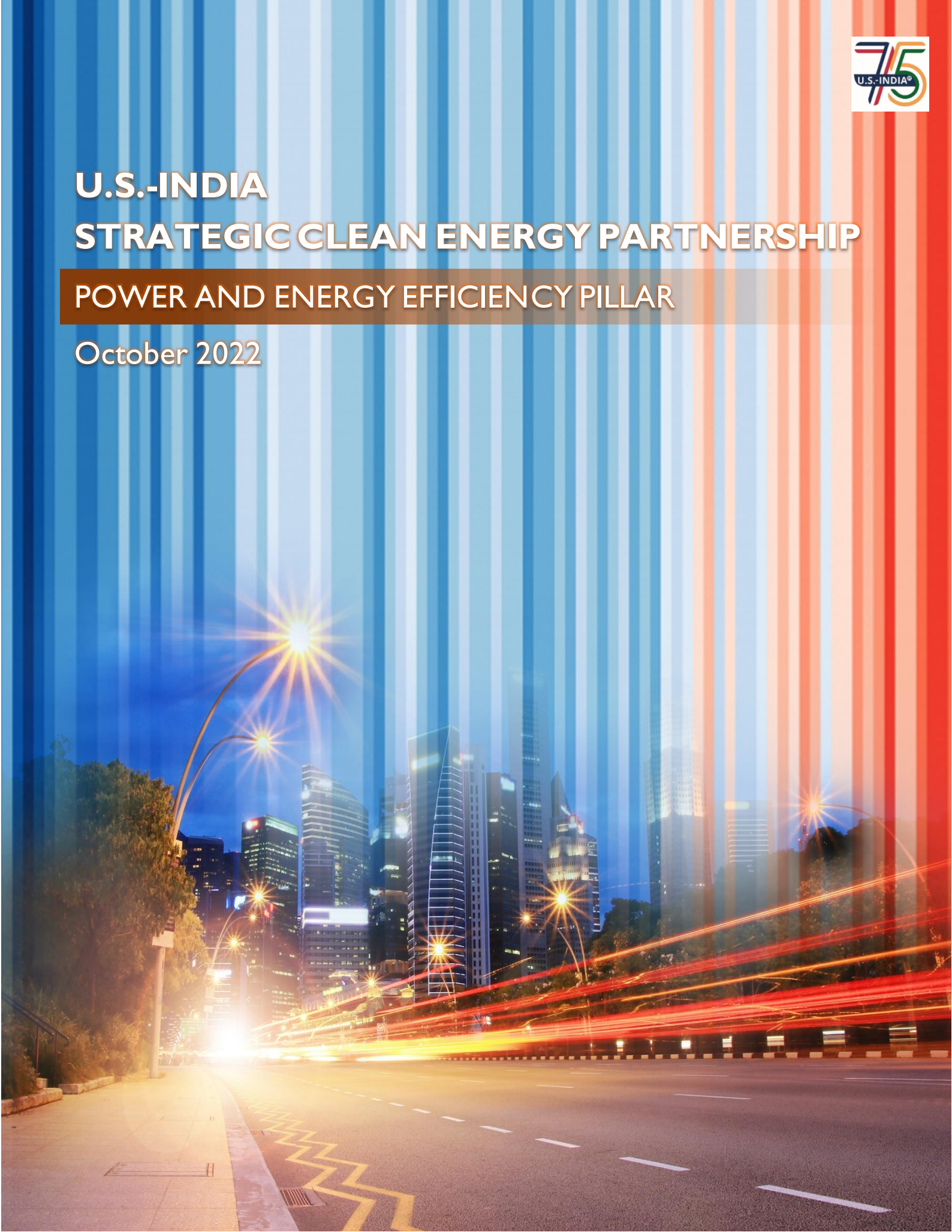




U.S.-INDIA STRATEGIC CLEAN ENERGY PARTNERSHIP

POWER AND ENERGY EFFICIENCY PILLAR

October 2022



GOVERNMENT OF INDIA
MINISTRY OF POWER



USAID
FROM THE AMERICAN PEOPLE



U.S. DEPARTMENT OF
ENERGY

USTDA
U.S. TRADE AND DEVELOPMENT AGENCY



U.S. International
Development
Finance Corporation

EXIM
EXPORT-IMPORT BANK
OF THE UNITED STATES



PARTNERSHIP OVERVIEW

OUTLINE

On the margins of the April 2021 Leaders Climate Summit, President Biden and Prime Minister Modi announced a new high-level U.S.-India Climate and Clean Energy Agenda 2030 Partnership, to accelerate progress toward shared climate and clean energy goals. The Agenda 2030 Partnership includes two tracks of engagement: 1) the Strategic Clean Energy Partnership (SCEP), and 2) the Climate Action and Finance Mobilization Dialogue. The U.S.-India SCEP builds upon a longstanding and fruitful bilateral energy dialogue focused on energy security and innovation. The SCEP was revitalized in September 2021, placing greater emphasis on electrification and decarbonization of processes