

EFFICIENT, EFFECTIVE, AND SUSTAINABLE:

The Impact of
Smart Energy Management
for Organisations



Introduction

Since the Industrial Revolution, energy demand has surged with population growth and technological advances. Yet, fossil fuels still dominate, making efficiency crucial.

For businesses, energy is a strategic priority amid rising costs, fluctuating demand, and environmental pressures. Traditional management is no longer sufficient.

Smart energy management—powered by IoT, AI, and analytics—optimizes consumption, cuts costs, and enhances reliability, shaping the future of energy efficiency.

Energy costs represent up to

30%

of the total operating costs for some of the industries, especially those who are reliant on continuous operations



Navigating Energy Expenditures: Challenges for Modern Organizations

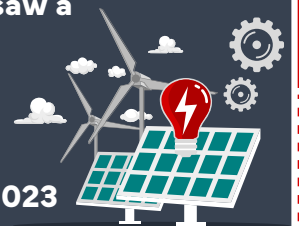
With soaring energy prices, cutting energy costs is now a financial necessity. Buildings consume over 42% of global energy, mainly for heating, cooling, and lighting.

For businesses, especially in energy-intensive industries, traditional systems fail to adapt, causing inefficiencies and rising expenses. The following data highlights energy consumption trends across key sectors, underscoring the urgency for smarter energy management.

India alone saw a

9%

increase in electricity demand in 2023



Energy expenses in **warehousing for e-commerce** businesses account for

10-20%

of operating budgets, driven by 24/7 lighting, HVAC systems, and automation equipment



Energy expenses can account for

40-50%

of total operating expenses in energy intensive **manufacturing** sectors like chemicals, steel and cement



In **hospitality** industry, HVAC

systems are responsible for nearly

40-60%

of the overall building's energy use



Retail, Logistics and Cold-chain businesses need

uninterrupted power supply and spend

20-30%

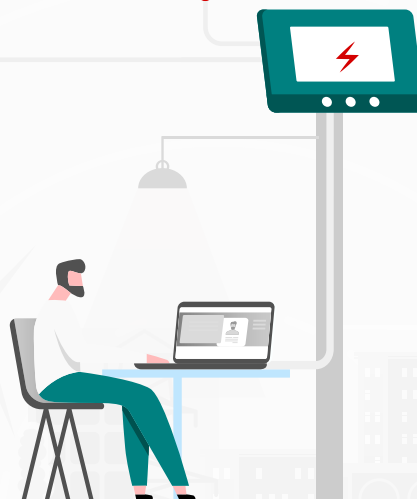
of their budgets in ensuring minimal downtime



HVAC systems and lighting in commercial **real estate** properties can account for

35-40%

of total energy expenses, especially in large office buildings with extended operational hours



Evolving Energy Strategies in a Sustainable World

As businesses shift towards renewable energy, aligning energy management with sustainability goals presents challenges. Once a niche, renewable energy is now central to corporate sustainability, driven by financial and environmental priorities.

ESG frameworks emphasize transparency in emissions and resource use, making energy management essential for optimizing consumption and reducing carbon footprints.

Beyond compliance, effective energy management strengthens long-term resilience against regulations and market shifts. Real-time monitoring and renewable integration drive efficiency while supporting ESG commitments.

Emerging Trends in Energy Management



Rise of Renewable Energy Integration

- Increased adoption of solar, wind, and hybrid energy systems.
- Corporations committing to 100% renewable energy (e.g., RE100 initiatives).



Carbon Tracking and Reporting

- Enhanced focus on tracking carbon footprints to align with ESG goals.
- Use of blockchain for transparent energy sourcing and carbon credit trading.



Energy Efficiency in Buildings

- Adoption of smart HVAC systems, LED lighting, and energy-efficient appliances.
- Increased use of green building certifications and retrofitting.



Smart Energy Management Systems

- Integration of IoT, AI, and ML for real-time monitoring and optimization.
- Predictive analytics to forecast energy demand and prevent disruptions.



Digital Twins in Energy Management

- Creation of virtual replicas of energy systems to simulate, predict, and optimize performance.



Water-Energy Nexus

- Integration of water and energy management strategies to optimize both resources.
- Adoption of energy-efficient desalination and water purification technologies.

