

# Desert solar power plant has a pollution problem

David Danelski, Orange County Register, 10-19-15

A solar power plant at the center of the Obama administration's push to reduce America's carbon footprint by using millions of taxpayer dollars to promote green energy has its own carbon pollution problem.

The Ivanpah plant in the Mojave Desert uses natural gas as a supplementary fuel. Data from the California Energy Commission show that the plant burned enough natural gas in 2014 – its first year of operation – to emit more than 46,000 metric tons of carbon dioxide.

That's nearly twice the pollution threshold for power plants or factories in California to be required to participate in the state's cap-and-trade program to reduce carbon emissions.

The same amount of natural gas burned at a conventional power plant would have produced enough electricity to meet the annual needs of 17,000 California homes – or roughly a quarter of the Ivanpah plant's total electricity projection for 2014.

The plant's operators say they are burning small amounts of natural gas in order to produce steam to jump-start the solar generating process. They said burning natural gas has always been part of the process.

Natural gas is used to preheat water that goes into boilers mounted on top of three 459-foot-tall towers at Ivanpah. This allows heat from the sun – captured by 352,000 mirrors – to make steam more quickly. The steam turns the turbines that produce electricity.

The Ivanpah plant off Interstate 15 near the Nevada border also has auxiliary gas boilers that kick in whenever cloud cover blocks the sun.

The primary use of the natural gas “is to optimize the amount of electricity produced from the sun by preparing the facility each day to utilize the solar resource as soon as practically possible, and safely,” said David Knox, a spokesman for NRG Energy, which runs the facility.

## **COSTS DEBATED**

The plant, which was developed by Oakland-based BrightSource Energy, was approved in 2010 amid questions about its cost to taxpayers and the facility's effect on the desert environment.

The U.S. Department of Energy granted Ivanpah \$1.6 billion in loan guarantees. As a green-energy project, it also qualified for more than \$600 million in federal tax credits.

Just before the project broke ground, President Barack Obama praised it in his weekly radio address.

“With projects like this one, and others across this country, we are staking our claim to continued leadership in the new global economy. And we're putting Americans to work producing clean, home-grown American energy that will help lower our reliance on foreign oil and protect our planet for future generations,” Obama said.

And former Interior Secretary Ken Salazar freed up large expanses of public land for the plant despite environmentalists' concerns about wildlife habitat and the loss of open space.

Ivanpah was built on 5.6 square miles of mostly undisturbed public land that was home to desert tortoises, a species threatened with extinction, among other wildlife.

David Lamfrom, desert project manager of the National Parks Conservation Association, said information about the amount of natural gas used at Ivanpah shows that the plant is essentially a hybrid operation that requires both fossil fuel and sunshine to make electricity.

He said he doubts the project would have gone forward if it had been billed a hybrid plant.

“It feels like a bait and switch,” Lamfrom said. “This project was held up as a model of innovation. We didn’t sign up for greener energy. We signed up for green energy.”

But Joe Desmond, BrightSource’s senior vice president of marketing, said that burning some natural gas allows much more clean energy to be produced from the sun. When electricity demands peak, the plant can produce carbon-free energy into evening hours.

The Ivanpah plant isn’t the only solar facility to use natural gas. It is used as a supplementary fuel at solar trough plants in Southern California that use curved mirrors to harness heat from the sun to make steam for turbines.

## **Gas Limitations**

Using some natural gas was always part of the Ivanpah plan, plant operators said.

The project design includes gas pipelines feeding power-generating areas below each tower. These lines are supplied by a large natural gas pipeline, operated by Utah-based Kern River Gas Transmission Co., that cuts through the Ivanpah Valley.

In 2010, the California Energy Commission required that gas use be limited. A condition of the plant’s license said that heat input from natural gas used in the plant could be no more than 5 percent of the heat that the plant captured from the sun.

But in March 2014, after three months of commercial operation, plant operators found they needed to use more natural gas, and they asked the commission for a change in the rules. And in August 2014, the commission voted to scrap the 5 percent rule and increased the plant’s annual gas volume limit by 38 percent to 1.57 billion standard cubic feet.

Most of the gas burning occurs in night boilers that “maintain seals and preserve heat” and in auxiliary boilers that “allow for a faster start-up” and “ride through certain transient cloud events ...,” said Knox, the spokesman for plant operator NRG Energy.

Knox said the plant still meets a state requirement that no more than 5 percent of its electricity production come from burning fossil fuel. This rule, however, does not factor in the gas burned to heat water before enough steam is generated to produce electricity.

That distinction is significant because it could affect the plant’s customers.

Under state law, alternative energy plants can’t use more than 5 percent “nonrenewable” fuel for electricity generation. If a plant goes over that threshold, its electricity can’t count toward the state’s renewable energy goals.

In California, utilities must get 33 percent of their electricity from renewable sources by 2020, and 50 percent by 2030.

Southern California Edison and Pacific Gas and Electric apply the amount of electricity they buy from Ivanpah toward their alternative energy quotas.

On Wednesday, Michael Ward, a spokesman for the state energy commission, said electricity produced at Ivanpah still appears to qualify as renewable energy because natural gas burned at night to maintain the system “does not count against the facility’s fossil fuel allowance of 5 percent.”

But Sadrul Ula, managing director of the Winston Chung Global Energy Center at UC Riverside, said all gas burned should be factored in when evaluating the plant because all of it is necessary for Ivanpah to function.

Ula, a UCR engineering professor, also said that Ivanpah is performing below expected production levels – while also relying on significant amounts of fossil fuel.

The plant produced just 59 percent of its annual power goal between July 1, 2014, and June 30. Ivanpah is supposed to generate 940,000 megawatt hours of electricity a year, enough to power about 140,000 California homes.

“It is a poorly performing hybrid,” Ula said.

Plant and U.S. Energy Department officials say production is improving and that Ivanpah is expected to reach its full output after about four years of operations. Getting the plant to run at its optimal levels takes time because the solar-tower technology is new and operations need to be honed with experience, they said.

## **Cap and Trade**

Meanwhile, state air quality officials are tracking the plant’s carbon emissions.

Ivanpah, like conventional power plants, must participate in California’s “cap and trade” program to reduce greenhouse emissions because its annual carbon dioxide emissions exceed 25,000 metric tons a year.

In the program, power plants and factories must either reduce carbon emissions or buy pollution credits from those that make reductions beyond their required levels, said Dave Clegern, a spokesman for the California Air Resources Board.

In 2013, when the plant was mostly testing its systems, Ivanpah reported 50,145 metric tons of carbon dioxide emissions to the air board, Clegern said.

The air board did not have emissions data for 2014.

But during that year, the plant burned 867,740 million British thermal units of natural gas, according to data made public by the state energy commission. According to a federal Energy Information Administration formula, burning that amount of gas would emit 46,084 metric tons of carbon dioxide.

Had such carbon pollution levels been known when the plant was proposed, it would have faced more opposition and tougher scrutiny by the federal Bureau of Land Management, said Lamfrom, from the National Parks Conservation Association.

“This is challenging fundamental assumptions about the project,” Lamfrom said. “If it had been billed as a 75 percent renewable energy project, the BLM might have said ‘no.’”

BLM spokeswoman Dana Wilson said she couldn't say what the agency might have done five years ago under different circumstances.