

INDUSTRY REPORT

INDIA POWER EPC MARKET

STUDY PERIOD: 2019 - 2030



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1 MACRO-ECONOMIC OVERVIEW

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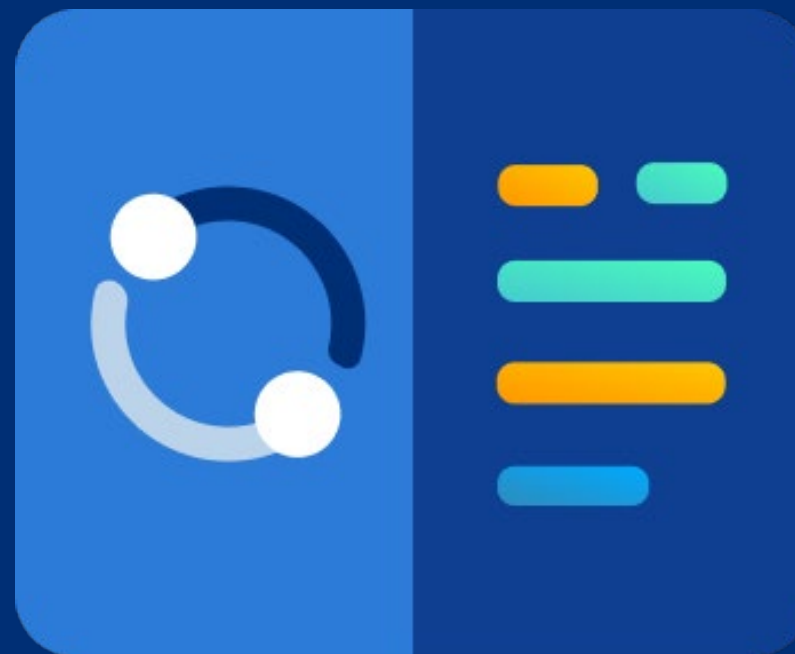
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1.1 GLOBAL

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1.1.1 ECONOMY ANALYSIS

GLOBAL (in %; otherwise mentioned)	2019	2020	2021	2022	2023	2024	2025	2026
GDP (Current Prices, USD Billion)	87,772.49	85,519.46	97,402.91	101,409.37	105,600.76	110,064.92	1,15,558.11	121,325.45
Inflation Rates	3.50%	3.26%	4.66%	8.63%	6.66%	5.8%	4.2%	3.5%
Private Consumption (Annual Change)	3.30%	-3.42%	8.80%	4.57%	4.73%	3.75%	3.75%	3.95%
Public Consumption (Annual Change)	3.12%	2.42%	2.95%	3.77%	2.93%	2.37%	2.92%	2.77%
Fixed Investments (Annual Change)	1.43%	-4.97%	8.58%	6.13%	5.55%	4.12%	4.77%	5.05%
Exports GNFS (Goods And Non-factor Services) (Annual Change)	1.08%	-9.10%	10.25%	8.08%	1.38%	3.65%	4.62%	4.62%
Imports GNFS (Goods And Non-factor Services) (Annual Change)	0.00%	-10.90%	15.38%	7.65%	4.18%	3.58%	4.28%	4.65%
Commodity Price Index (In Nominal USD, 2010 = 100)								
Total	79.34	63.07	100.90	142.52	108.04	105.10	99.00	97.30
Energy	78.25	52.68	95.38	152.57	106.95	101.52	94.50	92.50
Non-Energy	81.56	84.12	112.09	122.14	110.24	112.36	108.20	106.90
Precious Metals	105.44	133.54	140.17	136.80	147.34	180.17	178.00	174.30

Source: World Bank Group, International Monetary Fund (IMF), Mordor Intelligence



1.1.1 ECONOMY ANALYSIS

GLOBAL ECONOMIC OUTLOOK

- The global economic landscape shows modest improvement after several years of overlapping adverse shocks. Inflation seems to be easing without a significant slowdown in major economies, and a trend of widespread monetary policy easing is evident.
- According to the World Bank, over the next couple of years, while the United States and China—two primary engines of the global economy are set to decelerate, growth is anticipated to firm up in various emerging and developing markets. Overall, the post-pandemic global economic expansion is projected to maintain its steady trajectory. Yet, the global economy appears to be stabilizing at a relatively subdued growth rate. This pace may not be adequate for sustained economic development or bridging the per capita income gap.
- Moreover, challenges loom, including heightened policy uncertainty, increasing trade fragmentation, slower-than-expected inflation reduction, and tepid activity in major economies.
- In recent years, the global economy has undergone significant transformations, marked by notable shifts in key indicators. In current prices, the global GDP surged from USD 87,772.49 billion in 2019 to about USD 110,064.92 billion in 2024, with projections eyeing a reach of USD 121,325.45 billion by 2026. This upward trajectory highlights the economy's bounce-back from the 2020 slump and its resilience amidst global challenges.
- Inflation has been a focal point of economic discussions, witnessing a rise from a moderate 3.50% in 2019 to a concerning 5.8% in 2024, one of the most pronounced spikes in recent history. However, the global inflation rates are projected to decline to 4.2% in 2025 and further dip to 3.5% by 2026. This trend indicates that global monetary policies and economic measures are starting to rein in price pressures, yet the journey to complete price stability is gradual.

Source: Mordor Intelligence

GLOBAL ECONOMIC OUTLOOK

- Private consumption patterns transition from a -3.42% contraction in 2020 amidst the global pandemic to a vigorous 8.80% rebound in 2021 underscores the remarkable nature of the recovery. Following this, a moderation to sustainable levels, with figures around 4.73% in 2023 and a projection of 3.75% for 2024-2025, points to a normalization in consumer behavior and spending.
- Projections through 2026 indicate a gradual economic normalization. GDP growth is set to persist, albeit at a tempered rate, signaling a shift from the post-pandemic recovery to a more sustainable growth trajectory.
- The anticipated easing of inflation rates and steady private consumption growth point to an economy inching toward equilibrium, even as it grapples with structural challenges and adjustments.
- The global economy is set to sustain its growth while navigating inflationary pressures and shifting consumption habits.





1.1.2 GROWTH DRIVERS

HIGH-VALUE INDUSTRIES AND SWIFT INDUSTRIALIZATION FUEL GDP GROWTH

- In advanced economies like the United States, European nations, and Japan, GDP growth is primarily fueled by consumption, services, and technological innovation. While these economies experience slower growth than their emerging counterparts due to a more mature industrial and service sector, their pivot towards high-value industries such as technology, healthcare, and finance has bolstered GDP. Furthermore, these advanced economies are taking strides to enhance healthcare through initiatives like cybersecurity and digitalization.
- As an illustration, in January 2024, the Commission rolled out a European action plan to bolster the cybersecurity of hospitals and healthcare providers. This initiative, part of the Political Guidelines for the 2024-2029 Commission mandate, seeks to enhance threat detection, preparedness, and crisis response within the healthcare sector. The plan equips hospitals and healthcare providers with tailored guidance, tools, services, and training. Such innovations in healthcare are set to uplift the region's GDP and spur economic growth in the years ahead.
- Additionally, boosting investments in green energy, technology, and healthcare services fuels GDP growth. These advanced economies are also channeling efforts into enhancing productivity and fostering innovation within their service sectors.
- For instance, Japan is required to invest approximately JPY 320 trillion (USD 2.2 trillion) over the next decade to stay on track for its 2050 net-zero goal. This surge in decarbonization investments propels the green energy sector and enhances the country's GDP, ensuring economic resilience during the forecast period.

HIGH-VALUE INDUSTRIES AND SWIFT INDUSTRIALIZATION FUEL GDP GROWTH

- However, rapid industrialization, urbanization, and a burgeoning middle-class drive higher GDP growth in emerging economies such as China, India, Brazil, South Africa, Thailand, Indonesia, and other developing nations across Asia, Africa, and Latin America. These factors contribute to increased consumer spending, infrastructure development, and foreign investments, further accelerating economic growth in these regions.
- As a case in point, in July 2024, Saudi Arabia announced plans to boost its construction spending to USD 150 billion by 2025. The nation's construction output spans residential, institutional, infrastructure, industrial, energy, utilities, and commercial sectors, totaling USD 142 billion, a 4.3% increase from the previous year. These infrastructure projects are set to bolster the economy and enhance GDP during the forecast period.

Source: Mordor Intelligence





1.1.2 GROWTH DRIVERS

RIISING INFLATION AND FIXED INVESTMENTS FUEL ECONOMY

- Inflation in advanced economies remains generally stable, yet it can exhibit volatility due to global supply shocks, fluctuations in energy prices, or shifts in monetary policy. Central banks like the Fed and ECB target low and stable inflation to safeguard purchasing power and bolster economic growth.
- Data from the U.S. Bureau of Labor Statistics indicates that the annual inflation rate in the United States climbed for the third straight month, reaching 2.9% in December 2024, up from 2.7% in November 2024, aligning with market forecasts. In December 2023, the inflation rate stood at 3.4%, while in 2019, it was 2.3%.
- Inflation is projected to stabilize in the coming years. This stability is attributed to a balance between demand and supply in key sectors, notably housing and healthcare, where wages, commodity prices, and living costs play pivotal roles. Consequently, this stable inflation in advanced economies is poised to underpin consistent economic growth.
- Similarly, businesses increasingly channel their fixed investments into technology, R&D, infrastructure, and green energy projects in advanced economies. Emerging markets frequently struggle with elevated inflation rates driven by currency devaluation, fiscal deficits, and commodity price volatility. Several governments in developing nations have initiated projects to control inflation and are considering tightening monetary policies as a countermeasure.

RIISING INFLATION AND FIXED INVESTMENTS FUEL ECONOMY

- As of 2023, the Nigerian government, as reported by the World Bank, undertook several initiatives to rein in inflation. These measures encompassed monetary policy adjustments, fiscal prudence, and cash transfer programs, notably through interest rate hikes.
- Similarly, the Indonesian government established the Regional Inflation Controlling Team (RICT). This team is tasked with gathering price data, formulating regional policies, and bolstering logistics systems to manage inflation on a regional scale.
- Moreover, in developing economies, infrastructure projects ranging from roads and bridges to energy plants and industrial capacities rely heavily on fixed investments. Foreign direct investment (FDI) plays a pivotal role, especially in manufacturing and infrastructure, fueling the economic growth of these nations.
- As a case in point, owing to the Indian government's persistent efforts from 2014 to 2023, Foreign Direct Investment (FDI) equity inflows in the manufacturing sector surged by 55%, hitting a notable USD 148.97 billion. This marks a significant jump from the USD 96 billion recorded in the preceding nine years, spanning 2005 to 2014.
- Manufacturing, technology, and urban development are witnessing a surge in investments. For instance, as of 2024, China's Belt and Road Initiative (BRI) and India's "Make in India" are illustrative of substantial investments in emerging markets
- In the same way, in Argentina, urban development initiatives like the Metropolitan Buenos Aires Urban Transformation Project, the UrbanShift Argentina Child Project, and the National Urban Policy enhance housing and infrastructure and promote sustainability.

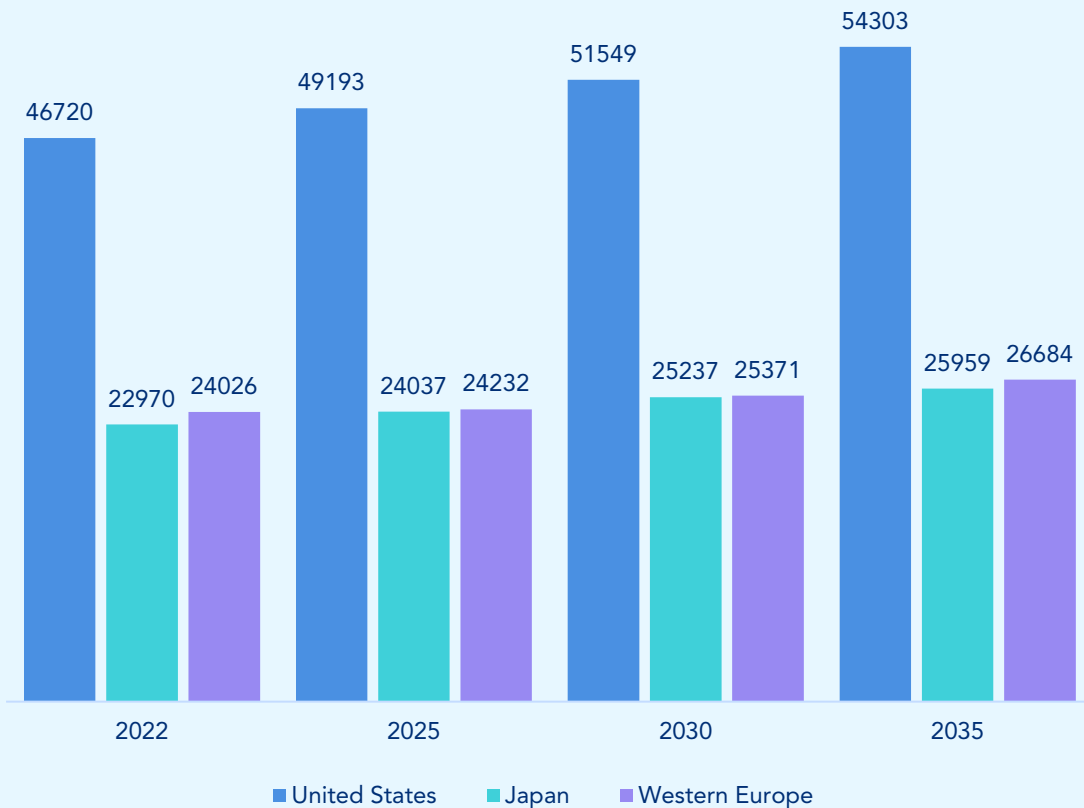
Source: Mordor Intelligence





1.1.2 GROWTH DRIVERS

**WORLD DISPOSABLE INCOME PER CAPITA BY COUNTRY, IN USD
PER PERSON, 2022-2035**



Source: U.S. Energy Information Administration

SURGE IN GOVERNMENT INITIATIVES BOOST BOTH PRIVATE AND PUBLIC CONSUMPTION

- In advanced economies, private consumption significantly drives GDP. With higher disposable incomes and better access to credit, consumers in these regions show robust demand for goods, services, and housing. Public consumption, especially in welfare and healthcare, is vital.
- Consumer behavior is evolving, with a noticeable shift towards digital services, e-commerce, and sustainability. As of October 2024, the European Commission (EC) has actively promoted these trends. The EU's adoption of the Digital Services Act (DSA) and the Digital Markets Act (DMA) aims to bolster online safety for citizens and foster a thriving digital landscape for businesses. These EU initiatives boost private and public consumption and stimulate GDP growth and overall economic expansion in the region.
- Nonetheless, the emerging economies are witnessing a surge in private consumption, fueled by a burgeoning middle class and rapid urbanization. A younger demographic in these regions further amplifies the demand for durable goods, technology, and discretionary items.
- Countries like India, Southeast Asia, and various African nations are seeing a notable uptick in consumer spending, with heightened interest in mobile phones, vehicles, and electronics. The government has introduced several measures to further stimulate this trend, especially in India.
- As a case in point, in the Union Budget 2024-25, the Indian government made headlines by slashing the essential customs duty on mobile phones, PCBs, and chargers from 20% to 15%. They also granted exemptions on critical minerals and components necessary for smartphone production.





