MMBtu LHV) 94,280; **(5)** Land-use efficiency (Power-based MW/ac) 0.15; **(6)** Land-use efficiency (energy-based MWh/acre-year) **(6a)** Total 374 **(6b)** solar only 366

Cooling: wet cooling, water obtained from on-site wells, drawing from Harper Valley Ground Basin. Each site will have two newly drilled wells. A single water treatment facility for each pair of wells to treat groundwater to meet potable standards for employee use. Onsite septic system disposal of waste water.

Estimated water use: Estimated minimum annual water use 850 ac ft + 5 ac ft potable water use; maximum annual use 1,077 ac ft + 5 ac ft potable water. "The applicant agrees to use no more than 2,160 acre feet per year (afy) of groundwater for each year that it is in operation" [NOTE the total amount of groundwater pumped, 2,160 afy as agreed, is consumed as they do not call for pumping any water back into the aquifer]. Note the groundwater source is adjudicated. The total amount of water pumped by this project plus SEGS 8 and 9 (3,891 afy) is 523 ac ft below the lid on production safe yield [maybe recharge balance??]. [But note, none of this mentions climate change]

p. 320 table indicates total groundwater pumping, including Albegona project and SEGS VIII and IX is 3,891 afy

Water uses: makeup water for cooling tower and circulating water system, makeup for solar steam generators, water for solar collector arrays (washing?), service water, potable water, fire protection

"To conserve water, the lower total dissolved solids reverse osmosis eject streams will be recycled back to the service wateCr storage tank for cooling tower reuse. Additionally, a clear well will be used and when the discharge exceeds the treatment system demand, the clear well discharge will be released to the cooling tower to further conserve water. To reduce overall water consumption and sizing of evaporation ponds, service water will first be used as makeup to the cooling tower and circulating water system."

Wastewater treatment effluent disposal to four 5-acre evaporation ponds. Solids left after evaporation to remain in pond for life of the project [what then??]. Alpha and Beta sites, each to have two double-lined 5-ac ponds. Have to meet stringent requirements, including leak

monitoring. Note that wastewater treatment effluent consists if concentrated brine resulting from several cycles of reuse in the cooling tower followed by a series of wastewater treatment processes.

Supplemental (to sun) fuel: each power island will have natural gas fired auxiliary boiler to provide equipment and HTF freeze protection. Auxiliary boilers will supply steam to HTF heat exchangers as needed during offline hours to keep HTF in liquid state when ambient T falls below HTF freezing point of 54 deg. F. In addition, each power island will have diesel backup generator for power plant essentials. No supplementary fossil energy source is proposed for electrical power production.

Preconstruction character of the land. Almost all, or all, center pivot farmland [from looking at site layout aerial photo]

Climate change: No assessment

Notes:

Project exempt from EIR requirement

Wet cooling ~5-7% more efficient than dry cooling, and allows improved cycle performance; use of wet-dry hybrid cooling would reduce makeup water by 80%. Dry cooling requires 130-150 ft. tall towers, but nearby Edwards AFB has height restrictions of 60 ft. Construction/operation of dry cooling would increase project costs by $52 million.

Beacon Solar project description

Source: California Energy Commission, Beacon Solar Energy Project, Commission Decision, CEC-800-2010-005 CMF, August 2010

Annotations in red by Wilshire

Location: ~ 4 miles NW of California City's northern boundary, ~ 15 miles north of Mojave, ~ 5 miles E-NE of Koehn Lake, ~ 4 miles south of Red Rock Canyon State Park.

Area: 2,012 acres, 1,266 acres of collectors acround central power block

Type of Facility: Parabolic trough, single axis tracking

Capacity: nominal 250 MW, production 600,000 MWh/yr

Capacity factor, Land-Use: **(1)** Capacity 250 MW; **(2)** Footprint (ac) 1,321; **(3)** Annual energy production 600,000 MWh, calculated capacity factor 27%; **(4)** Annual fuel consumption (MMBtu LHV) 36,000; **(5)** Land-use efficiency (Power-based MW/ac) 0.19; **(6)** Land-use efficiency (Energy-based MWh/acre-year) **(6a)** Total 454 **(6b)** solar only 450

Cooling: Wet cooling; CEC considers project meets LORS [existing laws, ordinances, regulations, and standards] existing laws, ordinances, regulations, and standards] standards except for water—state law prohibits use of potable water for power plant cooling, as applicant proposes.

