ORGANIZER

ISGF
India Smart Grid Forum

THE ENERGY SINGULARITY SUMMIT 2027

05 - 10 APRIL 2027

NEW DELHI INDIA

Builds on the 12 Editions of India Smart Utility Week (ISUW) conducted by India Smart Grid Forum (ISGF) since 2015

India SMART UTILITY Week

is now

THE ENERGY SINGULARITY SUMMIT (TESS)



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#TESS2027

THE ENERGY
SINGULARITY
SUMMIT 2027

The Energy Singularity Summit (TESS) 2027 is an International Conference and Exhibition for Energy sector, organised by the India Smart Grid Forum (ISGF), building on 12 successful editions of the India Smart Utility Week conducted since 2015. TESS 2027 will be held in New Delhi from **05–10 April 2027.** TESS 2027 will comprise of plenaries, keynotes, roundtables, technical sessions, technical paper presentations, tutorials, and technical tours, and bilateral workshops. **The 11th edition of the ISGF Innovation Awards will also be held as part of TESS 2027 on 09 April 2027**

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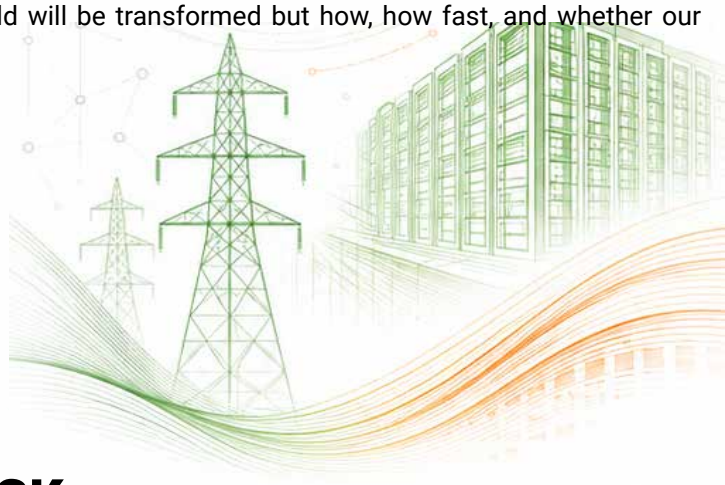
THE RACE TO AI SINGULARITY

"Singularity" – the point at which artificial intelligence surpasses human cognitive capacity and begins self-directed recursive improvement is no longer a speculative horizon. Successive generations of frontier AI models now arrive in weeks, not years, each expanding the boundary of what machines can do. The stakes are civilisational from AI-accelerated scientific discovery and unprecedented productivity to profound questions on accountability, equity and governance. The race toward AI singularity is underway – the question is not whether the world will be transformed but how, how fast, and whether our infrastructure can keep pace.

May 2026

"When we look back at this time, I think we will realize that we were standing in the foothills of Singularity"

– **Nobel Laureate Demis Hassabis**, *CEO of Google DeepMind*



THE ELECTRICITY BOTTLENECK:
POWER AS THE CRITICAL PATH TO AI SINGULARITY

Despite its apparent immateriality - its existence as patterns of numbers flowing across fiber and silicon, AI is a profound physical phenomenon. Training a single frontier model can consume as much electricity as tens of thousands of homes use in a year; inference across billions of users multiplies that demand many times over.

- The IEA projects global data centre electricity consumption to exceed **1000TWh annually by 2030**
- Data centres consuming up to **9 - 17% of US electricity** and similar inflection points approaching in Europe, Southeast Asia and India
- AI campuses demand power that is continuous, stable and clean, but transformer delivery times have stretched to **3-5 years globally**
- Interconnection queues are decade long, and net-zero commitments remain arithmetically impossible on **fossil-fuel electricity.**

The power grid is not a supporting actor in the AI story: it is the critical path. Without a grid that is simultaneously more powerful, more flexible, more reliable, and powered by green electricity, the trajectory toward AI Singularity will be throttled not by the limits of intelligence, but by the limits of the infrastructure that sustains it.