1.1.2 GROWTH DRIVERS

TRADE AGREEMENTS FUEL GROWTH IN GOODS AND NON-FACTOR SERVICES

- Advanced economies typically export high-value goods and services, including technology, pharmaceuticals, and financial services. While these economies depend on the global market for their exports, they also import a range of low-cost goods, predominantly from emerging economies. Trade dynamics are significantly influenced by trade agreements, such as the USMCA and various EU deals, alongside evolving trade policies like tariffs and sanctions.
- In the recent years, these nations have witnessed a surge in trade agreements, bolstering regional economic growth. For instance, in January 2025, Iraq and Britain finalized a trade package valued at up to 12.3 billion pounds (USD 14.98 billion) alongside a bilateral defense deal.
- Likewise, in July 2024, Italy unveiled a three-year action plan to rejuvenate its cooperation with China, covering trade, investment, education, environmental protection, and food security.
- However, there is a noticeable shift in emerging markets that increasingly emphasize the export of technology and services, aiming to lessen their dependence on commodities. In recent years, these nations have inked multiple trade agreements to address trade deficits.
- For instance, in July 2024, China and Serbia ratified a Free Trade Agreement (FTA) to enhance collaboration in automotive, technology, agriculture, and commodities. Similarly, India is set to commence FTA discussions with New Zealand and South Africa, aiming to broaden its FTA network. These agreements are poised to significantly rectify trade deficits and stimulate economic growth in emerging nations.

FACTORS DRIVING UPWARD TRENDS IN COMMODITY PRICES

- Energy, manufacturing, and agriculture heavily rely on commodity prices in advanced economies. Oil, gas, and food price fluctuations can trigger inflationary pressures and sway consumer behavior. For instance, the average cost of crude oil was USD 100.93 per barrel in 2022 but dropped to USD 82.49 per barrel in 2023. Such price changes not only influence commodity prices but also the broader economic growth.
- Energy prices, particularly for oil and gas, have a pronounced effect on inflation. As global demand for renewable energy and sustainable commodities surges, advanced economies are reshaping their consumption and investment strategies. The EU aims to cut greenhouse gas emissions by 55% by 2030 and achieve climate neutrality by 2050. In March 2024, Parliament endorsed a target of 42.5% renewable energy sources by 2030. However, EU nations are encouraged to aim for a 45% target, supported by the Commission's REPowerEU plan. These renewable energy initiatives are effectively curbing commodity prices and bolstering economic growth in the region.
- Commodity prices are important for many emerging economies, particularly those that export commodities. For example, the Middle East exports oil, Africa is rich in metals, and Latin America is known for its agricultural products. Volatility in these prices can greatly influence trade balances and fiscal health.
- The World Bank projects oil prices to dip to USD 81 per barrel in 2024 and further moderate in 2025, down from USD 83 in 2023. Such trends in commodity prices are poised to stimulate economic growth in these emerging nations.
- Typically, when commodity prices rise, exporting countries experience robust economic growth. Conversely, a decline in prices can trigger economic slowdowns. Recognizing these dynamics, emerging markets actively diversify their economies to lessen their dependence on commodity exports during the forecast period.

Source: Mordor Intelligence





1.1.3 KEY RESTRAINTS

**PUBLIC DEBT AND
WEAK
INFRASTRUCTURE
HAMPER ECONOMIC
GROWTH**

- Major economies grappling with slow or stagnant GDP growth can send global shockwaves, curbing demand and diminishing trade prospects. This stagnation can be attributed to several factors: mature industries facing saturation, soaring public debt levels, and a reliance on monetary easing, all of which stifle long-term GDP growth.
- Countries like Japan, the United States, and various European regions grapple with fiscal constraints due to their hefty public debt. As of September 2024, the United States national debt hit a staggering USD 35.4 trillion - a record high with no signs of easing. This debt surge is predominantly fueled by persistent overspending. In FY 2024 alone, the United States government overshot its revenue collection by approximately USD 1.83 trillion. The rising interest payments on this debt divert resources from productive investments, compounding the economic slowdown.
- Emerging economies face their own set of challenges. Factors like political instability, a heavy reliance on commodities, and infrastructure gaps hinder their economic progress. Recently, several nations have grappled with political upheavals, deterring foreign investments. As a case in point, In August 2024, Sheikh Hasina, who had been at the helm for 20 of the past 28 years in Bangladesh, resigned and fled the country amidst violent protests. Student-led demonstrations against public-sector job quotas ignited the uproar. The lack of a clear succession plan and ongoing unrest is likely to destabilize the country's economic environment, discouraging domestic and foreign investments.

**DEFLATION RISKS AND
FOOD AND ENERGY
PRICE VOLATILITY
SLOW DOWN
ECONOMIC GROWTH**

- Inflation shapes purchasing power, consumption patterns, and investment decisions. When inflation rates soar, they can diminish consumer confidence and erode purchasing power, leading to a dip in demand for goods and services. Conversely, subdued inflation or deflation in advanced economies stifles investment and consumer spending.
- As a case in point, as of 2023, Japan grappled with significant deflation, marking nearly two decades of declining prices and economic stagnation. Key drivers of Japan's deflation include an economic slump, nonperforming loans, and various supply and demand factors. This deflationary trend has curtailed business investments, heightened the debt burden on corporations, elevated real interest rates and wages, and ultimately stifled economic growth.
- However, emerging economies grapple with hyperinflation risks. In regions like Latin America and Africa, unstable monetary policies and currency devaluations erode purchasing power. Additionally, volatility in food and energy prices hits poor economies hard, driving up inflation rates and stunting economic growth.
- The global landscape is currently rocked by surging food and commodity prices, a fallout from Russia's invasion of Ukraine. Countries such as India, Brazil, Thailand, and Indonesia are witnessing erratic food price fluctuations, unsettling their macroeconomic stability and stirring global financial market volatility.
- As an illustration, in March 2023 report from the International Monetary Fund highlighted that world food commodity prices had surged nearly 40% in the two years leading up to Russia's invasion of Ukraine. The ensuing war only exacerbated this price hike.

Source: Mordor Intelligence



1.1.3 KEY RESTRAINTS

SUPPLY CHAIN DISRUPTIONS AND TRADE DEFICITS HINDER GNFS IMPORTS AND EXPORTS

- Advanced economies have grappled with significant challenges in the import-export of GNFS (Goods and Non-Factor Services) in recent years. Trade protectionism, characterized by heightened tariffs and non-tariff barriers, has stunted export growth.
- Additionally, supply chain disruptions, driven by an over-reliance on global supply chains, have exacerbated vulnerabilities to external shocks, impacting economic stability and growth prospects.
- For instance, in November 2024, the Centre for Economic Policy Research reported that many EU firms have faced supply chain disruptions in recent years. Since 2022, 37% of these firms have identified access to raw materials as a major business obstacle, while 34% have reported challenges due to disruptions in logistics and transport. These supply chain disruptions are hindering economic growth across the region.
- In developing countries, dependence on commodity exports, logistical challenges, and trade imbalances pose significant hurdles for the import-export of GNFS (Goods and Non-Factor Services). Disruptions in global supply chains stemming from geopolitical tensions, pandemics, or protectionist policies can lead to trade imbalances, curtailing economic expansion in emerging and developing economies.
- As an illustration, in Q4 2023, Nigeria faced a trade deficit of NGN 1415 billion, with imports surging by 163.1% while exports lagged, rising only 99.6%. Meanwhile, Brazil's trade surplus plummeted 48.5% to USD 4.8 billion in December 2024. This decline was attributed to increasing imports and a drop in exports, which fell 13.5% year-on-year to USD 24.9 billion.
- The downturn was mainly due to a 34.8% slump in extractive industry shipments, bringing them down to USD 5 billion, and a 23.2% dip in agricultural exports, which settled at USD 3.98 billion. Such trade deficits influence regional demand for goods and services and stifle economic growth.





1.2 INDIA

1.2.1 Insights into GDP and GVA

1.2.2 Limelight On Key Macro-economic Indicators

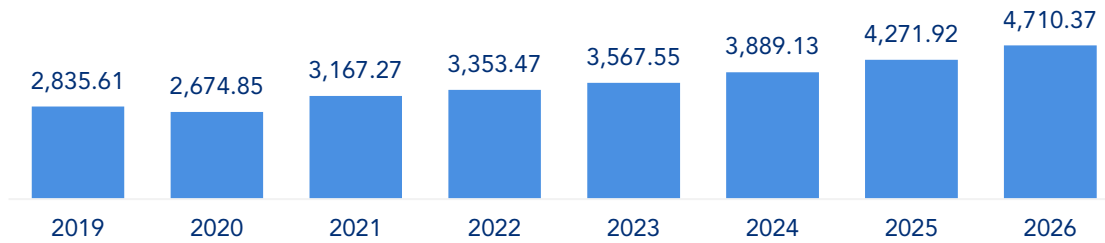
1.2.3 Analysis of Government Policies/Initiatives





1.2.1 INSIGHTS INTO GDP AND GVA

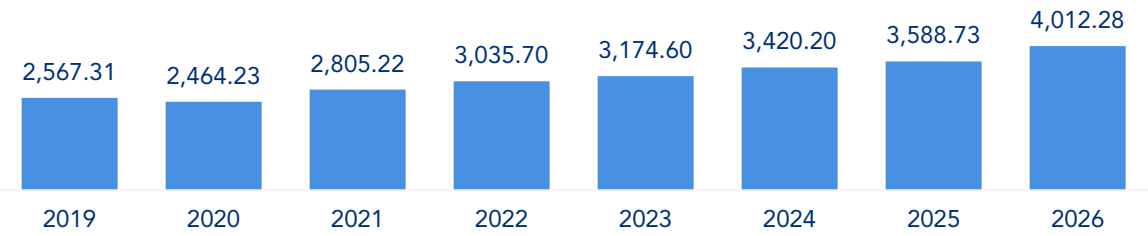
INDIA GDP (CURRENT PRICES), IN USD BILLION, 2019-2026



- The Gross Domestic Product (GDP), which represents the total value of goods and services produced, has steadily increased from USD 2,835.61 billion in 2019 to a projected USD 4,710.37 billion by 2026. In recent years, the country's economy is projected to grow significantly, with the GDP growing at the rate of 9-10% annually till 2026.
- The Indian economy is a mix of agriculture, manufacturing, and a rapidly growing service sector. Despite the significant role of agriculture in India, the sector faces low productivity and inadequate infrastructure and is vulnerable to climatic conditions. On the other hand, the service sector, including IT and financial services, has witnessed rapid expansion, becoming a major GDP contributor in recent years.
- The power sector is also a crucial contributor to India's GDP owing to the growing investments in power infrastructure, rising electricity demand, and the government's push toward renewable energy and smart grid projects. For instance, in January 2025, the Andhra Pradesh State Investment Promotion Board (SIPB) highlighted major investments in the renewable energy sector. The approved projects collectively represent an investment of USD 2.20 billion.
- However, 2020 witnessed a temporary decline in GDP, falling to USD 2,674.85 billion, primarily due to the COVID-19 pandemic, which led to disruptions in supply chains, project delays, and a slowdown in construction activities. The power sector, heavily reliant on large-scale infrastructure development, faced funding constraints, workforce shortages, and regulatory hurdles during this period, impacting overall economic output.
- Despite these challenges, the market bounced back in 2021, with GDP rising to USD 3,167.27 billion, signaling a strong recovery as infrastructure projects resumed and energy demand increased. The following years witnessed a stable growth pattern, with GDP projected to reach USD 4,271.92 billion in 2025 and surpass USD 4,710.37 billion in 2026, reflecting continuous investments in transmission and distribution networks, renewable energy projects, and industrial power consumption.

