



Energy and utilities

- Industry solutions

GridWeek 2007:
Modernizing the
U.S. electric grid



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Intelligent energy

Let's get smart about yielding and wielding power



Persistent power grid failures, the instability of oil prices, and the severity of changes in weather conditions have significantly raised the urgency of the issues of energy and climate change — for governments, corporations and the public overall.

In IBM's view, the work extends beyond any single company, industry or even country. It will require collaboration on many fronts. The goal: sustainable energy use that can build economies while protecting the planet. The challenge: rethink and redesign the systems that bring power to the people.



Innovation that Matters: Energy & Climate

Collaboration among IBM, its clients and environmental experts can result in more energy while still protecting the environment.

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(11:36 min., 22.1MB)

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(11:36 min., 10.4MB)

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Challenges & innovations

Addressing one issue in power generation unearths environmental and economic issues elsewhere. Challenges are many — but innovation is underway to help address many aspects of the system comprising energy and climate.



Challenges

- **Increased pressure** from a range of sources — including increased energy demands, overtaxed assets, price volatility, energy legislation and deregulation, and an aging workforce — will require energy and oil companies to innovate to ensure growth and maintain a reliable and cost-effective infrastructure.
- **Currently, the electric grid in the United States** — and in many other countries — is predominantly analog, a remnant of the Machine Age. In essence, that means we're running today's digital society through yesterday's grid. It's like running the Internet through an old telephone switchboard.
- **On the transportation fuels side of the equation**, easy-to-find and recover oil sources are dwindling, and the costs to find and recover oil in remote areas are climbing, making it more difficult to increase production to meet rising demand. Alternatives — like ethanol or bio-fuels — are confronted with a complex supply chain.
- **A growing consensus of scientists has concluded** that observed secular climate change is caused, in part, by carbon dioxide emissions from the combustion of fossil fuels. Policy makers in many parts of the world are — or soon will be — taking action to constrain carbon emissions through a range of regulatory actions.
- **Excessive heat, insufficient power and poor space utilization, layout and design** are just some of the problems rearing their heads in data centers worldwide. The physical limits of many data centers has been — or is about to be — reached. Gartner Group has said that through 2009, 70 percent of data center facilities will fail to meet operational and capacity requirements without some level of renovation, expansion or relocation.



Innovations

- **Innovative approaches** to deliver energy-efficient and environmentally-friendly processes and products have to be enabled by the application of information systems to production, logistics, product design, transport, and consumption.
- **Intelligent energy sources & solutions.** Many of these innovations will focus on intelligent energy sources and solutions that are managed digitally, and distributed over increasingly interconnected networks.

Digital utility networks that enable real-time energy monitoring and variable pricing, as well as integrated, energy-efficient appliances, equipment, and processes;

Smart oil fields, which enable energy providers to monitor and manage oil sources and reservoirs in real-time, driving much greater cost and production efficiency;

Seismic energy exploration, which enables providers to source energy more cost-effectively;

Safe nuclear energy emitting zero carbon dioxide levels;

Alternative energy sources, such as wind, biomass, fuel cells, solar, and tar sands;

New energy applications, such as hybrid and plug-in innovation in the automotive industry,

New energy-efficient innovations for power and cooling in the datacenter which increase the utilization of each computer, match energy use to workload demand and integrate it and facilities equipment to direct and optimize datacenter cooling to where it is needed.

Optimization of transportation and logistics processes to improve efficiency

- **Collaboration is essential.** To apply these innovations and create a reliable and sustainable energy system for the 21st Century, there must be a concerted and collaborative effort by industry, government and consumers — no company or organization can do this alone.
- **A diverse energy portfolio.** Many of these innovations will require energy providers to think much more broadly about energy sources and the management of an integrated, diverse energy portfolio. This includes more efficient and cleaner ways to find, extract and produce energy from existing sources — such as petroleum and coal— and, at the same time, develop and incorporate alternative or renewable energy sources — such as wind, solar and biomass. It's like creating a financial portfolio — we need to diversify, and have a mix of energy sources upon which we can draw.