and end uses, scaling up emerging clean energy technologies, finding solutions for hard-to-decarbonize sectors; and deploying technical solutions. Engagement with the private sector and other stakeholders remains a priority to facilitate rapid technology deployment and create economic opportunities for both countries. The U.S. Department of Energy and India's Ministry of Petroleum and Natural Gas lead overall engagement under the SCEP with robust interagency engagement on both sides.

STRATEGIC CLEAN ENERGY PARTNERSHIP PILLARS



UN Climate Change Conference Glasgow 2021 (November 2021)



"We can create an environment that raises the standard of living around the world. And this is a moral imperative, but it's also an economic imperative – if we fuel greater growth, new jobs, and better opportunities for all our people."

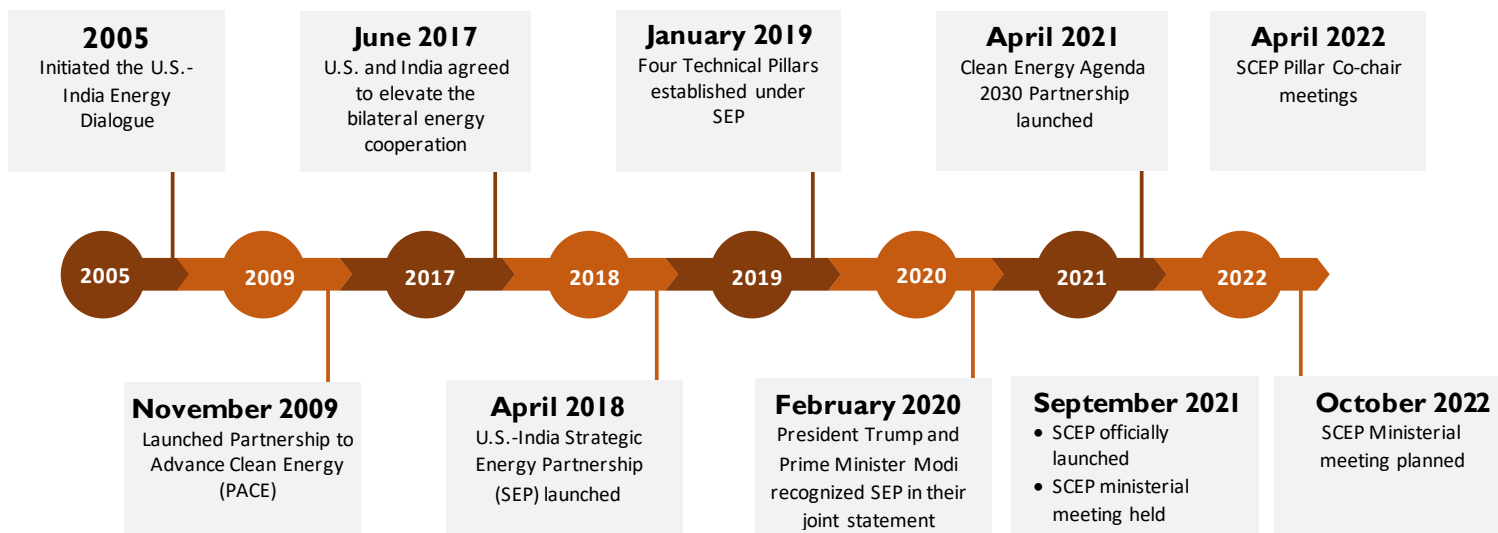
Joe Biden
President of the United States



"With the India-U.S. Climate and Clean Energy Agenda 2030 partnership, together we will help mobilize investments, demonstrate clean technology, and enable green collaborations."

