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### Navigating Risks, Powering India's Growth

# **SECTOR REPORT 2024**

Energy



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# Preface

Corporate India Risk Index is primarily an academic exercise to understand the level of risk that companies are facing and also assist in developing a successful risk aversion plan, CIRI is a first-ofits-kind risk measurement tool to gauge the level of a company's risk exposure and preparedness. This Corporate risk comprises of various aspects of the business–spanning customer, competition, regulatory environment, business operations, technology finances, environmental factors etc. The impact of unprecedented events is significantly higher now.

This Index is a comprehensive framework that draws upon global risk management best practices and comprises of 32 risk elements across 6 broad dimensions. The Risk Index is based on the principles of Lean and Six Sigma that qualify business processes by measuring effectiveness and efficiency.

ICICI Lombard's Corporate India Risk Index provides a crucial tool for assessing and addressing risks, fostering resilience and adaptability in the ever-evolving global landscape. In the current climate of increasing macroeconomic uncertainties, it is essential for corporates to prioritize robust risk management. We believe that a proactive approach to risk management not only fortifies individual businesses but also contributes significantly to India's overall economic growth and stability.

# **Executive Summary**

In 2024, India's energy sector made significant strides in its transition to cleaner energy sources, driven by ambitious renewable energy goals and the need for energy security amidst rising demand and extreme weather conditions. The country saw a sharp increase in electricity consumption, particularly due to industrial growth and prolonged heatwaves, leading to record renewable capacity additions, with solar power at the forefront. While renewable energy expanded, coal-fired generation remained resilient, supported by strong demand and increased domestic coal production, which helped reduce reliance on imports.

The government played a proactive role by launching schemes like SIGHT to promote green hydrogen adoption, supporting key sectors such as refineries and fertilizer plants. Measures such as subsidizing electricity production and capping retail prices for fuels ensured accessibility for low-income households and maintained industrial activity. In parallel, structural reforms improved the financial health of distribution companies (DISCOMs), while market coupling initiatives facilitated large-scale renewable integration, enhancing the overall energy landscape.

India's energy sector in 2024 demonstrated a balanced approach, aligning economic growth with climate goals through sustainable practices and energy efficiency measures. While challenges like coal dependency persist, the country is steadily progressing toward a sustainable and resilient energy future, driven by innovation and strategic reforms.

# Introduction

ICICI Lombard Corporate India Risk Index is a one of its kind, unified, credible, standardized corporate Risk Index that spans over the country level, the industry level, and the company level. The index has a comprehensive sector coverage. Aerospace and Defence, Agriculture and Food Processing, Automotive and Ancillary, BFSI, Biotech & Life sciences, Chemicals and Petrochemicals, Education Skill Development, Energy, FMCG, Healthcare Delivery, Infra and Realty, IT/ITES, Manufacturing, Media and



Gaming, Metals and Mining, New Age & Startup, Pharmaceuticals, Telecom and Communication Technology, Tourism and Hospitality, Transportation and Logistics.

The impact is identified across key business risk (internal and external) under the following 'Strategic Risk Areas', The ICICI Lombard Corporate India Risk Index Framework comprises of 32 risk elements across 6 broad dimensions.

### **Market and Economic Risk**

Corporate Risks arising due to market and economy related factors, such as internal or external political uncertainty, global slowdown, taxation-regulatory changes etc. Market and economy related risks are also identified as 'Systematic Risks', we have further classified the risks into below mentioned categories.

- Inflation: Inflation is the general increase in prices within the economy. The rising prices for businesses could result in bigger production spending and a fall in profitability. The companies should be attentive, acute, and responsive to changes in inflation to efficiently manage the prices of final products.
- Taxation: In a large democracy like India, complexity of multiple taxes (multiple taxes like GST, custom duties, central excise duty, etc.) is a major concern. The changing legislations, increased scrutiny by tax authorities and increasing public attention are together resulting in tax risks for organizations. There is, thus an increasing urgency for firms to manage their tax affairs efficiently to minimize tax risks.

- Regulatory Risks: Regulatory risk is the risk of changes in regulations and laws that might affect an industry or businesses. The regulatory changes can pertain to tariffs and trade policies, business laws pertaining to employment, minimum wage laws, financial regulation, Foreign Direct Investment etc.
- Foreign Exchange Risk: The exchange rate plays an important role for firms who export goods and import raw materials. The fluctuations in foreign exchange will have great impacts on the prices of traded goods. For example, if the currency depreciates (devaluation), the exporting firms will benefit. However, the firms importing raw materials will face higher costs on imports. The firms need to hedge their exposure to foreign exchange risks to insulate themselves from the impact from forex changes.
- **Geo-political Tension**: Geopolitical risk means the political and economic risks that are a potential threat to the financial and operational stability of companies.
- **Competitive risk**: Competitive risk is the risk associated with the fact that there are multiple companies competing in the market, each seeking to obtain the highest position and consumer ratings, to gain maximum benefits for themselves. The companies devise different strategies to garner a higher market share and acquire customers from competitors. Any failure in managing the competitive stand could lead to losses in business, thereby making marketing and competition a major risk in market.

# **Technology Risk**

Technology risks are also identified as information technology related risks which may arise due to failure of any installed hardware or software system, spam, viruses or any malicious attack. Also delay/over/under adoption of trending disruptive technologies can lead to technology related risks. We have classified the risks in below mentioned categories.

- Innovation Risk / Obsolete Technology: Innovation is the key to success in all the industries. Risk of redundancy and losing out to competition on account of poor R&D is a major concern.
- Intellectual Property risk: Dependence on trade secrets and unpatented proprietary knowhow.
- **Disruptive Technologies:** These will fundamentally alter the financial prospects of the industry.
- Data Compromise: Hardware failure refers to malfunctions within the electronic circuits or electromechanical components (disks, tapes) of a computer system; Software failure refers to an operating system crash. Such failures lead to stoppage of entire computer or operating systems creating substantial losses to business.

### **Operational and Physical Risk**

Risk of losses caused due to faulty or failed processes, systems or human resource related inefficiencies are classified as operational and physical risks. We have classified Operational & Physical risks in below mentioned categories.

- Critical Infrastructure Failure / Machine Breakdown: Industries with a heavy dependence on machinery consider any rise in machinery breakdowns a hindrance to their businesses operations. An untimely equipment breakdown can bring businesses to a standstill or be the root cause for fires and explosions. Mostly, human errors and deferred maintenances are the major reasons for such breakdowns. The companies should actively invest in timely maintenance of all machineries.
- Business Continuity / Sustainability: Non adoption of Business Continuity / Sustainability Plans and Lack of Internal Control tools would result in: Failure of businesses, Brand Equity / Loss of reputation, Financial Loss, Business model Failure, Ineffective engagement/communication with stakeholders, Losses in productivity, Lack of opportunity monitoring.
- Supply chain risk: Raw Material unavailability and Heavy Dependence on Global Supply Chains / Supplier concentration risk. Unavailability of raw materials owing to disruption in the supply chain or heavy dependency on one source (company/country) which is unable to supply owing to some geo- political tensions, fires, or any other incidents. Transportation is one of the key activities for companies making it an important risk to mitigate. The loss of goods in transit and spillage is one of the major concerns as it accounts for a sizeable loss of revenue to companies.
- **Commodity Price Risk Volatility in prices of raw materials:** The fluctuations in raw material prices creating a margin pressure / top-line pressure in the scenario of rising input costs.
- Portfolio Risk: Loss of key customers, Customer concentration Key customers accounting for a larger share of revenue, Over-dependence on suppliers, Business Model Risk: Transformative changes in business model, Tail Risks: Ability to overcome or manage extreme worst-case scenarios.
- **Environmental Hazard Risk:** Any environmental hazard having the potential to affect the surrounding environment.
- **Workplace Accident:** Fire and Explosion Hazards, Containment Incidents, Workplace Injuries
- Human Resource: Key person risk: This risk occurs when a business or business unit becomes heavily reliant on a key individual. Talent acquisition and retention - The companies require a highly skilled labor force for R&D as well as continuous production. Accessing skilled resources and expertise on an on-going basis is one of the major challenges; moreover, retention of trained staff is imperative. Labor shortages, Union Strikes & Industrial Actions, Employee

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health, safety, and security (SHE/Sustainability risk).