Estimated water use:, 200 afy for operations, non-cooling uses (153 af + 47 af for emergency purposes)

From Final Decision, 25 August 2010: (California Energy Commission, Beacon Solar Energy Project, Commission Decision, CEC-800-2010-005 CMF, 25 August 2010)

The facility will consume approximately 1,400 ac ft/y of recycled water, and 153 ac ft/y of groundwater with another 47 ac ft/y [groundwater?] held in emergency reserve. Groundwater to be used for non-cooling water needs. Tertiary-treated recycled water for cooling to be conveyed by underground pipeline. From Rosamond or California City [or both?]. 12 mile pipeline from CA City (40 mi from Rosamond, 23 to be placed in/adjacent to existing roads)

Since treatment facilities at both CA City and Rosamond will require upgrading, use of recycled water will be phased in over 5 yrs. For CA City option, operational use of groundwater will be 1,353 af/y first yr; 1,053 afy second yr; 753 afy third yr; 453 afy fourth yr, 163 afy fifth yr. If Rosamond option is used, project use of groundwater limited to 153 afy—p. 320. Limit of 153 afy of groundwater for non-cooling uses after CA City option phase-in of recycled water + 47 afy for emergency purposes, for total 200 afy groundwater use. [BUT, "record shows 8,086 af of groundwater could be used in 25 month construction period—p. 313—after which groundwater use drops to 153 af and stays that way for life of project"

Conditions of certification—project owner can use up to 8,086 af of onsite groundwater for construction; can use up to 153 afy for non-cooling uses + 47 afy for emergency purposes [construed to mean to replace recycled water that can't be supplied or received by project due to acts of God, natural disasters or other circumstances beyond control of project owner]; to use recycled water for all plant cooling purposes [~1,400 afy] [So, if all water were supplied by local groundwater, operations would require ~1,600 afy; how does this stack up with Abengoa's permitted up to 2,160 afy for same project design and capacity?]

Ownership of and potential for Beacon use of groundwater not resolved; proposed use of high quality fresh groundwater for cooling conflicts with State Water Resources Control Board and Energy Commission policies; no compelling evidence that use of Rosamond Community Services District and/or California City recycled wastewater would be environmentally undesirable or economically unsound; there is general uncertainty in hydrogeologic conditions and future groundwater levels—there is potential for significant drawdown that would impact nearby wells; monitoring and mitigation required if applicant permitted to use groundwater for plant cooling.

Water to be supplied by onsite wells. To consume estimated 1,388 afy. As this is inconsistent with state water policies, CEC staff examined alternative sources: pot. Sources degraded [elevated TDS] groundwater near Koehn Lake [But using this would draw potable water down to the contaminated zone], recycled waste water from Rosamond Community Services District, CA City

Water levels in wells in Koehn sub-basin appear to be partially recovering from ag overdrafts, but other parts of Fremont Valley Basin continue to decline; water levels in nearly half of Koehn sub-basin more than 40 ft below historical highs; since 1985, nine of 14 Koehn sub-basin wells show statistically significant increases from 0.03 to 5.8 feet per year, 2 wells show significant down trends of about 0.5 ft/yr.

Wastewater that cannot be reused discharged to on-site evaporation ponds (3 2-ac double-lined ponds)

Past agricultural activities consumed almost 640,000 ac ft. Since about 1995, simulations in the Koehn Sub-basin show slow but steady recovery of about 5,300 af/y [= 121 years to recovery if no recovery from mid-1980s when agricultural withdrawals dropped; assuming same as post-1995 recovery, from 1995 recovery of ~587,000 af deficit = 111 yrs to recovery]; addition of project reduces recovery rate to 4,600 af/yr [subtract another 13 years of the post-1995 recovery rate, to 2008, gives ~ deficit of ~518,000 ac ft, with recovery time at 4,600 af/yr = 113 years]

CEC estimates, based on operations water consumption of 1,388 af/y, project as proposed will consume ~50,000 af of high quality fresh groundwater during its 30 yr lifetime. Water levels in the hydraulically connected CA City area are declining in most wells and indicate consumption levels exceed recharge—the project will worsen that situation, along with expected population increase in CA City

Surface water from three main watersheds: Pine Tree Creek, Jawbone Creek; and an unnamed watershed adjacent to Pine Tree Creek watershed. Pine Tree Creek ephemeral, 100 yr flood hazard where it crosses site—applicant proposes filling Pine Tree Creek channel and rerouting around south and east project periphery

Jawbone Creek Watershed. Drains several canyons in Tehachapis, from south to north: Alphie Cny, Cottonwood Creek Cny, Water Cny, Jawbone Cny, and Red Rock Cny. Jawbone splits at the Southern Pacific RR, one branch going north, the other south toward project site. South reach defined by FEMA as Special Flood Hazard Area—the SFHA is nearly one mile wide north of project site—not mapped in project site but located immediately north where the creek flows easterly toward the Honda Proving Center and eventually Koehn DL, nearly 6 miles downstream from site.

