BIMSTEC ENERGY CENTRE

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Editorial

Welcome to 3rd Edition (Jan 2026) of our Quarterly (Oct-Dec 2025) BIMSTEC Energy Centre (BEC) e-Newsletter.

The October–December 2025 quarter marked a period of constructive engagement and key milestones for the BIMSTEC Energy Centre (BEC), reflecting its growing role as a regional hub for energy cooperation, knowledge sharing, and capacity building within the BIMSTEC region.

During the quarter, BEC organized two major online Capacity Building Programmes (CBPs). The CBP on *Hot Line Maintenance in Transmission Lines (HLM)* focused on advanced preventive maintenance techniques that enable critical works without shutdowns, thereby enhancing grid reliability, safety, and availability. Experts from Power Grid Corporation of India Limited shared practical insights on HLM principles, live-line working methods, specialized tools, safety practices, and innovative applications, highlighting the importance of modern maintenance approaches amid increasing renewable energy integration.

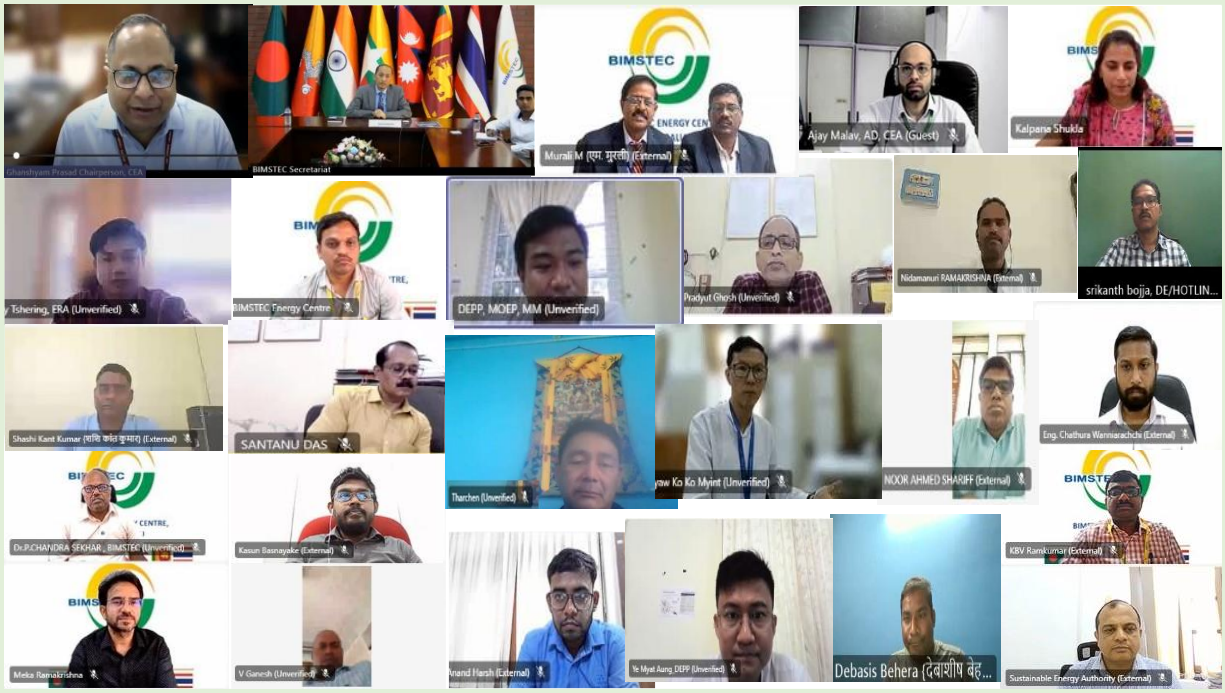
Another major CBP on *Grid Operational Challenges in View of Energy Transition* brought together over 225 participants from BIMSTEC Member States, including system operators, planners, engineers, and regulators. The programme addressed global energy transition trends, evolving demand patterns, large-scale renewable integration, emerging high-impact loads, inverter-based resources, and expanding cross-border interconnections. Drawing on India's experience, discussions emphasized the need for robust transmission planning, updated grid codes, advanced forecasting and digital tools, system flexibility, cybersecurity, and strengthened regional interconnections to ensure reliable and resilient grid operations.

Institutional strengthening was further advanced by the visit of H.E Shri Indra Mani Pandey, Secretary General, BIMSTEC Secretariat, to BEC on 12th December 2025. The visit provided strategic guidance on staffing, institutional networking, operational autonomy, and sustained capacity building, reaffirming strong support for BEC's mandate and future growth.

