

Quick Facts

A total of 115 gigawatts of new renewable energy was installed worldwide in 2012, according to Bloomberg New Energy Finance. This is more than half of the global electric capacity additions for the year, representing an investment of \$244 billion. This rapid growth spurred a 2012 NREL case study that surveyed international approaches to integrating clean energy into power grids.

The report concluded that governments can best enable grid integration by implementing five best practices: lead public engagement, particularly for new transmission; coordinate and integrate planning; develop rules for market evolution that enable system flexibility; expand access to diverse resources; and improve system operations.

As an outgrowth of the network of international collaboration that produced this report, the 21st Century Power Partnership—an initiative of the Clean Energy Ministerial—was launched in April 2012, and its global impact is expanding, advancing the state of knowledge of advanced power systems.

One foundational component of the 21st Century Power Partnership is the Public-Private Leadership Forum (PPLF), a joint effort of NREL, its Joint Institute for Strategic Energy Analysis, and the Global Green Growth Institute. PPLF creates a platform to develop public-private collaboration in the area of power system transformation. Leading companies such as IBM and Cisco are among those supporting the efforts.

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NREL Case Study Leads to International Partnership

Integrating electricity from variable renewable energy sources onto the grid is a key challenge facing the public and private sectors. The Clean Energy Ministerial (CEM), which seeks to advance clean energy globally, sought a comprehensive overview of effective approaches to renewable energy integration, and it turned to the National Renewable Energy Laboratory (NREL). CEM leadership requested a review of evolving approaches, lessons learned, and a summary of actions that energy ministers and other stakeholders can take to create supportive markets, institutions, and power systems.

Delivering on this request, NREL analysts produced a 2012 case study, “Integrating Variable Renewable Energy in Electric Power Markets: Best Practices from International Experience,” which drew upon dozens of interviews with international experts involved in crafting effective policies and markets. The authors focused on locations with relatively high penetrations of renewable energy, but different system and market characteristics: Australia (South Australia), Denmark, Germany, Ireland, Spain, and the United States (Colorado and Texas).

The report also proposed a cross-cutting initiative to transform the world’s power systems by implementing two complementary strategies: the large-scale deployment of renewable energy, and a combination of comprehensive energy efficiency and smarter grids. This recommendation helped lead to the launch of the 21st Century Power Partnership in April 2012, and its membership has since grown to include Denmark, Finland, Germany, India, Mexico, Spain, and the United States. NREL, together with its affiliated Joint Institute for Strategic Energy Analysis, are the operating agents.

The *21st Century Power Partnership* leverages knowledge and expertise developed through various existing CEM initiatives to provide direct, sustained support for policymakers in partner countries. The partnership has already begun work in India and Mexico, facilitating technical assistance and peer learning to support national and subnational activities by working with existing country and development assistance programs.



Electrical grid operators throughout the world are learning how best to integrate renewable energy sources into their operating practices. The 21st Century Power Partnership aims to encourage the large-scale deployment of renewable energy, in part through smarter electrical grids.

Photo from the California ISO.