- Financial Risk: Financial Reporting Risk: Material misstatement of Financial Statements, whether due to fraud or error. Interest rates and equity prices: Interest rate risk arising out of working capital borrowings at variable rates. Equity price fluctuations affect the Company's income or the value of its holdings of financial instruments. Liquidity Risk (Credit Risk / Receivables).
- Breaches of law (local/ international): Voluntary/ involuntary breaches of law can lead to costly lawsuits.

### **Crime & Security Risk**

Cybersecurity risks relate to the loss of confidentiality, integrity, or availability of information, data, or information (or control) systems and reflect the potential adverse impacts to organizational operations. These attacks can cause major financial losses, reputational harm, and a loss of client trust. Regarding cybersecurity, the BFSI industry in India has several difficulties, including difficult-to-secure legacy systems, a shortage of qualified cybersecurity personnel, and the requirement for ongoing system and network monitoring. There is a significant investment in cybersecurity tools like network monitoring, endpoint security, access control, and threat intelligence. Many organizations are also implementing cutting-edge technology like artificial intelligence and machine learning to strengthen their security posture.

We have classified Crime & Security risks in below mentioned categories.

- Cyber Crimes: Data Theft, Spam, scams and phishing, Hacking, Malwares and Viruses, Piracy, Fraud, Corruption, Malicious attacks
- Counterfeiting: Counterfeiting of goods/services leads to loss of revenues, profits and ultimately affects the brand equity
- Threat to Women Security
- **Terrorism:** Un-lawful use of violence and intimidation, especially against civilians, in the pursuit of political aims.

### **Natural Hazard Risk**

A natural hazard is the threat of an event that will likely have a negative impact. A natural disaster is the negative impact following an actual occurrence of natural hazard if it significantly harms a community. Due to India's geographical structure, it is one of the most disaster-prone countries in the world. Natural hazards like floods, earthquakes, landslides, and cyclones are common risks faced by India. The situation has worsened due to rise in GHG emissions, loss of biodiversity, deforestation, and degradation of environment. Natural disasters hamper the day-to-day operations of corporates, and it is important for them to understand that such risks cannot go unheeded. Over the years, Indian corporates have learnt to mitigate such risks by diversifying their supply chains, having multiple logistics partners, diversified geographical presence and multiple vendors.

Pandemic and other global epidemic diseases: Risk to business owing to disruptions caused by global pandemic scale events like the COVID-19 pandemic

# Strategic Risk

Strategic risk is the risk of undesirable outcomes of business decisions which may impact a company. Strategic risk is often a major factor in determining a company's worth, particularly observable if the company experiences a sharp decline in a short period of time. Several factors, such as unethical or unlawful activities, poor customer service, product recalls, data breaches, or unfavorable media coverage, can lead to strategic risk. An organization's reputation can be severely harmed by a single negative incident, such as a high- profile data breach or fraud scandal, resulting in a loss of clients, income, and market share.

- Resource scarcity / Misutilization / Overall Utilization: Difficulties in acquisition of land, water, fuel, or other resources for operations of business.
- Public Sentiment: Current events playing out in the public scene can change the public sentiment.
- **Delay in execution of projects:** Delays in execution of projects can surge in the capex.
- Increased number of recalls and quality audits: Impacts both the brand equity and increased operational expenses.
- **Failed / Hostile Mergers & Acquisitions:** High dependence on inorganic growth.

# Bottom-Up Risk Assessment Approach



Figure 1: Risk Assessment Approach

- Evaluation Parameters\*: The index maps the risks faced by any enterprise basis of Awareness, Probability, Criticality and Preparedness against the defined Risk elements. The evaluation Parameters are defined as:
- Awareness Level of awareness of potential risk affecting the firm.
- Probability Likelihood of risk to affect the business goals of the firm adversely.
- Criticality Level of impact of the identified risk on the success of business goals.
- Preparedness Risk handling practices/ mechanisms already in place to handle the risk.
- 2. Determining Risk Importance\*: Importance/Impact of individual risk element is established against individual sector based on the published corporate risk reports, in depth sector



understanding by F&S team and SMEs.

- **3. Calculating Maximum Sector Risk Score**: Weighted Sum of all risk elements based on their importance to the respective sector.
- 4. **Company Level\*:** All the Risk Index scores for companies in a sector are averaged to represent the sector; and sectors average to India. Risk Exposure is defined as the function of corporate's Risk Awareness and Probability of risk occurrence. Risk Management is defined as the function of an enterprise risk preparedness and criticality risk impact assessment.

# Defining the Risk Scale

We have selected 20 sectors to understand the current stand of our country today in terms of risk. Risk for various sectors is measured on the risk exposure scale and risk management scale.

### A. ICICI Lombard Corporate Risk Exposure – Scale

**Risk Exposure:** The impact of any internal, external or strategic occurrence on the financial performance of an organization is defined as the corporate risk exposure.

Risk has traditionally been seen as something to be avoided – with the belief that if behavior is risky, it's not something a business should pursue. But the very nature of business is to take risks to attain growth. Risk can be a creator of value and can play a unique role in driving business performance.

Let's look at the risk exposure scale.



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### B. ICICI Lombard Corporate Risk Management – Scale

**Risk Management:** Identification, Evaluation and Prioritization of corporate risks followed by well- coordinated steps to minimize the occurrence of uncertainties in the foreseeable future is defined as the Corporate Risk Management.

The risk management scale works in the opposite to that of the risk exposure scale.

Let's look at the risk management scale.



### c. ICICI Lombard Corporate Risk Index - Scale

**Risk Index**: Risk Index is a measurement tool to gauge the level of Risk Exposure against Risk Preparedness. The score intends to give companies/Sector/Country access to an extensive and quantifiable metrics of risk management.

Let's look at the risk Index scale.

10	•		Score under 40 indicates Ineffective Risk Index which means the corporate has very high-risk exposure or very poor risk management practices or both.
20	•		
30	•		
40	•		
50	•		Score between 40 - 55 is Sub-optimal risk index, indicating not all risks are handled effectively. Risk management practices are likely dated or inefficient.
60	•		Score between 55 - 65 is optimal risk index indicating most current risks are being handled effectively. Emerging risks associated with strategic initiatives need more diligence
70	•		Score between 65 - 80 is superior risk index indicating very effective and efficient risk management practices well positioned to handle current and future risks across
80	•		dimensions
90	•		Score above 80 is over preparedness indicating high investment in risk mitigation practices likely over investment in one or more risk dimensions difficult to justify ROI
100	•		

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# India - Resilient Growth and Superior Risk Management

In 2024, India's diverse sectors demonstrated significant growth and resilience, leveraging technological advancements, strategic reforms, and proactive risk management to navigate an evolving economic landscape. Despite global challenges, industries embraced innovation, digital transformation, and sustainable practices, positioning themselves for long-term success.

In this year, the integration of Artificial Intelligence (AI) across various sectors presented both significant opportunities and risks. While AI-driven innovations enhanced productivity, decision-making, and customer engagement, the adoption also raised concerns around data privacy, cybersecurity, and workforce displacement. India navigated these risks by implementing robust data protection regulations and promoting AI ethics in the development and deployment of technology. Additionally, the government and private sector invested in reskilling programs, ensuring the workforce was equipped to adapt to the evolving digital landscape. AI's strategic implementation across sectors like BFSI, healthcare, and manufacturing helped India enhance operational efficiency while balancing the challenges posed by rapid technological transformation. The Aerospace & Defence sector saw substantial advancements as India attracted global aerospace companies seeking to strengthen supply chains. Local firms expanded their capabilities, particularly in the growing private space sector, driving both revenue growth and global competitiveness. The Agri & Food Processing sector turned to precision farming and AI-driven analytics to enhance productivity, while renewable energy solutions like solar-powered cold storage reduced post-harvest losses, improving sustainability and efficiency.

