

Executive Report

Energy Transition & Sustainability Trends 2025

Leader Says



Ramesh Kannan

*Chief Business Officer,
Energy & Utilities, LTIMindtree*

"The journey toward a sustainable energy future is driven by transformative innovation and a deep sense of environmental responsibility. Green hydrogen stands as a beacon of clean energy, offering a zero-carbon pathway to reimagine industries and accelerate the global transition to a resilient and sustainable economy. By aligning economic priorities with environmental goals, carbon pricing emerges as a pivotal step toward reducing emissions and fostering global accountability. In parallel, advancements in downstream retail adoption exemplify the seamless integration of technology, personalization, and sustainability, empowering businesses to not only meet evolving consumer expectations but also lead the charge toward a greener tomorrow. Together, these innovations redefine the possibilities of what energy can achieve fueling progress while protecting our planet."



Parsh Ramanathan

*Global Delivery Head,
Energy & Utilities, LTIMindtree*

"In today's era, Energy is no longer just about supply and consumption. It's about intelligence, integration, and innovation. The Internet of Energy represents a pivotal shift, connecting every node of the energy ecosystem through digital intelligence and automation. By aligning cutting-edge technologies like AI-powered energy management and advanced performance monitoring, we are not just optimizing energy use but redefining resilience and efficiency for the future. Intelligent Asset Management takes this a step further, transforming assets into strategic enablers of sustainability. Together, these advancements ensure a future where energy systems are not only smarter and more adaptable but also key drivers of a cleaner, greener, and carbon-neutral world."