Narendra Modi
Prime Minister of India

THE JOURNEY SO FAR



PILLAR OVERVIEW



The Power & Energy Efficiency Pillar works to improve the reliability, resilience, flexibility, affordability, and sustainability of the power system. It encourages the reliable grid integration of the massive amounts of renewables that India aims to install as part of its 500GW nonfossil installed capacity goal, while also addressing rising energy demand. It works to modernize and improve grid infrastructure through smart grid technologies, energy storage, distributed energy resources, clean energy installation, digitization, and enhanced cybersecurity. It also works to reduce emissions through the use of emerging technologies like carbon capture, utilization, and storage (CCUS). Furthermore, the pillar works to transform utilities in order to facilitate India's power market transformation. It will also support the integration of a regional power grid to allow for greater development. Finally, the pillar promotes super-efficient appliances, improves energy efficiency and conservation in buildings and industrial processes.

Power & Energy Efficiency Pillar Co-Chairs



Andrew Light

Assistant Secretary for
International Affairs
U.S. Department of
Energy



Ajay Tewari

Additional Secretary for
International Cooperation
and Energy Transition
Ministry of Power



SUCCESS STORIES

U.S.-India Collaborative for Smart Distribution System with Storage (UI-ASSIST):

With support from U.S. Department of Energy and the Department of Science and Technology, the UI-ASSIST consortium (comprised of 30 U.S. and Indian universities, institutes, and industry partners) is working to advance the development of electric distribution systems in both the United States and India. UI-ASSIST focuses on providing affordable, clean energy while maintaining grid reliability and resiliency, and is promoting grid innovations that will advance economic growth and energy security in both countries. Now in its final year, the team will advance developed technologies to test beds and field demonstrations in both the United States and India. This collaborative R&D is part of the longstanding U.S.-India Partnership to Advance Clean Energy-Research (PACE-R) program.



UI-ASSIST Workshop at IIT Delhi (Credit: UI-ASSIST program)



Groundbreaking Ceremony on 17 June 2022 to Start Fieldwork at Chhabba Niwada & Bargadiya Purwa

Best Practices for Transforming India's Built Environment:

Building upon a Building Innovation Guide (BIG) workshop series (called the "BIGathon"), the DOE Lawrence Berkeley National Laboratory (LBNL) held a series of roundtables with Infosys, Indian Institute of Technology Madras Research Park (IITM-RP), the Indian Institute of Science (IISc) Bangalore, and other organizations, to expand the BIG focus on connected, smart buildings and post-COVID "back-to-work" healthy buildings. Through these stakeholder consultations, LBNL, Infosys, and IISc co-authored a "BIGathon+" whitepaper released in November 2021. The white paper identifies challenges in the built environment with the backdrop of the pandemic and climate crisis and recommends multi-sectoral solutions at the building, community and national-and regional-level. LBNL has also launched a quarterly webinar series, Global Building Technologies and Urban Systems (Global BTUS), inviting top experts from the Indo-Pacific region to share information, best practices, and engage in potential alignment with DOE laboratories. The purpose is to share recommendations from the BIG with stakeholders across the Indo-Pacific region and foster interest to include additional case studies from the region. These stakeholder consultations have led to expanded work on transforming India's built environment through emissions reductions in the buildings sector and assessing opportunities for grid-integration for load management.



SUCCESS STORIES

Supported the Ministry of Power (MoP) in the largest-ever rollout of smart meters worldwide:

USAID SPARC partnered with MoP and NSGM in the rollout of 250 million smart prepaid meters, largest such initiative in the world. This rollout is a key component of MoP's flagship reform 'Revamped Distribution Sector Scheme' (RDSS) of USD 42 billion. USAID developed a holistic 'consumer engagement toolkit' for smart meters with an objective to help raise consumer awareness and engage consumers proactively for active participation in the smart metering program. Additionally, USAID developed an Investment Analysis Toolkit for a holistic assessment of smart grid use cases such as advanced metering infrastructure, peak load management, outage management system, net metering, EV charging, etc. The toolkit comprised of an open-source, web-based Cost-Benefit Analysis tool, practitioner guide covering methodology, definitions, formulas and assumptions and quick walkthrough video of the tool.