In the Automotive sector, the shift toward electric vehicles (EVs) gained momentum, supported by government schemes aimed at promoting EV adoption. Major manufacturers expanded their EV portfolios, addressing both sustainability goals and evolving consumer demands. The BFSI sector continued its digital transformation, with AI integration enhancing fraud detection and compliance, further improving security and efficiency.

The Biotech & Lifesciences sector experienced accelerated growth, particularly in genomics and vaccine development, with India solidifying its role as a global leader in pharmaceutical manufacturing. The sector's innovation, supported by public and private investments, enhanced healthcare technology and medical devices. In Chemicals & Petrochemicals, India attracted significant investments to meet rising demand, driven by growing consumption from its expanding middle class, while the Education sector embraced AI and digital learning platforms, expanding access to quality education and equipping the workforce for future demands in emerging technologies.

The Energy sector made substantial progress towards sustainability, with a focus on renewable



energy, including ultra-mega solar parks and offshore wind projects. These initiatives were supported by favorable government policies and decreasing costs of clean energy technologies. The FMCG sector adapted to inflationary pressures by shifting focus towards premium products and ecommerce platforms, which were increasingly driving sales, particularly in rural markets.

In Healthcare, there was significant growth fueled by digital innovations such as telemedicine and AI-driven diagnostics, which helped improve access and efficiency in healthcare delivery. India also continued to strengthen its position as a global hub for medical tourism, offering competitive treatment options. The Real Estate sector benefitted from increased demand in affordable housing and infrastructure development, with commercial real estate seeing steady growth and an emphasis on sustainable building practices.

The IT sector continued to thrive despite global challenges, driven by demand for cloud services, cybersecurity solutions, and AI technologies. Tier 2 and 3 cities emerged as new tech hubs, with government support enhancing regional tech expansion. The Pharmaceutical sector saw an uptick in exports and domestic manufacturing, with reduced dependence on imports and new product launches in global markets bolstering its growth. In Manufacturing, India focused on boosting production through initiatives like the Production-Linked Incentive schemes, especially in electronics and EV manufacturing, which also contributed to job creation and supply chain resilience. The "China + 1" strategy adopted by global firms has played a pivotal role in shaping India's manufacturing sector. While it has increased risk exposure, it has also driven companies to invest in more sophisticated, globally relevant risk management practices, strengthening the sector's resilience and positioning India as a key player in global supply chains.

Media & Entertainment saw continued growth, with OTT platforms gaining popularity, especially in regional content. The Gaming industry also flourished, becoming a key revenue generator as mobile gaming gained dominance. In Steel and Mining, investments in decarbonization and digitalization allowed the sectors to reduce environmental impact and enhance operational efficiency. Startups saw substantial funding despite global slowdowns, with SaaS, fintech, and D2C brands leading the charge in innovation and market expansion.

The Telecom sector expanded 5G coverage and rural internet penetration, narrowing the digital divide and improving connectivity across the country. The Tourism & Hospitality sector rebounded strongly, attracting both domestic and international visitors, with eco-conscious travelers opting for sustainable tourism options and luxury experiences. Finally, the Logistics sector benefited from advancements in automation and multimodal connectivity, reducing costs and improving efficiency, while the government's National Logistics Policy streamlined operations, cutting transit times and enhancing cross-sector integration.

In summary, 2024 saw India's sectors display resilience and adaptability, addressing emerging risks through innovation, digital adoption, and sustainability initiatives. The country's ongoing focus on risk management, technological advancement, and strategic reforms has positioned its economy for continued growth and transformation, paving the way for India to solidify its place as a global economic leader.

# India Showcasing an Optimized Risk Handling



### Figure 2: Corporate India Risk Index 2024

A score of 65 on the Corporate Risk Index indicates optimal handling of risk by the Indian companies. In 2024, India faced significant market, economy, and operational risks across various sectors, highlighting areas for improvement in the coming years. The year was further complicated by global events such as the ongoing Israel-Palestine conflict, which led to geopolitical instability and fluctuations in global oil prices. The rise of recession fears in major economies like the United States and Europe disrupted supply chains and created demand uncertainties, impacting Indian exports and manufacturing. Investor sentiment in India remains flat in 2024, reflecting the cautious behavior of Angel and VC investors globally. This persistent challenge, which has carried over from 2023, highlights ongoing risks in the market and underscores the uncertainty that continues to affect investment decisions in the country.

Additionally, India's national elections increased risk exposure, with political uncertainty and policy shifts potentially affecting business operations, investor confidence, and sectoral reforms. These global and domestic challenges underscored the need for stronger risk management

frameworks and adaptive strategies across India's industries to navigate future uncertainties effectively.

In response to the heightened risks in 2024, companies across India have increasingly focused on strengthening their risk management frameworks. With the backdrop of global uncertainties, such as geopolitical conflicts and economic slowdowns, alongside domestic challenges like the national elections, businesses have prioritized proactive risk identification, mitigation strategies, and resilience-building measures. This shift reflects a broader trend of embedding risk management into corporate strategy, with an emphasis on agility, digital transformation, and sustainability.

As a result, sectoral risk indices have remained within the superior and optimal risk index range, demonstrating that most industries in India have effectively managed the challenges they faced. Through a combination of technological innovations, regulatory compliance, and strategic planning, sectors have been able to maintain stability and navigate both internal and external risks. This disciplined approach to risk management has ensured that, despite various pressures, India's sectors remained well-positioned for sustainable growth and continued progress in 2024.



### Below is a broader categorization of sectors in terms of risk index:

Figure 3: Corporate India Risk Index 2024 Sector Score



#### **Superior Risk Index**

Superior risk handling was found in nine industrial sectors:, Pharmaceuticals, Healthcare Delivery, Automotive & Ancillary, Manufacturing, Metals & Mining, Telecom & Communication, BFSI, Tourism & Hospitality, and Transportation & Logistics.

#### **Optimal Risk Index**

Optimal risk handling was found in 11 industrial sectors: Media & Gaming, FMCG, Infra & Realty, Agriculture & Food processing, Biotech & Lifesciences, IT ITES, Energy, New Age & Startup, Aerospace & Defence, Chemicals & Petrochemicals and Education & Skill Development.

# Energy Sector Insights 2024

India continues to maintain its position as one of the fastest-growing major economies, solidifying its role as a global economic powerhouse. While the country has witnessed sustained economic expansion, it remains a lower-middle-income economy, with per capita income still below the global average. India's youthful demographic, with a significant portion of the population under 30, offers immense potential for economic growth. However, energy security remains a critical aspect of India's development trajectory, as the country faces challenges of both supply constraints and rising demand across industries.

Coal continues to be a dominant source of energy, with India maintaining its position as the secondlargest coal consumer globally. Despite holding one of the world's largest coal reserves, the country remains dependent on imports to bridge supply gaps. Sectors such as power generation, steel, and cement remain heavily reliant on coal, necessitating strategic policy interventions. Additionally, the energy sector employs millions across various segments, including mining, transportation, and thermal power operations. However, regulatory uncertainties and global market fluctuations have introduced new complexities to the sector's stability.

The Indian power sector witnessed significant developments in the Financial Year 2023-24, with increasing electricity demand driven by post-pandemic economic recovery and industrial expansion. Installed capacity additions progressed but fell short of projections, primarily due to logistical delays and financing challenges. Thermal power plants experienced a rise in Plant Load Factors (PLFs) due to increased demand, reaching levels higher than the previous year.

Energy deficits remained under control, though seasonal fluctuations and grid reliability issues persisted. Power trading through exchanges gained momentum, supported by market reforms and pricing mechanisms. Discoms continued to face financial strain due to high transmission and distribution losses, liquidity constraints, and operational inefficiencies. Rising electrification rates, urbanization, and industrial activity have further fueled power consumption, with electric mobility adoption also playing a role in demand growth. Peak power demand in FY 2024 saw a notable increase, crossing previous records, while total energy consumption continued its upward trend. The industrial and commercial sectors retained their dominant share in electricity usage, with sustained economic activity ensuring steady demand growth. Gradual improvements in transmission infrastructure and policy-driven interventions are expected to support long-term energy security.