Evolution of Energy Management: From Traditional Systems to Future-Ready Solutions

Aligned with evolving energy consumption trends, energy management (EM) has significantly advanced, transitioning from traditional systems to modern methods and now to innovative, future-ready solutions. This evolution highlights the increasing focus on sustainability, operational efficiency, and cost optimization.

Aspect	Traditional EM	Modern EM	Future EM
Technology	Manual processes, limited data insights	Advance Technologies like IoT, AI/ML for predictive analytics and real-time optimization	Integration of decentralized energy networks, blockchain, and AI-driven automation
Approach	Reactive, addresses inefficiencies post-occurrence	Predictive analytics, real-time optimization	Hyper-efficiency, autonomous energy trading
Energy Sources	Focused on traditional grid power	Integrates renewables (solar, wind) with grid power	Decentralized energy networks, self-healing grids
Cost Management	Higher operational costs and energy wastage	Dynamic load management, lower costs	Near-zero energy wastage, precise forecasting
Sustainability	Limited impact	Reduced carbon footprints	Enhanced compliance and flexibility
Efficiency	Basic tracking	Improved efficiency, reduced peak demand charges	Autonomous, highly efficient energy systems



60% of India's total renewable energy is expected to be from solar by 2030



Drivers of Change

Modern energy management is being shaped by an interplay of several critical drivers, each contributing to a robust, future-ready approach.



Achieving Cost Efficiencies

- Energy expenses are a major part of organizational **OPEX**, making cost efficiency a priority.
- Smart energy management enables significant savings through **incremental improvements**.
- Organizations are adopting digital solutions like: **AI/ML-driven energy management tools, IoT-based sensors & gateways and Smart meters**.
- These innovations can **reduce energy consumption** by up to **30%**.



Advancing Sustainability Goals

- Sustainability is a global priority, driven by **CSR and ESG mandates**.
- In India, over **80%** of executives see **sustainability as key to long-term strategy**.
- Effective from **FY 2022-23, SEBI's Mandate** (issued in May 10, 2021) requires top **1,000** listed companies to file **BRSR disclosures**.
- This highlights the push for sustainability in business operations & reporting.



Minimizing Business Risks

- Energy management poses **financial, operational, regulatory, sustainability, and technological risks** with long-term impacts.
- Adopting **smart energy solutions** helps mitigate these risks through **real-time monitoring, fault detection, automated adjustments, and data-driven recommendations**.
- These systems optimize energy use, reduce downtime, lower carbon emissions, and enhance cost control, ensuring greater efficiency and risk minimization.



Leveraging Technology Advancements

- **Technology drives smart energy management**, optimizing consumption, reducing costs, and enhancing efficiency.
 - **IoT & AI:** Enable real-time monitoring, predictive maintenance and automated decision-making.
 - **Cloud Computing:** Enhances flexibility and responsiveness in energy management.
 - **Advanced Metering (AMI) & Dynamic Pricing:** Improve billing accuracy and cost optimization.
 - **Energy Storage:** Maximizes surplus energy use during peak demand.
 - **Cybersecurity & Blockchain:** Secure smart grids and enable peer-to-peer energy trading.
- By leveraging these technologies, businesses shift from reactive to proactive energy strategies, ensuring cost savings, resilience, and sustainability.

Need for Resilient Business

- Resilience is key to energy strategies amid rising demand and disruptions.
- **Microgrids** enable localized, self-sufficient energy generation, reducing grid dependence and integrating renewables like **solar and wind**.
- Backup systems (battery storage, gensets) ensure **uninterrupted operations, vital for critical industries**.

Bringing these factors together, modern energy strategies are evolving into an ecosystem where cost efficiency, sustainability, resilience, risk management, and advanced technologies converge. Businesses are leveraging smart energy systems to align their operations with both environmental and economic goals, ensuring reliability while meeting regulatory and CSR expectations. This comprehensive approach is not only transforming energy management but also positioning organizations as leaders in a sustainable, technology-driven future.

Navigating the Regulatory Landscape

Businesses are adopting innovative energy practices to improve enhance cost efficiency, sustainability, and regulatory compliance. Governments worldwide, including India, are enforcing stricter ESG and GHG reporting frameworks, compelling organizations to cut reduce carbon emissions. Key initiatives like the Carbon Credit Trading Scheme (CCTS) and the Perform, Achieve, and Trade (PAT) scheme are driving energy efficiency.