USAID South Asia Regional Energy Partnership (SAREP) signed a MOU with National Power Training Institute (NPTI) and Power Sector Skill Council (PSSC) for capacity building of discoms officials and technicians on smart meters. The program developed a training manual on smart meters installation on ground. It also developed training courses on IT/communications technology in smart metering, data analytics, SCADA, IT/OT technologies.

Study Tour of High-Level Government of India Delegation to U.S. on Smart Grid Technologies:

A study tour to U.S. was organized for a high-level Indian delegation comprising of senior Indian officials to provide the participants with access to best practices in smart grid technologies being implemented in the U.S. This exposed the high-level delegation to innovative technologies related to smart grids & clean energy implemented, live demonstration of smart grid technologies, and gain insights from experts & practitioners in the energy space in U.S.



Indian Delegation Visit to Los Angeles Department of Water and Power (LADWP)

Enabling Advanced Technologies for Modernizing Power Distribution Utilities:

Advanced technologies like Artificial Intelligence (AI)/Machine Learning (ML), drone applications, and asset-management solutions offer a huge potential to improve the operational efficiency and financial health of discoms.

USAID SPARC supported REC, MoP in conceptualizing and developing a framework to enable advanced technologies in power distribution. The focus of the framework included leveraging existing network of Technology Solution Providers (TSPs) including Startups, creating advanced technology-based use cases at the DISCOM level and supporting launch of the POWERTHON 2022 – a hackathon conducted to shortlist TSPs.

USAID SAREP organized a stakeholder's workshop on AI/ML for high-performing discoms in collaboration with Power Finance Corporation Limited (PFC) in November 2021. The workshop was attended by more than 150 participants from 50 discoms.

USAID SAREP has developed a white paper on 'Applications of Drones in the Power Distribution Sector'.



SUCCESS STORIES

Partnering States for Modernization of Distribution Utilities:

USAID SAREP has partnered with the state of Madhya Pradesh (MP) to modernize their discoms through implementation of advanced technology solutions. The program has initiated deployment of Proof-of-Concept (POC) projects in key discoms of MP on frontier technologies across thematic areas like theft detection and revenue assurance, asset health monitoring using data analytics and using drone applications, and consumer experience transformation. The POCs will be scaled up by the state based on successful outcomes.



Program Kick-off and Workshop to Advance Solutions for Power Distribution, Bhopal, Madhya Pradesh

Inviting bidders for TSREDCO & TSSPDCL office

Telangana Government has floated an e-tender for construction of a **Super ECBC Compliant and Net Zero Energy office building** for TSREDCO (Telangana State Renewable Energy Development Corporation Ltd.) and TSSPDCL (Telangana Southern Power Distribution Company Limited) at Mint Compound, Hyderabad.

Work Package 1: Civil, Plumbing & Firefighting

End date: 19.01.2022 (14:00 hrs)

More information: tender.telangana.gov.in>>'More.'>> Tender ID: 286212

Source: USAID MAITREE

Initiated New Concept of Grid Interactive Net Zero Energy Buildings as Last Mile Element of a Future Smart Grid:

USAID Market Integration & Transformation for Energy Efficiency (MAITREE), in partnership with National Smart Grid Mission (NSGM), introduced the concept of Grid Interactive Net Zero Energy Buildings (NZEBS) as last mile element of a future smart grid in India. USAID MAITREE organized a 'Zero-In Dialogue' series that brought together global experts to deliberate on various aspects like policies, regulations, technologies and consumer behavior related to grid interactive NZEBs.

USAID MAITREE also supported Telangana state (TSREDCO and TSSPDCL) to design and build the first SuperECBC Grid-Interactive Net Zero Energy Building in South Asia, to be built in Hyderabad.

Strengthened the uptake of building energy codes (ECBC):

USAID MAITREE supported the Lucknow Development Authority (LDA) to develop and adopt a Vision and Roadmap for Energy Efficient and Green Buildings. As a part of this vision, all future projects in the city will be ECBC (commercial and residential) compliant. Over 4,000 green and energy efficient affordable housing units were designed and built to be compliant with the Residential ECBC (ENS). Developed and launched the ECBC App and web portal to guide building owners, engineers and architects in application of Energy Conservation Building code requirements.



