

GREENING THE GRID: Advancing Energy System Transformation and Grid Modernization



Countries around the world are poised to transform the way they power their economies through investments in grid modernization and advanced energy technologies, including solar and wind generation.

THE CHALLENGE: GRID MODERNIZATION AND CLEAN ENERGY DEPLOYMENT

A modern electricity grid plays a vital role in enhancing national security, enabling economic development, and improving quality of life. Modern grids are:

- **Resilient** to natural and man-made hazards;
- **Reliable** in supplying electricity at all times;
- **Secure** from an increasing and evolving number of threats;
- **Affordable** to enable electricity access for all;
- **Flexible** to respond to variability and uncertainty in both electricity supply and demand, from the sub-second to the multi-year timeframes; and
- **Sustainable** through the utilization of clean and efficient energy resources.¹

The global imperative to address grid modernization in part stems from declining clean energy technology prices, particularly for solar and wind energy generation, which have already dropped below the price of new coal power plants in some countries.² Significant deployment of wind and solar energy raises new challenges because the electricity output from these renewable energy generators is location-specific, fluctuates according to the underlying solar and wind resource, and cannot be predicted with perfect accuracy. Therefore, integrating these technologies into the power system while achieving the other objectives of grid modernization will require an evolution in power system planning and operation.

GREENING THE GRID: TECHNICAL ASSISTANCE AND COLLABORATION

Greening the Grid is a technical assistance platform that provides a wealth of resources and guidance to support countries in applying state-of-the-art approaches to modernize the power system and prepare for increased

Greening the Grid provides technical assistance to energy policymakers, regulators, and power system operators in applying state-of-the-art approaches to modernize their power systems and plan for increasingly advanced and interconnected energy systems.

uptake of clean energy technologies, including variable renewable energy technologies. These resources—which are curated to meet the needs of partner countries—include a combination of analytical tools, training, and knowledge products. The Greening the Grid platform is organized into topic-specific Toolkits (see sidebar) that provide 1) concise and comprehensive overviews of emerging practices for addressing specific grid modernization challenges through physical infrastructure and institutional mechanisms; and 2) guidance on adapting these practices through the development and implementation of robust plans, policies, regulations, and practices.

1. United States Department of Energy. (2015). Grid Modernization Multi-Year Program Plan.

2. International Energy Agency, Nuclear Energy Agency, Organisation for Economic Co-operation and Development. (2015). “Projected Costs of Generating Energy.”



Drawing on the Toolkits, Greening the Grid also facilitates direct technical assistance tailored to the unique power system characteristics and priorities in each partner country. Examples of technical assistance opportunities include:

- Expert exchange on developing scenarios for large-scale wind and solar generation and integrating these scenarios into long-term generation and transmission plans.
- Development or technical review of grid codes, interconnection requirements, and procedures to facilitate deployment of distributed photovoltaics (PV) while maintaining cost-effective and reliable operation of the distribution system.
- Training and expert exchange on applying the Renewable Energy Zones (REZ) transmission planning process to connect high-quality, technically developable renewable resources to the grid.
- Expert review of specific policies, regulatory documents, or action plans to enable resilient power sector development.

PARTNER WITH US!

Interested in receiving technical assistance on grid modernization and advanced energy system planning through Greening the Grid? Please contact us to learn more and explore opportunities for collaboration.

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3. International Energy Agency. (2017). World Energy Outlook 2017. <https://www.iea.org/weo2017/>

4. National Renewable Energy Laboratory. (2018). "Resilience Roadmap." <https://www.nrel.gov/resilience-planning-roadmap/>

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GREENING THE GRID TOOLKITS



Grid Integration: Grid integration is the practice of developing efficient ways to deliver variable

renewable energy (RE) to the grid. The Grid Integration Toolkit focuses on transmission-scale considerations such as ancillary services, solar and wind power forecasting, and utility-scale storage and provides resources, guidance, and training to assist practitioners in navigating these and other key topics.



Distributed Photovoltaics (DPV): Growth in distributed PV is expected to accelerate globally

through 2040.³ The DPV Toolkit provides a robust set of resources, tools, and trainings on overcoming technical, regulatory, and market barriers to distributed PV growth.



Renewable Energy Zones (REZ):

The REZ Transmission Planning Process is a proactive approach

to planning, approving, and building transmission infrastructure to develop and connect areas of high-value renewable energy resources to the grid. The REZ Toolkit presents practitioners with knowledge and resources on applying the REZ process.

Jennifer E. Leisch, Ph.D.
USAID-NREL Partnership Manager
U.S. Agency for International Development
Tel: +1-303-913-0103
Email: jleisch@usaid.gov

Jaquelin Cochran, Ph.D.
National Renewable Energy Laboratory
Tel: +1-303-275-3766
Email: jaquelin.cochran@nrel.gov

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