Renewable energy remained a major focus area, with solar and wind capacities expanding steadily. Over the last five years, India's renewable energy share in installed capacity has grown significantly, though challenges such as storage limitations and grid integration persist. Hydropower generation fluctuated due to seasonal variability, impacting overall renewable energy output. Investments in energy storage solutions, green hydrogen initiatives, and offshore wind projects gained momentum, signaling a shift towards sustainable energy development.

According to the latest projections, coal will continue to play a key role in India's energy mix, despite increasing renewable integration. While the share of fossil fuels in electricity generation is gradually declining, coal-based power remains indispensable for ensuring base-load stability. The demand for coal is expected to grow, with peak consumption anticipated in the next two decades, aligning with India's evolving energy transition roadmap.

The power sector remains capital-intensive, with long gestation periods for project completion. Conventional power projects, particularly coal-based plants, continue to face financing and regulatory challenges, with environmental concerns driving stricter compliance measures. Infrastructure modernization, digitization, and policy-driven efficiency improvements remain critical to ensuring the sector's long-term viability.

The energy sector faced ongoing challenges in supply chain management, exacerbated by global geopolitical tensions and disruptions in commodity markets. The availability of critical components such as transformers, smart meters, and energy storage systems was impacted, leading to delays in project execution. Additionally, financial stress within the sector, exacerbated by rising subsidy burdens and revenue collection inefficiencies, has constrained investment flows. India's energy policy in 2024 remains deeply interconnected with global energy market trends. The need for balancing economic growth with energy security and sustainability continues to shape

policy decisions. Strengthening domestic supply chains, enhancing energy efficiency, and leveraging international collaborations will be crucial in navigating the evolving energy landscape.

# Energy Sector Risk Index 2024 Vs 2023



Figure 4: Detailed Comparative Analysis 2024 Vs. 2023

### Energy Sector Risk Index 2024 Vs 2023

The overall Risk Index for the sector decreased from 64 to 62 in 2024 owing to an increase in risk exposure which was also met by an increase in risk management.

#### Energy Sector Risk Exposure 2024 Vs 2023

Risk exposure saw an increase primarily due to the growing complexity of the energy landscape. The sector faced heightened geopolitical tensions that impacted global energy supply chains, including disruptions in oil and gas imports, as well as fluctuations in fuel prices. There was also an increasing vulnerability to climate-related risks, such as extreme weather events, that affected power generation and infrastructure. Additionally, India's ambitious push towards renewable energy adoption exposed the sector to new risks, including technological failures, the integration of variable renewable sources like solar and wind into the grid, and the challenges related to scaling energy storage solutions.

#### Energy Sector Risk Management 2024 Vs 2023

Risk management also increased as the sector took proactive measures to address these escalating challenges. Companies and government agencies focused on enhancing grid resilience and stability by investing in smart grids and energy storage technologies to better manage renewable energy supply fluctuations. There was an increased emphasis on diversification of energy sources, including expanding domestic energy production, increasing renewable energy capacity, and improving energy efficiency. Furthermore, the government implemented more robust policies and incentives to attract investments in green technologies and enhance energy security. The sector also ramped up its cybersecurity measures to safeguard critical infrastructure.

# Key Highlights

### **Risk Dimension Analysis: Market and Economy**

Risk Exposure Score: 71 Risk Management Score: 70



#### Inflation

■ Rising costs of imported coal and LNG significantly impacted power generation expenses, with thermal plants relying on imported fuel seeing a 15-20% cost increase due to coal price fluctuations between \$120-\$140 per metric ton in early 2024. This led to higher bids in power auctions and increased electricity tariffs.

Renewable energy projects saw a notable rise in capital costs, as solar module prices increased by 6-8% in Q1 2024, compounded by 40% import duties on photovoltaic panels. This

affected project feasibility, particularly for developers dependent on Chinese imports.

Infrastructure expansion costs surged, as steel prices averaged ₹60,000 per tonne and copper costs rose by nearly 12%, making grid modernization and new transmission line development more expensive. Transmission companies struggled to maintain project timelines due to these price hikes.

Higher borrowing costs continued to burden energy firms, with the RBI maintaining a 6.5% repo rate in early 2024, leading to higher debt servicing costs for power producers. Renewable energy developers, particularly smaller firms, faced delays in financial closure for new solar and wind projects.

### **Taxation Risk**

- The government revised the windfall profit tax on crude oil production multiple times in early 2024, impacting upstream oil and gas companies. With crude trading above \$90 per barrel, producers like ONGC and Oil India had to pay additional levies, reducing profitability.
- GST complications in the renewable sector persisted, as solar projects faced 5% GST on

modules but 18% on inverters and storage systems, causing financial strain for developers. The lack of uniform taxation disrupted cash flows and delayed project commissioning.

- The 40% basic customs duty (BCD) on imported solar modules remained unchanged in 2024, increasing capital expenditure for developers dependent on international supply chains. The high import duty slowed down India's transition to solar energy despite ambitious capacity expansion targets.
- State-specific variations in electricity duty and cross-subsidy surcharges increased, as several states adjusted rates in 2024 to recover losses from financially struggling DISCOMs. Industrial consumers saw a rise in electricity tariffs, making large-scale manufacturing operations costlier.

#### **Regulatory Risk**

- The delay in power tariff revisions by state regulators created financial stress for DISCOMs, leading to pending dues to power generators exceeding ₹1.3 lakh crore in early 2024. This liquidity crunch made it difficult for power producers to sustain operations and invest in future capacity expansions.
- New emission norms for coal-fired power plants set for 2024 forced companies to invest in flue gas desulfurization (FGD) systems, increasing capital expenditure for thermal generators. Many plants struggled to meet compliance deadlines, risking penalties and potential shutdowns.
- India's Green Hydrogen Mission, despite ambitious targets, faced policy bottlenecks, as government incentives and pricing mechanisms remained uncertain. Investors hesitated to commit capital without clearer guidelines on subsidies and production-linked incentives.
- Proposed amendments to the Electricity Act 2024 sought to introduce competition in power distribution, but faced resistance from state-run utilities. Private players remained cautious due to regulatory uncertainty, slowing the anticipated reforms in the distribution sector.

#### **Foreign Exchange Rates**

- The Indian Rupee fluctuated between ₹83-₹85 per USD in early 2024, increasing costs for imported energy components such as turbines, solar inverters, and lithium-ion batteries. This put financial pressure on renewable energy firms reliant on global supply chains.
- Global LNG prices remained volatile (\$9-\$14 per MMBtu), impacting India's long-term supply contracts, especially for power plants reliant on imported gas. This led to increased generation costs for gas-based power plants, affecting their competitiveness against cheaper coal-based alternatives.
- Forex fluctuations disrupted financial planning for renewable energy developers, as several offshore investors sought to renegotiate contracts due to currency volatility. Companies with dollar-denominated PPAs faced unexpected cost escalations.
- Hedging costs for energy firms increased, as companies implemented stronger risk management strategies to mitigate foreign exchange exposure. This resulted in higher

operational costs, particularly for firms importing essential power generation equipment.

#### **Geopolitical Risk**

- The global crude oil market remained volatile due to ongoing conflicts in the Middle East, with oil prices crossing \$90 per barrel in Q1 2024. India, heavily dependent on imported crude, saw increased costs for fuel-based power generation and transportation.
- US-China trade restrictions on solar and battery components continued to impact India's renewable sector, as domestic manufacturers struggled to meet the demand for high-efficiency solar modules and battery storage systems. This led to project slowdowns despite government incentives.
- The Russia-Ukraine war further disrupted LNG supply chains, affecting Indian gas importers relying on Russian supplies. Higher procurement costs for LNG-importing states like Gujarat and Maharashtra increased electricity generation costs for gas-fired power plants.
- Border tensions with China slowed technological partnerships in power infrastructure, with Indian energy firms facing restrictions on procuring advanced transmission equipment and grid management systems. This created a reliance on alternative sources, often at higher costs.