As we welcome the New Year, the BIMSTEC Energy Centre extends its warmest greetings and best wishes to the Governments and people of all BIMSTEC Member States. May the new year bring peace, prosperity, good health, and success to all, and may it further strengthen the spirit of partnership and mutual trust that underpins BIMSTEC cooperation.

Ghanshyam Prasad
Executive Director

Online Capacity Building Programme on "Hot Line Maintenance in Transmission Lines"



BIMSTEC Energy Centre (BEC) conducted an online Capacity Building Programme on '*Hot Line Maintenance in Transmission Lines*' on 14 October 2025.

The programme provided a valuable platform for engineers, professionals and experts from BIMSTEC Member States to exchange knowledge on preventive transmission line maintenance without shutdowns, helping to improve grid reliability. The session covered key aspects of Hot Line Maintenance (HLM), including its principles, live line maintenance methods, tools and safety practices. The programme also discussed various HLM applications in transmission lines and substations, as well as the use of insulated aerial work platforms and telescopic insulated bucket trucks.

The programme opened with a welcome address by Shri Ghanshyam Prasad, Executive Director, BEC, who emphasized the importance of capacity building, experience sharing, and Hot Line Maintenance in ensuring grid reliability and safety amid growing renewable energy integration.

In his special address, Shri Tshewang Dorji T, Director (Environment and Climate Change), BIMSTEC Secretariat, appreciated BEC's leadership in advancing regional energy cooperation and highlighted the Centre's role in strengthening grid interconnection, policy frameworks, and technical capacity. He underlined the relevance of Hot Line maintenance for reliable power supply and noted that future partnerships would further support sustainable energy development in the BIMSTEC region.

Key highlights of the Programme:

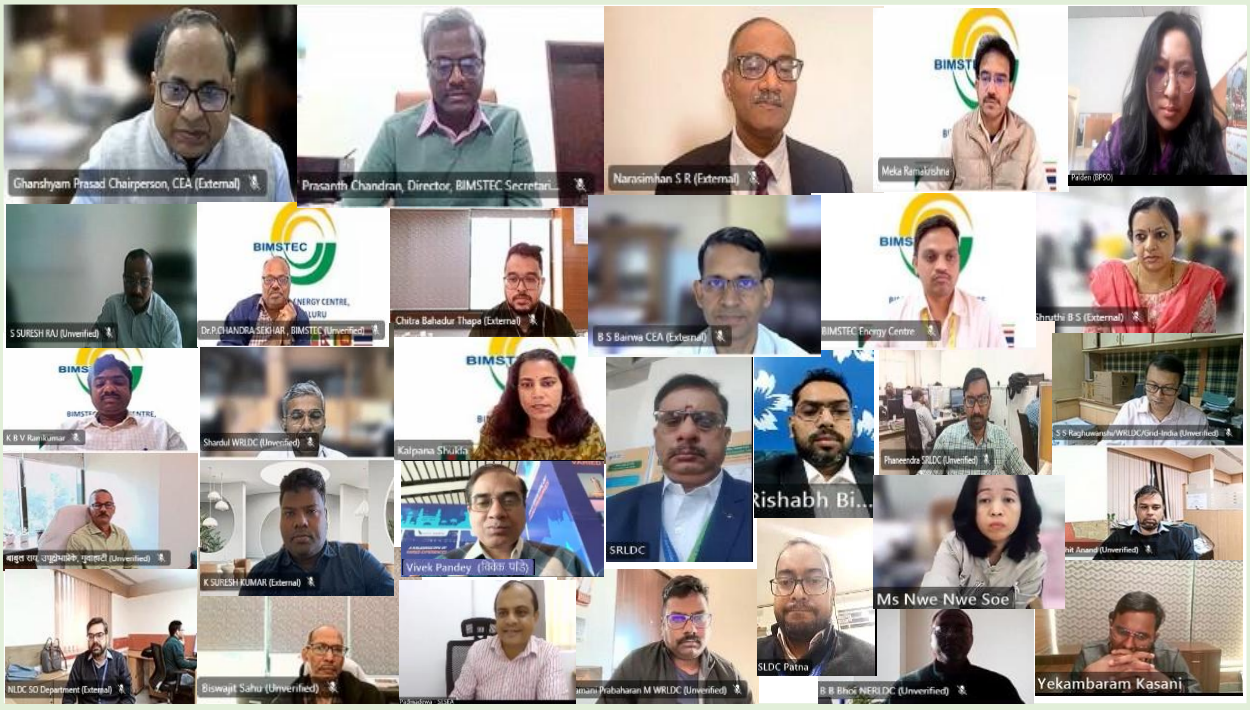
The Programme highlighted the role of Hot Line Maintenance (HLM) as a critical preventive maintenance practice for transmission lines and substations, enabling replacement of insulators, jumpers, vibration dampers, and rectification of defects without line or bay shutdowns, thereby ensuring high system availability. The fundamental principle underlying HLM was explained.