Supplemental fuel: identical to Albegona project: no supplementary energy source (e.g., natural gas to generate electricity at night) is proposed to be used for electric energy production. The project will utilize two auxiliary boilers fueled by natural gas to reduce startup time and for HTF freeze protection. The auxiliary boilers will supply steam to the HTF freeze protection heat exchangers during nighttime hours to keep the HTF in a liquid state when ambient temperatures are not sufficient to keep the temperature of the HTF above its relatively high freezing point (54 degrees Fahrenheit), diesel-fueled pump for fire protection. Project requires 17.6 mile gas pipeline

Preconstruction character of land:

Located primarily in previous agricultural land with areas having sparse scrub and brush

Site is bisected by a mapped FEMA Special Flood Hazard Area; applicant proposes to construct a diversion channel to reroute the design discharge of 28,000 cu ft/sec around project site—requires FEMA permit; diversion channel maintenance, including sediment removal, should be applicant responsibility in perpetuity.

Alfalfa farming from mid-1950s to mid-1980s lowered groundwater levels several hundred feet; pumping costs stopped alfalfa farming

Site soils have high permeability except where Rosamond clay loam occurs; 2 of 5 soils have high wind erosion pot; other 3 moderate; one soil type high water erosion potential, others moderate

Construction plan calls for ten individually elevated cut and fill pads or planar "cells". Site grading slopes SW to NE to direct storm induced sheet flow into transverse intercept trenches that convey runoff into retention basins.

Construction phase: Duration 5 years, ~3,765 af of groundwater will be used. Note construction water demand approximately 7,000 and 1,400 gallons per minute daily for 110 days from seven wells to support construction activity. Initial construction period [5 ,months] water demand: 3,375 ac ft. from groundwater existing onsite wells equipped with temporary pumps; 10,000 to 400,000 gpd, remaining 22 months of construction will use appx. 7,000-400,000 gpd, for 5-day weeks. [CEC corrected initial construction water use to 5,404 ac ft] [decreased water consumption for remaining 462 days of construction estimated at 567 ac ft] [total construction water use 5,971 ac ft.] [+ additional 55 af for soil compaction = 6,026 af for construction] [adding further corrections, CEC estimates total construction water to be 8,086 ac ft.] CEC estimates aquifer drawdown to be less than 1 foot in the 30-year period of operation.

Climate change: No assessment

Notes:

Project exempt from CEQA review

Article X, section 2 of the California Constitution states "*the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented…*" To better define "*unreasonable use*" in terms of power plant cooling, the SWRCB issued Resolution 75-58, "*Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling*", which sets forth, in priority order, a list of preferable water sources for power plant cooling as follows: (1) wastewater being discharged to the ocean, (2) ocean, (3) brakish water from natural sources or irrigation return flow, (4) inland wastewaters of low TDS, and (5) other inland waters. The resolution also states that fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would

be environmentally undesirable or economically unsound. More recently (2002), SWRCB clarified a basic principle, stating that "*The policy requires that the lowest quality cooling water reasonably available from both a technical and economic standpoint should be utilized as the source water for any evaporative cooling process utilized at these facilities*". Note: "fresh inland water" includes water suitable for domestic and agricultural uses.

Solar One Nevada project description. Note this site is developed on land owned by Boulder City and no environmental impact assessment was performed.

Sources: Wikipedia, Nevada Solar One (http://en.wikipedia.org/wiki/Nevada_Solar_One); Basin and Range Watch (http://www.basinandrangewatch.org/SolarOneNV.html)

Annotations in red by Wilshire

Location: El Dorado Valley, SW of Boulder City, Nevada

Area: 400 ac.

Type of facility: Parabolic trough

Capacity: nominal 64 MW, max. 75 MW; production estimated 134 million kWh/yr

Capacity factor: **(1)** Capacity 64 MW nominal; **(2)** Footprint (ac) 400; **(3)** Energy production annual 134,000 MWh, calculated capacity factor 24

Cooling: wet cooled, 400 afy (reported by Basin and Range Watch: http://www.basinandrangewatch.org/SolarOneNV.htm)

Estimated water use: ~400 afy, water source is the over-drafted Colorado River, via Lake Mead

Supplemental fuel:

Preconstruction character of land: Photographs of the site indicate a well-vegetated creosote scrub community, with numerous ephemeral drainages, which were destroyed by power plant construction.

Construction phase: No information

Climate change: No assessment

Notes:

Uses 760 parabolic troughs, >180,000 mirrors

Crescent Dunes projject description
http://www.blm.gov/wo/st/en/prog/energy/renewable_energy/fast-track_renewable.html

Source: Bureau of Land Management, Tonopah Solar Energy, LLC, Crescent Dunes Solar Energy Project, N-86292, DOI-BLM-NVB020-2009-0104-EIS, September 3, 2010

Annotations in red by Wilshire

Location: Approximately 13 miles NW of Tonapah, Nye County, Nevada

Area: 7,680 ac ROW, p. 2-66: permanent land disturbance, 1,704 ac, temporary disturbance, 102 ac. Total disturbance area 1,806 ac. Preferred Alternative, Alt. 2, permanent disturbance, 1,652 ac; temporary, 110 ac. Total 1,762 ac