Source: NITI Aayog, Mordor Intelligence

INDIA GVA (CURRENT PRICES), IN USD BILLION, 2019-2026



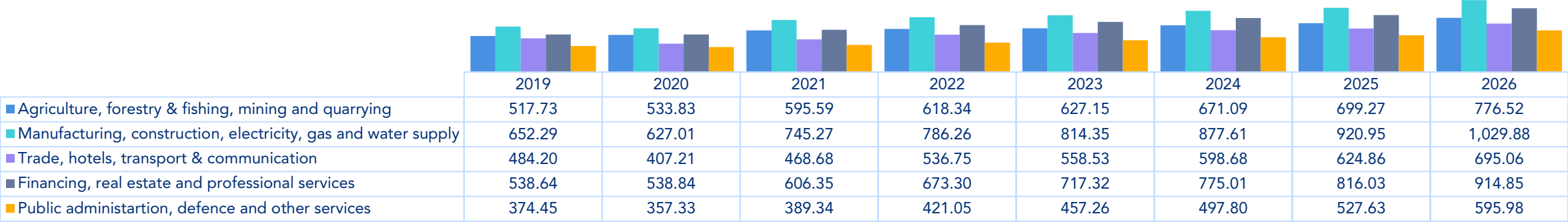
- India is the fifth-largest economy in the world. The country is one of the fastest-growing economies in the world poised to become the third-largest economy by 2030.
- GVA, which measures the actual economic output of the sector after adjusting for intermediate costs, rose from USD 2,567.31 billion in 2019 to a projected USD 4,012.28 billion in 2026. However, like GDP, GVA declined slightly in 2020, dropping to USD 2,464.23 billion due to the pandemic-induced slowdown. The disruption in construction activities, lower industrial power consumption, and financial challenges in project execution resulted in this temporary decline.
- Nonetheless, GVA rebounded in 2021, reaching USD 2,805.22 billion, indicating a resurgence in economic activity within the sector. Renewed government spending, private sector investments, and the resumption of stalled infrastructure projects fueled this recovery.
- The upward trend continued in subsequent years, with GVA crossing USD 3,420.20 billion in 2024 and expected to surpass USD 4,012.28 billion by 2026, reinforcing the sector's resilience and long-term growth potential.
- India's power sector, while contributing between 2-3% to the nation's Gross Value Added (GVA) at current prices, underscores its pivotal role in the economy. As the country amplifies its electricity generation, especially in renewables, the power sector continues to experience consistent growth.
- There has been an expansion of renewable energy initiatives, increased electrification efforts in rural areas, and investments in smart power management systems. For instance, in February 2024, Prime Minister Narendra Modi launched an initiative to provide free electricity to households through rooftop solar panels. The scheme, set to roll out in December 2024, offers up to 40 % subsidy to make renewable energy more affordable.





1.2.2 SECTORAL COMPOSITION OF GVA

SECTORAL COMPOSITION OF GVA, CURRENT PRICES, IN USD BILLION, INDIA, 2019-2026



- Over the years, the GVA of these sectors has shown a steady increase, reflecting economic growth, rising energy demand, and infrastructure investments. The agriculture, forestry & fishing, and mining & quarrying sectors have shown a gradual increase in their GVA, reflecting the growth in rural electrification projects, expansion in irrigation infrastructure, and increasing power consumption for mining operations. The GVA in this sector rose from USD 517.73 billion in 2019 to a projected USD 776.52 billion in 2026. Despite a minor dip in 2020 due to the pandemic, the sector regained momentum in 2021, reaching USD 595.59 billion, and has consistently grown since.
- The manufacturing, construction, electricity, gas, and water supply sector holds the largest share in GVA contribution within the India Power EPC Market, given its reliance on large-scale energy consumption and industrial activities. The sector’s GVA has increased from USD 652.29 billion in 2019 to an estimated USD 1,025.05 billion by 2026, showcasing its pivotal role in industrial growth and energy demand. While the sector experienced a slight contraction in 2020, falling to USD 627.01 billion, due to disruptions caused by COVID-19, it bounced back strongly in 2021 with USD 745.27 billion and has been on an upward trajectory since.
- The trade, hotels, transport, and communication sectors also contribute significantly to GVA in the power EPC market, benefiting from infrastructure modernization, increasing transportation electrification, and the rise of digital services. However, this sector was severely impacted during the pandemic, with its GVA declining from USD 484.20 billion in 2019 to USD 407.21 billion in 2020 due to lockdowns and reduced economic activities. The recovery began in 2021, with GVA rising to USD 468.68 billion, and it is projected to reach USD 914.86 billion by 2026.
- The finance, real estate, and professional services sector has steadily grown, with its GVA increasing from USD 538.64 billion in 2019 to an estimated USD 915.85 billion by 2026. The real estate and financial sectors are key beneficiaries of increased power demand in commercial buildings, industrial hubs, and IT parks. Even though the sector faced a minor setback in 2020 due to slowed real estate activity, it rebounded in 2021 with USD 606.35 billion and continued its growth trajectory.
- The public administration, defense, and other services sector has also shaped the Power EPC Market’s GVA, particularly through government-led energy projects and defense infrastructure investments. The sector’s GVA increased from USD 374.45 billion in 2019 to an expected USD 595.98 billion by 2026. Despite a minor dip in 2020 due to budgetary constraints during the pandemic, public sector investments in power transmission networks, defense-related energy projects, and government-run energy initiatives have helped it recover.

Source: NITI Aayog, Mordor Intelligence





1.2.3 TRENDS IN GDP AND GVA

1.2.3.1 GDP

1.2.3.2 GVA





1.2.3.1 GDP

TRENDS, GROWTH RATES, AND UPSCALING FACTORS FOR GDP

- Gross Domestic Product (GDP) is the total monetary value of all goods and services produced within a country over a specific period. A higher GDP signifies increased industrial activity, infrastructure development, and improved living standards.
- GDP is a key indicator of a country's economic growth, reflecting the overall value of goods and services produced within its borders. In India, the power EPC market plays a vital role in shaping GDP by driving large-scale infrastructure projects, improving energy access, and fostering industrial expansion. The sector is crucial for supporting economic activities across manufacturing, commercial establishments, and rural electrification, making it a key contributor to India's economic progress.
- Over the years, the power EPC sector's GDP contribution has steadily risen, from USD 2,835.61 billion in 2019 to an estimated USD 4,710.37 billion in 2026, indicating the sector's resilience and capacity for expansion.
- One of the most significant trends shaping GDP growth in the power EPC market is the transition towards renewable energy and sustainable infrastructure development. With India's commitment to achieving 500 GW of non-fossil fuel capacity by 2030, the demand for EPC services in solar, wind, and hydroelectric power projects has surged.
- Additionally, grid modernization initiatives, such as the National Smart Grid Mission and Green Energy Corridor, drive transmission infrastructure investments. Increased private sector participation and foreign direct investment (FDI) are accelerating the development of large-scale energy infrastructure, boosting GDP contributions through energy-efficient power plants, smart grids, and decentralized power solutions.

TRENDS, GROWTH RATES, AND UPSCALING FACTORS FOR GDP

- The GDP growth rate of the power EPC market has remained robust, with an estimated CAGR of 6.5% between 2021 and 2026. Despite a temporary slowdown in 2020 due to pandemic-induced disruptions, the sector demonstrated a strong recovery, largely due to government-led stimulus measures and renewed infrastructure spending.
- Government policies and investment programs, such as the Revamped Distribution Sector Scheme (RDSS) and Production-Linked Incentives (PLI) for solar manufacturing, have boosted investment in transmission, distribution, and renewable energy projects.
- Decarbonization and green hydrogen initiatives are expected to be game-changers in the power EPC industry. India's net-zero emission target by 2070 has paved the way for large-scale investments in green hydrogen production, energy storage systems, and carbon capture technologies.
- Additionally, the government's increased focus on offshore wind energy, hybrid renewable projects, and electric vehicle (EV) charging infrastructure is expected to sustain long-term economic growth in the sector.
- As investments in clean energy, smart infrastructure, and power transmission modernization continue to grow, the power EPC sector is set to become a cornerstone of India's long-term economic strategy.





1.2.3.2 GVA

TRENDS, GROWTH RATES, AND UPSCALING FACTORS FOR GVA

- Gross Value Added (GVA) represents the actual economic output of a sector after adjusting for intermediate costs, serving as a key indicator of the sector's contribution to a country's economy. GVA has shown a consistent upward trajectory in India, reflecting the sector's growing importance in driving the nation's economic growth. From USD 2,567.31 billion in 2019, GVA is projected to reach USD 4,012.28 billion by 2026, signaling a robust recovery from the pandemic-induced dip in 2020.
- The recovery has been driven by increased investments in infrastructure, renewable energy projects, and the electrification of rural and industrial zones, boosting power demand and, in turn, the GVA from power EPC activities. For instance, in September 2024, the Solar Energy Corporation of India (SECI), a state-owned entity, committed to infusing INR 180 billion (equivalent to USD 2.16 billion) in equity, aiming for a renewable capacity expansion by 2030.
- The growth rate within the Power EPC sector has been shaped by key trends such as the rising focus on renewable energy, government initiatives like the National Infrastructure Pipeline (NIP), and advancements in smart grid technologies. The market has witnessed steady growth, with GVA rising from USD 2,464.23 billion in 2020 to USD 2,805.22 billion in 2021, recovering swiftly as infrastructure projects resumed and energy demand rebounded.
- This growth is expected to continue, with GVA projected to surpass USD 3,420.20 billion by 2024, further accelerating to over USD 4,012.28 billion by 2026.

TRENDS, GROWTH RATES, AND UPSCALING FACTORS FOR GVA

- The upscaling of GVA within the Power EPC market can be attributed to various factors, including the integration of advanced technologies, renewable energy adoption, and a focus on energy-efficient infrastructure. Government-backed initiatives, such as promoting solar-powered irrigation systems and large-scale renewable energy projects, have catalyzed sectoral growth.
- Additionally, the increasing electrification of rural areas and industrial zones has contributed to the upscaling of GVA. As the demand for clean and sustainable energy rises, particularly with investments in smart power management and grid modernization, the power EPC market is expected to continue driving high GVA growth, positioning it as a critical sector in India's overall economic development.
- The manufacturing and construction sectors remain the largest contributors to the GVA of the Power EPC market, with their demand for energy-intensive infrastructure playing a crucial role in the continued economic expansion. Additionally, the rising adoption of electric vehicles, smart city projects, and renewable energy technologies are set to enhance GVA growth.





1.2.4 LIMELIGHT ON KEY MACRO-ECONOMIC INDICATORS

INDIA (IN %; OTHERWISE MENTIONED)	2019	2020	2021	2022	2023	2024	2025	2026
Inflation rate	4.77%	6.17%	5.51%	6.65%	5.36%	4.37%	4.10%	4.09%
Interest rate (RBI Repo Rate)	5.73%	4.26%	4.00%	4.96%	6.48%	6.50%	6.50%	5.50%
Interest rate (National Savings Time Deposit Account Scheme)								
1-year	6.95%	5.85%	5.50%	5.50%	6.80%	6.90%	6.90%	7.10%
2-year	6.95%	5.85%	5.50%	5.55%	6.93%	7.00%	7.00%	7.10%
3-year	6.95%	5.85%	5.50%	5.56%	6.98%	7.10%	7.10%	7.25%
5-year	7.75%	6.95%	6.70%	6.70%	7.38%	7.50%	7.50%	7.75%
Unemployment rate	6.51%	7.86%	6.38%	4.82%	4.17%	4.24%	4.30%	4.38%
Cash reserve ratio	4.00%	3.29%	3.66%	4.31%	4.50%	4.50%	4.00%	4.00%
Current account balance (USD Billion)	-24.55	24.01	-38.69	-66.98	-23.21	-44.56	-56.01	-75.52
Current account balance (% of GDP)	-0.87%	-0.90%	-1.22%	-2.00%	-0.65%	-1.15%	-1.31%	-1.60%
Population (Millions)	1,383.11	1,396.39	1,407.56	1,417.17	1,428.63	1,441.72	1,454.61	1,467.23
GDP, per capita (USD)	2,050.16	1,915.55	2,250.18	2,366.31	2,497.19	2,697.56	2,936.82	3,210.38
GDP, per capita (PPP, International Dollars)	7,181.52	6,997.36	8,087.99	9,207.16	10,233.45	11,111.71	11,937.80	12,834.68
General government revenue (% of GDP)	19.15%	18.16%	20.44%	19.95%	20.80%	21.26%	21.11%	21.14%
General government total expenditure (% of GDP)	26.85%	31.02%	29.71%	29.15%	29.12%	29.04%	28.67%	28.54%

Source: Ministry of Finance, IMF, World Bank, Mordor Intelligence





1.2.4 LIMELIGHT ON KEY MACRO-ECONOMIC INDICATORS

LIMELIGHT ON KEY MACRO-ECONOMIC INDICATORS

- India's inflation rate peaked at 6.65% in 2022, moderated to 5.36% in 2023, and is projected to decline to 4.09% by 2026. Inflation impacts power infrastructure costs, with higher rates increasing input costs and lower rates fostering stable investment conditions.
- The Reserve Bank of India's (RBI) repo rate, a key determinant of borrowing costs, was slashed from 5.73% in 2019 to 4.00% in 2021. Yet, the rate rebounded, hitting 6.50% in 2024, with a slight dip anticipated to 5.50% by 2026.
- National savings time deposit account interest rates mirrored this trend. For instance, one-year deposit rates dropped from 6.95% in 2019 to 5.50% in 2021, only to bounce back to the 6.90%-7.10% range in subsequent years. Elevated savings rates can bolster domestic savings, presenting a viable capital source for financing infrastructure and power initiatives.
- India's unemployment rate, having dipped from 6.51% in 2019, is projected to touch 4.38% by 2026, signaling a rebound in the labor market. A declining unemployment rate suggests a burgeoning labor force, vital for expansive infrastructure undertakings. A readily available and skilled workforce not only mitigates project delays but also amplifies execution efficiency in the power arena.

