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MINISTRY OF ELECTRONICS AND INFORMATION TECHNOLOGY

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VASUDHA FOUNDATION
Green ways for a good earth!

White Paper

AI for CleanTech Transformation:

Driving Low-Energy Intelligence for Inclusive Climate Action

Pre-Summit Event Summary | India–AI Impact Summit 2026

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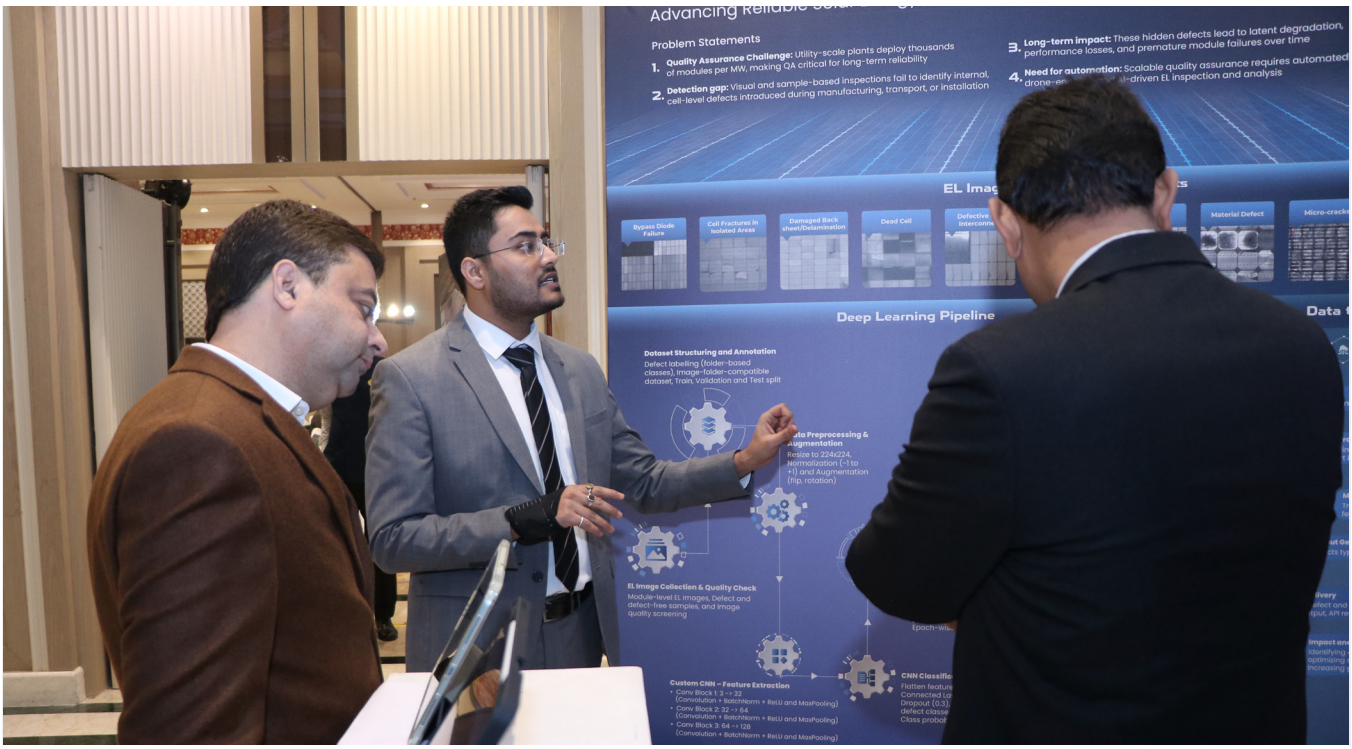
Introduction

Artificial Intelligence (AI) is rapidly emerging as a general-purpose technology with far-reaching implications for energy systems, climate action, and sustainable development.

Advances in machine learning, data availability, and computational capacity have accelerated AI deployment across sectors, positioning it both as a growing source of energy demand and a critical enabler of the clean energy transition and climate resilience. As countries pursue ambitious climate targets alongside digital transformation agendas, shaping the AI-energy-climate nexus has become a key policy and implementation priority.