In August 2022, the Indian government revised its Nationally Determined Contributions (NDCs), raising its ambition to a 45% reduction in GHG emission intensity by 2030 from 2005 levels



CCTS allows businesses to earn and trade carbon credits by reducing emissions, incentivizing cleaner practices. The PAT scheme, under the National Mission on Enhanced Energy Efficiency (NMEEE), sets energy reduction targets and rewards successful industries with tradable Energy Saving Certificates (ESCerts). Both programs create financial incentives for emissions reduction while fostering a market for energy efficiency.

Additionally, initiatives like tax credits under the National Solar Mission encourage renewable energy adoption, helping optimize costs and reduce emissions. Aligning with these frameworks enables helps businesses to improve efficiency, reduce lower their environmental impact, and gain a competitive edge in a sustainability-driven economy.

SEBI has mandated the 1,000 largest listed companies (by market capitalization) to submit the BRSR report as part of their annual reports, starting from the financial year 2022-23



500 GW by 2030

India's target of increasing renewables capacity from current ~180 GW capacity

Challenges with Traditional Building Management Systems

Traditional building management systems (BMS) are increasingly becoming inadequate for modern energy management needs. These systems are typically designed to operate on static schedules, offering limited flexibility in controlling energy systems such as HVAC, lighting, and equipment operation.



Traditional BMS lack real-time data and integration with modern technologies like IoT, cloud platforms, and analytics, limiting scalability and optimization. Their inability to adjust dynamically based on occupancy or environmental changes leads to inefficiencies, higher costs, and energy waste.

Additionally, their reactive nature results in unplanned downtime, costly repairs, and compliance challenges. As energy efficiency and sustainability become priorities, traditional BMS struggle to meet modern energy management demands.



Reactive maintenance approaches lead to **30% higher costs** compared to predictive maintenance, as unexpected breakdowns result in emergency repairs and downtime

Smart Energy Solutions: The Technological Edge

Smart energy solutions are revolutionizing how organizations manage energy consumption. Technologies like the Internet of Things (IoT), artificial intelligence (AI), machine learning algorithms, predictive analytics, blockchain, energy storage systems, cloud computing, and advanced metering infrastructure (AMI) enable companies to monitor, control, and optimize energy use in real time.

IoT In Energy Management

IoT-enabled sensors and connected devices continuously collect real-time data on energy consumption, occupancy patterns, and equipment performance. This data is transmitted over advanced IoT networks, integrating with centralized energy management platforms. By leveraging cloud-based analytics, edge computing, and AI-driven automation, businesses can gain deeper visibility into energy usage trends, predict maintenance needs, and implement real-time optimizations for improved efficiency, cost savings, and sustainability.



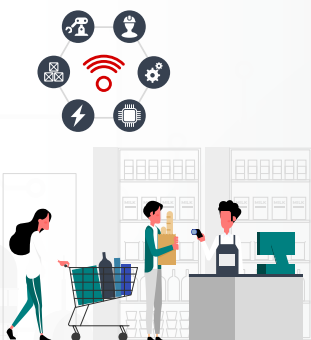
Manufacturing:
IoT sensors monitor machinery energy use and detect inefficiencies, reducing consumption by up to **25%**

Commercial Real Estate:
Smart lighting systems adjust to occupancy and natural light, cutting energy use by **15%**



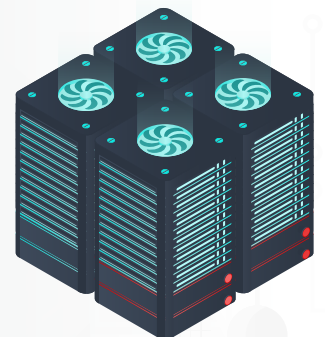
Predictive and Prescriptive Analytics

Predictive and prescriptive analytics optimize energy management by forecasting demand, identifying inefficiencies, and recommending corrective actions. AI-driven insights help anticipate equipment failures, enabling proactive maintenance to minimize downtime and improve operational performance.