LIMELIGHT ON KEY MACRO-ECONOMIC INDICATORS

- The cash reserve ratio (CRR), dictating the funds banks must retain with the central bank, has oscillated between 3.29% and 4.50% in recent years. Given its role in shaping banking system liquidity, a heightened CRR can curtail available liquidity, making borrowing pricier for businesses, including those in the Power EPC realm.
- India's current account balance has persistently been in deficit, with projections widening from -0.87% of GDP in 2019 to -1.60% by 2026. This current account deficit underscores India's status as a net importer, a reality that can sway foreign exchange rates and the expenses tied to imported materials and technologies vital for the power sector. Yet, despite these challenges, India's burgeoning economy and escalating energy demands continue to lure foreign investments into critical infrastructure domains.
- India's population is projected to grow from 1.38 billion in 2019 to 1.47 billion by 2026, increasing demand for power infrastructure. Government revenue as a percentage of GDP rose from 19.15% in 2019 to 21.14% by 2026, while expenditure increased from 26.85% to 28.54%.
- Rising GDP per capita, from USD 2,050 in 2019 to USD 3,210 in 2026, further drives electricity demand and infrastructure investment.





1.2.5 ANALYSIS OF GOVERNMENT POLICIES/INITIATIVES

NATIONAL INFRASTRUCTURE PIPELINE (NIP)

- Launched in 2019, the NIP is an ambitious project to propel India's infrastructure growth by focusing on key sectors like energy, transportation, and urban development. The pipeline outlines investment projects worth INR 111 trillion from 2020 to 2025, with a significant portion allocated to the energy sector, including power generation, transmission, and distribution.
- The inclusion of energy infrastructure projects, such as renewable energy projects, power grid expansion, and transmission lines, presents a robust pipeline of opportunities for EPC contractors. As of 2023, the NIP oversees 8,964 projects, collectively valued at over INR 108 trillion, all at various stages of implementation.
- The government's aim is to improve electricity access in rural areas, expand renewable energy generation (particularly solar and wind), and strengthen power transmission infrastructure directly aligns with the objectives of the Power EPC sector.

ATMAN NIRBHAR BHARAT ABHIYAN

- Launched in May 2020, a self-reliant India campaign seeks to reduce import dependency, especially in critical sectors like defense, energy, and infrastructure. In 2023, Prime Minister Modi steered India towards energy independence by 2047 under the Atmanirbhar Bharat initiative. Yet, at the time, India relied on imports for 90% of its oil and 80% of its industrial coal.
- The government aims to boost domestic manufacturing capacities, promote clean and renewable energy technologies, and support local power equipment and services supply chains.
- Additionally, this drive encourages the development of advanced technology and manufacturing units, reducing India's dependency on foreign companies for critical power infrastructure components.

AMRUT SCHEME

- Launched in 2015, the scheme focuses on rejuvenating and transforming urban infrastructure in Indian cities, emphasizing providing basic services such as water supply, sewerage systems, and urban transport.
- The objectives include ensuring universal access to water supply, reducing pollution, enhancing urban transport, and creating green spaces.
- Under the AMRUT Scheme, the government has allocated significant funds to improving urban infrastructure, and energy-efficient projects are a crucial part of this agenda. Smart city lighting, solar power installations in urban areas, and energy-efficient water pumping stations are just a few examples of projects that EPC contractors can engage with. Incorporating smart grids and solar power in urban rejuvenation projects presents strong opportunities for Power EPC companies specializing in renewable energy systems, storage, and efficient energy management.





1.2.5 ANALYSIS OF GOVERNMENT POLICIES/INITIATIVES

SMART CITY MISSION

- The Smart City Mission is an initiative by the Indian government to transform 100 cities into smart cities. These cities aim to be modern, sustainable, and equipped with state-of-the-art infrastructure, utilizing information technology to improve urban living standards.
- Smart cities will require an upgraded power supply infrastructure, including underground wiring, renewable energy systems, smart meters, and electric vehicle (EV) charging stations. These projects offer significant avenues for EPC contractors to contribute to developing smart grids, solar installations, energy-efficient buildings, and innovative lighting systems.
- The integration of digital technologies into the energy infrastructure of smart cities will create a demand for smart meters, automation, and data-driven energy management, areas in which Power EPC companies can play a critical role.

OTHER SIGNIFICANT INITIATIVES

- The National Policy on Biofuels aims to increase the share of biofuels in India's energy mix, which will support the construction and operation of biofuel plants.
- Additionally, initiatives such as the National Solar Mission and the Wind Energy Policy have created a strong emphasis on renewable energy. With a target of reaching 500 GW of non-fossil fuel-based energy by 2030, the government is incentivizing renewable energy production, including installing solar parks, wind farms, and hydropower projects.

Source: Mordor Intelligence



2 POWER SECTOR BACKGROUND – INDIA/GLOBAL

2.1 Value Chain Analysis – Power Sector

2.2 Global Electricity Analysis

2.2.1 Production in TWh

2.2.2 Consumption/Demand in TWh

2.3 India Electricity Analysis

2.3.1 Production in TWh

2.3.2 Consumption/Demand in TWh

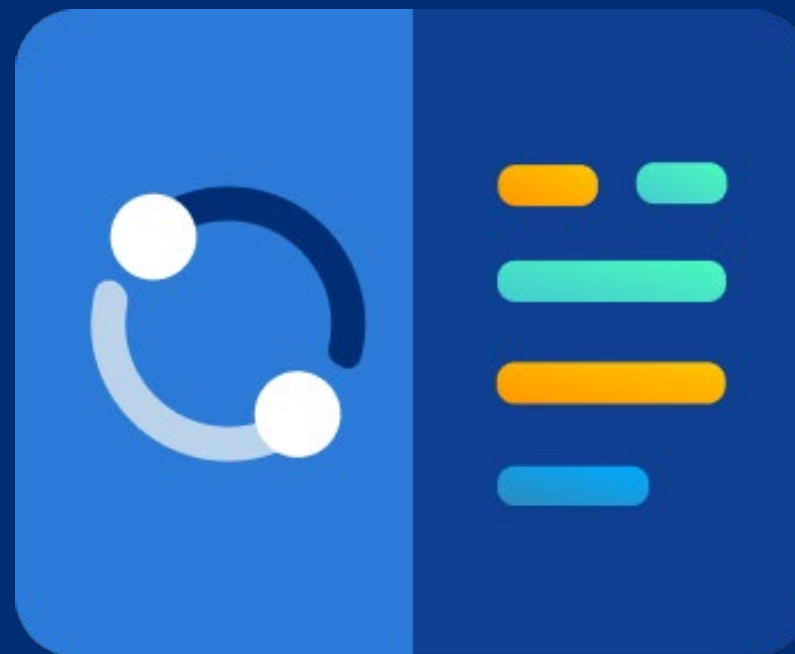
2.4 Electricity Consumption Comparative Analysis – India Vs. Global

2.5 India Power Investments and Forecast in USD Trillion, till 2030

2.5.1 Power Generation

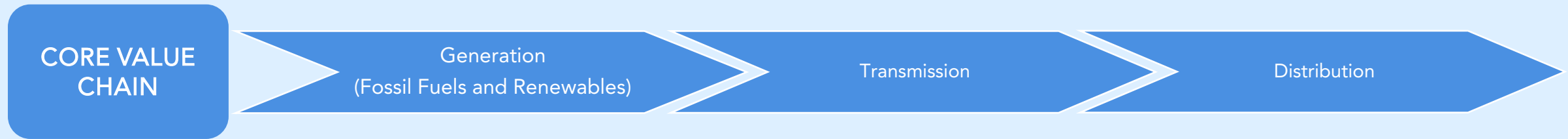
2.5.2 Power Transmission and Distribution (T&D)

2.6 Focus on India Power Sector Evolution And Watershed Policies





2.1 VALUE CHAIN ANALYSIS – POWER SECTOR



INSIGHTS INTO POWER SECTOR – GLOBAL MARKET

- Fossil fuels, including coal, natural gas, and oil, remain the primary sources of global electricity generation. Coal is widely used in many developing economies due to its availability and lower cost compared to other sources.
- In 2023, coal-fired power plants contributed 35.1% to the global electricity mix, according to the 2024 Energy Institute Statistical Review. While its share has decreased, coal's output increased from 10,211.1 TWh in 2020 to 10,317.2 TWh in 2022, reflecting an annual growth rate of 1.03%.
- Renewable energy sources like solar, wind, geothermal, and biomass are growing quickly worldwide. Solar and wind energy are expanding the fastest, supported by advancements in technology, lower costs, and environmental concerns. However, these energy sources require storage systems and grid management to maintain a stable power supply.
- As of October 2024, global electricity production capacity reached 206,7292 gigawatt-hours, with renewable energy contributing 313,532 gigawatt-hours. Renewables accounted for 36.6% of total net production, showing an 8.5% year-to-date growth compared to the previous year, as reported by the International Energy Agency (IEA).
- Transmission and distribution (T&D) encompasses the stages of transporting electricity from generators to homes and businesses via poles and wires. The key distinction between transmission and distribution lies in the voltage levels at which electricity operates during each stage. Power transmission involves moving electricity at high voltages from power plants to substations. Conversely, power distribution takes this high-voltage electricity and converts it to lower voltages at substations, making it suitable for private, public, and industrial consumers.
- Once electricity is generated, it is transported through electrical cables to its destination, whether overhead or underground. Collectively, these T&D lines form what is commonly referred to as "the grid." The power T&D market is set to grow, driven by rising energy demands, a shift towards distributed energy generation, and increased investments in smart grids.
- Annual expenditures by major U.S. utilities for electricity production and delivery surged by 12%, climbing from USD 287 billion in 2003 to USD 320 billion in 2023. This uptick was largely fueled by capital investments in electric infrastructure, which more than doubled in the same timeframe.
- Key growth drivers included upgrading aging infrastructure for better resilience against fire and storm damage; installing natural gas-fired generation, followed by wind, solar, and battery storage systems; adding new lines for renewable resources; and integrating advanced technologies such as smart meters, sensors, and automated controls.





2.1 VALUE CHAIN ANALYSIS – POWER SECTOR

INSIGHTS INTO POWER SECTOR – GLOBAL MARKET

- Similarly, capital investments in distribution infrastructure witnessed a USD 31.4 billion increase, translating to a 160% rise over two decades. In 2023, distribution spending alone escalated by USD 6.5 billion, reaching a total of USD 50.9 billion. This surge was attributed to upgrading aging equipment, installing new lines and transformers, and enhancing neighborhood grids' resilience against extreme weather and fluctuating renewable energy sources.
- In the Asia-Pacific region, a surge in electric transmission and distribution projects is evident, driven by urbanization, industrialization, and rising electric access. For instance, the Union Minister announced a planned expenditure of INR 9.12 trillion in November 2024, aimed at bolstering the country's power transmission infrastructure capacity by 2032.
- The National Electricity Plan (Transmission), as outlined by the Minister of State for Power, extends to 2031-32. The Plan envisions adding 1,91,474 circuit kilometers (ckm) of transmission lines and a transformation capacity of 1274 GigaVolt Ampere at voltage levels of 220 kV and above from 2022-23 to 2031-32.
- Inter-regional transmission capacity will rise from 119 GW to 143 GW by 2026-27 and to 168 GW by 2031-32. The Plan emphasizes new transmission technologies, cross-border interconnections, and private-sector involvement.
- In early 2023, China's State Grid Corporation announced a USD 77 billion investment in transmission for the year, with a commitment of USD 329 billion for the 2021-2025 14th Five-Year Plan period. China Southern Power Grid will invest USD 99 billion, bringing the national total to USD 442 billion.

INSIGHTS INTO POWER SECTOR – GLOBAL MARKET

- As renewable energy adoption surges, the need for transmission and distribution (T&D) lines is predicted to grow, bolstering the market. The electricity transmission and distribution landscape is undergoing transformative shifts, especially within the industrial realm. The restructuring of electricity markets, focusing on the transmission and distribution network, is paving the way for advanced transmission technologies in developing nations.
- In Europe, the United Kingdom and France are leading smart grid investments, committing over USD 133.7 billion through 2027. The European Commission's Energy Roadmap 2050 highlights that over 75% of future grid investments will focus on distribution infrastructure. These investments aim to bolster the region's capacity for new power generation sources and enhance electricity supply security.

Source: Mordor Intelligence





2.1 VALUE CHAIN ANALYSIS – POWER SECTOR



INSIGHTS INTO POWER SECTOR – INDIA MARKET

- A large section of the Indian population faces an electricity shortage despite having robust electricity access in the country due to the unavailability of a centralized grid. Hence, increasing investments in power transmission and distribution networks appears to be a potential opportunity to enable energy independence in rural areas in India.
 - The Indian power sector has coal-fired electricity generation that dominates with 47.4% of the diversified energy mix as of December 2024. However, environmental concerns such as growth in carbon dioxide emissions due to fossil fuel electricity generation and its impact on climate have made it necessary to opt for clean energy generation in the country.
 - India boasts one of the world's most diversified power sectors. Power generation sources span conventional options like coal, lignite, natural gas, oil, hydro, and nuclear, alongside non-conventional sources such as wind, solar, and energy derived from agricultural and domestic waste.
 - As electricity demand in India surges, projections indicate this trend will continue. India must significantly bolster its installed generating capacity to keep pace with this rising demand.
- India's electricity sector has transformed, offering diverse opportunities throughout the value chain, spanning regulated and deregulated domains. Coal continues to dominate India's energy landscape, with the Central Electricity Authority (CEA) at the helm of power system planning and operations and the Ministry of Power steering policy formulation. The landmark Electricity Act of 2003 sought to usher in a more efficient and competitive power market, introducing measures like open access for consumer choice and bolstering private sector participation in power generation.
 - According to the Ministry of Commerce and Industry, as of April 30, 2024, India boasts an installed power capacity of 442.85 GW, making it the third-largest producer and consumer of electricity globally.
 - With a burgeoning population and rising per-capita electricity usage, the momentum is set to continue. In FY23, India's power consumption surged 9.5%, reaching 1,503.65 billion units (BU). The power sector's allowance of 100% FDI has further fueled foreign investments.
 - Initiatives like the Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY) and the Integrated Power Development Scheme (IPDS) are poised to enhance the nation's electrification efforts. As highlighted in the National Infrastructure Pipeline 2019-25, energy sector projects command the lion's share (24%) of the total anticipated capital expenditure of INR 111 trillion (USD 1.4 trillion).
 - From April 2000 to March 2024, the power sector witnessed total FDI inflows of USD 18.28 billion. India's power sector is set to draw investments totaling INR 17 trillion (USD 205.31 billion) over the next 5-7 years.