Participants were introduced to key live line maintenance techniques, including the hot stick method, bare hand method, and a combination approach, along with specialized protective gear such as conductive and epoxy suits. Emphasis was placed on safety protocols, safe working distances, and operational do's and don'ts to ensure secure execution of live-line works.

The Programme showcased the effective application of HLM for insulator replacement, conductor and spacer repairs, fixing of jumper connections, and corona control components. Special case studies covered advanced HLM applications, including the installation of Dynamic Line Loading (DLL) sensors on 400 kV lines and innovative maintenance works on 765 kV transmission systems.

HLM applications in substations, such as live replacement of insulators and bus droppers, cleaning and lubrication of EHT isolators, and rectification of hot spots, were also discussed. In addition, the use of Insulated Aerial Work Platforms (IAWP)/telescopic insulated bucket trucks was demonstrated through case studies, highlighting their effectiveness in executing complex live-line maintenance tasks safely and efficiently.

Online Capacity Building Programme on "Grid Operational Challenges in View of Energy Transition"



BIMSTEC Energy Centre (BEC) conducted an online Capacity Building Programme on '*Grid Operational Challenges in View of Energy Transition*' on 09 December 2025.

Over 225 participants from BIMSTEC Member States including system operators, planners, engineers, and regulatory professionals joined the event. The Speaker for the CBP was Shri S.R. Narasimhan, former Chairman & Managing Director, Grid Controller of India Limited. The programme covered global energy trends, technical challenges, and operational imperatives arising from the energy transition. It addressed the rapid changes occurring in power systems due to large-scale renewable energy integration, increasing cross-border interconnections, and emerging high-impact loads such as electric vehicles, data centres, green hydrogen, and induction cooking.

Shri Ghanshyam Prasad, Executive Director BEC during the welcome address, highlighted the growing engagement of BIMSTEC Member States. He emphasized the operational and reliability challenges arising from large-scale renewable energy integration and increasing cross-border interconnections, noting India's experience with high renewable penetration and its implications for regional grid stability.

Shri Prasanth Chandran, Director, BIMSTEC Secretariat, in his special address, appreciated BEC's expanding role in regional capacity building and underlined the relevance of the programme amid accelerating energy transitions. He highlighted the increasing complexity of grid operations and the value of India's experience for BIMSTEC countries, while encouraging continued training initiatives and progress on regional grid interconnection frameworks to strengthen power cooperation.

Key learnings from the Programme:

- Energy transition is multi-dimensional, driven by climate change, rising emissions, SDGs, and the energy trilemma of security, equity, and sustainability, requiring decarbonized, decentralized, and digitalized power systems.
- Electricity demand patterns are changing rapidly due to next-generation loads such as air conditioning, heat pumps, electric cooking, EVs, green hydrogen, and data centres, leading to sharper peaks, higher ramping needs, and greater stress on grids.
- Large-scale renewable energy integration poses reliability challenges, including reduced system inertia, frequency and voltage control issues, and vulnerability to contingencies, as demonstrated by international grid disturbances and blackouts.
- High penetration of inverter-based resources (IBRs) and distributed energy resources necessitates updated grid codes, advanced standards (e.g., ride-through, frequency response), and compliance monitoring.
- Resource adequacy and system flexibility must be ensured across all time horizons, supported by energy storage, ancillary services, demand response, and capacity markets.
- Robust transmission planning and grid strengthening are critical, especially in renewable-rich zones, incorporating energy storage, reactive power support, grid-

forming inverters, system protection schemes, and resilience to extreme weather events.

- Accurate forecasting, scheduling, and situational awareness—supported by digital tools, AI/ML, synchro-phasors, and Renewable Energy Management Centres—are essential for reliable real-time grid operation.
- Cross-border interconnections offer significant benefits, enabling diversity in demand and generation, smoothing renewable variability, enhancing balancing, and improving regional grid resilience within BIMSTEC.
- Grid resilience and cybersecurity are emerging priorities, requiring disaster preparedness, secure OT–IT systems, continuous audits, and skilled manpower.
- Capacity building in modelling, simulation, and system operation, along with well-designed electricity markets, is vital to complement physical infrastructure and ensure long-term grid reliability during the energy transition.