A room full of engaged minds and active conversations

India stands at a pivotal intersection of rapid economic growth, accelerating digitalisation, and urgent climate action. With rising energy demand, ambitious decarbonisation commitments, and a fast-expanding AI ecosystem across industry, academia, and public institutions, India is uniquely positioned to leverage AI to drive a clean, resilient, and inclusive development pathway on its journey toward net zero by 2070. At the same time, India's high exposure to climate risks, ranging from extreme heat and floods to droughts and cyclones, underscores the importance of AI for climate adaptation, including weather forecasting, early warning systems, risk analytics, and decision support, as recognised under the UNFCCC framework.



Mr Jaideep Saraswat presenting the AI-Driven Detection in Solar PV Modules Using Electroluminescence (EL) Imaging

In this context, the AI for CleanTech Transformation: Driving Low-Energy Intelligence for Inclusive Climate Action pre-summit event served as a focused platform to connect policy priorities with real-world clean technology deployment and emerging AI system choices. Bringing together policymakers, global development institutions, clean technology and mobility platforms, AI solution providers, startups, and research organisations, the event examined how carefully chosen, energy-efficient, and people-centric AI models can support climate mitigation and adaptation, strengthen institutions, and empower end users, while generating actionable insights for policy, research collaboration, and responsible AI adoption in India's clean energy transition.

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Session I

Plenary Session

- The plenary session set the overarching vision for the pre-summit, positioning AI as a strategic enabler for India's clean energy and climate action goals, while emphasising the need for low-energy, responsible, and people-centric AI deployment.
- In his welcome address, Mr Srinivas Krishnaswamy (CEO, Vasudha Foundation) highlighted that AI has moved beyond being a niche technology and is now central to decision-making across sectors. Its real value lies not just in computational power, but in the ability to translate large, complex datasets into actionable insights aligned with development and climate priorities.

Mr Srinivas Krishnaswamy (CEO, Vasudha Foundation India) addressing the audience during the plenary session

- A strong emphasis was placed on the principle that there can be no AI strategy without a robust data strategy. Data quality, governance, accessibility, and contextual relevance were identified as decisive factors that determine whether AI delivers real-world impact or merely sophisticated outputs with limited value.
- Vasudha Foundation's early recognition of this need was reflected through the India Climate and Energy Dashboard (ICED), a globally unique, open, and integrated platform that consolidates climate and energy data to support evidence-based policymaking, research, and industry decision-making. ICED was highlighted as a foundational digital public good enabling AI-led insights across the energy and climate ecosystem.
- The session showcased practical AI applications already being deployed by Vasudha Foundation, including renewable energy and demand forecasting, net-zero pathway modelling, grid and system optimisation, targeted solar rooftop outreach planning, and AI-based diagnostics for solar module performance - demonstrating AI's tangible value across the clean energy value chain.
- Alongside opportunities, the environmental footprint of AI itself was acknowledged candidly. The discussion highlighted the growing energy intensity of data centres and AI workloads, underscoring the importance of choosing efficient models and use cases that maximise impact while minimising energy and emissions costs, a core theme underpinning the event.

- Ms Swetha Ravi Kumar (Executive Director, FSR Global) emphasised the transformative role of AI and data in making the power sector more efficient, reliable, and inclusive. She introduced the India Energy Stack (IES) as a digital public infrastructure initiative of the Ministry of Power aimed at enabling secure, interoperable, and stakeholder-driven data access, rather than creating a centralised data lake.

Ms Swetha Ravi Kumar, Executive Director, FSR Global

- The IES framework was presented as a platform to democratize innovation in the power sector, supporting over 70 identified use cases such as distributed energy resource integration and peer-to-peer trading. With extensive stakeholder engagement and a structured adoption strategy, IES was positioned as critical for grid integration, utility modernisation, and scaling AI applications at the state level.
- Mr Abhijeet Sinha (National Program Director, Ease of Doing Business & National Highways for EV) reflected on AI as a source of intelligence that must be carefully aligned with regulatory frameworks and ethical decision-making. He highlighted real-world AI applications in the EV and highway ecosystem, including energy balancing at charging stations, vehicle-to-vehicle communication for safety, and asset monetisation, illustrating how AI can optimise infrastructure while balancing economic and environmental priorities.

Mr Abhijeet Sinha, National Programme Director, Ease of Doing Business & National Highways for EV

- Dr Mohammad Rihan (Director General, National Institute of Solar Energy) emphasised that the green energy transition and AI development are mutually reinforcing. With the rapid scale-up of distributed and variable renewable energy, particularly under schemes like PM Surya Ghar, AI was identified as essential for grid integration, demand-side response, time-of-use tariffs, and managing variability across seasons and load profiles.