#### **Competition Risk**

- The renewable energy sector saw intensified competition in 2024, with aggressive bidding in solar and wind auctions driving tariffs below ₹2.50 per unit. Established players struggled to maintain profitability, while new entrants disrupted market dynamics.
- Private players faced stiff competition from PSU energy companies, as government-backed firms secured long-term contracts at favorable rates. This made it difficult for private firms to sustain large-scale projects, especially in solar and wind energy.
- Battery storage and green hydrogen attracted heavy investments, increasing competition for project approvals and incentives, with global firms like Tesla and Reliance vying for a dominant position in India's energy storage market.
- Thermal power plants faced competition from emerging clean energy sources, with several industrial consumers shifting to captive renewable generation, reducing long-term demand for coal-based power.

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# **Risk Dimension Analysis: Technology**

Risk Exposure Score: 67 Risk Management Score: 67



### Innovation Risk / Obsolete Technology

• Aging thermal power plants struggled with efficiency upgrades, as many plants continued using subcritical technology, leading to lower efficiency levels compared to modern ultrasupercritical units.

Grid modernization efforts lagged behind energy transition needs, with slow adoption of smart grid and AI-based demand forecasting tools, increasing the risk of supply-demand mismatches.

■ Green hydrogen production faced technological bottlenecks, with India's

electrolyzer manufacturing capacity not scaling quickly enough to meet the 2024 demand surge, limiting industrial adoption.

Battery storage deployment faced efficiency challenges, as high costs and limited domestic production of lithium-ion cells slowed the integration of energy storage into grid systems.

### **Intellectual Property Risk**

- Domestic solar manufacturers faced patent disputes with global firms, with allegations of technology infringement on high-efficiency photovoltaic cell designs, delaying production expansion plans.
- Wind turbine technology faced risks of design replication, as smaller Indian firms attempted to reverse-engineer advanced offshore wind turbine models, raising concerns over IP violations.
- India's push for indigenous battery manufacturing led to IP-related challenges, with global suppliers restricting access to proprietary lithium-ion and sodium-ion battery technologies.
- Software vulnerabilities in energy management systems increased IP theft risks, with instances of unauthorized access to proprietary algorithms used for grid load balancing and predictive maintenance.

### Disruptive Technology

AI-driven energy management systems began transforming power grid operations, but traditional utilities struggled to integrate these advanced systems due to lack of digital infrastructure.

- Next-generation nuclear power technologies gained momentum globally, but India's progress in advanced reactors remained slow, creating a risk of falling behind in clean energy innovation.
- Direct air capture (DAC) carbon removal technology started gaining commercial traction, but Indian power companies hesitated to invest due to high costs and uncertain regulatory incentives.
- Decentralized peer-to-peer (P2P) energy trading platforms gained traction, allowing small renewable producers to sell power directly, but traditional utilities viewed this as a competitive threat.

#### **Data Compromise**

- Power sector cyberattacks increased in 2024, with multiple DISCOMs reporting hacking attempts targeting billing databases, leading to concerns over data integrity and consumer privacy.
- Energy trading platforms faced security breaches, with hackers attempting to manipulate power prices through unauthorized access to real-time trading algorithms.
- Smart meter deployments exposed vulnerabilities, as cybersecurity firms detected loopholes that could allow remote manipulation of meter readings, raising risks of financial fraud.
- Confidential project bidding data faced risks of leaks, with unauthorized disclosures of tariff bids for renewable energy auctions affecting market competitiveness.

# Risk Dimension Analysis: Operational and Physical

Risk Exposure Score: 72 Risk Management Score: 74



### Critical Infrastructure Failure / Machine Breakdown

A major grid disturbance in December 2023 highlighted vulnerabilities India's in power transmission network. as excessive demand fluctuations led to load shedding in multiple states, the need for emphasizing advanced grid modernization.

Coal-based plants suffered frequent forced outages, with reports indicating that over 8,000 MW of thermal capacity remained unavailable at various times in early 2024 due to boiler tube leakages and turbine failures, impacting power supply stability.

Aging hydropower plants in North India

continued to face mechanical failures, particularly during peak winter months when extreme cold impacted turbine efficiency, reducing power generation capacity by 10-15% in affected plants.

Offshore wind projects faced delays due to logistical challenges in transporting and installing large turbines, with supply chain disruptions leading to prolonged commissioning periods and increased costs.

### **Business Continuity / Sustainability**

- Coal shortages in Q1 2024 caused operational challenges, with domestic coal production unable to meet demand, leading to power plants operating at critically low stock levels. Over 15 GW of capacity faced supply constraints, affecting industrial consumers.
- Unpredictable monsoons impacted hydropower generation, as reservoir levels in key projects dropped by 8-12% compared to previous years, reducing the availability of hydroelectric power during peak demand months.
- Government push for net-zero commitments increased sustainability pressure on energy firms, requiring utilities to integrate green energy faster despite infrastructure constraints. Companies struggled to balance fossil fuel reliance with clean energy mandates.
- Supply chain disruptions in solar module imports affected project timelines, with

manufacturers facing shortages due to global semiconductor supply issues, causing commissioning delays for multiple utility-scale solar plants.

### **Supply Chain Risk**

- Global shipping disruptions affected coal imports, as congestion in major international ports led to delays in shipments arriving at Indian ports, impacting the fuel supply for thermal plants dependent on imported coal.
- Solar module imports from China faced customs clearance delays, with increased scrutiny on shipments leading to higher logistics costs and project delays for Indian solar developers.
- Wind turbine manufacturers struggled with component shortages, particularly for rare earth materials needed for generators, increasing production costs and delaying project execution.
- LNG procurement faced supply risks due to fluctuating global availability, with spot market prices remaining unstable, forcing Indian importers to renegotiate long-term contracts.

#### **Commodity Price Risk - Volatility in Prices of Raw Materials**

- Coal prices remained volatile, fluctuating between \$120-\$140 per metric ton in early 2024, making it difficult for power plants to plan long-term procurement strategies without cost overruns.
- Lithium and rare earth metal prices surged due to high demand for energy storage systems, increasing battery production costs for renewable energy storage projects in India.
- Steel and copper prices remained unstable, impacting the cost of power transmission projects, with grid expansion plans facing higher capital investment requirements.
- Oil price fluctuations above \$90 per barrel increased the cost of fuel for diesel-based backup power systems, affecting industries relying on backup generation during peak demand periods.

### **Portfolio Risk**

- The push for renewable energy diversification increased financial exposure for traditional energy firms, as companies investing in solar, wind, and green hydrogen struggled with cost overruns and delayed return on investment.
- Thermal power plants faced reduced long-term demand, as industrial consumers signed long-term green energy purchase agreements, shifting away from coal-based electricity, impacting capacity utilization rates.
- Fluctuations in global LNG prices made gas-based power plants financially unviable, with several plants operating at suboptimal load factors due to high fuel costs and lower merit order dispatch.
- Hybrid energy projects combining solar, wind, and battery storage saw increased adoption but faced integration risks, with challenges in synchronizing multiple energy sources for stable grid supply

### Environmental Hazard Risk

- Extreme weather events in 2024 disrupted energy infrastructure, with severe heatwaves increasing power demand while hydropower output declined due to lower water availability.
- Coastal power plants faced operational risks due to rising sea levels and increased cyclone frequency, with some facilities implementing new flood protection measures after repeated weather-related disruptions.
- Coal mining operations faced stricter environmental regulations, leading to delays in environmental clearances for new projects, impacting fuel supply security.
- Renewable energy projects faced opposition from local communities and environmental groups, particularly in ecologically sensitive zones, delaying project execution and increasing compliance costs

### Workplace Accident

- Coal mines reported increased workplace safety concerns, with several incidents of mine collapses and gas leaks affecting worker safety in 2024, prompting stricter government inspections.
- Thermal power plants faced higher accident rates due to aging infrastructure, with boiler explosions and electrocution incidents leading to temporary shutdowns and increased maintenance requirements.
- Renewable energy project sites reported safety challenges during large-scale solar panel and wind turbine installations, with multiple cases of worker injuries due to height-related accidents.
- High-voltage transmission line projects saw an increase in workforce hazards, as rapid expansion of India's power grid led to higher risks of falls, electrical shocks, and equipment malfunctions during construction activities

### Human Resource Risk

- The energy sector faced a shortage of skilled professionals in renewable technologies, with companies struggling to hire trained engineers for solar, wind, and battery storage projects.
- Government initiatives to transition coal workers to green energy jobs progressed slowly, leading to concerns about unemployment risks in coal-heavy regions like Jharkhand and Chhattisgarh.
- Attrition rates increased in IT roles within energy companies, as skilled data analysts and cybersecurity professionals moved to higher-paying sectors, creating gaps in digital transformation efforts.
- Labor strikes and wage disputes in power generation and distribution companies led to temporary operational disruptions, with unions demanding higher wages in response to inflation.