Visit of the Secretary General, BIMSTEC to BEC

H.E. Shri Indra Mani Pandey, Secretary General, BIMSTEC Secretariat, Dhaka, visited BIMSTEC Energy Centre (BEC), Bengaluru on 11 December 2025 and interacted with the BEC staff. During the visit, Shri Ghanshyam Prasad, Executive Director, BEC & Chairperson, CEA, Dr. J Sreedevi, Director General (DG), CPRI and Shri B S Bairwa, CE (PSPA-II), CEA also participated in the session.

Shri Ghanshyam Prasad, Executive Director, BEC, welcomed the Secretary General, BIMSTEC and briefed him on the establishment, operationalization, and key activities of the BIMSTEC Energy Centre. He acknowledged the guidance of the BIMSTEC Secretariat and the technical, institutional, and financial support of CPRI in making BEC fully functional. He highlighted BEC's progress in capacity building, with three

online programmes conducted in 2025 and participation exceeding 200 delegates from Member States. The BEC team presented the Centre's mandate, organizational structure, staffing and infrastructure status, digital platforms, and planned activities.

The Secretary General appreciated BEC's work and advised strengthening staffing, monitoring construction of the permanent building, and developing direct networks with Member State institutions to enhance operational autonomy. He encouraged BEC to follow successful regional models, continue capacity building despite limited participation, and focus on trust-building and tangible outcomes for Member States. He emphasized patience, sustained effort, and faster implementation to enable BEC to evolve into a self-sustaining regional institution.

Key Energy & Power Developments across the BIMSTEC Region during October-December 2025

Bangladesh:

- New policy, titled "Enhancement of Private Participation in the Renewable Energy-based Power Generation," took effect October 14, 2025 enabling private and foreign investment in renewable energy–based power generation, targeting 20% renewables by 2030.

Bhutan:

- India and Bhutan have signed a Memorandum of Understanding (MoU) aimed at expanding their long-standing energy collaboration beyond hydropower to include solar, wind, biomass, green hydrogen, and energy storage technologies. The partnership will facilitate joint research, technology transfer, and capacity building, enabling Bhutan to establish a more diversified and resilient energy portfolio. India will provide financial and technical support, with a focus on scalable project development and market integration.
- Bhutan's Carbon Market Framework 2025 was officially released in December 2025 as the comprehensive national framework guiding carbon market participation and implementation under the Paris Agreement.

India:

- As of 31 October 2025, India's total installed power generation capacity crossed 505 GW, with non-fossil fuel sources exceeding a 51 % share, a key step in transitioning to clean energy. Country met its Nationally Determined Contributions target of securing 50% of its installed power capacity from non-fossil fuel sources, achieved five years ahead of schedule.
- A comprehensive policy for co-firing municipal solid waste charcoal in coal thermal power plants was released. The policy aims to utilise surplus agricultural residue

and unmanaged municipal waste to reduce emissions and support the Swachh Bharat Mission.

- ❖ Year 2025 marks Highest-Ever Renewable Energy Expansion in India's Energy Transition Journey as India adds record 44.5 GW renewable energy capacity in 2025 (till November 2025). Solar Installed Capacity touches 132.85 GW as nearly 35 GW was added and Wind capacity reaches 54 GW after 5.82 GW increase.

Nepal:

- ➢ A memorandum of understanding (MoU) was signed between India's Power Grid Corporation and the Nepal Electricity Authority (NEA) for the development of the 400kV Inaruwa (Nepal)–New Purnea (India) and 400kV Dododhara (Nepal)–Bareilly (India) double-circuit transmission systems. These critical transmission links are expected to boost power exchange capabilities between the two countries, fostering energy security, grid stability, and economic growth across the region.

Thailand:

- ➢ Thailand's National Energy Policy Council (NEPC) approved the preliminary framework for the implementation of the "Community-based Solar Power Generation Project", which is part of Thailand's Ministry of Energy's "Quick Big Win" policy initiative. This project aims to enhance local energy security and reduce electricity costs for local communities nationwide.

Nuclear Energy and the Path to a Net-Zero Future

Introduction

Climate change has emerged as one of the most pressing challenges of our time. Rising global temperatures, extreme weather events, and environmental degradation highlight the urgent need to drastically reduce greenhouse gas emissions. To limit global warming to 1.5°C and achieve net-zero emissions by mid-century, the global energy system must undergo a profound transformation. While renewable energy sources such as solar and wind are expanding rapidly, evidence increasingly shows that nuclear energy plays a critical and complementary role in achieving a reliable, low-carbon future.