Retail:
AI-driven platforms analyse foot traffic, weather, and sales data to optimize HVAC usage, reducing energy waste during off-peak hours

Data Centers:
Predictive analytics monitors cooling systems, enabling pre-emptive maintenance to prevent failures and costly repairs



Non-compliance with energy regulations results in penalties and fines amounting to **5-10% of annual revenue** for industries in non-compliance

Advanced Data Analytics

Advanced data analytics integrated with cloud and edge computing provide actionable insights into energy consumption, helping businesses identify inefficiencies, benchmark performance, and reduce costs. By leveraging energy consumption IoT data, organizations can make data-driven decisions to enhance efficiency and ensure regulatory compliance. Smart grids and blockchain further enhance energy distribution and transaction transparency.



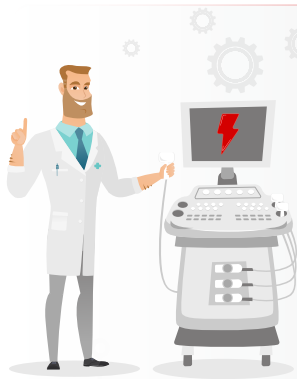
Hospitality:
Smart energy management systems adjust room temperature and lighting based on guest behaviour, achieving up to **20%** annual energy savings

Industrial:
Energy analytics platforms compare usage across locations, identifying inefficiencies and enabling targeted equipment upgrades for improved efficiency



System Integration

Smart energy solutions integrate with existing building management systems, unifying HVAC, lighting, and security controls. This seamless integration automates energy-saving strategies while ensuring operational efficiency.



Hospitals:
Integrated energy management platforms optimize HVAC and backup power, ensuring patient safety and energy efficiency

Office Buildings:
Smart energy systems centralize control, reducing energy use, simplifying maintenance, and enhancing occupant experience



Buildings relying on manual energy management practices incur **10–15% higher operational costs**, driven by inefficiencies in energy use and resource allocation

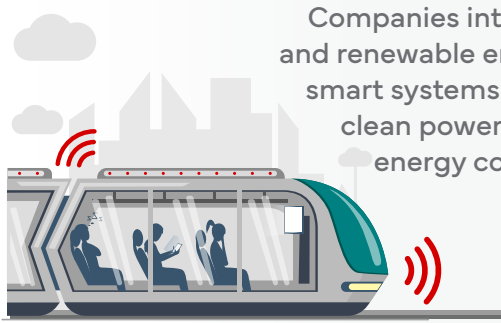


Studies indicate that the absence of real-time data can lead to **25–30% higher equipment downtime**, impacting productivity and operational continuity




Renewable Energy Integration and Management

Smart energy systems seamlessly integrate and manage renewable sources such as like solar, wind, and hydropower. They enable real-time monitoring and balancing of energy sources, optimizing clean energy usage while ensuring reliable power supply.




Tech Sector:
Companies integrate solar and renewable energy, using smart systems to prioritize clean power and reduce energy costs by up to **20%**

Industrial Developments:
Smart grids enable businesses to sell excess solar power, lowering energy bills. Indian Railways has over 200 MW of solar power installed at major stations to meet growing energy needs sustainably




Automation and Smart Controls

Smart energy systems use automated controls to optimize energy usage based on real-time data and predefined parameters. They dynamically adjust lighting, HVAC, and other systems in real time, reducing manual intervention and enhancing energy efficiency.




Office Spaces:
Smart thermostats adjust heating and cooling based on time and occupancy, cutting energy costs by **10-15%**

Manufacturing Plants:
Automated control systems optimize energy use by adjusting consumption during low demand or downtime



The integration of IoT, AI/ML, advanced data analytics, and cloud-based platforms with renewable energy has transformed energy management. By automating systems and incorporating clean energy, businesses achieve cost savings, lower environmental impact, and ensure regulatory compliance. These innovations support ESG goals while driving long-term profitability through smarter energy use.

Modern Energy Management Systems (EMS) provide a future-proof solution, adapting to shifting energy demands and regulations. With predictive analytics, real-time monitoring, and renewable integration, EMS enhances resilience and mitigates risks. Its scalability makes it essential for businesses transitioning to net-zero emissions, ensuring competitiveness in a decarbonizing global economy.