Type of facility: Power tower

Capacity: Nominal 110 MW, p. 1-7: expected energy production ~485,000 MWh/yr

Capacity factor, Land-use: **(1)** Capacity 110 MW; **(2)** Footprint (ac) 1,762; **(3)** Annual energy production 485,000 MWh, calculated capacity factor 50%

Cooling: Hybrid cooling, with cooling tower and air-cooled condenser (ACC). Finned tube air cooling—similar to a car radiator; wet cooling to be used only during periods of high demand; condensed steam gathered in a condensate tank. Full dry cooling rejected because of decreased efficiency (= increased cost of electricity)

Estimated water use: p. xxiii: water table drawdown in excess of 10 feet "will not extend beyond the proposed project site." p. 2-21 water use during operations not expected to exceed 600 afy; ~ 854 afy of existing water rights to be acquired, subject to approval from Nevada Division of Water Resources. p. 2-40: operations water use estimates: steam cycle makeup, 100 afy; mirror wash, 70 afy; hybrid cooling, 430 afy. Mirror washing program to be implemented to wash mirrors on continual basis.

Supplemental fuel: NA

Preconstruction character of land: The area is flat. Inter-Mountain Basins Mixed Salt Desert Scrub dominant plant community; primarily undeveloped. p. 3-44: A few ephemeral drainages cross proposed site. "Ephemeral washes show the path that surface water runoff typically takes during intense storms." This is incorrect as ephemeral channels change positions over time. It is likely that there are more than a "few" runoff channels. It is stated that there is one potential existing ephemeral drainage in the Alternative area [includes both Alternative A and B sites. Fig. 3-9 indicates that washes emerging from the mountains are intercepted and absorbed by the Crescent Dunes preventing formation of easily recognized ephemeral washes in the Alternative area]. The site descriptions are inadequate and incomplete.

Construction phase: p. 2-34: duration ~30 months, 6 days/week. p. xxi, xxii, direct impact by removal of topsoil and vegetation within project area, approximately 1,628 to 1,673 ac will be graded to construct project facilities, and an additional 167 to 213 ac will be temporarily disturbed. Revegetation and reclamation of temporarily disturbed areas to be done at end of construction. p. 2-21: estimated water use during construction: 500 afy for first year, 150 afy during remaining construction for total water use of 725 af. p. 2-37 groundwater, from one of two on-site wells in unconfined aquifer at 100-200 ft. depth.

Climate change: p. 3-48, 49: Introductory remarks cite old, out of date references (e.g. 2001 IPCC report). Commentary is boiler plate, with little site-specific application. Greenhouse Gas emissions (Section 4) are given cursory treatment. There is no assessment of potential effects of climate change on operations of the power plant.

Notes:

p. 2-24: Thermal storage; system designed to provide excess heat (above that which can be instantly used by the power block), stored in two-tank liquid salt tanks for use at night; auxiliary electric heat source needed to keep salt in molten state during protracted maintenance outages

Central tower, 653 feet high, molten salt HTF ($NaNO_3$ and KNO_3); 538 ft of tower to be concrete or steel construction

Solar array in circle with 4,300 foot radius (~ 330 ac); approximately 17,500 heliostats, each 670 square feet—24X28 ft on 12 foot tall stalks

~9.5 mile 230 kV transmission line

40 ac "temporary" borrow pit for construction aggregate, ~7 mi NW of Proposed site, ~3.5 mi NW Preferred Alternative site, along active drainage channels NW of site; adjacent to an existing pit

Site overlaps several mining claims [note close proximity to Anaconda mine to north]

Imperial V. project description

Sources: CEC, Imperial Valley Solar Energy Project (Formerly SES Solar Two), Presiding Members' Proposed Decision, *California Energy Commission*, CEC-800-2010-006 PMPD, August 2010; Bureau of Land Management, Final Environmental Impact Statement, Imperial Valley Solar Project.

Information in orange from FEIS; Annotations in red by Wilshire

Location: 14 miles west of El Centro, 4 miles east of Ocotillo

Area: ~6,140 ac public land (BLM), 360 ac private land

Type of facility: Heat engine, 28,360 SunCatchers, each 25 kW. SunCatchers 38 feet tall

Capacity: Nominal 750 MW [Preferred Alt. selected 709 MW alternative]

Capacity Factor, Land-Use: **(1)** Capacity 750 MW; **(2)** Footprint: 6,500 ac; **(3)** Annual energy production 1,840,000 MWh calculated capacity factor 24.7% [SEE Efficiency Table 1, p. 4, Efficiency of the Presiding Members' Proposed Decision Expected to operate ~3,500 hours/year; **(4)** Annual fuel consumption (MMBtu LHV) 0; **(5)** Land-use efficiency (Power-based MW/ac) 0; **(6)** Land-use efficiency (Energy-based MWh/ac//yr) **(6a)** Total 249 **(6b)** Solar only 249

Cooling: Air-cooled radiator system. The hydrogen gas is cooled by a standard glycol-water radiator system and is continually recycled within the engine during power cycle

Estimated Water Use: NOTE: Imperial Valley Groundwater Basin currently overdrawn by 17,000 afy (in excess of recharge) Water to be supplied from Seely Wastewater Treatment Facility, with plant entitled to as much as 200,000 gal/day (224 afy) of recycled water for operations. Hydrogen gas produced on-site by electrolysis of water, using appx. 184 gal/day (0.0133 afy; for 365 days, = .21 afy). Water use for operations approximately 33,550 gpd, (32.7 afy)—note, calculating it out: 33,550 X 365 divided by 326,000 = 37.5. Mirror washing 8 normal washes, one scrub wash per year almost certainly underestimated.