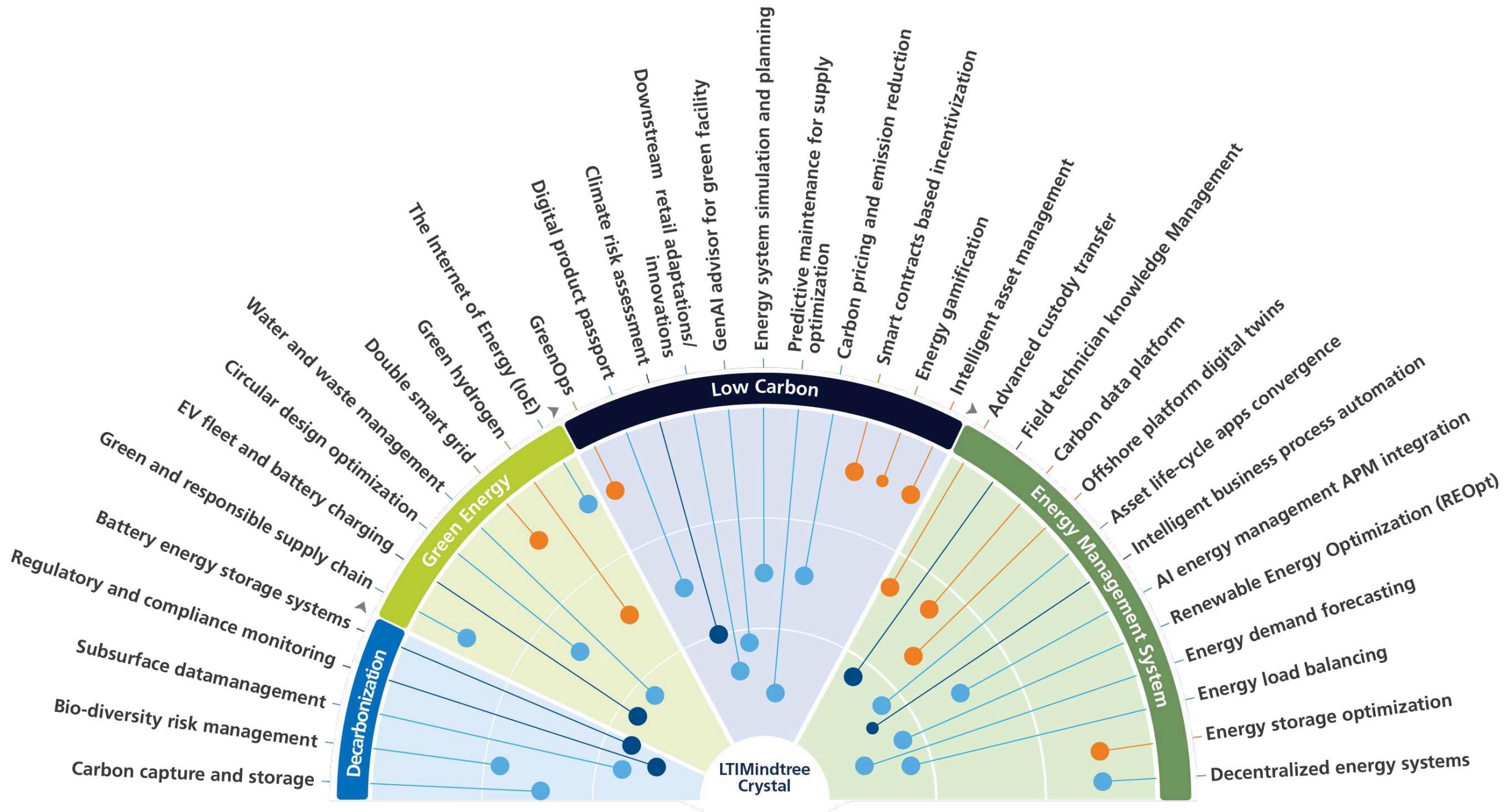


Tushar Trivedi

*Vice President,
Utilities, LTIMindtree*

"Sustainability in energy demands innovation, responsibility, and efficiency. By prioritizing water and waste management, we optimize resources and minimize environmental impact, ensuring cleaner energy systems. Energy demand forecasting provides actionable insights to meet future needs, while decentralized energy systems bring production closer to consumption, enhancing efficiency and resilience. Together, these strategies pave the way for a sustainable and eco-friendly energy future."

Energy Transition & Sustainability Trends Radar



Horizon	
Horizon 1	Technology will be in the market within 0-1 year
Horizon 2	Technology will be in the marketplace within 1 - 3 years
Horizon 3	Technology will be in the marketplace after 3+ years

Adoption Phase	
Emerging	Trend is still under R&D
Improving	Trend creates hype and promotes innovation
Mature	Trend is accepted by the masses

Market Potential	
Low	
Medium	Market potential indicates the expected revenue opportunity from the technology trend
High	

Key Trends

We have identified 35 trends across 4 segments - Decarbonization, Green Energy, Low Carbon and Energy Management System, and the details can be accessed from the comprehensive report.

This executive report provides a preview to 8 key trends from the 35 trends.

AI Energy Management APM Integration



Why is it a Game-Changer?

AI energy management and Application Performance Management (APM) integration optimize grid operations through enhanced demand forecasting and real-time monitoring, improving efficiency and reliability. AI-driven predictive maintenance reduces downtime and extends equipment life. Factors such as grid modernization, rising electricity demand, and the focus on sustainability and digitalization are accelerating the adoption of AI in energy management.



Opportunities

Renewable energy adoption is rapidly increasing as compared to conventional energy sources. However, renewable energy comes with challenges, such as its intermittent nature, energy storage restrictions, and infrastructure issues. Conventional grids are not designed to handle these challenges. Therefore, using AI to enhance grid stability is the need of the hour and is a major factor boosting AI's acceptance in energy management.



Our Solution

LTIMindtree implemented AI energy management and APM for a top American energy provider, creating a data lake, intelligent data platform, data model, and asset performance platform. Key KPIs were a 20% increase in energy efficiency, a 15% reduction in unplanned downtime, and a 25% improvement in asset utilization. The solution enhanced grid stability, optimized maintenance, and supported renewable energy integration.





Downstream Retail Adaptations/Innovations



Why is it a Game-Changer?

Downstream retail adaptation transforms the energy and utilities sector by enhancing efficiency, offering personalized solutions, promoting sustainability, and providing competitive advantages. By adopting energy-efficient technologies, such as LED lighting and advanced Heating, ventilation, and air conditioning (HVAC) systems, and transitioning to renewable energy sources, retailers can lower their operational emissions. Additionally, encouraging consumers to use energy-efficient products and decarbonizing the grid further reduces downstream emissions.



Opportunities

The energy transition space offers significant opportunities for downstream retail adoption, such as the extensive deployment of Electric Vehicle (EV) charging infrastructure, providing consumers with convenient access. Digital platforms and smart technologies present opportunities for personalized energy management, allowing consumers to monitor and optimize their energy consumption. Partnerships with utilities for Energy-as-a-Service (EaaS) models and promoting green energy products, like Battery Storage Systems (BSSs), generate new revenue streams and support sustainability goals.