Dr Mohammad Rihan, Director General, National Institute of Solar Energy

- In the keynote address, Mr Mohammed Y. Safirulla K. IAS (Director, IndiaAI Mission, MeitY) situated clean-tech AI within India's broader national AI strategy. He highlighted significant public investment in AI infrastructure, compute capacity, and indigenous foundation models, while underlining the mission's four objectives: democratizing AI, fostering local innovation, enabling AI-for-good applications, and aligning with global AI governance standards.

Mr Mohammed Y. Safirulla K. IAS, Director, IndiaAI Mission, MeitY

- The plenary concluded with a shared consensus that AI for clean technologies must be inclusive, scalable, and grounded in public-interest outcomes - delivering affordable energy, resilient systems, and livelihoods - while ensuring that AI itself remains sustainable, efficient, and aligned with India's climate and development imperatives

Plenary Session

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Session II

Plenary Session

Choosing the Right AI: Narrow and Generative Models in Clean Technology Systems

- The panel discussion explored a central question for AI-led clean technology deployment: not all problems require the same kind of intelligence, and choosing between narrow AI and generative models has significant implications for energy efficiency, system reliability, and sustainability.
- Setting the context, Mr. Jaideep Saraswat (Associate Director, Vasudha Foundation) reflected on how the public release of generative AI tools like ChatGPT transformed learning, knowledge creation, and organisational workflows. However, he emphasised that innovation and sustainability must reinforce each other, and that responsible AI adoption requires deliberate choices rather than defaulting to large, energy-intensive models.

Panel Discussion 1 | Choosing the Right AI Approach: Narrow and Generative AI in Clean Technology Systems

- Mr Ashis Panigrahi (Co-Founder and Director, DOMAINXEED) clarified the distinction between narrow AI and generative AI. Narrow AI models are task-specific, deterministic, and optimised for prediction, classification, control, and forecasting, making them well-suited for applications such as energy load estimation and system optimisation. In contrast, generative AI creates new content and enables new business models but often comes with significantly higher energy costs.

Mr Ashis Panigrahi, Director, IndiaAI Mission, MeitY

- Responding to the growing tendency to rely on larger datasets and increasingly complex models, the panel emphasised the need to shift the conversation from data maximisation to model efficiency, transfer learning, and contextual intelligence - particularly in energy- and resource-constrained clean-tech systems.
- Mr Thomas Mampilly (Fractional CxO, Project Tech4Dev) shared a practical example of building small, targeted models to identify housing types using limited data and strong human insight. The case demonstrated that resilience-building and targeted interventions do not require large models, but rather thoughtful problem definition and localised intelligence.

Mr Thomas Mampilly, Fractional CxO, Project Tech4Dev

- The discussion highlighted a key concern: LLMs are increasingly being used indiscriminately, without assessing whether their energy intensity is justified for the task at hand. Participants argued for a "carrot and stick" approach, where energy efficiency becomes a core criterion before selecting or deploying any AI model.
- Mr Bharani Kumar Depuru (CEO and Co-Founder, AiSPRY; Visiting Faculty, ISB) used a compelling analogy - using a Formula 1 car to buy groceries - to illustrate the inefficiency of applying large models to simple tasks. He introduced the concept of model routing, where queries are automatically directed to the most appropriate model size, minimising unnecessary energy use while preserving performance.

Mr Bharani Kumar Depuru, CEO and Co-Founder, AiSPRY; Visiting Faculty, ISB

- Transparency emerged as a critical enabler of responsible AI. The panel noted that global regulatory developments, such as the Artificial Intelligence Act of the European Union (EU AI Act) and emerging disclosures on energy and carbon intensity per AI query, could push technology providers to adopt more efficient architectures and give users greater visibility into the environmental cost of AI use.
- Ms Uma Soni (Vice President, Mobius by Gaian) cautioned against equating AI progress solely with efficiency gains or monetisation. She emphasised the need to build intelligence that is adaptive and pattern-driven, rather than narrowly optimised for single use cases, ensuring AI systems remain flexible and inclusive over time.