32.7 afy for operational water use—mirror washing, make-up water, potable water, dust suppression, etc. SunCatcher washing 8 normal, one scrub per yr, 14 g/wash

Supplemental fuel: NA

Preconstruction character of land: ORV use on designated routes. Prior grazing?? Sonoran creosote bush scrub covers site and transmission line alignment. Tamarisk scrub community, mainly near canals, ditches, washes, and along New River. Disturbed areas limited to road shoulders, ORV and dirt roads, abandoned pads, misc. Diverse wildlife. Special status species: 4 plant, 7 animal species

Construction phase: [CEC p. 356-357 on counter] 39 months. p. 4.17-11: It does not appear at the time the FEIS was prepared, that Seely Wastewater Treatment plant improvements necessary to provide water for construction will be completed on time. The alternative source is groundwater provided by private source. Water use during construction avg. 45,000 gpd, peak use 90,000 gpd. Assuming 39-month construction period, 15 days at peak usage, total construction use appx. 54 million gallons or 166 af

Climate change: p. 4.4-1 to 9, p. 4.4-4 relates specifically to the agency preferred alternative, and includes removal of vegetation as a cause of greenhouse gas (GHG) emissions, claiming that replacement vegetation will minimize the impact. No data are provided to assess magnitude of

impact, and deferral of revegetation to the unknown time of plant closure renders this discussion useless. The remainder of this section, through p. 4.4-9 focuses exclusively on operations GHG emissions, saying nothing about the effects of potential air temperature increases and diminished precipitation on operations.

Notes:

LORS inconsistency [relating to imperial Co. Land Use Ordinance re a privately-owned parcel within project site]. Commission finds that the project's benefits warrant overriding this LORS inconsistency.

Hydrogen supply produced by electrolysis (from water) by on-site hydrogen generator.

Two one-ac evaporation ponds

Calico project description [Note rights to this site were sold to another solar firm in December 2010 that will likely result in a change in the type of facility]

Annotations in red by Wilshire

Source: Bureau of Land Management, Final Environmental Impact Statement for the Calico Solar (Formerly SES Solar One) Project, San Bernardino County, California, August 2010

Location: Approximately 37 mi east of Barstow, CA, north of I-40

Area: 6,215 ac (Agency preferred alt.)

Type of facility: Heat engine, Agency pref. alt.: 34,000 suncatchers

Capacity: Nominal capacity: 850 MW; annual production 1,840,000 MWh

Capacity factor, Land-use: **(1)** Capacity 850 MW; **(2)** Footprint (ac) 6,215; **(3)** Annual energy production 1,840,000 MWh , calculated capacity factor 24.7; **(4)** Annual fuel consumption (MMBtu LHV) 0; **(5)** Land-use efficiency (Power-based MW/ac) 0; **(6)** Land-use efficiency (Energy-based MWh/acre-year) **(6a)** Total 249 **(6b)** solar only 249

Cooling: NA

Estimated water use: Groundwater source. p. 4-365-368. Proposed action would consume avgerage 20 afy for operations—mirror wash and domestic use;. Additional water to generate hydrogen for power plant use. Total operational consumptive use approximately 20.4 afy

Supplemental fuel: NA

Preconstruction character of land: Site crossed by a few open vehicle routes. Vegetation communities: creosote bush scrub (dominant), salt bush scrub, rock outcrop, disturbed Mojave creosote bush scrub, developed land; four special/sensitive species (10 listed in Table 3-9), nine special-status wildlife species (16 listed in Table 3-9) within or in proximity to the project site; 335 cultural sites, including 325 archaeological sites and archaeological isolates. Four wilderness areas, one wilderness study area in vicinity, two areas of critical environmental concern (ACECs) in project area. About 1,800 acres in the project area that were donated to the BLM for conservation.

No substantive information provided on site slope variability.

Construction phase: 52 months duration; water use average 136 afy during construction, with total water use of 600 af.