Our Solution

We are assisting a leading Swedish fuel company in diversifying beyond fossil fuel retail by offering electric car rentals via mobile app and online car insurance sales. We're developing an e-mobility platform with Radio Frequency Identification (RFID) for seamless EV charging payments. We're also creating a customer solution for modern fuel retail loyalty and management using a Commercial-Off-The-Shelf (COTS) marketing analytics platform.

Energy Demand Forecasting



Why is it a Game-Changer?

Energy demand forecasting incentivizes consumers to reduce power use at peak demand periods. It helps in strategic planning decisions such as infrastructure development, maintenance scheduling, and capacity planning. Using Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT) in energy demand forecasting empowers stakeholders to simplify energy transition, ensuring a cleaner and more resilient future.



Opportunities

Energy demand forecasting is pivotal in the energy transition, enabling more efficient and sustainable energy systems. Key opportunity areas include advanced forecasting, which supports grid stability by predicting fluctuations in energy consumption. Additionally, it aids in optimizing Energy Storage Systems (ESS) by anticipating peak load periods and ensuring efficient resource use.



Our Solution

LTIMindtree capabilities include load forecasting through advanced analytics leveraging an Artificial Neural Network (ANN)-based forecasting model. Automated power scheduling enhances turnaround time and real-time merit order dispatch, which enhances visibility and improves turnaround time. Our expertise in COTS and custom Energy Trading and Risk Management solutions for energy and utilities provides comprehensive visibility into pricing, positions, risks, and financial compliance.





Green Hydrogen



Why is it a Game-Changer?

Green Hydrogen (GH2) is a game changer in energy transition and sustainability because it offers a zero-emission alternative to fossil fuels. GH2 is produced by electrolyzing water using renewable energy (solar, wind, or hydropower). It can be locally produced, reducing dependency on imported fossil fuels and enhancing nations' energy security.



Opportunities

Utilizing green hydrogen offers substantial value by enhancing air quality, promoting energy security, and facilitating renewable energy integration. However, challenges include high production costs compared to grey hydrogen from fossil fuels. Green hydrogen can power fuel cell vehicles, offering a clean alternative to fossil fuels with long driving ranges and quick refueling times.



Our Solution

A heavy equipment manufacturer sought a seamless GH2 supply for their furnace and welding processes. They faced unnoticed anomalies, causing production halts and downtime. LTIMindtree's Insight NXT platform interfaced with Supervisory Control and Data Acquisition (SCADA) systems, managing power, H2/O2 flow, and temperature. This solution provided end-to-end operational insights, centralized monitoring, and intuitive KPI dashboards.

Decentralized Energy Systems



Why is it a Game-Changer?

Decentralized energy systems are key to the global energy transition, moving from fossil fuels to sustainable, renewable sources. These systems are more reliable and cost-effective, as they are less prone to failures and inefficiencies. Decentralized systems, such as mini-grids and stand-alone setups, can extend electricity access to remote and underserved communities, promoting social and economic development.



Opportunities

Decentralized energy systems enable local renewable energy deployment and expand clean energy access to remote communities. They enhance grid resilience and provide communities with control over energy use. Community solar initiatives foster ownership and environmental responsibility. During natural disasters or grid failures, these systems ensure continuous power supply, increasing energy access in remote areas.



Our Solution

The Larsen and Toubro (L&T) group has implemented decentralized energy solutions globally. This includes a microgrid for an energy and power generation company in India, which enhanced energy access and reliability. L&T also developed the 700-megawatt (MW) Ar Rass 1 solar photovoltaic independent power plant (IPP) in Saudi Arabia and a hybrid energy management system for a clean energy producer in California.





Intelligent Asset Management



Why is it a Game-Changer?

Managing extensive assets in the energy industry is challenging due to aging equipment and scattered sites. Intelligent Asset Management (IAM) tools are essential for improving real-time asset tracking, data consolidation, visibility, and decision-making. Innovations like digital twins, Augmented Reality (AR), and drones optimize asset utilization and improve sustainability in energy production. They also enhance workflow operations amidst regulatory and economic pressures.



Opportunities

As renewable energy systems expand, asset management becomes complex. Connecting more assets to the grid heightens the complexity of deployment, tracking, and maintenance. IAM tools proactively monitor critical assets like power plants, transmission lines, and renewable energy systems. IAM in the energy sector optimizes operations, reduces costs, and enhances sustainability using data analytics, IoT sensors, and AI.