Ms Uma Soni, Vice President, Mobius by Gaian

- The panel also discussed how AI energy impact must be measured beyond traditional metrics like Power Usage Effectiveness (PUE). Attention should be paid to the full lifecycle energy consumption of AI, covering both model training and inference, and critically, to the net system-level benefits delivered, such as energy savings, emissions reductions, and improved reliability.
- Data centres were reframed not only as energy consumers but also as potential participants in demand response, capable of shifting workloads and supporting grid flexibility if enabled by policy and market mechanisms.
- Referencing emerging research on frugal and efficient AI models, the panel underscored the importance of public digital goods, cascading model architectures, and system-level efficiency as guiding principles for AI deployment in clean technology.
- The session concluded with a shared outlook that the future of AI in clean tech must be reliable, inclusive, transparent, and energy-aware, with success measured not by model size or novelty, but by how effectively AI solves real-world problems while minimising its environmental footprint.

Panellists of Panel Discussion 1

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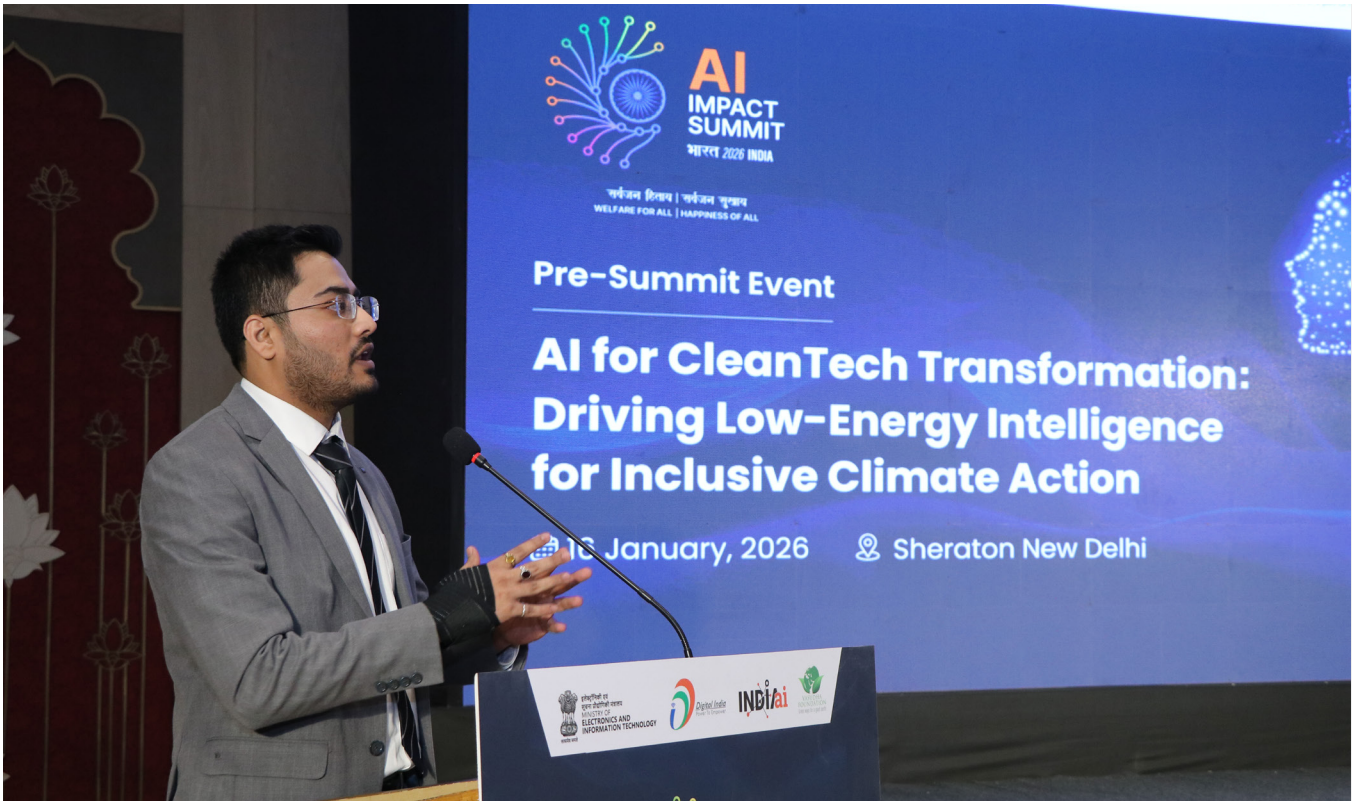
Session III

Spotlight Session I

Operationalising AI in Clean Technologies: Applications, Data, and Deployment

- The spotlight session focused on translating AI concepts into deployable, real-world clean technology solutions, emphasising that the success of AI lies not in model sophistication alone, but in problem formulation, data quality, explainability, and user-centric deployment.
- Setting the tone, Mr Jaideep Saraswat (Associate Director, Vasudha Foundation) highlighted that effective AI adoption begins with asking the right question. Using examples from predictive maintenance, the discussion stressed that identifying which components are most likely to fail is often more valuable than predicting failure in general, as it directly informs actionable decisions on the ground.



