

“We build all the steel structural work,
and if we’re not doing that, it’s concrete. But the bigger point
is, we’re producing energy for the country.”

Barry Bloesser (left)
doing construction
on a transformer at
the Roscoe Wind
Farm, a 209-mega-
watt project in
Roscoe, Texas,
with Phill Ness.
(Photographed
Feb. 14.)



GOAL

Fix the Grid

ACTION PLAN

The United States uses 4 trillion kilowatt-hours of electricity each year, and the figure is expected to climb, outstripping our generating capacity. More power plants are only part of the answer. Using networking technology to monitor—and react to—what’s happening in the grid at each moment can improve efficiency and prevent outages. Decentralizing the production of electricity can also make the grid more resilient and save some of the 400 billion kwh now lost while current flows through long-distance transmission lines to the nation’s households.

1 Small-Scale Power

Microgrids will be small areas—like the residential and industrial neighborhoods shown here—where energy needs are roughly matched by local generation. A control station will juggle demand, buying and selling power to the main grid. During a regional blackout, a microgrid can run in “islanded” mode.

2 Advanced Monitoring

Today, utilities don’t learn of local power outages until they receive angry phone calls. Roger Anderson, a researcher at Columbia University’s Lamont-Doherty Earth Observatory, has worked with Con Ed to develop a system that uses real-time data and machine-learning techniques to help the utility prevent outages. “We want to be predictive instead of reactive,” Anderson says.

3 Cogeneration

About 60 percent of the energy used to generate electricity in power plants is wasted as heat. A more efficient approach: Install

small, natural-gas-powered cogeneration units in individual buildings to make electricity, and capture the heat for climate control.

4 Electricity Storage

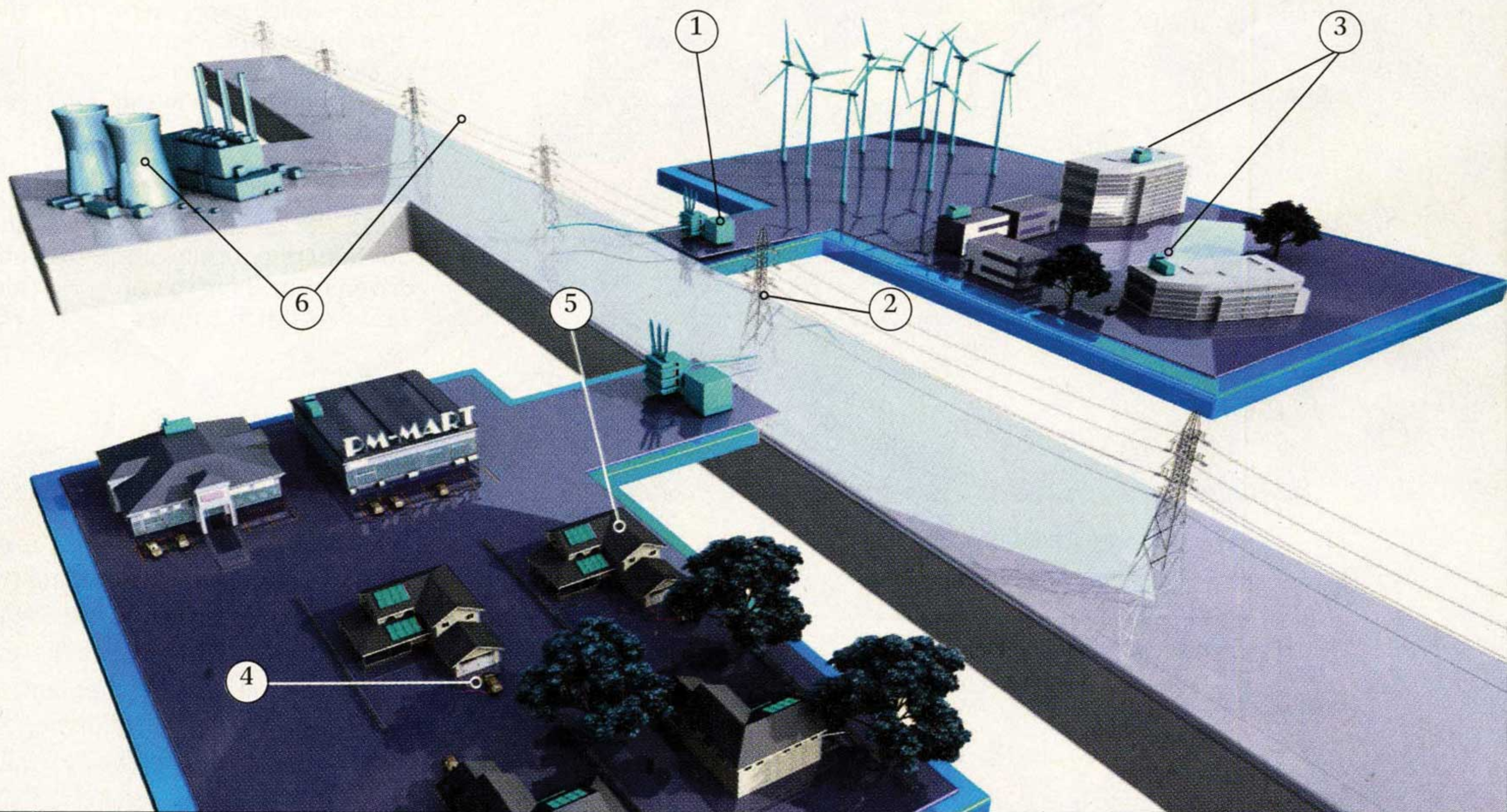
Plug-in hybrid cars could give the grid a power reserve. Drivers would charge the cars at night, then sell some power back during the day.

5 Demand Pricing

Spikes in electricity usage can damage transformers, triggering blackouts. Studies run by the DOE’s Pacific Northwest National Laboratory showed that with the right pricing and technology, homeowners could buffer the grid from trouble by letting it temporarily reduce their incoming power load.

6 Traditional Power

The United States will need more big power plants—and added transmission lines to connect them with users. High-temperature superconducting transmission lines can carry three to five times the current of copper lines, while superconducting transformers can cut transmission losses in half.



108 ft. below. He was among 13 people killed; 145 more were injured.

“The I-35W bridge was labeled ‘structurally deficient’ for 16 years,” says Jesus de la Garza, a professor of civil and environmental engineering at Virginia Tech. “That meant it was due for reconstruction at some time

in the future.” Had the work taken place, the catastrophe wouldn’t have occurred. (According to a preliminary finding of the National Transportation Safety Board [NTSB] released in January 2008, steel gusset plates had fractured, owing mainly to a flaw in the original design.) There are 153,521 structurally deficient or

DIAGRAM BY AXEL DE ROY