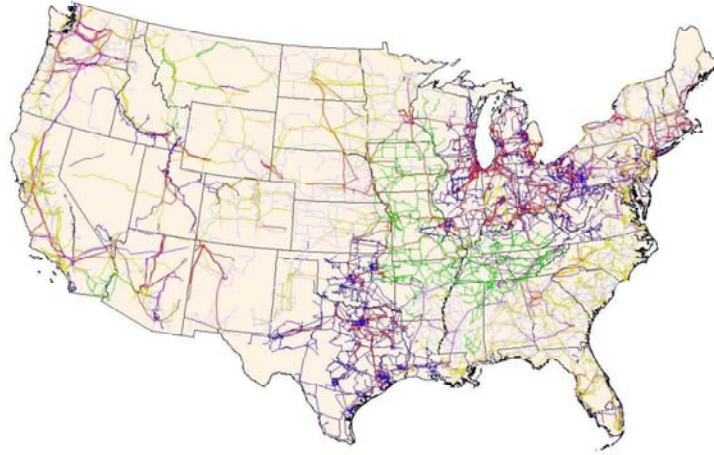




The “smart grid” means adding computer intelligence and communications to the electricity distribution network and much of what’s connected to it, from solar panels ... to smart appliances ... to plug-in cars. It holds great promise for cleaner, more efficient power, healthier air and lower greenhouse gas emissions.

But not all smart grids are created equal. Their environmental promise may never be realized, unless the right choices are made from the start. That’s why Environmental Defense Fund got in on the ground floor and is playing a lead role on both technology and policy planning for the smart grid. We believe a smarter grid can cut air pollution from the electric utility sector by as much as 30% over the next two decades.

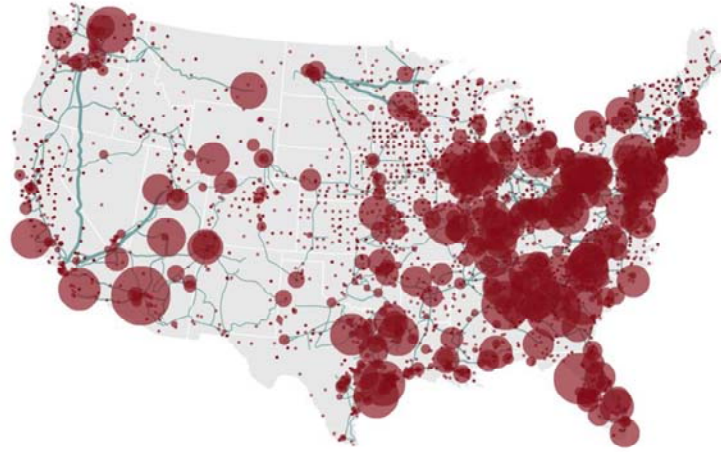
175,000+ miles high-voltage lines



Source: FEMA

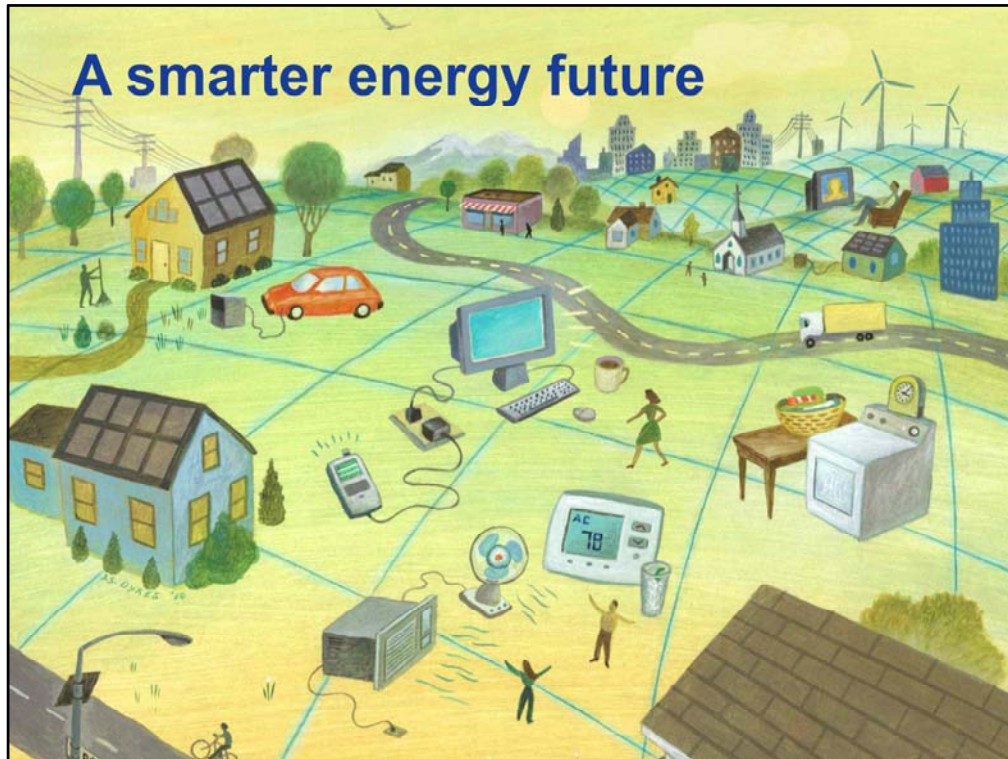
Today's electric grid is hardly different than in Thomas Edison's time, only bigger. It blankets the nation with high-voltage transmission lines and millions of miles of neighborhood distribution wiring. This old grid is inefficient by design. More than a quarter of its distribution capacity is used less than 5% of the time.