Mr Jaideep Saraswat, Associate Director, Vasudha Foundation, addressing the Spotlight Session I

- Speakers underscored the importance of structured AI development methodologies, where clear problem definition, confidence levels, and explainability are essential - particularly in operational contexts where technicians and operators must trust AI outputs to act on them.
- The session also addressed emerging shifts in AI deployment, including the transition from cloud-based AI to edge AI, and from ad-hoc "vibe coding" to agentic and automated coding approaches, reflecting the need for faster, more secure, and context-aware decision-making in energy systems.

Mr Bharani Kumar Depuru

- Mr Akash Kaushik (Co-Founder, GoodEnough Energy) highlighted the complexity of applying AI to battery energy storage systems (BESS). Predicting degradation, state of charge, and remaining useful life remains challenging due to the loosely coupled nature of models and real-world variability across cells and operating conditions. He emphasised the need for integrated modelling approaches that consider these parameters together to improve reliability and availability.

Mr Akash Kaushik, Co-Founder, GoodEnough Energy

- Mr Ankur Sharma (Co-Founder, Flock Energy) emphasised a critical gap in the energy ecosystem: valuable energy and operational data exist but are underutilised or inaccessible to end users, particularly consumers. He argued that AI deployments must be consumer-centric, ensuring that data-driven insights ultimately empower those who are affected by energy system decisions.

Spotlight Session I - Operationalising AI in Clean Technologies: Applications, Data and Deployment

- Mr Kiran Kumar Jasti (Senior Vice President, Propel Industries) shared on-the-ground insights from deploying AI in electric trucking and heavy mobility systems. Given low digital literacy among many users and high safety risks, AI-based monitoring of driver behaviour, braking response, and vehicle usage was highlighted as essential for improving safety, operational discipline, and trust in EV adoption.

Mr Kiran Kumar Jasti, Senior Vice President, Propel Industries

- Mr Satish Vishwakarma (Fleetx.io) presented large-scale AI deployment in the logistics sector, a major contributor to emissions. With hundreds of thousands of connected devices and AI-enabled dashcams, Fleetx uses AI for route optimisation, fuel monitoring, load planning, driver behaviour analysis, and smart contracts, directly linking operational efficiency with cost savings and CO reduction.

Mr Satish Vishwakarma, Fleetx.io

- A recurring operational challenge discussed was data interoperability and standardisation, especially when dealing with hundreds of sensors and equipment from multiple OEMs. Speakers emphasised the importance of shared data dictionaries and standardised formats to ensure consistent, high-quality analytics across various assets, including wind turbines and storage systems.
- In discussing grid-scale storage and digital twins, speakers noted that real-world conditions often diverge from simulated models, with cell-level variability and changing usage patterns requiring continuous recalibration of AI systems to remain effective.
- The session also identified opportunities to automate utility operations and training, noting that many utilities still rely on outdated operational frameworks that do not reflect the growing integration of batteries, distributed renewables, and flexible demand.
- AI was highlighted as a powerful tool for behaviour change, particularly in transport and logistics. By providing real-time feedback, alerts, and performance assessments, AI systems can improve driving behaviour, reduce accidents, and ease the transition from internal combustion vehicles to EVs.
- During the closing reflections, speakers identified priority areas for future action: building indigenous AI capacity and talent, strengthening safety standards, designing solutions with the end user in mind, ensuring data governance and localisation, and starting AI deployments with a clear long-term vision for scalability and security.
- The session concluded with a shared understanding that operational AI in clean technologies must be grounded in trust, usability, and real-world constraints, ensuring that technological advances translate into measurable environmental, safety, and efficiency gains.

Panellists of Spotlight Session I

Session IV

Spotlight Session II

Operationalising AI in Clean Technologies: Applications, Data, and Deployment

- Spotlight Session II shifted the focus from technology and deployment to the human and institutional dimensions of AI in climate action, emphasising that while AI can enable scale, trust, resilience, and impact are built at the ground level with people and institutions.
- Setting the context, Ms Vrinda Gupta (Associate Director, Vasudha Foundation) highlighted that climate action ultimately plays out locally. AI-led innovation must therefore be accompanied by accountability, transparency, and accessible data, ensuring that technological progress translates into real benefits for communities.