SUCCESS STORIES

Design of National Chiller Energy Efficiency Program:

USAID MAITREE, in partnership with EESL, designed and launched the National Chiller Energy Efficiency Program (NCEEP). The program is aimed at accelerating the replacement of old chillers and lower cooling energy intensity in centralized airconditioned buildings.

The program undertook a detailed market feasibility assessment on chiller plant replacement in India and assess distribution of chiller population by age, cooling capacity, technology etc. Additionally, the assessment included market demand for ESCO financing and forecasts for chiller replacement. USAID MAITREE developed business models for EESL partnering with private sector ESCOs for scaling EE in India. Organized and facilitated a consultation workshop on Private ESCO Engagement Initiative for EESL.



ESCO Engagement Initiative



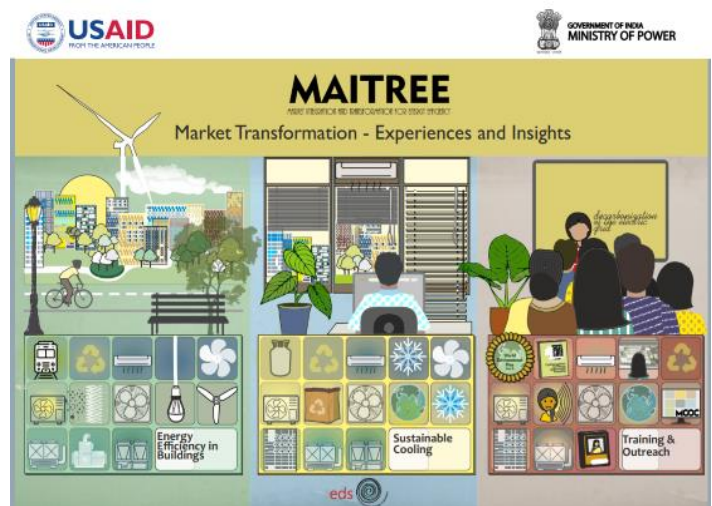
Source: EESL

Enabling Sustainable Public Procurement for Advancing Green Cooling in India:

USAID MAITREE collaborated with United Nations Environment Programme (UNEP) to introduce a new category of Green Room Air Conditioners on the Government eMarketplace (GeM) as a part of the Sustainable Public Procurement (SPP) initiative of the Government of India. The GeM portal has enabled all central and state government agencies to buy super-efficient and environment friendly green ACs. More than 12,000 green ACs were sold in the first six months of the launch. The program also developed and released a whitepaper on 'Advancing Green Cooling through Sustainable Public Procurement'.

Launch of Energy Efficiency Market Transformation Report:

USAID Market Integration and Transformation for Energy Efficiency (MAITREE) program has addressed the interlinked challenge of cooling and building energy efficiency. The program activities have focused on market transformation for energy efficient and green buildings in India; by leveraging private investments, and strategic use of public funds while formulating an implementation framework for the widespread adoption of a particular strategy or technology. The program supported the uptake of cutting-edge technologies, innovative business models, and promoted end-user engagement for large-scale interventions to accelerate adoption of energy efficiency strategies and technologies. This report summarizes the work done under the USAID MAITREE program and the market transformation effect demonstrated.



Market Transformation Report



SUCCESS STORIES

Supported Indian Railways on Energy Efficiency as a Strategic Approach Towards their Net Zero Targets:

USAID SAREP organized a national workshop with Indian Railways on 'Towards Net-Zero: Scaling-Up Energy Efficiency in Buildings and Infrastructure of Indian Railways'. Chairman Railway board, Members and more than 65 participants from all Railway zonal offices participated in this workshop. The program developed a strategy and a detailed action plan for Indian Railways on energy efficiency in non-traction both for existing and new building and facilities.



Workshop with Indian Railways on "Towards Net-Zero: Scaling-Up Energy Efficiency in Buildings and Infrastructure of Indian Railways"

Advancing Industrial Efficiency through ISO50001 Energy Management Systems:

To support industrial efficiency through implementation of the ISO50001 standard, the U.S. and India held technical exchanges on their respective energy management system (EnMS) tools and programs. The U.S. Department of Energy briefed on its EnMS software tool (50001 Ready Navigator), accreditation programs, measurement and verification, research, case studies, and success stories. India's Bureau of Energy Efficiency shared information about its own EnMS programs, including pilot projects on adoption of ISO 50001 in Perform, Achieve and Trad (PAT) industries, and best practices from the EnMS programs. The sides also discussed worker training, performance recognition and facility certification. DOE and BEE are considering conducting training for small and medium-sized enterprises. DOE and BEE will also commence training on tools for calculating potential energy savings for waste heat recovery in industrial processes and how to assess decarbonization benefits.