2.1 VALUE CHAIN ANALYSIS – POWER SECTOR

INSIGHTS INTO POWER SECTOR – INDIA MARKET

- Electricity flows from generating stations to end-consumers via transmission, sub-transmission, and distribution networks.
- Electricity is primarily generated at voltages ranging from 11 KV to 33 KV. This is then stepped up to voltages of 132 KV, 220 KV, 400 KV, or even 765 KV for transmission across the country, utilizing both inter-state and intra-state transmission networks.
- For distribution, electricity is stepped down to voltages of 66 KV, 33 KV, 22 KV, 11 KV, and 0.4 KV for consumer supply. Additionally, some states and Union Territories also utilize voltages like 6.6 KV or 3.3 KV.
- Power distribution serves as the final and most critical link in the electricity supply value chain, directly connecting to consumers.
- Challenges such as unreliable power supply, high AT&C losses, an aging and overloaded network, inadequate cost recovery, and low consumer satisfaction plague the distribution sector. These issues have led to the poor financial health of Discoms, hindering their ability to invest in infrastructure upgrades.
- The Ministry of Power has rolled out various reform measures and rules aimed at bolstering the financial viability of distribution utilities, empowering them to deliver reliable and quality power around the clock. Moreover, to address these challenges, several initiatives have been launched, complemented by a definitive regulatory framework, to reduce Aggregate Technical and Commercial (AT&C) losses.
- In a bid to enhance the quality and reliability of power supply, the government rolled out the RDSS scheme. This initiative targets a nationwide reduction of AT&C losses to 12-15% and aims to close the ACS-ARR gap by the fiscal year 2024-25. Spanning from FY 2021-22 to FY 2025-26, the scheme boasts a budget of INR 3,03,758 crores, with the Central Government contributing an estimated INR 97,631 crores.

Source: Mordor Intelligence

INSIGHTS INTO POWER SECTOR – INDIA MARKET

- AT&C loss serves as a key metric for assessing a utility's operational efficiency. With numerous utilities pushing for losses below 10%, the distribution sector is poised for significant performance and sustainability advancements by 2030. Embracing ICT, especially Smart Metering, alongside optimizing and expanding the network, is expected to further empower Discoms in minimizing these losses.

ESTIMATED AT&C LOSSES

Range	2025- 26	2026- 27	2027- 28	2028- 29	2029- 30
Loss>25	3	1	0	0	0
25<=Loss<20	2	4	3	1	1
20<=Loss<15	18	11	11	11	7
Loss<=15	48	55	57	59	63
Total	71	71	71	71	71

- To prevent electricity shortages from hindering growth, it is crucial to expand generation, transmission, and distribution capacities at a pace that not only matches but slightly outpaces demand growth.





2.2 GLOBAL ELECTRICITY ANALYSIS

2.2.1 Production in TWh

2.2.2 Consumption/Demand in TWh

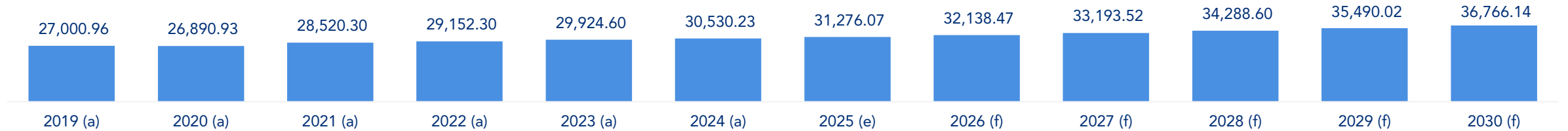




2.2.1 PRODUCTION IN TWH

ELECTRICITY PRODUCTION AND FORECAST IN TWH, GLOBAL, 2019-2030

CAGR (2024 TO 2030): 3.15%



- The global electricity generation mix is diverse, but fossil fuels (coal, natural gas, and oil) still dominate, contributing a significant portion of the world's electricity. Coal remains a major source, particularly in some developing economies, due to its abundance and relatively low cost.
- However, concerns about air pollution and greenhouse gas emissions associated with coal-fired power plants drive a global shift towards cleaner energy sources. Natural gas is increasingly used in power generation due to its lower carbon emissions than coal and its flexibility in accommodating intermittent renewable energy sources. Oil plays a smaller role in electricity generation, primarily in regions with limited access to other fuel sources.
- In some countries, nuclear power provides significant electricity, offering a low-carbon baseload power source. However, concerns about nuclear safety and radioactive waste disposal continue to fuel debate surrounding its role in the global energy mix. Hydropower, utilizing the energy of flowing water, is another significant source, particularly in countries with abundant water resources. However, the environmental impacts of large-scale hydropower projects, including habitat destruction and displacement of communities, are significant considerations.
- Renewable energy sources, including solar, wind, geothermal, and biomass, are experiencing rapid growth globally. Solar and wind power are particularly prominent, driven by technological advancements, decreasing costs, and growing environmental concerns. These intermittent sources require energy storage solutions and grid management strategies to ensure a reliable power supply.
- Geothermal energy harnesses heat from the Earth's interior, providing a consistent baseload power source in geologically suitable locations. Biomass energy uses organic matter as fuel, offering a renewable option, but its sustainability depends on responsible forest management and agricultural practices.
- In October 2024, global electricity production capacity reached 206,7292 gigawatt-hours, and renewable energy 313 532 gigawatt-hours, with a share in total net production of 36.6% and up to 8.5% year-to-date value compared to the previous year, as reported by the International Energy Agency (IEA).
- The Asia-Pacific region led the global power scene in 2023, claiming nearly 51.1% of the world's installed power generation capacity. Major players in the global power generation and transmission & distribution (T&D) markets included China, the United States, India, Russia, Germany, and Brazil.
- Driving forces behind the growth of the global power market include surging electricity demands from various sectors, urban expansions, a global shift towards clean energy, and governmental initiatives to boost electricity access, especially in developing regions.
- As of 2023, coal-fired power generation held a 35.1% share of the global electricity mix, according to the 2024 Energy Institute Statistical Review. While this share has declined, coal's output rose from 10,211.1 TWh in 2020 to 10,317.2 TWh in 2022, reflecting a 1.03% annual growth rate.

Source: International Energy Agency (IEA), Mordor Intelligence

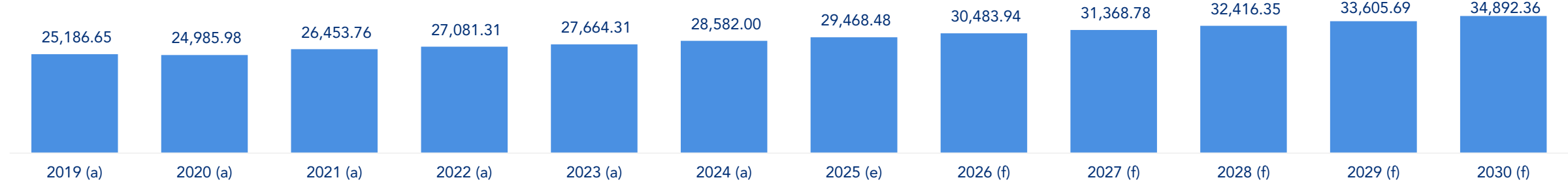




2.2.2 CONSUMPTION/DEMAND IN TWH

ELECTRICITY CONSUMPTION/DEMAND AND FORECAST IN TWH, GLOBAL, 2019-2030

CAGR (2024 TO 2030): 3.38%



- Energy demand in emerging markets and developing economies, home to nearly 85% of the global population, has surged by approximately 2.6% annually over the past decade. This uptick is fueled by a population boom of over 720 million, a 50% economic expansion, and a 40% surge in industrial output.
- Additionally, the total floor space in buildings has expanded by 40,000 square kilometers, comparable to the Netherlands. Given this swift development, clean energy faces a steeper challenge in supplanting oil, gas, and coal in these economies than their advanced counterparts.
- Countries like Germany, the United Kingdom, and the United States are moving away from coal. In October 2024, the United Kingdom bid farewell to coal-powered electricity. The Ratcliffe-on-Soar station, central England's last coal plant, wrapped up its operations on September's last day. After over fifty years of service, this closure was hailed by the United Kingdom government as a crucial stride towards its 2030 goal of an entirely renewable energy grid.
- According to the International Energy Agency (IEA), global electricity demand is set to surge at an accelerated pace over the next three years, with an average annual growth rate of 3.4% projected through 2026. This uptick is largely attributed to a buoyant economic outlook, spurring heightened electricity demand in advanced and emerging markets.
- Advanced economies and China are witnessing a surge in electricity demand, bolstered by the ongoing electrification of residential and transport sectors and a significant expansion in the data center industry. In 2023, electricity accounted for an estimated 20% of final energy consumption, a rise from 18% in 2015. While this uptick is commendable, the pace of electrification must quicken to align with global decarbonization ambitions.
- According to the IEA's Net Zero Emissions by 2050 Scenario, which aims to cap global warming at 1.5 °C, electricity's stake in final energy consumption is projected to approach 30% by 2030. Moreover, 85% of the surge in global electricity demand in 2026 is expected to originate from emerging economies, with China playing a pivotal role, even as it navigates structural economic shifts.
- In 2023, bolstered by its services and industrial sectors, China's electricity demand surged by 6.4%. However, as China's economy is poised to decelerate and pivot away from heavy industry reliance, projections show a gradual easing in electricity demand growth: 5.1% in 2024, 4.9% in 2025, and 4.7% in 2026.

Source: International Energy Agency (IEA), Mordor Intelligence





2.3 INDIA ELECTRICITY ANALYSIS

2.3.1 Production in TWh

2.3.2 Consumption/Demand in TWh

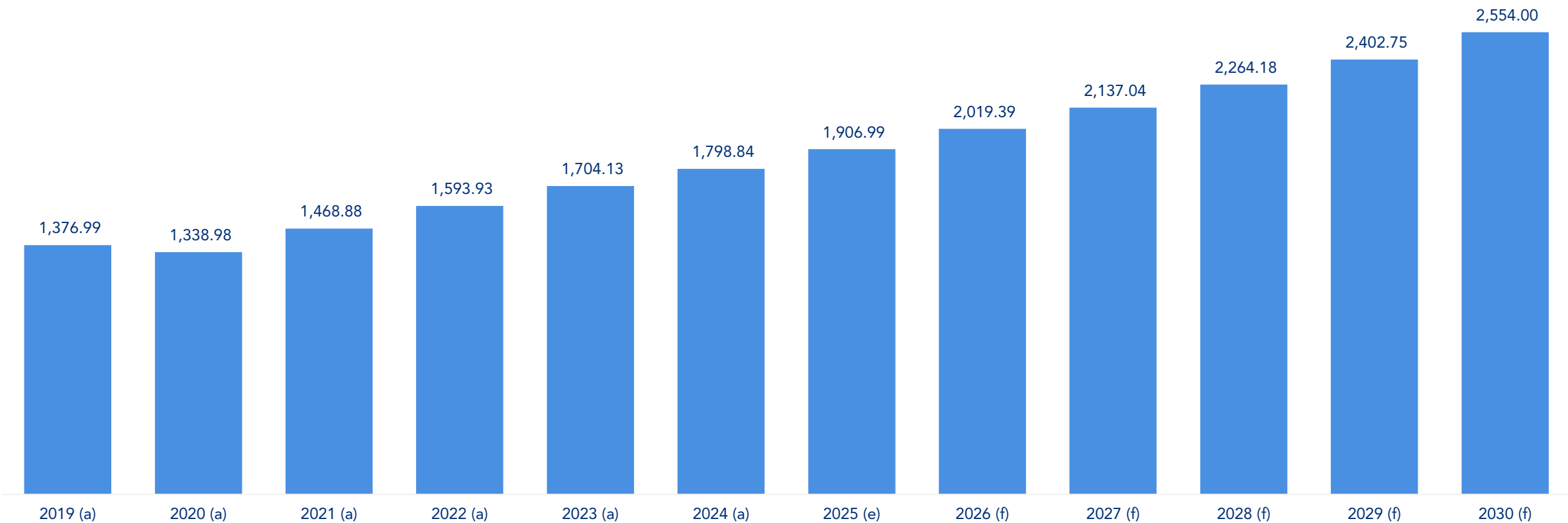




2.3.1 PRODUCTION IN TWH

ELECTRICITY PRODUCTION AND FORECAST IN TWH, INDIA, 2019-2030

CAGR (2024 TO 2030): 6.02%



Source: Central Electricity Authority of India, Central Electricity Regulatory Commission, Ministry of Statistics and Programme Implementation, Ministry of Power, NITI Aayog, Ministry of New and Renewable Energy, Mordor Intelligence

