

Policy recommendations

# Environmental sustainability

## The opportunity

Because datacenters will rank among the world's major consumers of electric power by the middle of the next decade, the ongoing development of a global cloud infrastructure provides an important opportunity to accelerate the development of renewable energy, to develop and deploy new clean energy technologies, and to drive further improvements in energy efficiency.

Research, development, and capital investment have led to improvements in the availability of renewable energy, new clean energy technology, and significant advances in datacenter efficiency. In addition, cloud-based technologies such as energy-smart buildings and green urban infrastructure can accelerate the transition to clean energy across sectors.

## The challenge

As governments begin to focus on the potential of the cloud to improve energy efficiency and expand access to clean and renewable energy, they face important challenges. One is the fundamental complexity of expanding the availability of clean energy. Each country has its own energy policy framework, fuel mix, market structure, legacy infrastructure, and political priorities. In some countries, energy infrastructure is outdated and integration with renewable sources is difficult.

In others, better alignment of policies with consumer demand for clean energy can facilitate direct purchasing and on-site generation of renewable energy and encourage greater transparency and competitive pricing that will help datacenters and their customers use energy more efficiently. Governments must also balance a wide range of economic, political, and social imperatives as they evaluate energy policy options.

## Policy recommendations

With the right policy framework, cloud computing can help governments make progress toward their clean energy goals and speed the transition to a clean energy economy. Because hyper-scale computing is more efficient than individual servers and datacenters, government adoption of cloud services can accelerate efficiency improvements.

In addition, policies that support renewable and clean energy can provide countries with a competitive advantage in attracting technology firms and other investments that prioritize clean energy sourcing. Broad partnerships and collaboration between governments, businesses, and nongovernmental communities are essential to progress. Steps that can expand access to clean energy and increase energy efficiency include:

**Increase access to clean energy.** Energy sources, infrastructure, and policies vary greatly from country to country. In nations where renewable and other clean energy are viable options, governments should facilitate the development of new renewable energy sources by setting targets and providing incentives that promote the development and use of clean energy. While policy design will vary by country, policy options may include: renewable portfolio standards that require a certain amount of electricity to be generated by solar, wind, hydro, and other zero carbon sources; tax incentives for renewable and other cleaner energy; and pollution rules that encourage a shift to cleaner energy sources. In countries where these incentives already exist, governments can accelerate clean energy development by allowing direct energy investment by large consumers either on-site or through third parties and by facilitating partnerships between consumers and utilities to increase the availability of renewable energy in a cost-effective way.

**Encourage energy efficiency and research and development.**

Because cloud-based services are generally more efficient than individual servers and datacenters, increased use of the cloud can drive energy efficiency gains—a recent study found that organizations can reduce energy use by 30 percent to 90 percent when they move from on-premises software to the cloud.

Governments can encourage these gains through policies and regulations that encourage migration to the cloud. Ongoing research and development is also critical to improve energy efficiency and develop new clean energy technologies. Governments should encourage investment in research and development and support public-private partnerships, particularly in new battery technologies that can store clean energy at scale and smart-grid technology that can use real-time information to balance power distribution. In addition, cloud services provide valuable tools for improving efficiency, such as reduced energy use in water management, public transportation, and residential heating. Governments, academic research institutions, and companies should continue to work together to use cloud computing technologies to discover and drive these kinds of efficiencies.

**Promote transparency.** Governments should increase transparency for energy pricing and energy use. Government rules and incentives that increase public access to information about when and where energy demand is high, when and where energy supply is plentiful, and what sources are the most efficient, cleanest, and affordable can reduce energy waste and accelerate clean energy development. The cloud can help the energy sector organize, analyze, and deliver this type of information so that energy producers and consumers can make more informed decisions and create more efficient operations. In addition, specific policies that require public reporting and transparency of energy consumption by buildings can help reduce energy use.

### **Accelerate energy efficiency through smart energy systems.**

The utilization of cloud-based smart systems for buildings and urban infrastructure can significantly reduce energy consumption. To effectively utilize these smart systems, governments should promote wide-scale broadband connectivity and the deployment of smart devices either directly or through supporting policies.

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#### *Evidence and further reading:*

**Microsoft Blog:** [Greener datacenters for a brighter future: Microsoft's commitment to renewable energy](#)

**Microsoft Blog:** [Microsoft, Accenture, and WSP Environment and Energy Study shows significant energy and carbon emissions reduction potential from cloud computing](#)

**Microsoft Blog:** [Microsoft signs joint amicus brief in support of EPA's Clean Power Plan](#)

**Microsoft Blog:** [For Earth Day—Improving efficiency and sustainability worldwide](#)

**Microsoft Blog:** [Carnegie Mellon sees a way to cut energy use by 20 percent with cloud machine learning solution](#)

**Microsoft Blog:** [Ecolab and Microsoft team to face water shortage challenges](#)

For links to these and other resources, please visit:  
<http://www.microsoft.com/cloudforgood>