Businesses using outdated energy systems spend up to **40% more** on scaling operations, as manual upgrades and system overhauls are labour-intensive and costly

Benefits of Implementing Smart Energy Management

Smart energy management solutions deliver significant cost savings by optimizing energy consumption and eliminating inefficiencies. IoT, AI devices and real-time monitoring enable businesses to reduce energy waste, lowering operational costs. For energy-intensive industries, even minor reductions in usage can result in substantial financial benefits.

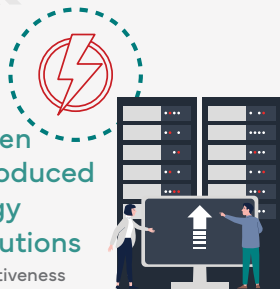
15-30%

cost savings is what businesses experience by implementing smart energy management solutions



Less than **1.2 PUE** was achieved when data centers introduced automated energy management solutions

*PUE - Power Usage Effectiveness



Smart energy management enhances operational efficiency through automation and real-time adjustments, optimizing energy use based on demand and environmental conditions. This reduces energy waste and extends equipment lifespan by minimizing strain during low-demand periods.

Smart energy management ensures regulatory compliance by providing real-time data for accurate ESG and GHG reporting. This helps businesses meet sustainability targets, avoid penalties, and showcase their commitment to environmental responsibility.

Logistic company was able to bring down carbon emissions by

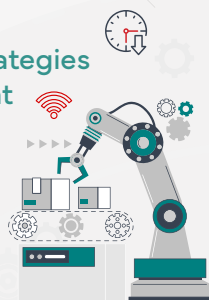
20%

by using smart energy management solutions



Predictive maintenance strategies in their energy management helped a manufacturing firm to reduce equipment downtime by

25-30%



Predictive analytics help mitigate risks related to equipment failure and operational downtime. By identifying potential issues before they occur, businesses can schedule proactive maintenance, reduce unplanned downtime, and lower maintenance costs.

Organizations are also adopting smart energy management solutions to improve brand image by aligning with sustainability goals. By implementing energy-efficient practices and integrating renewable sources, organizations can position themselves as leaders in sustainability. Furthermore, smart energy systems offer scalability to meet growing energy demands and seamlessly integrate with emerging technologies like AI, blockchain for energy trading, and smart grids, ensuring competitiveness in an evolving energy landscape.

Beneficiaries of this Whitepaper

Beneficiaries	How This White Paper Helps	Key KRAs Achieved
 <p>Energy Managers & Facility Managers</p>	<ul style="list-style-type: none"> ▶ IoT and real-time monitoring for granular visibility and dynamic adjustments. ▶ Predictive analytics for maintenance planning. ▶ Integration of renewables for sustainability. 	<ul style="list-style-type: none"> ▶ Improved energy efficiency. ▶ Reduced operational costs. ▶ Enhanced operational continuity.
 <p>Chief Sustainability Officers (CSOs)</p>	<ul style="list-style-type: none"> ▶ Renewable energy integration and data analytics to reduce carbon footprint. ▶ Predictive tools for ESG and GHG compliance. 	<ul style="list-style-type: none"> ▶ Achieve sustainability targets. ▶ Ensure regulatory compliance. ▶ Improved environmental impact.
 <p>Chief Financial Officers (CFOs)</p>	<ul style="list-style-type: none"> ▶ Reduce energy costs through smart energy management. ▶ AI and data analytics for forecasting energy costs and planning. 	<ul style="list-style-type: none"> ▶ Lower operational costs. ▶ Enhanced financial planning. ▶ Mitigated energy-related risks.
 <p>IT Infrastructure & Operations Leaders</p>	<ul style="list-style-type: none"> ▶ IoT, AI, and cloud integration for scalable, flexible systems. ▶ Insights on centralized energy management for distributed setups. 	<ul style="list-style-type: none"> ▶ Scalable and flexible energy systems. ▶ Technological optimization for better efficiency.
 <p>Compliance & Regulatory Officers</p>	<ul style="list-style-type: none"> ▶ Simplified compliance with real-time tracking and reporting tools. ▶ Advanced analytics for accurate ESG and GHG reporting. 	<ul style="list-style-type: none"> ▶ Seamless compliance. ▶ Reduced non-compliance risks. ▶ Access to actionable energy data.
 <p>Investors</p>	<ul style="list-style-type: none"> ▶ Insights into cost-saving opportunities and ROI on energy efficiency investments. ▶ Data-driven evaluation of ESG performance and sustainability impact. ▶ Benchmarking tools to compare energy strategies across industries. 	<ul style="list-style-type: none"> ▶ Improved investment decision-making. ▶ Enhanced portfolio sustainability. ▶ Increased confidence in long-term returns.