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### **Financial Risk**

- Rising interest rates in 2024 increased financing costs for energy infrastructure projects, impacting the viability of capital-intensive renewable energy developments.
- Delayed disbursement of subsidies for renewable energy projects created liquidity constraints, with solar and wind developers struggling to maintain cash flow due to pending government payments.
- State electricity distribution companies (DISCOMs) continued to struggle with high debt levels, with payment delays to power generators causing financial stress in the sector.
- Fluctuations in international lending rates made foreign debt more expensive, particularly for large-scale renewable energy investments relying on global financing.

### Breaches of Law (Local/International)

- India's renewable energy sector faced compliance challenges with international climate commitments, as delays in meeting the 500 GW non-fossil fuel capacity target raised concerns about adherence to COP26 and COP28 pledges.
- Thermal power plants encountered stricter emission norms enforcement, with multiple facilities struggling to meet the revised 2024 deadlines for Flue Gas Desulfurization (FGD) system installations, leading to regulatory penalties.
- Coal mining violations increased scrutiny from environmental agencies, with several illegal mining operations shut down in Jharkhand and Odisha, affecting coal supply to dependent power plants.
- Renewable energy developers faced legal disputes over land acquisitions, as solar and wind projects in Rajasthan and Gujarat encountered litigation over land ownership and environmental clearances.

### **Risk Dimension Analysis: Crime and Security**

Risk Exposure Score: 63 Risk Management Score: 64



### Cyber-crimes

Power grid cyberattacks escalated in 2024, with reports of suspected state-sponsored hacking attempts targeting Load Dispatch Centers (LDCs) and transmission networks, raising concerns over national security.

Multiple electricity distribution companies (DISCOMs) suffered ransomware attacks, with hackers encrypting billing and consumer data, leading to service disruptions and financial losses.

• Oil and gas pipeline networks faced digital threats, as automated monitoring systems were

targeted by cybercriminals attempting to manipulate pressure control mechanisms.

Renewable energy assets such as solar farms and wind turbines experienced cyber vulnerabilities, with hackers attempting to disrupt remote monitoring systems, posing risks to operational continuity.

### Counterfeiting

- Substandard solar panels and inverters flooded the Indian market, with multiple cases of counterfeit modules failing to meet performance standards, leading to efficiency losses in largescale solar projects.
- Fake electrical components in power grid infrastructure increased reliability risks, with incidents of transformers and switchgear failures traced back to non-certified manufacturers supplying low-quality equipment.
- Unauthorized use of patented battery storage technology was reported, as some local firms attempted to bypass licensing agreements for advanced lithium-ion and sodium-ion battery designs.
- Illegal blending of biofuels with conventional fuels led to operational inefficiencies, with power plants struggling to maintain combustion stability due to unregulated fuel compositions.

### **Threat to Women Security**

Women workers in coal mining and thermal power plants faced workplace safety concerns, with reported cases of inadequate security in remote operational sites leading to increased risk of harassment.

- Female engineers and technicians in renewable energy projects raised concerns over lack of secure accommodation in rural project locations, impacting workforce participation.
- Women professionals in the energy trading and analytics domain faced cybersecurity threats, including targeted phishing attacks and online harassment related to industry-sensitive data handling.

### Corruption

- Allegations of bribery in coal block allocations persisted, with investigative agencies scrutinizing irregularities in mine leasing processes, delaying project approvals.
- Financial misreporting in DISCOMs continued to be a major concern, as fraudulent billing and inflated subsidy claims led to revenue losses and audit discrepancies.
- Renewable energy project tenders faced transparency issues, with reports of preferential bidding practices and manipulation of solar and wind auction results impacting fair competition.
- Illegal power theft syndicates remained active, particularly in high-loss regions, where unauthorized connections and meter tampering continued to drain revenues from the formal electricity market.

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# Risk Dimension Analysis: Natural Hazard and Event

### Risk Exposure Score: 73 Risk Management Score: 79



# Natural Hazards like flood, drought, famine, earthquake, landslide etc

Cyclones and extreme weather events disrupted power generation and transmission, with 2024 witnessing severe storms affecting coastal energy infrastructure, leading to prolonged outages.

• Landslides in hydroelectric project zones, especially in the Himalayas, raised concerns over dam safety, with increased sedimentation impacting turbine efficiency and reservoir capacity.

Flooding of coal mines in monsoon season

affected fuel availability, forcing thermal power plants to rely on expensive imported coal, increasing generation costs.

Lightning strikes damaged critical grid substations, leading to localized blackouts and higher maintenance costs for transmission operators.

### Pandemic and other Global Epidemic Diseases

- Global supply chain disruptions due to resurgent COVID-19 variants in key manufacturing hubs affected solar panel and battery imports, delaying India's renewable energy project timelines in early 2024.
- Workforce shortages in coal and thermal power plants were observed during localized outbreaks of viral infections, impacting maintenance schedules and plant efficiency.
- Delayed deliveries of critical grid components, such as transformers and circuit breakers, due to factory shutdowns in China and Southeast Asia, slowed infrastructure upgrades.
- Health-related absenteeism in field operations, particularly among maintenance and transmission teams, created operational gaps, forcing companies to rely on contract labor, impacting service quality.

# **Risk Dimension Analysis: Strategic Risk**

Risk Exposure Score: 66 Risk Management Score: 72



# Resource scarcity / Misutilization / Overall Utilization

India's coal reserves faced depletion concerns, with high dependency on imported coal, as domestic production fell short of meeting peak summer demand in 2024, leading to higher fuel costs.

• Water shortages in thermal power plants worsened, particularly in arid regions, where reduced water availability impacted cooling system efficiency, forcing some plants to operate below capacity.

Land acquisition challenges slowed the expansion of solar and wind projects, with local

protests and ecological concerns delaying approvals for large-scale installations.

Underutilization of installed renewable capacity due to inadequate storage infrastructure led to curtailments, with solar and wind farms forced to dump excess energy due to lack of grid integration.

### **Public Sentiments**

- Increasing opposition to large-scale hydroelectric projects intensified in 2024, particularly in the Northeast and Uttarakhand, with environmental groups raising concerns over displacement and ecological damage.
- Public dissatisfaction with high electricity tariffs led to protests in several states, as DISCOMs struggled to balance subsidy burdens and financial viability, fueling negative sentiment.
- Growing demand for sustainable energy resulted in social media campaigns against coal expansion, pressuring policymakers to accelerate the transition to cleaner alternatives.
- Local resistance against transmission infrastructure expansion delayed key grid projects, as communities opposed new high-voltage lines due to land displacement concerns.

### **Delay in Execution of projects**

Land acquisition and regulatory approvals remained key bottlenecks for renewable energy projects, with several large-scale solar and wind farms missing their commissioning deadlines in 2024.

- Thermal power plant expansions faced delays due to supply chain disruptions in equipment procurement, particularly for boiler and turbine components.
- Hydropower projects suffered setbacks due to geological challenges and extreme weather, with landslides and flooding slowing construction progress in hilly terrains.
- Grid transmission infrastructure upgrades fell behind schedule, impacting renewable energy evacuation capacity, forcing temporary shutdowns of operational solar and wind plants.

### Increased in no. of recalls and quality audits

- Stringent BIS (Bureau of Indian Standards) quality regulations for solar panels and inverters led to multiple product recalls, as non-compliant modules failed efficiency and durability tests in 2024.
- Frequent inspections of battery energy storage systems (BESS) uncovered safety concerns, leading to recalls of lithium-ion battery units that exhibited overheating and fire hazards.
- Quality audits in thermal power plants identified substandard spare parts usage, particularly in boiler and turbine maintenance, increasing unplanned shutdown risks.
- Oil and gas refining units underwent intensified regulatory audits, with multiple cases of noncompliance detected in emission control and hazardous material handling, leading to mandatory corrective actions.

