

Image from Getty Images 1384789075



South Asia Group for Energy–India

India is working towards a goal of achieving 40% renewable electricity capacity with an additional 500 gigawatts (GW) of renewable energy by 2030. At the heart of this goal is a push to improve Indian grid security, resilience, and reliability.

The need for new information and grid planning processes in South Asia is growing. Power sector decision makers in the region are on the cusp of a rapid, large-scale decarbonization effort amid increased extreme weather event frequency and intensity and changing electricity demand patterns.

The **South Asia Group for Energy (SAGE)** is working with Grid India and the Central Electricity Authority (CEA) to determine the best methods to deploy more inverter-based resources (IBR) such as solar photovoltaic generators and utility-scale battery. To address grid strength and stability concerns, planners and operators are working with the National Renewable Energy Laboratory's (NREL) team, through SAGE, to identify potential solutions for strengthening the grid and fostering grid reliability.

A New Vision for India's Grid

By implementing the following activities together with the experts at NREL, planners, operators, and other stakeholders in India will be equipped to address the challenges of decarbonizing the country's grid while ensuring it remains reliable and resilient for generations to come.

1. Mapping Out IBR Integration

The roadmap created in this first activity will help planners identify and address the IBR-related concerns present on India's grid system across the next 5–10 years. This activity will support planners in determining the best deployment methods and combinations of grid-enhancing technologies, like grid forming inverters and synchronous condensers.

2. Integrated Planning, Operational, and Stability Modeling and Analysis

The modeling and analysis work is expected to help NREL and Indian stakeholders achieve greater understanding of the issues utilities, grid operators, and grid planners have faced and initiate tailored analytical work that can be expanded over the remainder of the project.

Specifically, the analyses done in this task is expected to aid in:

- Optimizing the 500-megawatt (MW) battery system India is installing
- Planning and integrating synchronous condensers on the grid
- Planning and utilizing Indian transmission assets.

The objective of this activity to create a multipurpose toolset for grid analysis in India as well as at least one technical report on deployment, operation, and reliability. The hope is that it will help stakeholders, planners, and policymakers ultimately make the best decisions on how to reform the grid with high IBR share.

3. Stakeholder Engagement

Regular, direct correspondence between stakeholders and researchers at NREL will take place to enhance the impact and credibility of these activities. This will give stakeholders the opportunity to provide direct feedback and share their own plans, progress, and outcomes.

About SAGE

SAGE is a consortium consisting of USAID and three U.S. Department of Energy national laboratories: Lawrence Berkeley National Laboratory, NREL, and Pacific Northwest National Laboratory.

Through SAGE, governments, public institutions, and private sector partners in South Asia can access best-in-class energy expertise from U.S. national labs to support long-term planning and strategic development and receive consultation on complex energy challenges.

SAGE is supporting India's transition to a more sustainable and renewable energy future, aligning with the nation's ambitious goals for a greener energy grid. Learn more and explore SAGE resources by visiting www.sarepenergy.net/sage.



Image from Getty Images 1384789072

Contacts

Adarsh Nagarajan, NREL
adarsh.nagarajan@nrel.gov

Monali Zeya-Hazra, USAID India
mhazra@usaid.gov

South Asia Group for Energy



This work was prepared by NREL, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08GO28308. Funding provided by USAID under Contract No. IAG-22-22059. The views expressed in this report do not necessarily represent the views of the DOE or the U.S. Government, or any agency thereof, including USAID.

NREL is a national laboratory of the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Operated by the Alliance for Sustainable Energy, LLC

NREL/FS-6A40-89808 • August 2024