Climate Change: p. 3-44 to 48. Introductory material on climate change and greenhouse gas [GHG] emissions and governing laws. p. 3-48 lists 3 DOI Secretarial Orders relating generally to climate change, none of which provide information on assessing impacts of solar power plant construction on GHG releases, or of potential impacts of temperature increase and diminished precipitation on power plant operations. p. 3-49 provides a boiler plate statement appearing in other solar power plant environmental assessments: "Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change." The following pages discuss climate changed and GHG in very general terms, focusing locally only on a scale of California. p. 3-51 contains the only reference to the project site, stating only that there are currently no human-made sources of GHGs on the Calico Solar Project site. The gross deficiencies of this 7-page statement are that nothing specific is said about GHG emissions from project operations or from the clearing of the land.

Notes:

On November 19, 2010, the CEC temporarily suspended site certification due to complaints of improper licensing; the project has also been threatened with lawsuits on the basis of wildlife impacts. The project cost, more than $2 billion, and the possibility that it will fail to make the December 31, 2010 deadline to qualify for stimulus funding threatens this project and its sister project, Imperial Valley. The rights to develop the land were sold to a NY firm in December 2010 that reportedly would use PV technology. This would require new environmental assessments thus jeopardizing acquisition of stimulus funds unless that program is extended.

Project requires transmission line upgrade, involving removal of 65 miles of older 220 kV lines and construction of 65 miles of 500 kV line, 55 miles of which would use the 220 kV ROW; 10 miles of new ROW.

p. 4-30. Alternative One, Proposed Action: "Construction of the Calico Solar Project would result in the loss of approximately 8.230 acres of native vegetation from the construction of access roads, Preferred Alternative reduces land use to 6,215 acres. SunCatcher footings,

stormwater and electrical transmission facilities, and various on-site buildings. "While the entire project site would not be cleared of vegetation during its initial development, ongoing operations would likely result in long-term adverse impacts on the remaining vegetation from maintenance activities such as mowing, mirror washing, and weed management activities during the operation of the facility. For example, regular mowing would likely result in a conversion from creosote bush scrub to more herbaceous vegetation, and would alter the suitability of the site for all but the most disturbance-tolerant species. Site reclamation activities following the decommissioning of the proposed solar field would restore existing conditions for some plant species, but the alteration of existing habitat conditions (e.g., soil chemistry) would likely preclude the full restoration of the site to pre-project vegetation conditions."

p. 4-364. "Site development for the Proposed Action [i.e. Alternative 1, not preferred Alternative 1a, but same hydrologic impacts] would result in direct, adverse, long-term impacts on surface hydrology on the project site due to a loss of on-site ephemeral drainages which promote groundwater recharge…" Effectively mitigated. Note, also promotes downslope, offsite vegetation deterioration, not mitigated.

Desert Sunlight Solar Farm project description
http://www.blm.gov/wo/st/en/prog/energy/renewable_energy/fast-track_renewable.html

Source: Bureau of Land Management, U.S. Department of Energy, Desert Sunlight Solar Farm Project Draft EIS and CDCA Plan Amendment, August 2010

Annotations in red by Wilshire

Location: N I-10 SE side of Joshua Tree NP, in boundary indentation

Area: 4,410 ac, with 4,090 ac for the solar farm, 230 ac for transmission corridor, 90 ac for substation. Table 4.3-1 gives a total disturbance area of 4,505 acres for Alternative 1. p. 4.4-1 refers to removal of 4,245 acres of habitat, Alternative 1.

Type of facility: Thin film Cd-Te PV

Capacity: p. 1-1. nominal capacity 550 MW PV

Capacity factor, Land-use: **(1)** Capacity 550 MW; **(2)** Footprint (ac) 4,410 **(3)** Annual energy production, no estimate provided; **(4)** Annual fuel consumption, NA; **(5)** Land-use efficiency (Power-based MW/ac), no data available; **(6)** Land-use efficiency, no data available (Energy-based MWh/acre-year) **(6a)** Total **(6b)** solar only

Cooling: NA

Estimated water use: p. 2-37, Table 2.2-2, Operational water use 252,000 to 1.3 million gallons per day (0.8 to 4.0 af/day = 292 to 1,460 afy)

Supplemental fuel: NA

Preconstruction character of land: Fig. 3.3-1 maps only two vegetation communities: Desert dry wash woodland and Sonoran creosote bush scrub, the latter being dominant. A very small area is mapped as developed. P. 3.3-11. Only very minor aeolian deposits were recognized [this almost certainly misses the very common soil enrichment in eeolian constituents as is common in the Mojave Desert]. Creosote Bush-White Bursage Series and Blue Palo Verde-Ironwood-Smoke Tr4ee Series are the two vegetation communities in Project locations. The former consists of creosote bush, burro bush, boxthorn, brittlebush, indigo bush, and cheesebush. The latter consists of blue palo verde, ironwood, smoke tree, and desert willow. About 5 acres disturbed. 6 special status plant species identified on project site. The Desert Dry Wash Woodland is designated a Sensitive Natural Community. 29 special status wildlife species are identified as potentially occurring in the project site, and 19 are identified as confirmed and potentially susceptible to impact (Table 4.4-2, Alternative 1).