#### **Failed Mergers and Acquisitions**

- Proposed mergers in the renewable energy sector faced regulatory scrutiny, as CCI (Competition Commission of India) raised concerns over market concentration and fair competition in 2024.
- Debt-laden DISCOMs struggled to attract private investment, leading to failed acquisition attempts by energy companies seeking financial restructuring opportunities.
- Global energy giants hesitated in acquiring Indian assets due to policy uncertainties, particularly in the evolving carbon credit and green hydrogen incentive frameworks.
- Oil & gas sector witnessed unsuccessful merger negotiations, as valuation mismatches and regulatory challenges stalled deals between domestic and international players

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# ICICI LOMBARD: Key Solution Offerings

### Property

Evaluation of various risks to understand areas for improvement, such as fire preparedness, electrical safety, safety & emergency preparedness, maintenance and house-keeping, etc. By evaluating risks, we can identify potential hazards and advise on mitigating risks.

- Property Loss Prevention: We believe users should carry out detail risk visit followed by benchmarking of the industry good practices (Industry Risk Profiling). For instance, industries such as chemicals & petrochemicals impose a major challenge in manufacturing due to inherent risk. We recommend solutions for "Low Focus High Loss Areas. This can help in minimizing severity losses. All the risk recommendations are grouped into four different segments based on cost-impact matrix and the priority is decided accordingly. Key decision makers at user's end can ensure to get recommendations implemented.
- Comprehensive Risk Assessment (CRA): A Comprehensive Risk Assessment is a systematic approach to electrical safety specially designed for industries to evaluate potential hazards and recommend improvements, coupled with savings. It is an important tool for identifying risks, severity of hazards and avoid incidents arising out of electrical faults.
- Electrical Risk Assessment (ERA): An Electrical Risk Assessment is a basic solutions focused towards electrical safety designed to evaluate potential hazards and recommend improvements. Majority of fires in India are caused due to electrical installations. Ensuring safety of electrical installations of industrial unit or organization is critical to reduce risk and ensure safety compliance with Safety Standards and Regulation. ERA is an important tool which have 6 inbuilt solutions such as Electrical Audit & Thermography, etc.
- Fire Hydrant IoT: Fire Hydrant IoT: Fire hydrant IOT (ILGIC Patented Solution) is an automated device for monitoring key parameters such as Hydrant and Sprinkler line pressure, Main and Jockey pump on-off status, Firewater tank level. These can be interpreted to provide intelligence on unauthorized usage of water and leakage, effectively saving water. This information pertaining to breach of above-mentioned parameters is notified through dashboard & email alerts. Monitoring of such system is essential as these fire fighting systems are lifeline during any emergency.
- Temperature & Humidity IoT: Provides end-to-end plug & play ambient temperature and humidity monitoring Solution to manage temperature and humidity-controlled environment more efficiently. It generates Automated reports (historical trends for different locations etc.). Intelligent Alerts SMS & emails is sent to the concerned (one or multiple) stakeholders in case

any anomaly.

- Electrical IoT: Electrical IoT is a patented solution (ILGIC Patented Solution) to avoid any instances of short circuiting due to abnormal voltage & current conditions. These are mainly built for application in warehouses. This solution has been created as these locations are having huge stocks with lesser manpower during emergencies mainly during non-business hours. The device automatically cuts off power in case of abnormality & restarts back when situation is normal.
- Ultrasound technology for Gas Leak Detection: Use of ultrasound technology for leak detection in process lines. The methodology recommends a non-destructive way of avoiding losses with no downtime. The main objective is to identify the leakages in all pressurized systems including pipelines by using ultrasound technology and tag them for rectification. It also includes listing leaks with individual CFM losses and cost savings possible.
- Fire Mitigation Solutions: Solutions have been designed based on their specific needs, keeping in mind the level of awareness and complexity of the location. These best-in-class solutions which are installed at correct locations.
- Renewable Solutions: In line with our philosophy of recommending business solutions, we recommend efficiency measurements for wind and solar power generating assets. Drones are used to provide high accuracy and quick reach which is not possible through any traditional methodology. User get to know about the low performing module and ways to improve the same within the entire solar plant with latlong identification. We recommend advanced drone-based technology for inspection of wind turbines and solar PV modules.

### Marine

In the dynamic realm of marine insurance, cargo faces a myriad of risks, from unpredictable weather conditions to unforeseen accidents, safeguarding against potential challenges at sea and in surface transportation / INLAND movement is paramount.

- MLCE (Marine loss control engineering): Frequent occurring losses due to Peril such as accident, wet damage, theft, non-delivery, pilferage, hijack of consignments, mishandling shall be examined with ground inspections, to determine root cause analysis with MIS, claim assessment reports collectively in the form of logistics audit.
- MWS (Marine warranty surveys): Our inhouse practices of condition survey prior risk inception & post risk inceptions helps our customers to have an independent risk management of the high value / ODC (over dimensional cargo) movements conducted by the Insured so that reliance over logistics service provider is supervised with Insured's nominated risk assessment team having a worldwide presence with a supervised network. Not only marine cargo, but HULL insurance risk exposures are surveyed for risk assessment and risk management.
- **Technical engagements:** Uncertainty of the risk associated with the transit can be concluded

with marine experts. Assessing vessel's condition for SEA transit as a full chartered load on behalf of the Insured, Risk assessment of cargo from packing, handling, lifting, securing, transit and final delivery methodology shall be discussed with the logistics team. Vessel selection, stowage and securing methods can be jointly discussed with the User's logistics team for a safe transit, dispatch and delivery coverage after assessing the risk on desktop with a virtual or F2F engagement and / or a ground visit.

Transit Telematics: With the government's constant agenda of upgrading to digitalized operations by introducing ULIP and NITI Aayog mode of operations, not having a visibility of transit will hamper your logistics operations. IOT and SAAS (software as a service) based products incorporating the design of a cost efficiency and loss mitigation system can help enhance delivery with safe operation. Additionally, a 24\*7 risk control is recommended to effectively monitor and mitigate theft / pilferage prone dispatches to ensure a safe transit delivery. Be it a temperature-controlled cargo, expensive cargo in transit or liquid bulk cargo in lorry tankers, it is essential to mitigate the risk and losses that might occur due to accidents caused by fatigue, unexplained conditions, or theft. We have case studies of successful recovery of stolen goods with our telematics services.

### Liability

The growing adoption of technology in organizations has not only led to crucial data being stored and processed on digital platforms but also facilitated the automation of operations, thereby enhancing business efficiency. However, this shift also amplifies cyber risk, exposing sensitive information to potential threats and rendering organizations vulnerable to financial losses, reputational damage, and legal liabilities. As organizations delve deeper into the digital realm, fortifying cybersecurity measures becomes imperative to safeguard operational integrity and protect critical data from unauthorized access or breaches.

- Phishing Simulation: Experience cutting-edge phishing simulation tests to fortify your organization's defenses against cyber threats. You can enable phishing attack simulations to educate your employees on identifying and handling potential risks. Through engaging and interactive scenarios, you can raise awareness and equip your team with the necessary skills to detect and thwart phishing attempts.
- Awareness Campaigns: With Cyber Awareness Campaigns, you can go beyond just educating organizations about cybersecurity. The campaigns are meticulously designed to empower your team with essential best practices, insights into global incident trends and a comprehensive understanding of potential risks. Interactive designs help you captivate and engage your employees, fostering a cyber-aware culture within your organization. Customized campaigns can perfectly align with your unique needs and requirements and stay informed and vigilant.
- Incident Response and Readiness: A bespoke service that fortifies organizations with robust processes and clear communication channels for proficient cyber-incident management. This

recommendation not only trims down the incident response time but also facilitates prompt, accurate action within the crucial initial hours. By meticulously assessing your organization's incident response policies and sculpting response systems in alignment with global industry benchmarks, this ensures you are thoroughly prepared to tackle the evolving digital threat landscape.