July 2025

"AI's natural limit is electricity, not chips. We need to plan ahead to ensure we have the energy needed to meet the many opportunities and challenges that AI puts before us."

- **Eric Schmidt**, *former CEO and Executive Chairman of Google*

ENERGY SINGULARITY:
A PARALLEL TRANSFORMATION

25 July 2026

"We are in Singularity"

– **Sam Altman**, *CEO of OpenAi*

Energy Singularity is AI Singularity's necessary counterpart in the physical world – the point at which the electricity system becomes self-optimising, fully decarbonised and structurally capable of meeting the demands of an AI-driven civilisation without constraint. It is the defining double challenge of the coming decade: **power AI and decarbonise the planet; and the two mandates are deeply complementary.**

A renewable-dominated grid requires intelligence, flexibility and storage that make it robust enough to serve AI-scale loads; and AI is exactly the tool needed to manage such a grid's complexity.

The grid that can power AI is the same grid that can save the planet. Recognizing and acting on this convergence is the strategic insight at the heart of Energy Singularity



SELF - OPTIMISING ELECTRICITY SYSTEM

FULLY DECARBONNISED GRID

STRUCTURALLY CAPABLE OF MEETING GW-SCALE DEMANDS

INTELLIGENT, FLEXIBLE & RESILIENT

INDIA'S STRATEGIC ROLE AND ISGF'S MISSION

India stands at the precise intersection of both Singularities. As the world's fastest-growing major renewable energy market having crossed 279 GW of installed renewable capacity in Q1/2026, with a committed trajectory to 500 GW of non-fossil capacity by 2030 and as one of the most dynamic emerging AI economies on the planet, India faces the dual mandate of Energy Singularity in its most acute and consequential form. How India powers its AI ambitions while decarbonizing a grid still significantly dependent on coal will be one of the defining energy stories of the coming decade, with implications far beyond its borders.

It is against this backdrop that the India Smart Grid Forum, building on twelve successful editions of the India Smart Utility Week conducted since 2015 as one of the world's foremost platforms on smart energy, is launching The Energy Singularity Summit (TESS). TESS is conceived as a global convergence point, where the urgency of AI's power demands meets the ambition of a decarbonized, intelligent grid; where fusion scientists share a stage with grid operators and AI researchers; where the policy frameworks, investment models, and international partnerships needed to accelerate both singularities are forged.

World **Fastest-Growing** Major Renewable Energy Market

279 GW+ Installed Renewable Capacity (Q1/2026)

500GW Non-Fossil Capacity Target by 2030

One of the **World's Most Dynamic AI** Economies

A Singularity Convergence Point for Dual Singularities - **AI and Energy Singularity**

EMERGING TECHNOLOGIES ENABLING ENERGY SINGULARITY



A powerful convergence of technology streams is making Energy Singularity achievable, not as a distant aspiration, but as an engineering and policy programme already underway.

Advanced Renewables: Next-generation solar technologies like perovskite cells approaching 30% efficiency, bifacial modules and agrivoltaic co-deployment are dramatically reducing the land and capital requirements for solar energy. Simultaneously, offshore and floating wind architectures are unlocking rich wind corridors previously inaccessible to fixed turbines.

Grid-Scale and Long-Duration Energy Storage: Energy storage serves as the linchpin of a reliable, renewable-dominated grid. Lithium iron phosphate (LFP) battery systems, which have seen cost reductions exceeding 90% over the last decade, are currently being deployed at gigawatt scale to handle short-duration balancing. Pumped hydro, flow batteries, thermal storage, and emerging iron-air and gravity-based technologies are extending economical storage durations to days and weeks

AI and Digital Superintelligence for Grid Management: Artificial intelligence is the largest new load on the grid and the most powerful tool available to manage it. By closing the loop between physical and digital energy systems, AI-driven demand forecasting, reinforcement learning for autonomous grid control, digital twins, predictive asset maintenance, and real-time dispatch optimisation enable grid operators to manage complex, distributed, and bidirectional power flows with a precision and speed beyond human capability.