Why Nuclear Energy Matters for Net-Zero

Nuclear power is one of the world's largest sources of low-carbon electricity. Today, it supplies about 10% of global electricity and more than one-quarter of all low-carbon power worldwide. Over the last five decades, nuclear energy has helped avoid approximately 70 gigatonnes of carbon dioxide (CO_2) emissions and continues to prevent over 1 gigatonne of CO_2 annually.

A key advantage of nuclear energy is its round-the-clock availability. Unlike variable renewable sources that depend on weather conditions, nuclear power provides stable and dispatchable electricity. This reliability strengthens grid stability and supports the large-scale integration of renewables, ensuring uninterrupted power supply even when solar and wind output fluctuates.

Supporting Clean Electricity and Beyond

Electricity generation accounts for nearly 40% of global energy-related CO_2 emissions, but the remaining emissions come from industry, heating, and transport sectors that are difficult to decarbonize. Nuclear energy stands out as one of the few clean technologies capable of addressing both electric and non-electric energy needs.

Advanced technologies such as Small Modular Reactors (SMRs) and next-generation reactors are being developed to serve these roles more flexibly and cost-effectively, opening new pathways to deep decarbonization.

Why SMRs Matter

Small Modular Reactors are advanced nuclear reactors with a power capacity typically ranging from less than 30 MWe to about 300 MWe. Unlike traditional large reactors, SMRs are designed for factory-based manufacturing, modular construction, and faster on-site installation. This approach can reduce construction time, improve quality control, and lower project risks.

According to international projections, global nuclear capacity must double by 2050 to align with net-zero pathways, and SMRs are expected to be a major contributor to this growth.

Key Advantages of SMRs

SMRs offer several advantages that make them well-suited for the evolving energy landscape:

- **Flexibility:** SMRs can operate as base-load power sources or adjust output to complement variable renewable energy such as solar and wind.
- **Enhanced Safety:** Many SMR designs incorporate passive safety systems, reduced emergency planning zones, and simplified reactor designs.
- **Scalability:** Capacity can be increased gradually by adding modules as demand grows.
- **Versatility:** Beyond electricity, SMRs can provide industrial process heat, district heating, desalination, and clean hydrogen production.
- **Site Adaptability:** SMRs can be deployed in remote or off-grid locations and can repurpose retired coal-fired power plant sites.

These features make SMRs especially attractive for countries seeking reliable clean power without the high upfront investment and long construction timelines associated with large reactors.

Replacing Coal and Enabling a Just Transition

Coal remains one of the most carbon-intensive fuels, responsible for a significant share of global emissions and air pollution. Replacing coal-fired power plants with nuclear facilities can dramatically cut emissions while maintaining energy security.

Importantly, nuclear energy also supports a "just transition." Nuclear projects create long-term, high-skilled employment and stimulate local economies, helping communities previously dependent on fossil fuels transition without severe economic disruption. Several countries have successfully used nuclear power to phase out coal while protecting jobs and ensuring affordable electricity.

Global Momentum and the Road Ahead

Many countries are now recognizing nuclear energy as an indispensable part of their climate strategies. According to international energy scenarios, global nuclear capacity must double by

2050 to meet net-zero targets. This will require extending the life of existing reactors and building new capacity, supported by clear policies, public acceptance, and sustained investment.

Almost half of the emissions reductions needed by 2050 are expected to come from new and emerging low-carbon technologies, including advanced nuclear systems. Ensuring that nuclear energy has a place in climate and energy policy discussions is therefore essential.

Initiatives in the BIMSTEC Region:

India's **Sustainable Harnessing and Advancement of Nuclear energy for Transforming India (SHANTI) Act, 2025** explicitly promotes the application of nuclear science and technology beyond power generation, including in healthcare, food, water, agriculture, industry, research, environment, and emerging technologies such as artificial intelligence and advanced manufacturing. By enabling the use of nuclear energy for hydrogen production, process heat, and other non-electric applications, the Act aligns nuclear development with broader national and global decarbonisation strategies.

Conclusion

Achieving a net-zero world is not possible with a single solution. It requires a diverse, resilient, and science-based energy mix. Nuclear energy—safe, reliable, and low-carbon—offers a proven solution that complements renewables, strengthens energy security, and supports economic development. As the world accelerates climate action, embracing nuclear energy alongside other clean technologies will be crucial to avoiding the worst impacts of climate change and securing a sustainable future for generations to come.

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