

# Energy Storage for Renewable Energy Integration in India

## Context

The Indian electricity sector faces substantial challenges marked by a surge in demand and heavy reliance on coal. Despite achieving 99% electrification in 2020, the Indian Government anticipates further growth, aiming to double the electricity generation capacity by 2030. Coal-fired power plants dominate, constituting 72% of the total electricity generation in 2020, with an additional 100 GW of diesel generators as backup. However, political shifts have led to a decline in new coal-fired power station constructions, emphasising renewable energies. While solar and wind energy costs are competitive, the intermittent nature necessitates complementary storage technologies for round-the-clock reliability. Current storage costs pose challenges. Grid infrastructure expansion must align with renewable capacity additions to prevent congestion. The Government of India set up a 'Round-the-Clock' tender to combine renewable energy with storage, yet implementation is pending. Introducing storage systems at various levels, including decentralisation, emerges as a solution. However, despite government support for battery manufacturing, regulatory gaps hinder decentralised storage solutions.

Project name	Energy Storage for Renewable Energy Integration in India (StoREin)
Commissioned by	German Federal Ministry for Economic Affairs and Climate Action (BMWK)
Project region	India
Lead executing agency	Ministry for New and Renewable Energy (MNRE), Government of India
Duration	2022 - 2029

## Objective

The objective of the project is to advance India's transition to renewable energy and to contribute to its climate targets by addressing challenges associated with intermittent solar and wind energy. Focused on enhancing energy storage capacity at the distribution grid level, the project aims to overcome existing economic barriers and knowledge gaps related to decentralised storage systems. By strengthening policy frameworks, demonstrating financial feasibility through on-the-ground applications, and building awareness and capacity among key stakeholders, the project seeks to facilitate the integration of viable storage solutions.



Photo: Battery Energy Storage

## Approach

The project focuses on advancing knowledge through collaborative efforts, seeking to optimise synergies and support India's carbon-neutral initiatives. It engages a diverse array of stakeholder groups, including ministries, electricity commissions, authorities at central, state, and nodal levels, DISCOMs, private companies, hospitals, malls, and other public infrastructure entities.

## Published by

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## The Benefits

**I:** Improving conditions for an enhanced policy and regulatory framework for decentralised energy storage systems.

**II:** Providing evidence on use cases and viable business models through demonstration projects.

**III:** Conducting project studies and strengthening research and development networks to enhance the understanding of viable decentralised energy storage system applications in the Indian research community.

**IV:** Enhancing human capacity on energy storage planning, design, implementation, and operation.

**V:** Raising awareness of key stakeholders on decentralised energy storage systems through the dissemination of project findings.

## Contributions to the 2030 Agenda



Photo: Power Poles with PV in the background

## Expected Results

The project is expected to yield multiple benefits at different levels, improving the framework conditions for the introduction of viable storage system applications at the distribution level. The following achievements are envisaged under the project by 2029:

- Three initiatives, regulations or policies related to decentralised energy storage have been updated or introduced by the relevant agencies at the national or state level.
- Three governmental representatives on the level of Deputy Secretary or higher have disseminated results that were obtained from operation of the demonstrations projects or that are contained in the analyses conducted.
- One research roadmap for decentralised energy storage for India has been developed by a Forum comprising prominent Indian research institutes and experts, ensuring the representation of women. Specific thematic sub-groups are created on technology selection, standards, applications/end-uses, business models, battery recycling, safety, skill development, women workforce.

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