5,500+ power plants



Dot size indicates annual power generation. Source: NPR, from EPA data

All those wires carry electricity from thousands of central power plants, most of which burn fossil fuels. The grid is all about one-way transmission from power plants to customers. But a smarter grid will be a two-way street.



The smarter grid will integrate rooftop solar panels and other local generating capacity, so customers won't just buy and use energy; they'll also be able to generate and sell it.

When a home or neighborhood generates more power than it needs ... or when it can save energy at times of peak demand and peak prices ... it will be able to sell that excess power back to the grid – running the electric meter backwards.

EDF technology partners



ORACLE®



Microsoft®



GRIDPOINT



The smart grid will use information technology being developed by some of America's best-known corporations – and some of the newest. Venture capitalists have invested more than \$1.3 billion in the smart grid to date. In fact, 40% of clean-tech finance last year went to smart grid technology.

EDF is working with technology leaders like Dell, IBM, Cisco and GE to maximize the environmental benefits of smart grid technology in several real-world demonstrations, including the Pecan Street Project in Austin, Texas, and other pioneering efforts in California and North Carolina.

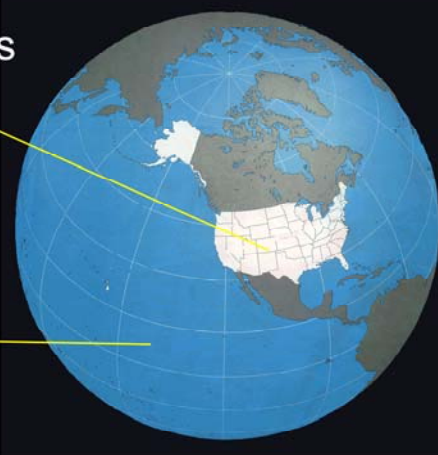
Electric utility investment by 2030

United States

\$1.5 trillion

Global

\$13 trillion



Source: "Transforming America's Power Industry, The Investment Challenge 2010-2030" by The Brattle Group for The Edison Foundation

With or without the smart grid, we're on the cusp of a massive investment in energy infrastructure to replace aging facilities and meet future electric demand. In the United States, the average power plant still in service today was built in the 1960s.

We're looking at \$1.5 trillion dollars of new investment needed in the U.S. alone. But will that be spent replacing old facilities with more of the same? Or will it be invested in renewable energy and a smarter grid that can smooth out the demand for power and reduce air pollution?

The power of innovation



Where EDF is active now with state regulators

Those decisions about electric utility investment are governed primarily at the state level, by state Public Utility Commissions. EDF already is working with PUCs and with local nonprofit partners in CA, TX, IL, NC and NY to put smarter grid policies in place.

California, the first to act, ordered its utilities to address three areas identified by EDF: reducing pollution, fostering competition to increase innovation, and giving new energy sources the same access to wholesale markets as traditional power generation.

Now EDF is seeking to add staff capacity to work in 5 to 10 additional states, to reach a tipping point where smarter state regulations become the norm nationwide.

EDF also is working with the Regional Transmission Organizations that govern interstate power transactions and the Federal Energy Regulatory Commission (FERC), which oversees transmission lines and wholesale markets. All of EDF's levels of engagement – local, statewide, regional and national – are crucial to ensure that a smarter grid will embrace the power of innovation for a healthier environment.

Competitive access is key

Closed marketplace



Open marketplace



To spur innovation, regulators must allow competitive access to the grid, as EDF is advocating strongly. This could do for electricity what open competition and the Internet did for telecommunications.

The Bell System wouldn't allow other companies' devices on the phone network until regulators and the courts required competitive access in 1984. That change, along with the open architecture of the Internet, has led to a blossoming of new devices, products and services.

For the smart grid to flourish, all energy providers – whether giant central power plants, home rooftop solar panels or energy efficiency aggregators – must have equal access and fair compensation.



A smarter grid also makes it possible to use much more solar and wind power, reducing the use of polluting fossil fuels and cutting greenhouse gas emissions. Many states, in the interest of healthier air, have set increasing percentages of electricity that must come from such renewable sources in the future – up to one-third.