Advanced Transmission Infrastructure: High-voltage direct current (HVDC) links, flexible AC transmission systems (FACTS), grid-forming inverters, and superconducting cables provide the critical physical backbone for intercontinental clean energy systems. As conventional synchronous generators retire, grid-forming inverters are stepping in to resolve grid stability challenges.

The Nuclear Renaissance (SMRs): Factory-built, standardised Small Modular Reactors (SMRs) can be sited directly adjacent to load centres, delivering the firm, dispatchable, and carbon-free baseload power that intermittent renewables alone cannot guarantee.

Quantum Technologies and Algorithms: As the grid evolves into a massively distributed network of billions of interacting nodes spanning renewable generation, EV fleets, smart buildings, and AI campuses, the mathematical complexity of real-time power flow control exceeds classical computing limits. Quantum algorithms (such as quantum annealing, QAOA, HHL, and VQE) execute complex unit commitments and grid optimisation exponentially faster than classical supercomputers. Practical adoption is already advancing to minimise electrical losses and balance load.

Microgrids and Demand-Side Flexibility: Critical infrastructure is safeguarded by islandable smart microgrids, while the demand side transforms passive consumers into dynamic balancing assets through smart meters, dynamic Time-of-Use (ToU) tariffs, Vehicle-to-Grid (V2G) bidirectional flows, and AI-managed smart buildings and campuses.

AI-Accelerated Nuclear Fusion: Commercial nuclear fusion is now approaching reality, with private companies targeting pilot fusion power plants within this decade. Artificial intelligence is the decisive catalyst in this timeline compression; machine learning models optimise plasma confinement via reinforcement learning in hours rather than years, predict and mitigate disruptions in real time, generate novel magnet geometries, and accelerate materials discovery for extreme reactor environments.

Superconductivity and AI-Driven Materials Discovery: Machine learning models trained on crystallographic and electronic structure data are currently screening millions of candidate compounds in silico to identify room-temperature, ambient-pressure superconductors, compressing discovery cycles from decades to months. Scaling these materials to manufacturing will revolutionize grid infrastructure by enabling lossless long-distance power transmission, ultra-compact power electronics, and commercially viable fusion reactor magnets.

Advanced Power Electronics and Emerging Frontiers: Wide-bandgap semiconductors, specifically silicon carbide (SiC) and gallium nitride (GaN) allow power converters, inverters, and motor drives to operate at higher voltages, temperatures, and switching frequencies with substantially lower energy losses. By reducing the size, weight, and cost of the interfaces between generation, storage, loads, and the grid, these advanced materials make the entire energy conversion chain more efficient and responsive.

Biomimicry and Artificial Photosynthesis: Applies nature-inspired chemical and biological mechanisms to engineer novel, highly efficient architectures for solar energy capture, direct clean fuel synthesis, and next -generation power system materials.

CONFERENCE THEMES

CONTINUATION FROM ISUW THEMES

- AI and Digital Superintelligence for Grid Management: Demand Forecasting, Autonomous Grid Control, Digital Twins and Predictive Maintenance
- Smart Microgrids and Resilient Power Systems for Critical Infrastructure and AI
- Demand-Side Flexibility: Smart Meters, Time-of-Use (TOU) Tariffs , Vehicle-to-Grid (V2G) and AI-Managed Smart Buildings and Campuses
- The Cooling Challenge: Cooling as a Service through District Cooling Systems (DCS) and Enhanced Flexibility for the Distribution Grid
- New Architecture and Control Systems for the Green Grid with Multidirectional Power Flows
- Digital Energy Grids: Where Customers (and Smart Appliance/EV/Drone/Robot) can Buy Electricity from the Greenest and Cheapest Source through P2P Transactions
- New Loads and New Customers: GW scale AI Data Centres, MW Scale EV Charging Stations; and Billions of Humanoid Robots and Trillions of AI Agents
- Grid-Scale and Long-Duration Energy Storage: LFP Batteries, Pumped Hydro, Flow Batteries, Thermal Storage, Iron-Air and Gravity-Based Energy Storage Technologies
- Nuclear Renaissance: Small Modular Reactors (SMRs) for Firm, Dispatchable, Carbon-Free Power
- Offshore and Floating Wind: Unlocking New Resource Frontiers
- Green Hydrogen: Long-Duration Storage and Decarbonisation of Hard-to-Abate Industries
- Enabling Policies, Regulations and Skilled Workforce with Gender Balance for the Energy Singularity Era