Our Solution

LТИMindtree Intelligent Asset Management uses IoT, AI/ML, and predictive analytics to boost asset reliability and performance. Solutions include SAP Intelligent Asset Management for digitizing maintenance and the Insight NXT platform for real-time equipment visibility. These services enhance equipment availability, safety, and cost efficiency, helping clients make smarter decisions and significantly improve asset management.

The Internet of Energy (IoE)



Why is it a Game-Changer?

Energy organizations can manage energy consumption and optimize energy management systems in real time by leveraging IoT. IoE involves smart grid technology, allowing users to integrate communication systems, control power flow, monitor system health, and automate power management. It can improve grid resilience, achieve significant cost savings, and reduce energy wastage.



Opportunities

The Internet of Energy (IoE) offers advancements in smart grids, renewable energy integration, predictive maintenance, and energy optimization. IoE's sensor networks, analytics, and automated controls detect and respond to grid disturbances, reducing outages and enabling self-healing grids. It also supports prosumers in monitoring and optimizing their energy generation and consumption.



Our Solution

LTIMindtree and Vodafone have partnered to provide smart IoT solutions using the Insight NXT platform and Vodafone's IoT-managed connectivity. This collaboration supports industry X.0 and digital transformation across sectors. It creates scalable, end-to-end solutions with IoT, metaverse, AI, and ML, ensuring secure, connected ecosystems.





Carbon Pricing and Emission Reduction



Why is it a Game-Changer?

The increasing adoption of carbon pricing is reshaping the business environment, making it essential for corporate strategy. Carbon pricing encourages reduced energy use and cleaner fuels, promoting investment in clean technologies. According to the World Bank, there are over 64 global carbon pricing initiatives and 75 carbon pricing instruments in operation as of 2024. This demonstrates the effectiveness of market-based tools in driving the transition to a low-carbon economy.



Opportunities

For the world to achieve net-zero emissions by 2050, organizations would require stronger carbon-pricing policies, technological advancements, and international collaboration. Transparent carbon pricing aids decision-making, reduces competitive imbalances, and minimizes carbon leakage. It encourages investment in renewable energy and energy-efficient technologies like Carbon Capture Utilisation & Storage (CCUS). Emission standards can lead to financial benefits through rebates and reduced fees, incentivizing organizations to cut Green House Gas (GHG) emissions.



Our Solution

LTIMindtree offers diverse Environmental, Social, and Governance (ESG) solutions via Insight NXT, including ESG NXT, Smart Spaces, Energy NXT, and Worker NXT. These platforms provide robust ESG management and reporting capabilities. Smart Spaces from LTIMindtree's industry practice transforms the built environment, ensuring operational excellence and exceptional user experiences.

Delivery Leaders

Venkat Sarma

Associate VP, Global Delivery Head, Utilities

C. Ravi

Senior Director, Program &
Project Management, Utilities Americas

Rohan Savla

Senior Director, Program &
Project Management, Energy – Americas

Manesh Parmar

Principal – Consulting, CPTS - Europe

Sandeep Kamath

Principal, Architecture

Ankit Gupta

Associate Principal, Industrial IoT

Prafulla Bal

Senior Specialist, Industrial IoT

Global Technology Office

Indranil Mitra

Vice President

Sachin Jain

Principal Director - Consulting

Bharat Trivedi

Senior Principal - Architecture



About LTIMindtree Crystal

LTIMindtree Crystal brings technologies trends to cross-industry enterprises. It presents exciting opportunities in terms of foresight to future-ready businesses keen to make faster and smarter decisions on existing and emerging technology trends. The LTIMindtree Crystal is an output of rigorous research by our team of next-gen technology and domain experts and meticulously rated by them across a set of parameters. We hope you enjoyed reading the Energy Transition and Sustainability Trends Executive Report 2025.

Please reach out to crystal@ltimindtree.com for any queries.

Getting to the
future, faster.
Together.

LTI Mindtree is a global technology consulting and digital solutions company that enables enterprises across industries to reimagine business models, accelerate innovation, and maximize growth by harnessing digital technologies. As a digital transformation partner to more than 700 clients, LTI Mindtree brings extensive domain and technology expertise to help drive superior competitive differentiation, customer experiences, and business outcomes in a converging world. Powered by 86,000+ talented and entrepreneurial professionals across more than 40 countries, LTI Mindtree — a Larsen & Toubro Group company — solves the most complex business challenges and delivers transformation at scale.

For more information, please visit <https://ltimindtree.com>.