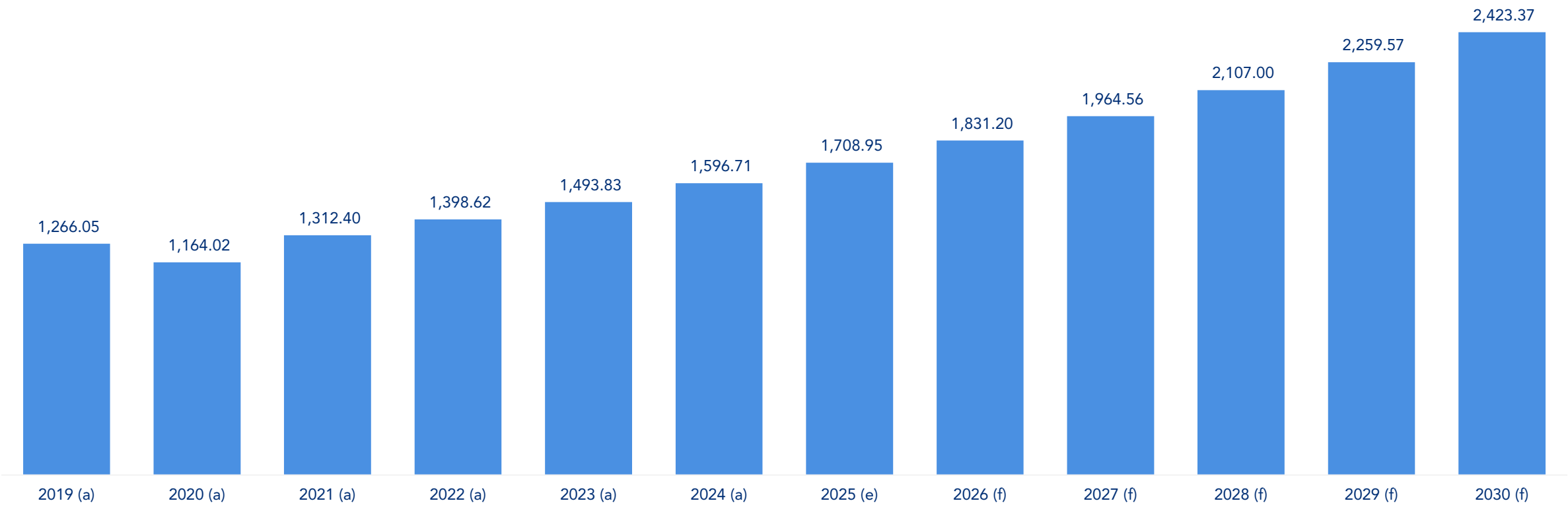




2.3.2 CONSUMPTION/DEMAND IN TWH

ELECTRICITY CONSUMPTION/DEMAND AND FORECAST IN TWH, INDIA, 2019-2030

CAGR (2024 TO 2030): 7.20%



Source: Central Electricity Authority of India, Central Electricity Regulatory Commission, Ministry of Statistics and Programme Implementation, Ministry of Power, NITI Aayog, Ministry of New and Renewable Energy, Mordor Intelligence





2.4 SHIFT TOWARDS RENEWABLE ENERGY SOURCES

WORLDWIDE SHIFT TOWARDS RENEWABLE ENERGY

- With an increasing focus on energy diversification, several countries are concentrating on investment in renewable technologies to lower dependency on domestic or imported fossil fuels, such as crude oil and coal. Various underdeveloped countries, like African countries and a few other South Asian countries, have opted for solar energy as a cheaper form of energy for electricity generation to provide power in remote places.
- Countries like China, the United States, Germany, India, Japan, Brazil, and the United Kingdom are the primary markets for renewable energy, with significant growth witnessed in recent years, driven by the flexibility of an independent grid. As of 2023, the countries mentioned above held the majority share of global renewable energy capacity, with over 60%.
- China is a major contributor to the growth of the renewable energy market in the Asia-Pacific and globally. As of 2023, the country held around 31.6% of global renewable energy capacity, with hydropower holding a major share of the renewable energy mix at around 42%.
- Nuclear power is a significant low-emission source of electricity, accounting for around 10% of global electricity generation. It can also generate low-emission heat and hydrogen. More efforts are required to get nuclear power on pace to achieve net zero emissions by 2050.

OECD'S RENEWABLE GROWTH VS INDIA'S COAL DEPENDENCE

- In October 2024, the International Energy Agency reported coal electricity production at 1,310,861 gigawatt hours. Concurrently, solar energy's contribution was about 3.25%, equating to 67,243 gigawatt hours. The OECD's net electricity generation for October 2024 reached 857.5 TWh, a 2.1% uptick from the previous year. Fossil fuels accounted for 396.7 TWh (46.3%), renewables contributed 313.5 TWh (36.6%), and nuclear sources made up 143.8 TWh (16.8%).
- In India, electricity production rose to 134,170 gigawatt-hours in October 2024, up from 128,817 gigawatt-hours in September 2024. While OECD nations are steadily distancing themselves from fossil fuels, bolstering their renewable and nuclear energy contributions, India's power sector remains predominantly reliant on coal. This reliance persists even as India expands its renewable energy capacity.
- Factors influencing this divergence include historical infrastructure investments, prioritization of economic development, technological prowess, and the financial means to transition energy sources.

Source: Mordor Intelligence





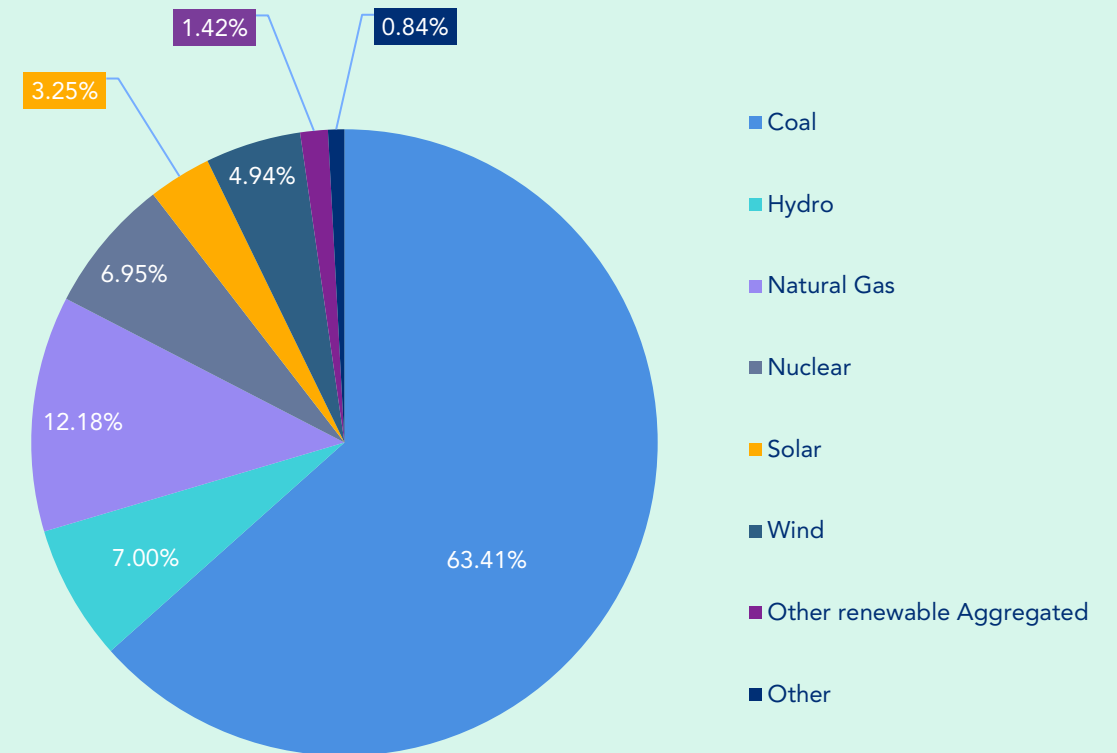
2.4 SHIFT TOWARDS RENEWABLE ENERGY SOURCES

OECD'S RENEWABLE GROWTH VS INDIA'S COAL DEPENDENCE

- India's rising electricity production and its gradual embrace of renewables hint at a deliberate shift towards a more varied energy portfolio. Yet, this evolution unfolds at a distinct pace compared to developed countries, shaped by India's unique developmental hurdles and its emphasis on energy security.
- Global electricity consumption is poised for continued growth, spurred by factors like population surges, urban expansion, and heightened electrification across sectors. Yet, this demand is tempered by advancements in energy efficiency, the rise of smart technologies, and evolving consumer habits.
- The pressing challenge remains balancing this surging demand with a shift to cleaner energy, all while ensuring electricity remains reliable and affordable for every demographic.

Source: Mordor Intelligence

TOTAL INSTALLED CAPACITY SHARE (%), BY SOURCE, GLOBAL OECD COUNTRIES, IN OCTOBER 2024



Source: International Energy Agency





2.4 SHIFT TOWARDS RENEWABLE ENERGY SOURCES

INDIA'S TRANSITION TO A SUSTAINABLE ENERGY FUTURE

- India has achieved a total electricity generation capacity of 452.69 GW, with a notable contribution from renewable energy sources. As of October 2024, the renewable energy capacity stands at 201.45 GW, representing 46.3% of the nation's total installed capacity. This shift underscores India's increasing commitment to cleaner, non-fossil fuel energy sources. Solar power, harnessing India's abundant sunlight, leads with 90.76 GW.
- Wind power, capitalizing on the country's coastal and inland corridors, follows with 47.36 GW. Hydroelectric power, tapping into India's rivers, contributes significantly: large hydro projects account for 46.92 GW, while small hydro adds another 5.07 GW.
- Biopower, encompassing biomass and biogas, contributes 11.32 GW. These bioenergy initiatives harness agricultural waste and diversify India's clean energy portfolio. Collectively, these efforts are steering India away from traditional fossil fuels, paving the way for a sustainable energy future.
- Several leading states are shaping India's renewable energy landscape. Rajasthan leads the pack, boasting 29.98 GW of installed renewable energy capacity, thanks to its expansive land and plentiful sunlight.

INDIA'S TRANSITION TO A SUSTAINABLE ENERGY FUTURE

- Close behind, Gujarat stands at 29.52 GW, propelled by its dedicated solar and wind energy projects. Tamil Nadu secures the third spot with 23.70 GW, capitalizing on advantageous wind patterns. Meanwhile, with its blend of solar and wind initiatives, Karnataka holds a capacity of 22.37 GW, rounding out the top four. Collectively, these states are pivotal in steering India towards its renewable energy ambitions and a sustainable energy future.
- India's power sector heavily relies on coal, a trend shaped by historical investments and a quest for energy security. Coal accounts for 47.40% of India's total power generation, backed by a robust capacity of 218.97 Gigawatts as of December 2024. This reliance on coal is not arbitrary; it's bolstered by India's vast domestic coal reserves, a well-established infrastructure, and the consistent baseload power that coal plants provide. Yet, this coal dependency isn't without its drawbacks, as it has led to air pollution and greenhouse gas emissions, spurring a gradual policy shift in the energy sector.
- In a notable shift, solar power has emerged as a key player, generating 21.18% of the nation's power with a capacity of 97.86 Gigawatts as of December 2024. This surge in solar capacity can be attributed to plummeting solar panel costs, proactive government policies, and global climate commitments. Initiatives like the National Solar Mission, competitive bidding, and state-level programs have fast-tracked solar adoption.

Source: Mordor Intelligence





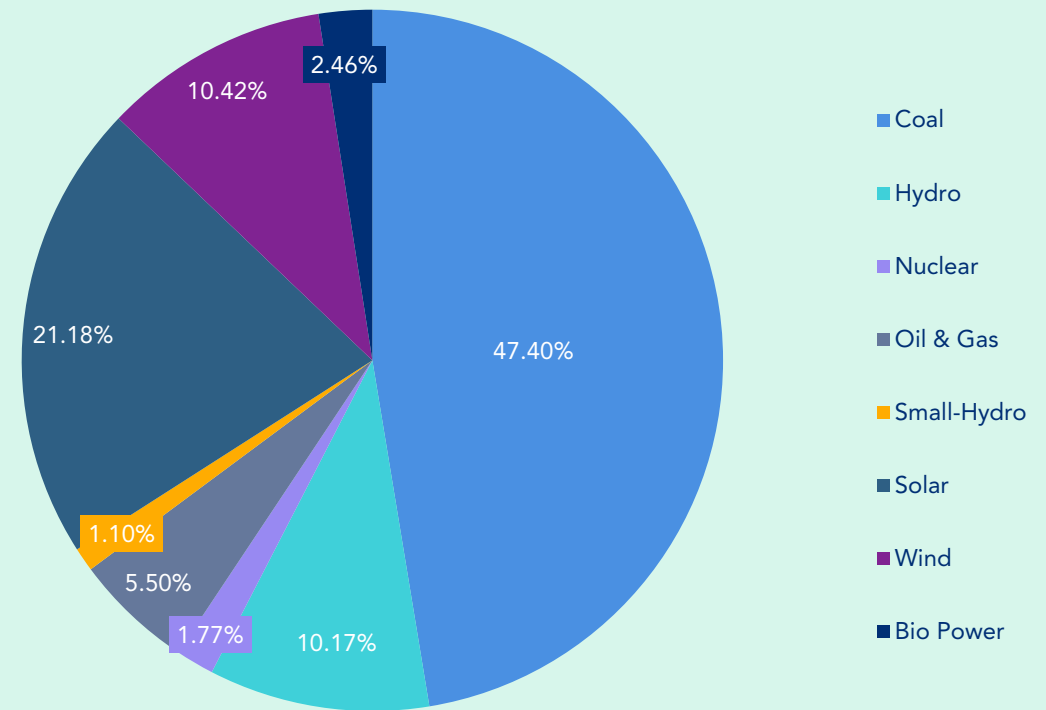
2.4 SHIFT TOWARDS RENEWABLE ENERGY SOURCES

INDIA'S TRANSITION TO A SUSTAINABLE ENERGY FUTURE

- From large-scale solar parks to rooftop installations and innovative financing, these elements have collectively bolstered India's solar capacity. This shift is especially noteworthy considering the minimal contribution of solar power to the energy mix just ten years prior.
- As India navigates this energy landscape, the coexistence of coal and solar marks a pivotal transitional phase. The nation is not only ramping up its solar capacity but is also adopting cleaner coal technologies and enhancing the efficiency of its coal plants.
- This balanced approach ensures energy security while steering towards a cleaner energy future. Furthermore, bolstering infrastructure such as upgraded transmission networks and storage facilities is expected to be vital for this transition, especially for integrating solar power into the grid.

