
THE POLITICS AND BUSINESS OF CLIMATE CHANGE

4. DOE:

Past is prologue for climate threats to energy -- report

Umair Irfan, E&E reporter

Published: Friday, July 12, 2013

Energy and climate change are intertwined, a fact that the Obama administration recently acknowledged with plans to regulate greenhouse gas emissions from generators. Experts note, however, that shifting rainfall, heat waves and storms have severe consequences for the energy sector, as well.

The Department of Energy issued a report yesterday definitively linking certain energy infrastructure disruptions like power plant shutdowns, blackouts and transmission interruptions to the changing climate, projecting that these threats may get worse and create cascading impacts ([Greenwire](#), July 11).

The new report pieces together energy production problems over the past decade linked to climate variables like drought, extreme heat and floods, filling in a picture of America's vulnerability. "No one has ever thought to compile this and look at them together in one place," said Jonathan Pershing, deputy assistant secretary of Energy for climate change policy and energy at DOE, who supervised the report's production.

While U.S. EPA is getting the ball rolling on carbon emissions restrictions on fossil fuel-fired generators, Pershing explained that DOE is illustrating in this report how these plants are creating problems for themselves already, along with what managers can do to dampen these risks now. "It is explicitly about adaptation," he said.

Climate change may still be a touchy subject in energy, especially when it comes to fossil fuels, but plant managers are growing increasingly concerned about how environmental factors may drive their bottom line. "A lot of that is driven by concerns about extreme weather events more than long-term climate," said Thomas Wilbanks, a corporate research fellow at Oak Ridge National Laboratory who co-authored the report.

Many of the power plants, transmission lines, transformers and substations that provide electrons on tap were constructed decades ago in an era of cheap fuels and blissful ignorance about climate change. Pushed to extremes by the climate -- whether it's millions of air conditioners running simultaneously during a heat wave, or water too warm to cool a steam column, or record snowfall -- these systems start to crack.

From mining fuel to the generators to the hardware carrying electricity, every segment of America's energy infrastructure faces climate repercussions, according to DOE.

When it rains, it pours

Earlier this year, 660,000 customers lost power in the Northeast following a winter storm due to transmission damage. Barge traffic on the Mississippi River, including coal and petroleum shipments, slowed due to low water levels ([ClimateWire](#), March 22). Last summer, eight power plants in Illinois sought and received permission to discharge water hotter than is permitted under federal Clean Water Act permits. The report highlights 30 examples of such anomalies, which may become the norm.

Though acute events like storms have obvious and well-understood effects on electric infrastructure like knocking down power lines, a more ominous threat is presented by two key climate variables: heat and water.

"If you think about temperature, at higher temperatures, your efficiencies of power generation go down," said Vincent Tidwell, a distinguished member of the technical staff at Sandia National Laboratories and a co-author of the report. "You also lose capacity in transmission lines."

On the demand side, cooling needs create load spikes during the hottest part of the day. Meanwhile, high temperatures increase risks of wildfires, which can burn through transmission lines that cross grasslands and

forests. "Any single piece by itself may not be a huge factor, but when you put together all those factors, it becomes pretty important," Tidwell said.

Water, both too much and too little, also poses significant hurdles for electricity production.

In 2011, triple-digit heat and record drought led Texas' electric grid manager, the Electric Reliability Council of Texas (ERCOT), to declare power emergencies. The state is experiencing drought conditions again this year ([ClimateWire](#), June 21).

Kent Saathoff, executive adviser to the CEO of ERCOT, explained that water is essential to thermal power plants like coal and nuclear generators, which rely on heat to produce steam to spin a turbine. Plants also use water for cooling. "It needs to be below a certain temperature in order to effectively condense steam," he said.

In drought conditions, power plants have to tap other sources for properly conditioned water, like underground aquifers, or they must draw cool water from deeper within reservoirs. Otherwise, plants have to shut down.

The challenge of redeveloping infrastructure

Officials are looking for ways to beat the mounting heat, from curbing energy demands by pushing for greater efficiency among customers to techniques like "dry" cooling for power plants that avoid using water. "It's going to be a technical solution," Saathoff said. "Anything that requires plants to run less will help mitigate the drought issues."

Texas generators have plenty of company: The DOE report notes that 60 percent of America's coal plants are in water-stressed regions. "It raises concerns that we've been concerned about for some time," Saathoff said of the report.

In New York, officials are trying to implement lessons learned from Superstorm Sandy. "The most critical thing we had to deal with post-Sandy was flood levels," said Jim Gallagher, executive director of the New York State Smart Grid Consortium, a nonprofit group that promotes grid stability in the state.

He explained that in urban areas like New York City, much of the infrastructure that delivers electricity is below ground, including transmission lines, transformers and backup generators. "The parts that are most vulnerable are those located in flood zones," Gallagher said, adding that these flood zones are expanding due to climate change.

The solution is to redevelop this infrastructure on higher ground, build sea walls or make hardware waterproof, but that is challenge on its own. "Grid improvements can be expensive. We need to make sure we go about our investment wisely," Gallagher said, noting that the state already has some of the highest electricity prices in the country.

However, it's a choice between a high upfront price tag or an even higher bill down the line when the next disaster hits. "Sandy showed us that when you lose the electric grid, the costs to the economy are enormous," he added. "We need to look at how we analyze benefits and costs and how the results of that analysis are communicated to policymakers and the public."

The next step, according to DOE's Pershing, is to develop more detailed climate strategies, working on a state-by-state basis to create infrastructure models and best practices. The department is also investigating financing and investment mechanisms that push utilities and grid operators to take the plunge in resiliency investments.

Advertisement



2nd ANNUAL
NATURAL GAS FLEET VEHICLES
Adoption & Operation ROI Congress 2013

September 25-26
Austin, Texas
REGISTER HERE