- CXO's Session: CXO's Session service provides immersive training sessions, personalized coaching & interactive discussions to empower your CXOs with cybersecurity knowledge that aligns with your business objectives. The subject matter experts recommend strategic guidance and in-depth insights into the ever-evolving threat landscape, translating technical jargon into practical language. Regular cybersecurity forums facilitate peer-to-peer learning and benchmarking against industry standards. CXO- focused approach ensures a cyber-aware leadership team that drives your organization's success securely into the future.
- Weekly Threat Intelligence Bulletin: Stay ahead of cyber threats with the Weekly Threat Intelligence Bulletin. We meticulously curate this comprehensive bulletin, providing timely insights on emerging threats, vulnerabilities, and attack trends. Delivered directly to your inbox, it recommends proactive advantage by promptly identifying potential risks. With continuous updates and ongoing support, you can confidently adapt your Defence strategies to combat the most sophisticated threats. It enables you to make informed decisions and protect your organization from emerging threats with Weekly Threat Intelligence Bulletin.
- Email Security: Safeguard your organization's communication channels with the Email Security solutions. We recommend robust measures to protect against phishing, malware & other email-borne threats. The advanced email filtering and authentication technologies prevent malicious emails from reaching your users inbox. Implementing encryption protocols to ensure the confidentiality of sensitive data in transit is a good idea. With real-time monitoring and threat intelligence, email security measures provide proactive Defence, detecting and blocking suspicious activities promptly. You can protect your organization's reputation and sensitive information with comprehensive Email Security measures, ensuring a secure and reliable email environment.
- Agent-less Patching: Agent-less patching platform for companies and MSMEs who want a rapid solution to distribute critical security updates and vulnerability fixes without causing system downtime. The patching platform not only assists with patch deployment, but it also enables your system administrator in understanding the patches, Adjustments & impact of the patches on the system. Before applying the patch, the software generates a warning if the system requires downtime or a reboot. You can experience a hassle-free patching process with the platform recommending enhanced security for your organization.
- EDR/MDR Services: Elevate your organization's cybersecurity capabilities with the Endpoint Detection and Response (EDR) and Managed Detection and Response (MDR) services. These advanced solutions provide continuous monitoring, rapid threat detection & effective incident response, safeguarding your digital assets in real-time. With EDR, proactively detect and

respond to threats at the endpoint level, while MDR service offers 24/7 monitoring and expert support. You can strengthen defenses against the most sophisticated cyber-attacks with EDR/MDR services, ensuring a resilient and secure digital environment.

- All-in-one Operating System: All-in-One Operating System is a true game-changing platform that provides a fortified desktop environment to foster secure collaboration and centrally managed cybersecurity resilience. Inbuilt endpoint security serves as a vigilant guard, blocking potential dangers. Effortless IT management provides with a user-friendly interface, leading to significant cost savings in IT infrastructure. It provides in-built end-point security, automated updates and patches along with extensive device reports. Organizations can unlock a secure and prosperous future by embracing the All-in-One Operating System in their IT infrastructure.
- Cyber Risk Management & Compliance Dashboard: Gain a clear understanding of your organization's cyber risk exposure with Cyber Risk Management & Compliance Dashboard. This powerful tool assesses your risk posture, quantifies potential financial Impact & evaluates compliance with industry standards and regulations. Armed with this information you can make informed decisions to prioritize cybersecurity investments and ensure compliance with relevant laws and regulations. The intuitive dashboard provides a comprehensive view of your cybersecurity performance enabling data-driven decision-making. This solution enables organizations to stay ahead of threats and ensure a resilient cybersecurity posture.
- Security Score Card: Track your organization's cybersecurity performance with a dynamic Security Score Card solution. This comprehensive rating provides a clear overview of your security posture, highlighting areas that require attention and improvement. It empowers data-driven decisions, allowing you to focus on strengthening key areas. Identify potential risks and compliance gaps with industry standards and regulations. With actionable insights, you can prioritize cybersecurity investments effectively, ensuring a robust and resilient Defence against cyber threats. This Security Score Card solution can be your strategic tool to proactively elevate your cybersecurity posture.
- VAPT: Enhance your organization's cybersecurity defenses with the Vulnerability Assessment and Penetration Testing (VAPT) service. Skilled professionals conduct rigorous assessments, simulating real-world attacks to identify potential vulnerabilities in your digital infrastructure. With detailed insights, you can fortify your defenses and proactively address weak points before malicious actors exploit them. This service goes beyond identifying vulnerabilities, you also get actionable recommendations to mitigate risks effectively. Organizations can be one step ahead of cyber threats, ensuring the security and resilience of your critical assets with the comprehensive VAPT service.

### Engineering

In engineering risk management, it's vital to adopt a holistic approach that extends beyond immediate concerns to proactively tackle potential risks and uncertainties. Drawing upon

considerable expertise in claims handling and risk evaluation, a robust and customized protection strategy can be ensured.

Construction endeavors face a myriad of risks such as floods, cyclones, impact damage, fires, theft, and collapse. However, the adverse effects of these risks can be mitigated through the

implementation of extensive loss prevention measures specifically tailored for engineering projects.

- Engineering Loss Prevention Exercise (ELP): To effectively manage losses in Engineering Risk, fostering a culture of loss prevention is crucial. It's widely acknowledged that each construction project is distinct, presenting specific challenges related to geography, geology, occupancy, and construction methodology, which in turn result in unique associated risks. To cater this challenge a specific risk management framework which deals about the unique requirement of each project could be created for the loss prevention with reference to some parameters of distinctive research and industries best practices.
- Drone Solutions for Linear Projects: In recent years, the construction industry has undergone significant changes due to the introduction of drone-based construction solutions. These cutting-edge technologies are transforming the planning, design, and execution of construction projects. A major benefit of drone technology in construction is its capacity to conduct aerial surveys, providing extensive coverage and detail. Drones, equipped with advanced cameras and sensors, can rapidly capture precise images and data, offering project managers valuable insights into site conditions. This data can facilitate project planning, cost estimation and design optimization by providing a comprehensive understanding of the project's parameters.
- CPM Fleet & Fuel Management: An advanced GPS-equipped sensor is available to precisely measure direct fuel consumption, evaluate engine efficiency, and detect potential tampering of diesel engines in both mobile vehicles and stationary machinery. This solution enables real-time alerts for service reminders and critical health issues, facilitating prompt resolutions and enhanced utilization. Additionally, it offers valuable insights into machinery and equipment performance through comprehensive analyses, resulting in optimized inventory usage and increased efficiency.

### Health

We highly recommend exploring proactive and preventive healthcare solutions, which can make a significant difference in maintaining good health. Recognizing that majority of in-patient department (IPD) admissions could be prevented with timely interventions and regular healthcare, it is important to focus on health, not just during illness.

Pioneering Digital Platform: We recommend exploring digital health innovations offered by industry leaders, which provide cutting edge health solutions through the IL TakeCare (ILTC) app. Our platform has transformed the way health services are delivered by introducing a fully digital and cashless Outpatient Department (OPD) and Wellness Program.



- Health Advisory Services: We recommend a suite of health advisory services on the IL TakeCare app. Users can access health risk assessments, diet and exercise trackers, health parameter tracking and trends and sleep, meditation & hydration reminders. In addition, the platform recommends a feature to upload health records up to 1GB, and provides informative health blogs.
- IL TakeCare App: IL TakeCare app is a One-Stop-Solution for users with insurance needs. This robust user engagement is a testament to the high-value features that the app provides. Unique to the app is the innovative self-health assessment feature, which includes Face scan technology that can measure blood pressure, heart rate, cardiac variance, and SpO2 levels. The platform provides seamless teleconsultations with medical practitioners and specialists, and even recommends access to mental wellness experts to the insured. The facility for cashless OPD services and the efficient claim settlement process further enhance user experience. By encapsulating a wide range of state-of-the-art health services and solutions, the IL TakeCare platform revolutionizes corporate health management and serves as a comprehensive digital health solution.





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### Navigating Risks, Powering India's Growth

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