Source: Mordor Intelligence

TOTAL INSTALLED CAPACITY SHARE (%), BY SOURCE, INDIA, AS OF DECEMBER 2024



Source: Ministry of Power, Government of India





2.5 INDIA POWER INVESTMENTS AND FORECAST IN INR TRILLION, TILL 2030

2.5.1 Power Generation

2.5.2 Power Transmission and Distribution (T&D)

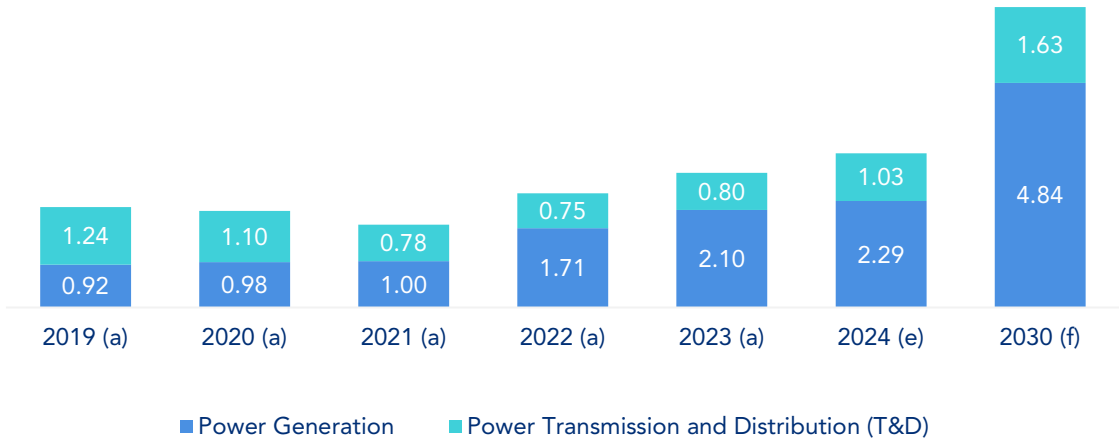




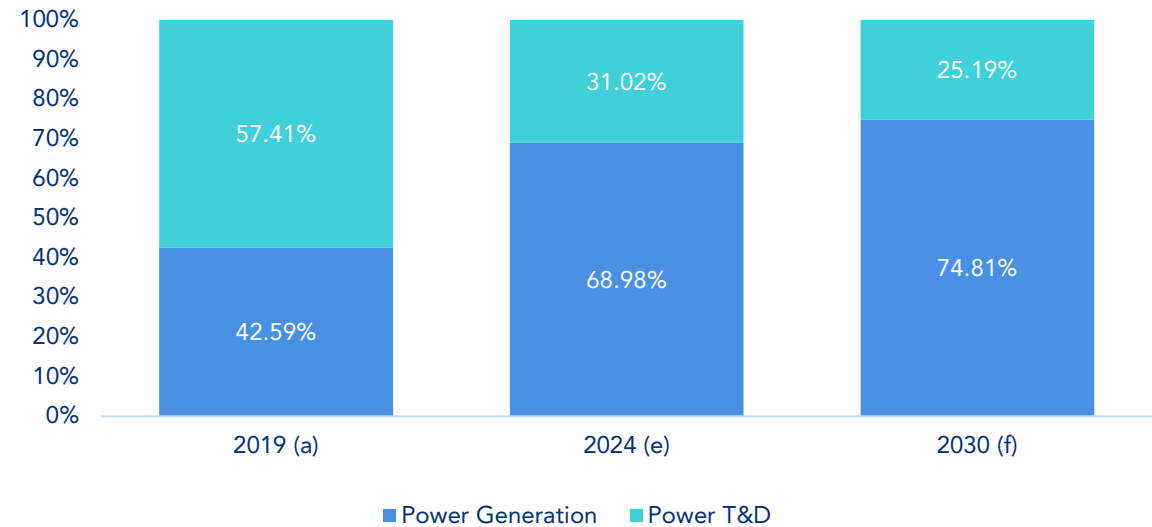
2.5 INDIA POWER INVESTMENTS AND FORECAST IN INR TRILLION, TILL 2030

POWER INVESTMENT MARKET, SIZE AND FORECAST IN INR TRILLION, BY SECTOR, INDIA, 2019 - 2030

CAGR (2024 TO 2030): 11.74%



POWER INVESTMENTS MARKET, SHARE (%), BY SECTOR, INDIA, 2019-2030



	2019 (a)	2020 (a)	2021 (a)	2022 (a)	2023 (a)	2024 (e)	2030 (f)	CAGR (2024-2030)
Power Generation	0.92	0.98	1.00	1.71	2.10	2.29	4.84	13.26%
Power Transmission & Distribution	1.24	1.10	0.78	0.75	0.80	1.03	1.63	7.95%
Total	2.16	2.08	1.78	2.46	2.90	3.32	6.47	11.74%

Source: Mordor Intelligence

Note: Excluding private-sector investments in T&D Sector

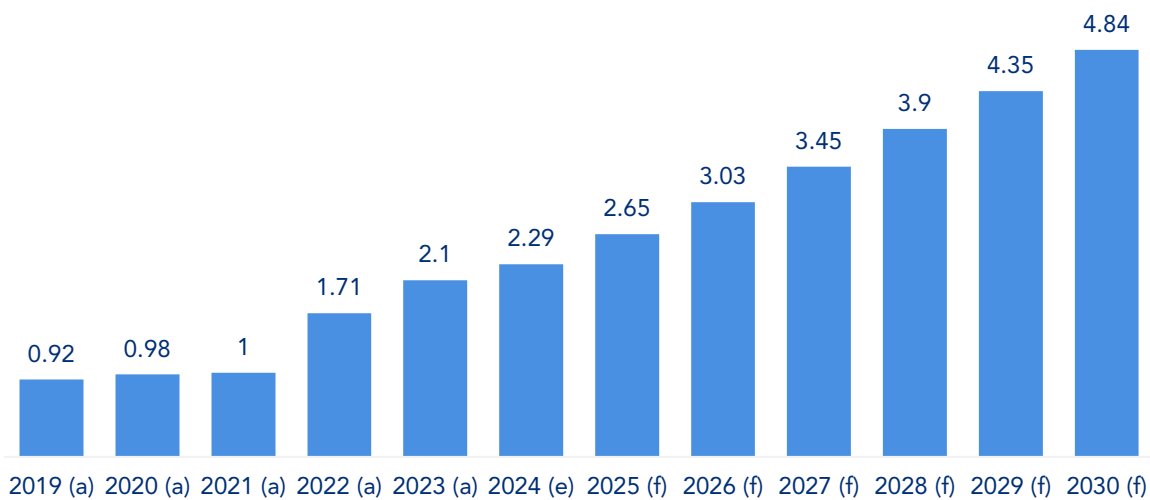




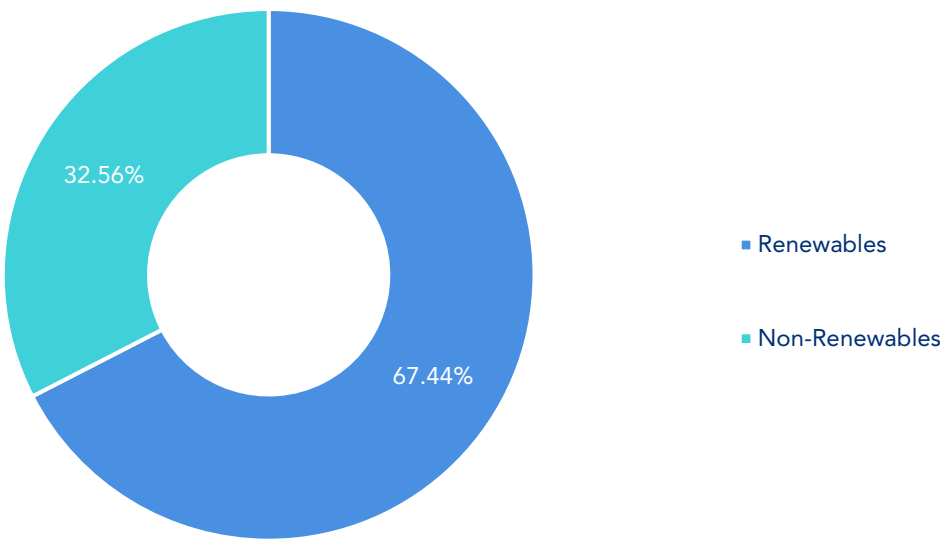
2.5.1 POWER GENERATION

POWER INVESTMENT IN POWER GENERATION, IN INR TRILLION, INDIA, 2019-2030

CAGR (2024 TO 2030): 13.26%



POWER GENERATION INVESTMENT BREAKUP (%), BY FUEL SOURCE, INDIA, 2023



- Investments in India's power generation sector are increasingly favoring renewables over non-renewables, signaling a pronounced shift towards bolstering clean energy. By October 2024, India's renewable energy capacity surged past 203.18 GW, representing over 46.3% of the nation's total power capacity. Solar energy leads the charge with a robust 92.12 GW, underscoring India's commitment to harnessing its abundant sunlight.
- Wind energy, tapping into the vast potential of the nation's coastal and inland corridors, contributes to 47.72 GW. Hydroelectric power, drawing from India's rivers and water systems, adds another 51 GW to the mix, with large projects accounting for 46.93 GW and small ones 5.07 GW. Together, these renewable sources are not only diminishing India's reliance on fossil fuels but are also steering the nation towards a sustainable energy future.

Source: Mordor Intelligence

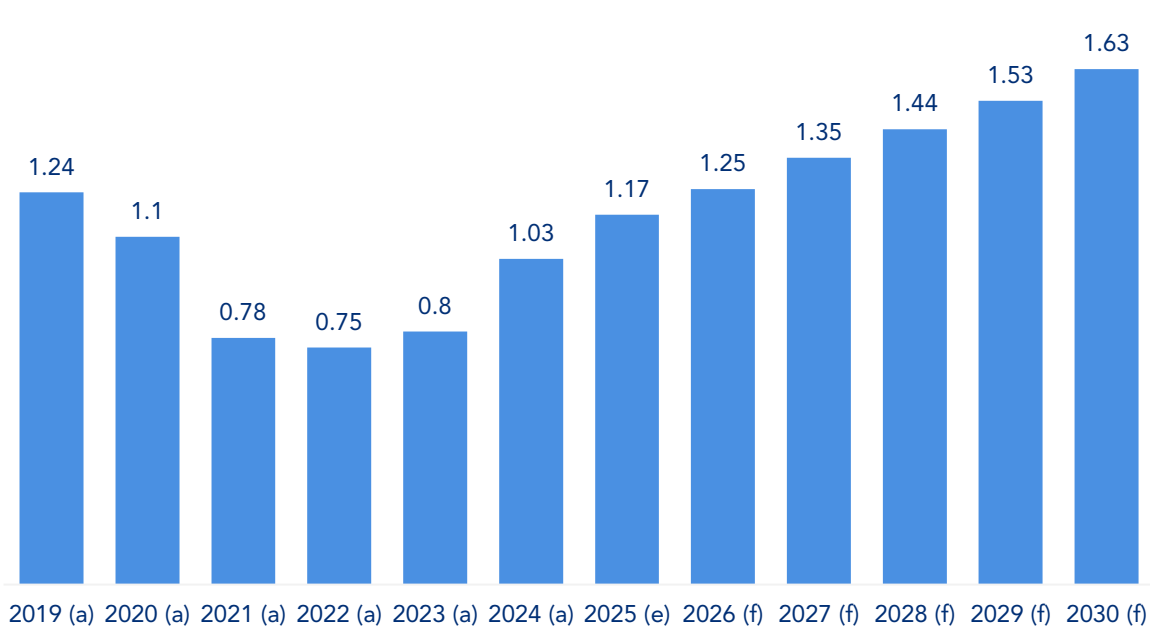




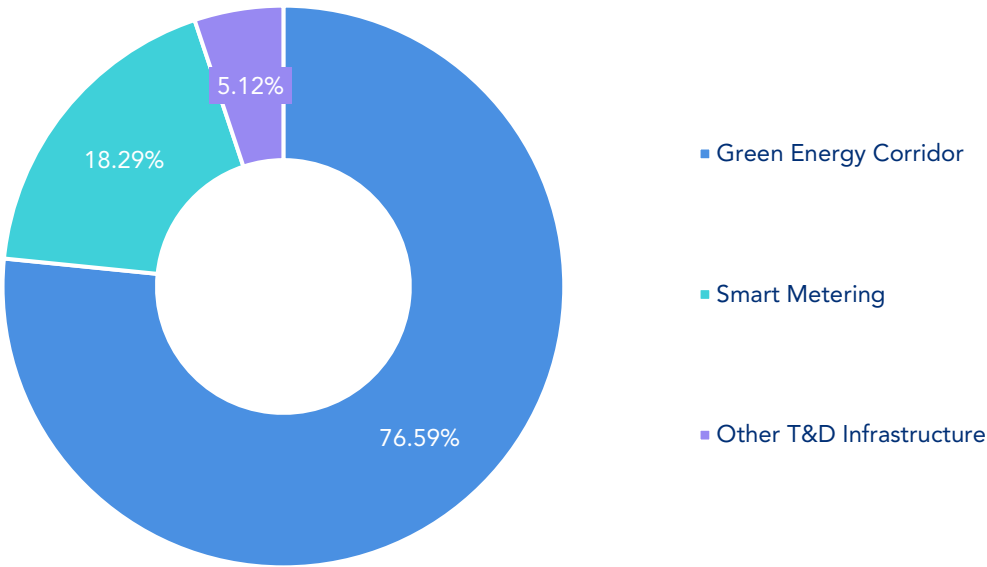
2.5.2 POWER TRANSMISSION AND DISTRIBUTION (T&D)

POWER INVESTMENTS IN POWER TRANSMISSION AND DISTRIBUTION, IN INR TRILLION, INDIA, 2019-2030

CAGR (2024 TO 2030): 7.95%



POWER T&D INVESTMENTS BREAKUP (%), BY INFRASTRUCTURE, INDIA, 2023



- As the power generation installation base expands, the demand for a robust and reliable transmission system is set to surge. This demand is fueled not only by the ongoing additions to generation capacity but also by a vigorous push towards renewable energy and efforts in rural electrification. Investments in the power transmission and distribution (T&D) network are significantly influenced by PGCIL's strong execution capabilities and healthy financial standing. Additionally, the increasing government's thrust on improving access to electricity and providing 24x7 power to all is expected to further drive the T&D investments in the next five years.