Construction phase: Construction period 26 months; water use during construction total 1,310.55 to 1,410.55 af [the number of significant figures is absurd as these can at best be weather-dependent rough guesses]

Climate Change: This is a very elementary and lengthy treatment of climate change that is not relevant to the project. Focus is mostly on emissions, but without project-specific data to support the lengthy unnecessary review. A discussion of potential GHG releases from land disturbance provides no site-specific data whatsoever in an academic review of this issue, nor is any consideration given to potential impacts on solar generation from climate change to warmer and drier conditions in the southwest.

Notes:

p. 1-4. Red Bluff Substation on ~75 ac; transmission tie line up to 12.2 miles long, encompassing up to 256 ac

p. 2-21 activities described for “temporary disturbance zones” lead to long-term degradation

---

Lucerne Valley Solar proj. descrip.

Source: Final Environmental Impact Statement and Proposed California Desert Conservation Area Plan Amendment for the Proposed Chevron Energy Solutions Lucern Valley Solar Project, DOI-BLM-CAD008-2008-0030, BLM/CA/ES-2010-013+1793, August 2010.

Annotations in red by Wilshire

Location: S. HW 247, SE of Lucerne Valley, approximately 8 miles east of junction of Barstow Road and Old Woman Springs Road in Lucerne Valley.

Area: 516 ac total ROW, project footprint 433 ac

Type of facility: thin film PV

Capacity: 45 MW

Capacity factor, Land-use: no estimatesk of annual energy production made, so capacity factor and land-use efficiency not calculated.

Cooling: NA

Estimated water use: primarily for mirror washing, 22,520 to 45,240 gallons/year (0.07 to 0.1 afy) for full project; "actual water requirements for maintenance not known." p. 2-33, 20,000-30,000 gallons of water annually for panel washing. p. 3.5-6: "Approximately 1,000 gallons of water would be needed to wash a 1-MW block of panels. The worst case washing would be two washings per year; however many other similar projects have not needed washing in over two years. [Note no such projects cited]" Collection of approximately 50% of water, filtered and reused. "Assuming that procedure would be used" water use 500 gallons per 1 MW block, or 22,520 gals/year, worst case 45,240 gals in 2 washes/yr. Water "from a permitted off-site source." NOTE no comment on whether water source is in Lucerne Valley Basin or not, or how overdraft would be permitted. This whole section is half-baked (or less), and is not credible.

Supplemental fuel: NA

Preconstruction character of land: p. 2-5 describes site as previously disturbed land. P. 3.5-4 states "Approximately 96 percent of the site is sparsely to moderately vegetated, with the remaining area made up of desert wash channels (3 percent) and disturbed areas (1 percent)." 7 larger drainages on the site, numerous scattered smaller drainages. Note extent of potential flood hazard not studied/mapped. p. 3.6-4: "Thirty-seven plant species were observed on the site during the one-day reconnaissance level survey…" Three major plant communities on site, creosote-white bursage, white bursage, desert wash. "Some of the site was disturbed, and low densities of invasive weed species" were found throughout the site. [Note that Figure 3.6-1, map of vegetation types has a legend unit of disturbed land, with only roads mapped as this unit, and Table 3.6-1 lists 5 acres, 1% of site, as disturbed]. Wildlife species identified also appear to have been inventoried only on a hit-and-miss basis, as inadequate as the plant survey. p. 3.6-12: incomplete description of special status plants and animals, and listing of those species only as having potential to occur on the site (Table 3.6-3) reveals clearly the inadequacy of the plant and wildlife surveys, with the possible exception of the desert tortoise.

Construction phase: water use first phase approximately 5.4 af; second phase approximately 4.6 af . p. 2-33, 2-phase construction, total 270 days duration [Alt. 3; Pref. Alt. combination of Alt. 3, 4]

Climate Change: p. 4.1-10 to 12 (Alternative 3, Proposed Action). Focused primarily on greenhouse as (GHG) emissions. Effects of vegetation clearing and soil disturbance on GHG releases provide no site-specific data. No discussion of effects of climate change—increasing temperatujre, reduced precipitation—on plant operations.

Notes:

p. 3.5-6. "Since 1917, the withdrawal of groundwater from the basin [Lucerne Valley Groundwater Basin], combined with slow recharge, has frequently resulted in overdraft conditions in many parts of the basin."

Some hydrologic info not available at time of FEIS completion

Project installed on natural terrain, which would be "grubbed and scarified," which would "remove vegetation and roots" no alteration of natural drainage; apprtoximately 12.5 ac would be graded.

Approximately 4,500 panels

Expect to develop salvage plan to promote long-term survival of healthy Joshua trees and all cacti, except cholla species, to be removed as part of project. Difficulties in transplantation expected to cause loss of a large percentage of cacti, yet impact on yucca plants (including Joshua trees) is described as "short-term". p. 2-40: BLM, under Pref. Alt. says its research on the viability of transplants "has determined that the survival of the plants would be minimal."

p. ES-10. "The proposed action would directly remove approximately 433 acres of creosote bush-white bursage, white bursage, and/or desert wash communities that are associated with special status plants." Clearing/grading, construction are all sources of direct mortality to wildlife species.