Key Takeaway

Many companies struggle to manage energy consumption and control costs effectively. This white paper explores the adoption of data-driven energy management solutions to enhance efficiency, productivity, reliability, and sustainability.

Organizations are leveraging digital technologies to transform energy management, achieving generating high ROI through improved efficiency and operational productivity.

Transitioning from traditional to smart energy management is crucial for businesses aiming to optimize energy costs and reduce carbon emissions while meeting sustainability goals.

IoT, AI, ML, cloud analytics, cybersecurity, and blockchain-powered smart energy systems enable offer real-time monitoring, predictive analytics, and seamless infrastructure integration.

The time for change is now—businesses have a social responsibility to become greener and more sustainable. Smart energy systems simplify ESG and GHG compliance, ensuring long-term adaptability in a dynamic energy landscape.

The benefits are clear: cost savings, improved efficiency, risk mitigation, and enhanced brand reputation. By embracing smart energy solutions, businesses can secure immediate financial gains and build a resilient, future-proof energy strategy aligned with global sustainability trends.

Airtel IoT Smart Energy Management: Driving Compliance and Savings

Airtel IoT Smart Energy Management empowers businesses to optimize energy consumption, reduce operational costs, and achieve sustainability goals. By leveraging cutting-edge technologies like IoT, AI, and cloud analytics, Airtel IoT provides end-to-end energy management systems that deliver real-time insights, predictive analytics, and seamless integration with existing infrastructure.

With SEBI's Green Mandate requiring the top 1,000 companies to comply with nine ESG attributes by FY27, Airtel IoT Smart Energy Management address high carbon emissions, inefficient asset optimization, and fragmented energy data. By providing actionable insights and reducing energy costs, Airtel IoT Smart Energy Management ensures compliance with SEBI's Business Responsibility and Sustainability Report (BRSR) requirements.

Airtel IoT advantages and measurable impacts

- Airtel IoT Smart Energy Management delivers real-time monitoring through IoT sensors and AI/ML-powered dashboard, enabling actionable insights and anomaly detection, while predictive maintenance reduces downtime and cuts maintenance costs by up to 20%.
- By identifying energy wastage, businesses can achieve up to 15% reduction in energy spend and an approximate 11% increase in productivity.
- The solution also ensures ESG compliance through centralized data monitoring and reporting, accelerating decarbonization efforts.
- Built on secure, telco-grade 4G and cloud infrastructure, Airtel IoT's scalable platform offers unified asset management, simplifying operations and driving long-term efficiency.
- Airtel IoT Smart Energy Management enables efficient tracking and management of **Scope 1 and Scope 2 emissions**, helping clients monitor direct emissions from owned sources and indirect emissions from purchased energy, ensuring improved sustainability and regulatory compliance.

Why Airtel IoT?

Airtel IoT's expertise in IoT and connectivity delivers scalable, secure, and future-proof energy solutions. By enabling smarter energy management, Airtel IoT helps businesses meet sustainability goals, comply with regulations, and achieve long-term operational efficiency. With **56% RMS, 45 million connections**, and a trusted partnership with **11,000 enterprises**, we continue to lead in delivering seamless and scalable connectivity solutions.

Contact us to explore collaboration opportunities and discover how our solution can save energy costs.





About Airtel Business

Airtel Business is a leading provider of integrated communications solutions in India. With a wide gamut of end-to-end solutions spanning cellular IoT, connectivity, cloud, data centre, cyber security and cloud-based communications, the company's offerings are engineered to deliver high-speed connectivity, unparalleled wide coverage and scalable bandwidth to customers across enterprises, governments, carriers and small and medium businesses (SMBs).

For more details, visit <https://www.airtel.in/business/>

About Think Teal

Think Teal is an Analyst firm tracking the Enterprise ICT Market in India. Think Teal helps technology firms understand the markets that they serve and support them in achieving their business objectives.

To understand more about Think Teal, reach out at connect@think-teal.com