Commitment & collaboration

Questions for Wayne Balta, IBM vice president for environmental affairs and product safety

Q: IBM works with a lot of clients in the energy and utilities industries and with chemical and petroleum companies to improve energy discovery, production and distribution. But IBM is a big company in its own right, and therefore potentially has a big environmental impact in what it does in its own house. So what is IBM doing?

A: To reduce greenhouse gas emissions and protect the earth's climate, we are focused on two major contributors: carbon dioxide and perfluorocompounds [PFCs]. PFCs are used in the manufacturing of semiconductors. In 1988, we were the first company in our industry to publicly commit to a specific reduction of PFC emissions. The result is from 2000 to 2005 we reduced our PFC emissions by 58 percent and the technology that enabled us to do this has been made available to others in the industry.

Now for CO₂. Our opportunity to reduce CO₂ emissions is through conserving energy, part of IBM's environmental management system since at least 1974. From 1990 to 2005, IBM reduced CO₂ emissions through energy conservation by an amount equal to 40 percent of the 1990 amount. We believe that's one of the largest CO₂ accomplishments you'll see from a company regarding its energy consumption.

PROOF POINTS

- IBM is one of the largest purchasers of renewable energy in the EPA's Green Power Partners program, and in 2006 was number one among Fortune 10 companies.
- IBM routinely sends more than 70 percent of its trash from its major global sites to be recycled.
- IBM was the first IT company to reach the one-billion-pound milestone for collecting and managing electronic product waste.
- Since 2002, IBM has sent less than three percent of its product waste directly to landfills; in 2006, it was less than one percent.
- IBM is the only company to win the U.S. EPA Climate Leader Award twice.

Q: Electricity is still mostly produced by burning fossil fuels, at least in the U.S. What does this imply for the future of IBM's energy consumption?

A: When feasible, we also purchase renewable energy such as wind, solar and biomass. We've also purchased Renewable Energy Certificates to support renewable energy in places where it isn't directly available to IBM.

Q: You mentioned that IBM has been managing its electricity consumption since 1974. Is that when environmental issues first became a concern at IBM?

A: Actually, our first environmental policy was put on paper 36 years ago [in 1971] by Thomas Watson, Jr. [IBM's second chairman, and son of the founder].

Similar to IBM's leadership in areas of corporate responsibility — like diversity — our actions have occurred well before laws or regulations required us to act. IBM first published a corporate environmental report back in 1990 — 17 years ago — and has published one every year since then without interruption. We may well be the only Fortune 100 company that can say that. And keep in mind, the prerequisite for being able to publish a report is that there is a management system and business processes in place to measure and manage what you do. Long before globalization exploded on the scene, IBM's environmental management system was global. It's been registered to an external, international standard, called ISO 14001, for ten years. In 1997, IBM was the first company to achieve a single global registration, which means our environmental management system is the same no matter where we are located.

Q: What's IBM's history of collaborating with other organizations on issues related to the environment?

CLIMATE COLLABORATION	
IBM's participation in climate protection initiatives	
1992	Charter member of U.S. EPA ENERGY STAR program.
1995	One of 3 manufacturers to voluntarily report greenhouse gas emissions under new U.S. Dept. of Energy registry.
2000	Charter member of World Wildlife Fund's Climate Savers program. First IT company invited to join business leadership council of Pew Center on Global Climate Change. Charter member of World Resources Institute's "green power" market development group.
2002	Charter member of U.S. EPA's Climate Leaders program.
2003	Charter member of Chicago Climate Exchange. (2007: Creditor status, with 3,750 carbon financial instruments.)
2006	Joined the U.S. EPA's SmartWay transport partnership, aimed at reducing CO ₂ emissions related to shipping.

A: IBM has been working on many external collaborations regarding energy and climate change. We join these groups of like-minded companies and organizations to work with us, challenge us, and set goals, as well as to share and learn from each other. It's important to note that our voluntary external engagements each involve working with groups that have commitments to act and produce results; it's not just about aspirations. IBM has acted under each and its results have been publicly reported, with some even audited by a third party. And they have attracted some very favorable recognition.

Green Grid is one example of a new partnership with companies to try to come up with a standard way to measure energy efficiency of server and storage products. It goes back to our mantra of "what gets measured, gets managed."

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