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New Delhi, India

NEW THEMES

- "Everything to the Grid" Energy Systems for the "Reimagined Grid"
- Advanced Transmission Infrastructure: HVDC, FACTS, Grid-Forming Inverters and Superconducting Cables
- Powering Data Centres on Land, in Orbit and under the Sea
- Wired and Wireless Charging of EVs, Drones, Humanoid Robots and Flying Cars
- Agentic AI based VPP-ESS Interconnections for Grid Flexibility
- Room-Temperature Superconductors and AI-Driven Materials Discovery
- Next-Generation Solar: Perovskites, Bifacial Modules and Agrivoltaics
- Nuclear Fusion: AI-Accelerated Path to Commercial Fusion Power
- Advanced Power Electronics: Wide-Bandgap Semiconductors (SiC and GaN) for a more Efficient Energy Conversion Chain
- Quantum Technologies and Quantum Algorithms for Power Flow Control and Optimization in Real-Time
- Biomimicry and Artificial Photosynthesis
- Cyber Security: Quantum Safe and Lattice Based Cryptography
- Emerging Space Technologies: Architecture and Energy Systems for Colonising the Moon and Mars, and the Autonomous and Zero Pollution Mobility
- Autonomous and Zero Emission Vehicles

PROGRAM STRUCTURE AND CO - HOSTED EVENTS

05 APRIL 2027 MONDAY
SPECIAL WORKSHOP

06 APRIL 2027 TUESDAY
WE3 ASIA
WE3 ASIA DINNER
IEC - IEEE - BIS Smart Energy Workshop
TESS + IRED MASTERCLASS

07 APRIL 2027 WEDNESDAY
TESS INAUGURATION
TESS CONFERENCE & EXHIBITION
BILATERAL WORKSHOPS
IRED
TESS + IRED WELCOME RECEPTION

08 APRIL 2027 THURSDAY
TESS CONFERENCE & EXHIBITION
BILATERAL WORKSHOPS
IRED

09 APRIL 2027 FRIDAY
TESS CONFERENCE & EXHIBITION
BILATERAL WORKSHOPS
IRED
ISGF INNOVATION AWARDS AND GALA DINNER

10 APRIL 2027 SATURDAY
TECHNICAL TOURS AND CULTURAL TOURS

CO - HOSTED EVENTS

IRED
CO - ORGANIZERS
DERlab | ISGF India Smart Grid Forum

WE3 ASIA
CO - ORGANIZERS
SEW | ISGF India Smart Grid Forum

BILATERAL WORKSHOPS:

- AFRICA – INDIA POWER SYSTEMS CONVERGENCE WORKSHOP
- USA – INDIA SMART ENERGY WORKSHOP*
- BRAZIL – INDIA SMART ENERGY WORKSHOP*
- UK-INDIA SMART ENERGY WORKSHOP*
- INDONESIA – INDIA SMART ENERGY WORKSHOP*

Program Under FInalization

The Journey Towards Energy Singularity begins here and now

ISGF India Smart Grid Forum

The India Smart Grid Forum (ISGF) is a Think-Tank of global repute on Smart Energy, Electric Mobility and Smart Cities. ISGF, established as a Public Private Partnership initiative of Government of India in 2011, is spearheading the mission to accelerate electric grid modernization and energy transition in India. ISGF is registered as a Not for Profit Society under Indian Societies Act and have its registered office at CBIP Building, Malcha Marg, Chanakyapuri, New Delhi 110021.

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