



Solar Thermal Electric Generation: Still Not Cheap, Not Green?

By: Marlo Lewis
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So I'm headed back to California from Las Vegas on I-15 when my eyes are dazzled by the light. Immense rectangular objects on three gigantic towers shine brighter than the desert sky in the noonday Sun. I avert my gaze, finding the discomfort level about the same as staring at an oncoming car with the brights on at night.

Taking in the panorama, I notice that the summits of the towers seem to be caught in the crosshairs of energy beams. The sci-fi fan in me is thinking, 'Cool!' What is this scene out of a Hollywood CGI extravaganza?

Google instantly sets me straight. This is Ivanpah Solar Electric Generating System – the controversial solar power project held up for years due to its potential adverse impact on the “threatened” Mojave desert tortoise. Relocation and private conservation may save the tortoise, but Ivanpah has another ecological downside: It incinerates birds.

Ivanpah began generating power in February of this year. Even before commercial operation commenced, news outlets reported accounts of singed, scorched, and possibly vision-impaired birds. In April, the National Fish & Wildlife Service (FWS) Forensics Laboratory published a preliminary analysis of avian mortality at three California solar facilities. Of those, Ivanpah was the worst offender.

FWS investigators found that cloud-like emanations near the rectangular boilers (see photo below) attract insects, which attract small birds, which attract birds of prey, creating a “mega trap” for both local and migratory winged creatures.

Environmental journalist Todd Woody ably summarized the FWS study in *The Atlantic*:

The Ivanpah solar thermal power plant in the Southern California desert supplies enough carbon-free electricity to power 140,000 homes. For birds, bats and butterflies, though, the futuristic project is the Death Star, incinerating anything that flies through a “solar flux” field that generates temperatures of 800 degree Fahrenheit when 300,000 mirrors focus the sun on a water-filled boilers that sit on top three 459-foot towers.

“It appears Ivanpah may act as a ‘mega-trap,’ attracting insects which in turn attract insect-eating birds, which are incapacitated by solar-flux injury, thus attracting predators and creating an entire food chain vulnerable to injury and death,” concluded scientists with the National Fish and Wildlife Forensics Laboratory in a report that investigated 233 bird deaths representing 71 species at three Southern California solar power plants.

FWS Office of Law and Enforcement (OLE) officials reported that, “At times birds flew into the solar flux and ignited.” Ivanpah personnel call such mid-air combustions “streamers.” Although some such events may be due to loose debris or insects, OLE officials reported “instances where the amount of smoke produced by the ignition could only be explained by a large flammable biomass such as a bird. Indeed OLE observed birds entering the solar flux and igniting, consequently becoming a streamer.”

The officials observed streamers “about once every two minutes.” That implies a large annual avian death toll. OLE cautions that the “numbers of dead birds are likely underreported, perhaps vastly so” due to lack of systematic monitoring, rapid degradation of carcasses, and consumption of body parts by scavengers.

Birds flying through the solar flux field may die not only from burns but also because feather damage can impair birds’ ability to thermo-regulate, forage, evade predators, or avoid crashing into objects.

The FWS report notes that Ivanpah is an ‘equal opportunity’ killer, zapping both insectivores and raptors, local and migratory fowl, waterfowl and terrestrial birds.

Environmental journalist Chris Clarke, who’s been covering the issue since last September, reported in May 2014 that “97 birds were found killed or mortally injured between April 1 and 29 at the nearly 4,000-acre plant in San Bernardino County south of Las Vegas” — the most lethal month yet in the facility’s history. The article includes a list of the species and numbers of identified bird kills (see end of post).

In June, Clarke reported that bird kills in May ebbed slightly from their peak in April:

According to the Monthly Compliance Report for May [pp.245-247] filed with the California Energy Commission (CEC), a total of 80 birds were confirmed killed at the San Bernardino County solar plant in May. 44 of the birds showed clear signs of scorching, singeing, or melting of feathers consistent with exposure to extreme temperatures, as would happen if the birds flew through the plant’s solar flux fields.

What are the public policy implications of this grisly mess?

Back in 1997, Robert L. Bradley, Jr. authored a study for the Cato Institute provocatively titled *Renewable Energy: Not Cheap, Not Green*. Bradley catalogued a host of subsidies propping up wind and solar power. He argued that “levelized cost” comparisons understate the expense of renewables because such analyses ignore the intermittency and non-dispatchability of wind and solar — limitations that make renewable kilowatts less valuable than fossil-fuel kilowatts.

Bradley also assembled a large body of evidence that wind farms are bird-chopping “Cuisinarts of the Air.” In addition, he noted that birds, especially raptors, are prone to crash into the large mirrors (heliostats) used to concentrate sunlight on the tower-top boilers of solar-thermal power plants.

Subsequent data and analysis confirm the basic thrust of Bradley’s pioneering study. The Energy Information Administration’s latest (year 2012) assessment finds that the capital cost of new solar thermal electric generation is nearly five times that of new advanced combined cycle natural gas generation (\$5,067/kW vs. \$1,023/kW).

Ivanpah cost \$2.2 billion to build. Most of the capital was provided by the Federal Financing Bank — a \$1.6 billion loan guaranteed by the Department of Energy under the same program that financed Solyndra and other failed alternative energy companies. It’s doubtful Ivanpah owner-operator Brightsource Energy would have moved ahead without that subsidized financing. According to the *Wall Street Journal*, Brightsource spent \$500,000 lobbying on behalf of its loan in 3rd quarter 2010 through 2nd quarter 2011.

And now we know that solar thermal can literally incinerate birds at a rate of one every two minutes.

Renewable energy advocates like to point out that the leading causes of avian deaths in the U.S. are windows in residential buildings and house cats. That is undoubtedly true, but it is beside the point. Nobody ever claimed that houses and cats are “green.” Proponents do claim that wind and solar are green.

Does your typical fossil-fuel power plant kill birds as frequently and promiscuously as a wind farm or solar thermal facility of comparable size? Not unless it’s got a hell of a lot of windows and house cats.