But because solar and wind power is intermittent, not continuous, this poses a new challenge for the design and operation of the grid. A smarter grid can make greater use of these intermittent energy sources. Here's how:

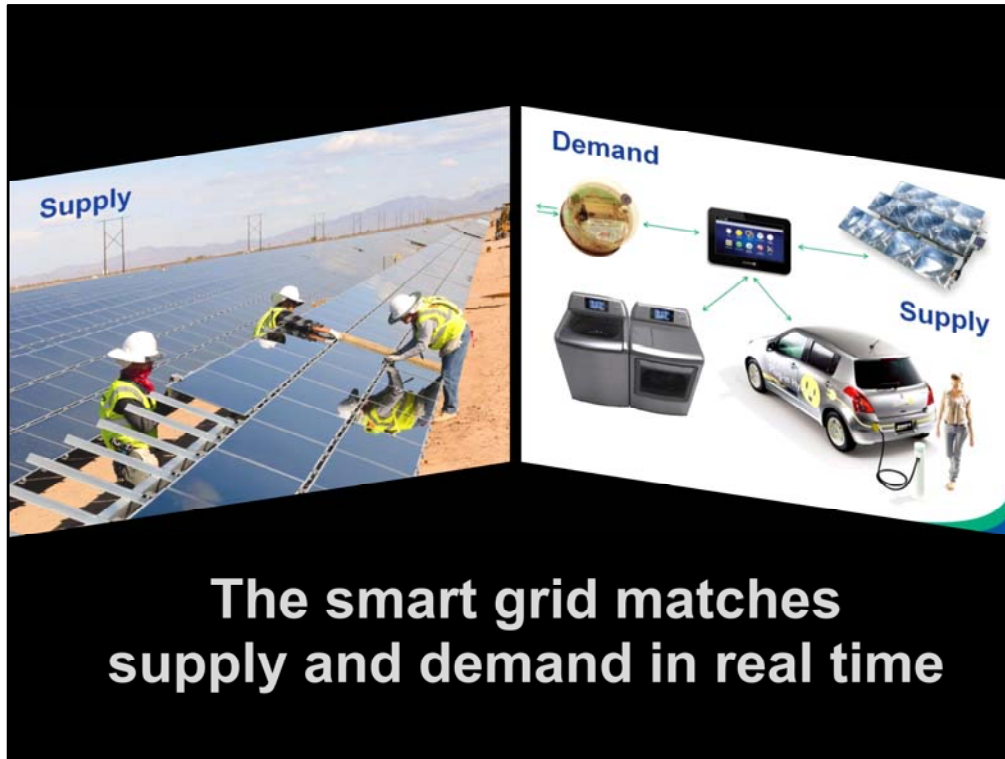


In a home or business, a smarter meter will be in constant communication with the grid, aware of when clean renewable power is available.

The smarter meter can share that information with other smart devices, like intelligent appliances, plug-in cars and home energy management systems. So, for example, you could tell your car to recharge only when clean and economical wind power is available – as long as it's fully recharged by morning.

If you decide to integrate your own local supply of electricity, like rooftop solar, that becomes part of the equation. When a cloud passes by, reducing the supply, your intelligent washing machine could pause, correspondingly reducing the demand, or even borrow power temporarily from your plug-in car's battery. (A plug-in car represents supply as well as demand.)

If your solar panels generate more than you need on a hot summer afternoon, you could sell the excess power onto the grid, running your meter backwards and earning the high peak-power rates – as long as regulators have put the right rules in place.



In any grid, supply must constantly equal demand, or brownouts and blackouts happen. Today, expensive and polluting fossil fuel plants are running on standby, waiting to kick in whenever solar or wind power wavers.

But in a smarter grid, millions of intelligent home energy systems can respond to variations in solar and wind supply by adjusting their demand instantly, within whatever limits homeowners have set. It's called demand response.

Having 10 megawatts of demand response is just like having a 10-megawatt power plant standing by – lots of little pieces add up to do the same job, except without any pollution. EDF is working to get the demand response technology and rules right, so that electric companies and wholesalers will pay just as much for clean demand response as they'd pay for peak power.

Some of EDF's smart grid team



Miriam Horn
Smart Grid Initiative
Director



Jim Marston
National Energy
Program Director



Mark Brownstein
Energy Program
Deputy Director



Michael Regan
Southeast Climate
and Air Policy
Director

EDF's smart grid initiative is led by veteran staffers with decades of cumulative experience in the energy arena. These experts enjoy effective working relationships with electric utilities, regulatory officials, technology companies, consumer groups and other stakeholders across the country.

Now EDF must increase its staff capacity to expand this smart grid effort from the initial 5 states into 10 to 15 more. In an industry dominated by state-level regulation, that's the only way to reach a tipping point and ensure that the smart grid achieves its full national potential to provide reliable power, greater energy efficiency, healthier air and lower greenhouse gas emissions.



Consider this phenomenon we've all experienced: When we gaze at the night sky, we know the light we see didn't just happen. It started on its way to us very long ago.



The same is true for the light we see on Earth. It started with decisions many decades ago about what kind of generating plants and transmission lines to build and where.

Now, the decisions we make about power generation in the next few years will have a lasting impact for generations to come. This is our chance to get the grid right for the next 50 years.

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That's why EDF's full engagement is needed now. We won't settle for merely a smart grid when a smarter grid is within reach. It's what the country needs. It's what the planet needs. It's the smarter thing to do.