Fig. 2.1 Map; site crossed by 5 mapped drainages

Silver State Solar N, S project description

Source: Bureau of Land Management, Final Environmental Impact Statement for the Silver State Solar Energy Project, DOI No. FES 10-50, September 2010

Annotations in red by Wilshire

Location: 2 miles east of Primm, NV, east of I-15

Area: p. ES-4: Alternative 2, Proposed Action (BLM Preferred Alternative). N and S combined, 2,967.47 ac of which 178.5 ac would remain undisturbed, 11 ac would be temporarily disturbed, and 2,777.97 ac [total disturbed 2,788.97 ac. Note significant figures absurd] would be disturbed

long-term. p. ES-4: Site preparation to consist generally of tilling and compaction with heavy equipment. p. 2-2 states project would disturb a total of 2,967 ac.

Type of facility: Cd-Te thin film PV

Capacity: Silver State North is 60 MW; Silver State South is 267 MW [total 327 MW]; p. 2-2 states project is 400 MW

Capacity factor, Land-use: Data needed to calculate capacity factor not provided

Cooling: NA

Estimated water use: p. ES-7: water supplied by two on-site wells under long-term contract to Las Vegas Valley Water District. Operations and maintenance require 21 afy, mostly for panel washing, to be done twice yearly.

Supplemental fuel: NA

Preconstruction character of land: p. 3-34 to 39: Dominant vegetation community creosote bush-white bursage interspersed with small areas of ephemeral vegetation. Area is undisturbed. Species observed in 2009 recon. include creosote bush, burro-weed, Mormon tea, Spanish bayonet, big galleta grass, Mediterranean grass, Tiquilia sp., Indian rice grass, grama, and Salsola sp. Vegetation associated with ephemeral washes similar to dominant community. April 2010 inventory identified a total of 100 genre representing 35 different plant families. 10 non-native species identified, several of which are classified as invasive plants and/or noxious weeds. 10 cacti and yucca species identified; based on stratified random sample, an estimated 116,543 cacti and yucca plants are present on project site, all of which are protected and regulated by the State of Nevada. In addition 11 Special Status plant species have potential to occur in the Project area, along with 10 reptile species, and 7 bird species.

Construction phase: p. 2-38: duration 4 years, requiring 600 af of water. Peak water use for dust suppression, up to 600 af total with no more than 200 af in any one year.

Climate change: p. 3-10 to 11. p. 3-10: Section 3.1.3.1, Potential Effects of Climate Change considers impact on public health resulting from direct effects of heat and frequent heat waves, and others; "The Colorado River basin is expected to see less precipitation overall." There is no discussion of the potential effects of climate change on operations, except very indirectly re water availability (p. 2-38, requires recharge of 270 afy by rapid infiltration basins of treated effluent from the two Jean correctional facilities, at such time as the contracting water source is unable to fully service its customers. Since the Colorado River basin is currently in drought, and climate change expectations are for this to continue indefinitely, the project water supply is vulnerable). p. 3-10, 11: Section 3.1.3.2, Existing Greenhouse Gas Emissions lacks rigorous site-specific discussion of construction and operational contributions to GHG releases (including the brief statements in Section 4). No site-specific discussion of GHG releases due to removal of vegetation and soil disturbance.

Notes:

p. ES-4: Drainage controls consist of 5 earthen berms, constructed to a height of 3 to 5 feet above grade with a top width of approximately 15 feet. Would cause temporary disturbance of 11 ac and permanent disturbance of about 17.7 ac

p. ES-8. Effects to groundwater from hazardous materials unlikely due to depth of the water table and applicant proposed measures. Note the common assumption that thick unsaturated zones (soils/rock between surface and water table) effectively adsorb contaminants is incorrect (see Howard Wilshire and others, The American West at Risk: Science, Myths, and Politics of Land Abuse and Recovery (New York, Oxford University Press, 2008), Chapters 7 and 10).

Fig. 2.2-1. Project built on active alluvial fan. One array field is crossed by a drainage with mapped FEMA 100 year flood zone. No apparent recognition that fan drainages change with time—a channel becomes blocked by flood debris, and shifts to another location; braiding resulting from such processes is evident on the photo comprising Fig. 2.2-1

Fig. 2.6-2 indicates total berm impact dimensions (of compacted backfill), could be 4-5 times the 15 foot width of the top of the berm (slopes on drainage-intercept side of berm 2:1, on solar array side 3:1) for a 3,,000 foot-long exterior berm; berms within solar arrays are smaller.

Fig. 2.2-1. Numerous drainage channels cut off by field arrays. This will have long-term downstream, off-site impacts on vegetation.