Ms Vrinda Gupta, Associate Director, Vasudha Foundation

- Mr Vikas Kanungo (Senior AI and Digital Transformation Expert, World Bank Group) reframed AI as a tool for unlocking public value from data rather than a purely technological intervention. He noted that with the advent of large language models, the definition of digital literacy has shifted - from people learning how to use technology to machines learning how people communicate and make decisions, creating what he termed a "digital dividend."

Mr Vikas Kanungo, Senior AI and Digital Transformation Expert, World Bank Group

- Drawing from agricultural use cases, he highlighted AI-enabled chatbots deployed in Maharashtra that integrate weather, soil, landholding, and crop data to deliver highly personalised advisories to farmers, ranging from irrigation and disease management to market timing, demonstrating how AI can directly empower end users.
- He further emphasised AI's role in reducing data fragmentation and enabling governments to move from reactive responses to proactive climate action by integrating diverse datasets and applying general AI algorithms to anticipate risks and guide early interventions.
- On institutional strengthening, Mr Kanungo underscored the importance of standardising data and AI architectures to support scalable solutions. Initiatives such as geo-spatial platforms integrating satellite and departmental data were cited as improving both administrative efficiency and field-level verification.

- Dr Lata Vishnoi (Scientist D, Indian Meteorological Department) outlined India's progress in applying AI and advanced computing to weather forecasting and agrometeorological services. She highlighted the increasing granularity of forecasts, from seasonal to block-level daily advisories, supporting millions of farmers through platforms like Agromet Advisory Services and community-based dissemination channels such as Mausamgram.

Dr Lata Vishnoi, Scientist D, Indian Meteorological Department

- AI-driven automation under national agricultural meteorology programs was presented as a way to scale advisory services equitably, especially for small and marginal farmers, while maintaining scientific rigour and reliability.
- Mr Shashank Misra (Founder & CEO, Ekak Innovations) reflected on building AI solutions in agriculture with a clear problem-first approach, stressing that equity and inclusion must often be designed into AI systems, particularly when working with smallholders, rather than assumed to emerge organically.

Mr Shashank Misra, Founder & CEO, Ekak Innovations

- Mr Akshat Goel (CTO, Farmers for Forests) discussed the use of AI in agroforestry and climate mitigation, where satellite and drone imagery, combined with deep learning models, are used to assess land eligibility, monitor tree cover, and support voluntary carbon initiatives. AI was positioned as critical to overcoming the cost, scale, and verification challenges inherent in agroforestry adoption.

Mr Akshat Goel, CTO, Farmers for Forests

- The moderated panel discussion surfaced key challenges in downscaling data to local contexts, including data reliability, standardisation of observation networks, and the computational intensity of generating granular models - often requiring high-performance computing resources.

Spotlight Session II - Harnessing AI for Climate Action to Empower People, Leverage Data and Strengthen Institution

- A recurring concern was digital exclusion, as large segments of farmers lack access to smartphones or digital tools. Speakers emphasised the need for multi-channel dissemination strategies and institutional intermediaries, such as CSOs and local governance structures, to bridge this gap.
- Multilateral institutions were highlighted as key enablers, bringing cross-country experience, policy expertise, and implementation support to help governments align AI strategies with local realities and build scalable digital public infrastructure.
- The session reinforced that inclusive AI requires intentional design choices, strong partnerships with civil society, and continuous engagement with end users to ensure that solutions reflect real needs rather than technological enthusiasm alone.

Panellists of Spotlight Session II

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Conclusion

Collectively, the sessions underscored that AI's true value in clean technologies lies not in scale or complexity alone, but in purposeful design, efficient model choice, strong data foundations, and deep engagement with end users and institutions. From national digital public infrastructure and grid modernisation to last-mile agricultural advisories and logistics optimisation, the discussions highlighted that AI must remain transparent, energy-aware, and grounded in real-world constraints. The pre-summit concluded with a shared recognition that advancing AI for climate action in India will require coordinated efforts across government, industry, civil society, and academia, ensuring that AI strengthens resilience, enables inclusive growth, and accelerates the clean energy transition while remaining aligned with India's broader development and climate imperatives.

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