The sides continue sharing lessons learned and best practices, including across the winning teams.

Growing Innovators on Net Zero Efficient Buildings Powered by Renewables:

The U.S. and India continued collaborating between the DOE's Solar Decathlon™ (SD) and Solar Decathlon India (SDI) (led by the Indian Institute for Human Settlements and AEEE) on collegiate competitions to prepare the next generation of building professionals to design, build, and advocate for high-performance, zero energy buildings. A successful design competition was completed in both countries with continued collaboration on respective build competitions in future phases. The SD/SDI programs challenged teams to develop high-performance, energy efficient, low carbon buildings that also address affordability and resilience.



SUCCESS STORIES

Strengthened the capacities of Indian regulators on Forward Contracts and Financial Derivatives:

On the request from Indian central electricity regulatory commission (CERC), USAID hosted several workshops and training on forward contracts and financial derivatives in the power sector. This included a series of six webinars with case studies from the United States, Europe, and India on the use of derivatives in the power sector. USAID also organized a three-day training and curated a study tour to Europe on financial derivatives for the Indian Forum of Regulators to gain an understanding of financial derivatives, associated risks and measures to address them.



Capacity building on Forward Contracts and Financial Derivatives

Enhanced Understanding on Fostering Competition and Financial Management of Utilities:

USAID hosted a study tour to the United States for a delegation from Ministry of Power, Central Electricity Authority (CEA), Department of Economic Affairs, and Tata Power to provide exposure to practical information, case studies, and best practices in effective accounting, debt collection, revenue enhancement programs and systems, and improvement programs.



Study tour to the United States

Creating Market Opportunities for Pumped Hydro Energy Storage (PHES) in India:

USAID through its SAREP program is providing technical assistance to Central Electricity Authority (CEA) to promote Pumped Hydro Energy Storage (PHES) in India. This includes development of a PHES site attractiveness tool so that various PHES sites can be compared and suitable sites can be identified.

Support to Forum of Regulators (FOR) on scaling and integration of renewable energy:

USAID is supporting FOR to develop regulatory frameworks, guidelines, and undertaking supporting studies for renewable energy and its grid integration. SAREP is providing support to various technical committees and working groups of FOR on resource adequacy, ancillary services mechanism, Energy storage and Electric Vehicles, management of RE curtailment, green energy open access, advanced technologies. As part of the engagement thus far, SAREP has supported in a draft report on regulatory framework for energy storage and electric vehicles, regulatory guidelines to minimize renewable energy curtailment for reasons other than technical and grid security and recommendation on pumped storage.



SUCCESS STORIES

Phase 2 of South Asia Group for Energy (SAGE) to be launched:

USAID partnered with three U.S. Department of Energy National Laboratories - National Renewable Energy Laboratory (NREL), Lawrence Berkeley National Laboratory (LBNL), and the Pacific Northwest National Laboratory to offer state-of-the-art technical analyses and modeling, with capacity building for local partners. The SAGE consortium will implement research, analysis, and capacity building activities focused on energy sector opportunities in India and throughout South Asia. The goal is to equip USAID partner governments with critical information and consultation, enabling strategic investments along South Asia's path to self-reliance. Under the first phase, SAGE undertook a detailed scoping on Resilient, Reliable and Sustainable Power Systems for South Asia and developed three papers on decarbonization roadmap for South Asia, Air Quality Challenges and roadmap, and Transition from Coal which were disseminated through webinars. Phase 2 of SAGE is now awarded and ready to be formally launched in November 2022.

