



Powering the Future

Transforming Energy Use, Energy Generation and Carbon Management Through Information Technology

At Microsoft, we see information technology (IT) as a key tool to help address the daunting energy and climate challenges that the world faces. We envision a clean energy ecosystem where information technology empowers people and organizations with software tools to increase energy efficiency and accelerates innovation and deployment of clean energy sources.

Improving Energy Efficiency Across the Economy

IT has a critical role in helping reduce carbon and greenhouse gas emissions in many sectors. We see particular potential in energy-saving applications that take advantage of widely available existing technology to support practices such as virtual meetings and telecommuting. For example, by encouraging Microsoft employees to use our unified communications telework tools, we reduced travel per employee by 10 percent in fiscal year 2008, eliminating 100 million miles of air travel and 17,000 metric tons of CO₂ emissions.

The power of software combined with increasingly smart appliances and inexpensive sensors can also make an important difference in how people understand and change their energy use at home. Starting in the United States, we have launched a free online application called [Microsoft Hohm™](#) that helps consumers analyze where energy is being consumed in the household, compare their energy usage with that of others in their area, learn ways to save, and track improvements.

Enabling Breakthroughs in Clean Energy Generation and Delivery

A long-term sustainable energy future will require a transition to zero-carbon energy sources over the next 20 years. IT has a key role to play in enabling this transition, from supporting breakthroughs in energy research to managing an increasingly distributed set of energy sources feeding into the electrical grid.

One challenge to relying on renewable energy sources such as solar and wind power is their intermittent availability. IT-enabled electrical appliances equipped with smart meters can help smooth these energy fluctuations by shifting consumer demand from periods when energy is scarce and expensive to times when it is more available and cheaper.

Software is also helping scientists model and perfect cleaner energy sources. For example, complex modeling called computational fluid dynamics has significantly improved the design and placement of wind turbines to maximize their efficiency. Scientists are using computer models to design improved alloys for solar photovoltaic cells, speed the process of generating ethanol from farm waste, and improve the efficiency of hydrogen fuel cells. At Microsoft Research, we are working to provide the scientific community with new tools to accelerate these efforts.



A report generated by Microsoft Dynamics AX showing energy consumption and carbon emissions.

Advancing Emissions Accounting and Management

Transitioning to a clean energy economy requires the ability to track and manage emissions by organization, by geography, and potentially by individual products across their supply chain and lifecycle. IT tools that support this capability will allow organizations to set carbon reduction goals and track their progress, and consumers to choose which products or services they buy based on a business's carbon footprint.

We have added a new [Environmental Sustainability Dashboard](#) to the Microsoft Dynamics® AX enterprise resource planning system to allow small and medium-sized businesses to measure and manage their carbon footprint using data from their utility bills. Together with the Clinton Climate Initiative, we provide a free [Web-based tool](#) that enables the world's largest cities to monitor and reduce their greenhouse gas emissions. Microsoft is also collaborating with the Carbon Disclosure Project, an independent not-for-profit organization that holds the world's largest database of corporate climate change information, to enable companies to report this information in a more detailed and standardized way.

Microsoft Leadership in Increasing the Energy Efficiency of IT

Although advances in hardware and software have dramatically increased the energy efficiency of computing, the IT industry must continue improving in this area. Microsoft is helping minimize energy use and carbon emissions while increasing access to technology by:

- **Improving the energy efficiency of our operating systems, software products and services.** We have built sophisticated energy-saving features into the Windows® operating system, including tools in Windows 7 designed to help IT professionals effectively deploy power management policies and troubleshoot energy efficiency problems. Microsoft's new datacenters consume 50 percent less energy for the same level of output than datacenters built just three years ago.
- **Providing tools to help customers reduce IT energy use.** A "power savings calculator" within the Microsoft Assessment and Planning Toolkit provides a report of potential savings from adopting energy-efficient computing technologies such as enhanced power management and virtualization. Microsoft® System Center Configuration Manager 2007 allows users to assess their client settings against the U.S. Environmental Protection Agency's ENERGY STAR recommendations.
- **Sharing energy efficiency best practices and technical guidance with customers, partners, governments and industry.** Through our involvement in the [Climate Savers Computing Initiative](#), Microsoft is helping promote more efficient computing systems and power management. We also helped develop the EU Code of Conduct for Data Centres, a set of voluntary energy efficiency best practices.

Policy Considerations: Realizing the Full Potential of IT

To fully optimize the contribution that IT can make to a sustainable energy economy, policymakers should:

- **Lead by example.** By applying power management and virtualization to their IT infrastructure and promoting telework, governments can help save energy, gain efficiency, demonstrate best practices and build the market for IT solutions that reduce energy use.
- **Invest in basic research, enabling infrastructure and new technologies.** Governments need to adequately fund science research into renewable and sustainable low-carbon energy sources. Also, it's important for governments to subsidize infrastructure such as the wide-scale broadband connectivity and broad deployment of smart meters necessary for many IT-enabled energy solutions.
- **Reform energy regulations to foster demand-side management.** Regulators should consider adopting real-time pricing policies that open the market for demand-side management. Examples include requiring near-real-time reporting of energy consumption, promoting variable-pricing energy models, requiring technical interoperability, and promoting solutions that use widely available technologies such as cell phones and PCs.