Collaboration on Energy Storage

DOE in partnership with the Foreign Commercial Office organized a technical session on the potential for U.S.-India collaborations in the long-duration battery storage. The session organized during the Renewable Energy India (REI) Expo 2022 in Greater Noida, registered views from DOE, National Renewable Energy Laboratory, Indian Energy Storage Alliance and U.S. industry players including EOS Energy Enterprises and Invinity Energy Systems. Bringing together insights from policy, research and industry viewpoints, the session provided a platform to initiate discussions between stakeholders on both sides to explore, evaluate and identify partnership opportunities. Several technical webinars being planned on the subject over next months will help us to crystalize these partnership opportunities to concrete actions.



Session on Long Duration Battery Storage at REI 2022



OTHER KEY ACHIEVEMENTS



- DOE and MoP launched a new Energy Storage Task Force to facilitate an ongoing and meaningful dialogue among U.S. and Indian government officials, industry representatives, and other stakeholders to help scale up and accelerate deployment of energy storage technologies to facilitate clean energy transition.
- DOE and DST organized a series of U.S.-India deep dive expert exchanges on 1) carbon capture, 2) carbon utilization and conversion, and 3) carbon storage to discuss research capabilities and priorities, share challenges and approaches, and identify research areas of greatest interest for collaborative R&D under the U.S.-India Partnership to Advance Clean Energy-Research (PACE-R).
- DOE and the Bureau of Energy Efficiency launched a new effort to develop a Building Sector Outlook to reduce the carbon footprint of buildings (both operational and embodied carbon), and to develop a Grid-Integrated Efficient Buildings feasibility framework to assess opportunities for grid-connected buildings in load management.
- Initiated exchanges with India's Ministry of Housing and Urban Affairs (MoHUA) to share best practices and latest technology solutions for high-performance energy efficient buildings and design as part of the Central Vista project and in affordable housing under the PMAY scheme with experiences shared by DOE's Better Buildings Program and Department of Housing and Urban Development.
- Under the U.S.-India Clean Energy Finance Task Force, the U.S. Department of State issued a report, including policy recommendations, on "Business Model for Scaling Up Super-Efficient Appliances" with a focus on increasing adoption of super-efficient fans among low-income consumers.
- USAID through its SAREP program will be supporting Central Electricity Authority (CEA) in developing a threat model and cybersecurity maturity index for Indian utilities.
- Supported Telangana State Renewable Energy Development Corporation to develop a grid interactive building, which is now in the advanced stages of construction.
- Organized a national workshop with Indian Railways on "Towards Net-Zero: Scaling-Up Energy Efficiency in Buildings and Infrastructure of Indian Railways". Chairman Railway board, Members and more than 65 participants from all Railway zonal offices participated in this day long workshop.
- Developed action points for Indian Railways on energy efficiency covering strategies for energy efficiency in non-traction such as at appliance level and facility level.
- Conducted energy audits of sample buildings for developing a national program for Indian Railways on energy efficiency retrofitting of existing buildings.
- Through SAREP partnership fund, initiated grant projects on behavioral demand response with Tata Power Delhi Distribution Limited, as well as developing, delivering, and disseminating India-specific methodologies to facilitate grid interactive buildings in India.
- Partnered with the Nalanda University, TSREDCO and CREDA for advancing green and Net Zero energy buildings. Nalanda University Net Zero Energy Campus was presented as an exemplary case study in BRICS Workshop on Energy Efficiency and Clean Energy 29-30 April, 2021, hosted my Ministry of Power





The pillar will continue to strengthen engagement according to the following agreed priorities:

- Modernize power system infrastructure and strengthen electricity systems for a more reliable, secure, efficient, affordable, and cleaner energy supply. Modernization efforts may be accomplished through implementation of smart grids, grid integration of renewables, energy storage, distributed energy resources, flexible resources, ancillary services, and enhanced digitization and cybersecurity.
- Support reform of the distribution sector through new business models, increased private sector participation, incubation and deployment of smart distribution technologies, and strengthening of institutions.
- Promote energy efficiency and conservation, including in buildings, appliances, and the industrial sector; promote use of information and communication technologies (ICT) in energy efficiency.
- Support power market transformation and technology deployment by improving the investment climate, including through improved procurement practices, ease of doing business, new business models, regulatory oversight, and private sector engagement.
- Support utility modernization and integration of power grids in South Asia and Indo Pacific to support development of clean energy.
- Promote industrial decarbonization, including in sectors like steel and cement, through electrification, energy efficiency, and emerging technologies (e.g., CCUS and hydrogen).



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