Source: Mordor Intelligence

Note: Excluding private-sector investments in T&D Sector; PGCIL: Power Grid Corporation of India Limited





2.6 FOCUS ON INDIA POWER SECTOR EVOLUTION AND WATERSHED POLICIES

INDIA EVOLUTION TOWARDS THE SUSTAINABLE ENERGY

- India is decisively shifting from its traditional reliance on coal-based power generation to renewable energy sources, especially solar and wind. This transition is bolstered by ambitious government initiatives, notably the target of achieving 500 GW of renewable energy capacity by 2030.
- The sector also witnessed heightened private sector involvement, with reforms in distribution companies (DISCOMs) to enhance their financial health and operational efficiency. Smart grid technologies and advanced metering infrastructure are being deployed to modernize the power distribution network. Policy measures, such as amendments to the Electricity Act, also strive to foster a more competitive and efficient market structure.
- According to the Ministry of New and Renewable Energy, India has reached a significant milestone in its renewable energy journey, with its total renewable energy capacity crossing the 200 GW (gigawatt) mark as of October 10, 2024.
- According to the Central Electricity Authority, the total renewable energy-based electricity generation capacity is 201.45 GW. The country has steadily built a diverse renewable energy base, from sprawling solar parks to wind farms and hydroelectric projects.
- These initiatives have reduced reliance on fossil fuels and strengthened the nation's energy security. When factoring in the 8,180 MW of nuclear capacity, the total non-fossil fuel-based power accounts for almost half of the country's installed electricity generation capacity, signaling a strong move toward clean energy leadership on the global stage.

INDIA EVOLUTION TOWARDS THE SUSTAINABLE ENERGY

- India is making a significant shift towards renewable energy, aiming to meet its rising electricity demands sustainably and reduce its reliance on fossil fuels. As one of the world's fastest-growing economies, India has set ambitious energy security goals, prioritized environmental health and honored its global climate commitments under the Paris Agreement.
- Solar energy, bolstered by initiatives like the Jawaharlal Nehru National Solar Mission (JNNSM) and supportive policies offering tax incentives and subsidies, has emerged as a pivotal force in this transition.
- However, India's renewable energy ambitions extend beyond just solar. The nation is channeling investments into wind, hydro, biomass, and green hydrogen, crafting a well-rounded energy portfolio. Wind power thrives in states like Tamil Nadu and Gujarat, while substantial hydropower projects bolster grid stability. Furthermore, advancements in smart grids, energy storage, and digital tools effectively address the challenges of renewable intermittency.
- Through a series of policies and initiatives, the Indian government has played a pivotal role in propelling the growth of its renewable energy sector. The Ministry of New and Renewable Energy (MNRE) spearheaded the National Solar Mission, a key driver of solar capacity expansions. Additionally, the government has rolled out significant initiatives such as the establishment of solar parks and the SATAT program, which emphasizes the promotion of Compressed Bio-Gas (CBG) as a sustainable alternative for affordable transportation.

Source: Mordor Intelligence





2.6 FOCUS ON INDIA POWER SECTOR EVOLUTION AND WATERSHED POLICIES

POLICY OVERVIEW

MINISTRY OF POWER 500 GW NON-FOSSIL FUEL TARGET

- The Government of India has set a target for establishing 50% cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030. In this regard, the following additional initiatives have been taken toward the integration of renewable power in the grid:
 - Transmission schemes for integration of 66.5 GW renewable generation in states like Rajasthan, Gujarat, Maharashtra, Madhya Pradesh, Karnataka, Andhra Pradesh, and Tamil Nadu have been planned and are under various stages of implementation.
 - About 55.08 GW of renewable potential has been identified in Rajasthan, Gujarat, Himachal Pradesh, and Ladakh, for which planning of transmission system has been carried out, and the implementation of the same would be taken up.
 - About 33.35 GW of renewable generations can be integrated into the ISTS grid through margins at various existing/ under construction ISTS S/s.
 - For the remaining capacity addition, SECI has preliminarily identified 181.5 GW of potential Renewable Energy Zones in 8 states - Andhra Pradesh, Karnataka, Telangana, Rajasthan, Maharashtra, Madhya Pradesh, and Offshore wind at Gujarat and Tamil Nadu with various hybrid and solar locations planned with Storage (BESS of 43.6GW). In this regard, a report for transmission systems for integration of over 500 GW of non-fossil fuel-based generation capacity by 2030 has been prepared by the Central Electricity Authority.
- About 51,000 kilometers of transmission lines and 4,33,500 MVA of transformation capacity are expected to be added to the Inter-State Transmission System (ISTS) network at an estimated cost of about INR 2.44 trillion. These transmission schemes include various high-capacity 765kV and 400kV EHVAC transmission lines and ± 800 kV & ± 350 kV HVDC lines.

Source: Mordor Intelligence





2.6 FOCUS ON INDIA POWER SECTOR EVOLUTION AND WATERSHED POLICIES

INDIA SETS A USD 109.50 BILLION (INR 9.15 TRILLION) BLUEPRINT FOR POWER SECTOR TO MEET 458 GW DEMAND BY 2032

- India, under the leadership of Prime Minister Mr. Narendra Modi and the Ministry of Power, has rolled out an ambitious plan, allocating INR 9.15 trillion (approximately USD 109.50 billion) to bolster its power infrastructure. The goal is to cater to a projected demand of 458 GW by 2032.
- In a move to fortify the national power grid and enhance energy security, the Indian government has greenlit new Interstate Transmission System (ISTS) schemes. These schemes are designed to channel 9 GW of renewable energy (RE) power from Rajasthan and Karnataka. Implemented through the tariff-based competitive bidding (TBCB) mode, these initiatives contribute to India's broader target of achieving a 500 GW RE capacity by 2030, with 200 GW already integrated into the system.

PM-SURYA GHAR: MUFT BIJLI YOJANA

- With a budget of INR 750.21 billion (USD 9 billion), the Union Cabinet has approved the PM-Surya Ghar: Muft Bijli Yojana. The initiative aims to install rooftop solar systems and promises free electricity for up to 300 units monthly for ten million households.

GOVERNMENT'S POWER SECTOR SCHEMES GET 50% HIGHER FUNDS

- The government has boosted funding for its 2024 budget initiatives in the power sector by 50%. These increased allocations, directed towards green hydrogen, solar power, and green-energy corridors, align with the nation's renewable energy targets set for 2030.





2.6 FOCUS ON INDIA POWER SECTOR EVOLUTION AND WATERSHED POLICIES

POWER MINISTRY EARMARKS 81 THERMAL UNITS TO MOVE COAL TO RENEWABLE BY 2026

- To address the annual coal demand-supply mismatch and achieve India's ambitious target of 500 GW in renewable energy, the Ministry of Power has pinpointed 81 thermal units set to transition from coal to renewable energy sources by 2026.

SCHEME FOR "DEVELOPMENT OF SOLAR PARKS AND ULTRA MEGA SOLAR POWER PROJECTS"- REG EXTENSION IN SCHEME TIMELINE

- While solar power projects can be established nationwide, their scattered development results in elevated costs per MW and increased transmission losses. Smaller capacity projects face hefty expenses in site development, extending transmission lines to the nearest substation, securing water, and building essential infrastructure.
- Additionally, project developers often grapple with prolonged land acquisition and obtaining various clearances and permissions, leading to project delays. To address these hurdles, the "Development of Solar Parks and Ultra-Mega Solar Power Projects" scheme was introduced in December 2014, aiming to expedite project setups for solar developers.

CARBON CREDIT TRADING SCHEME, 2023

- The Carbon Credit Trading Scheme aims to create a strong platform for trading carbon credits. Each credit, equivalent to one metric ton of carbon dioxide equivalent (tCO₂e), signifies a quantified unit of emissions reduction, removal, or avoidance. Industries and entities within the country can trade these credits to manage their greenhouse gas emissions. Ultimately, the scheme seeks to motivate obligated entities to shrink their carbon footprint by curbing emissions.



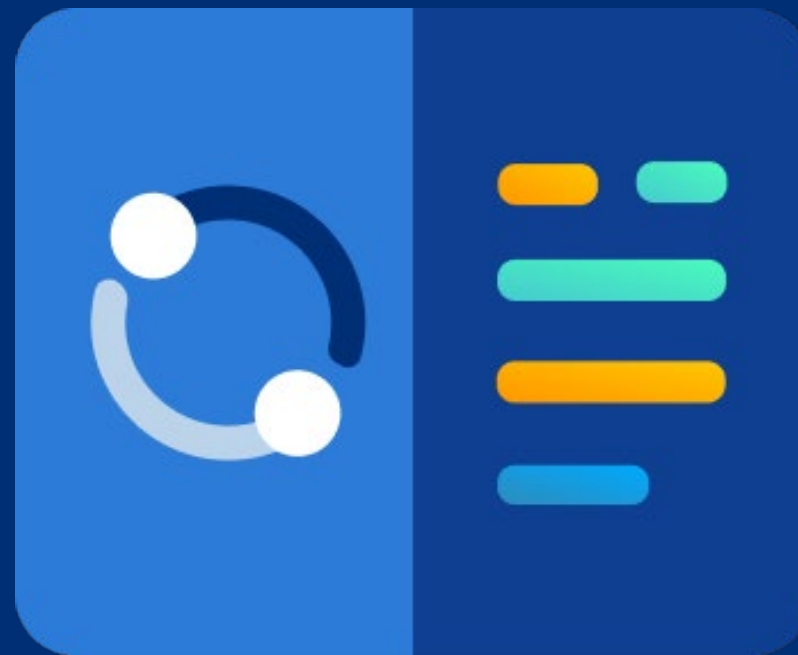
3 INDIA POWER DISTRIBUTION SECTOR

3.1 Distribution Sector Analysis

3.2 Special Focus on Policies Impacting the Power Distribution

3.3 Spotlight on Revamped Distribution Sector Schemes

3.4 India Discoms Analysis





3 INDIA POWER DISTRIBUTION SECTOR

- India's power sector value chain hinges on its distribution sector, the final and vital link. In recent years, this sector has faced financial strains, battling irregular tariff hikes, high AT&C losses, and delays in subsidy payments from state governments. These hurdles have diminished the purchasing power of distribution companies.
- Revenue streams are challenged, with some states holding off on tariff revisions for seven to ten years, jeopardizing financial stability. The predicament is exacerbated by late payments, especially from state government subsidies. Additionally, entities like municipal corporations, hospitals, and schools contribute to the unpaid dues. To counter these financial challenges, DISCOMs frequently resort to expensive short-term loans, a stopgap measure that jeopardizes their future.
- Once viewed as a daunting terrain, the power distribution sector is witnessing a significant transformation. The Revamped Distribution Sector Scheme (RDSS), a five-year initiative with a budget of INR 3 trillion, aims to revitalize distribution and enhance Discoms' management. Key focus areas include network fortification, smart metering, and skill enhancement. Alongside earlier initiatives like Saubhagya and the Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY), RDSS has fostered a disciplined operational approach in Discoms, urging them to champion the cause of universal electrification.
- As India's power distribution sector evolves, the emphasis on the new discom scheme intensifies, heralding promising advancements in 2024. Central to this transformation is the adept management of smart meter data, underscoring the need for a robust data management system. It is worth noting that the integration of smart meters with IT-OT systems is set to bolster the sector's operational and financial health.
- However, the journey isn't without its challenges. Addressing data privacy and cybersecurity issues related to smart meter data complicates the implementation. Additionally, managing costs becomes crucial, especially with fluctuations in raw material prices and Right-of-Way (RoW) challenges. Successfully navigating these complexities requires a strategic and holistic approach, ensuring the new discom scheme's integration while bolstering the resilience of India's power distribution landscape.
- Yet, amidst these challenges, the power distribution sector stands on the brink of growth. By emphasizing effective reform implementation and upholding governance standards, the Indian power sector steps into 2024 with renewed hope, eyeing substantial strides toward its transformative goals.

57
Number of
Public DISCOMs

13
Number of
Private
DISCOMs

1,154,348.53
Electricity Sales
(MU)
As of FY 2023-24

275.44 Million
Number of
Consumers
As of FY 2023-24





3.1 DISTRIBUTION SECTOR ANALYSIS

3.1.1 Distribution Lines Length By Voltage in ckm, till 2030

3.1.2 Distribution Lines Investment By Voltage in USD Billion, till 2030

3.1.3 Investments by Key States

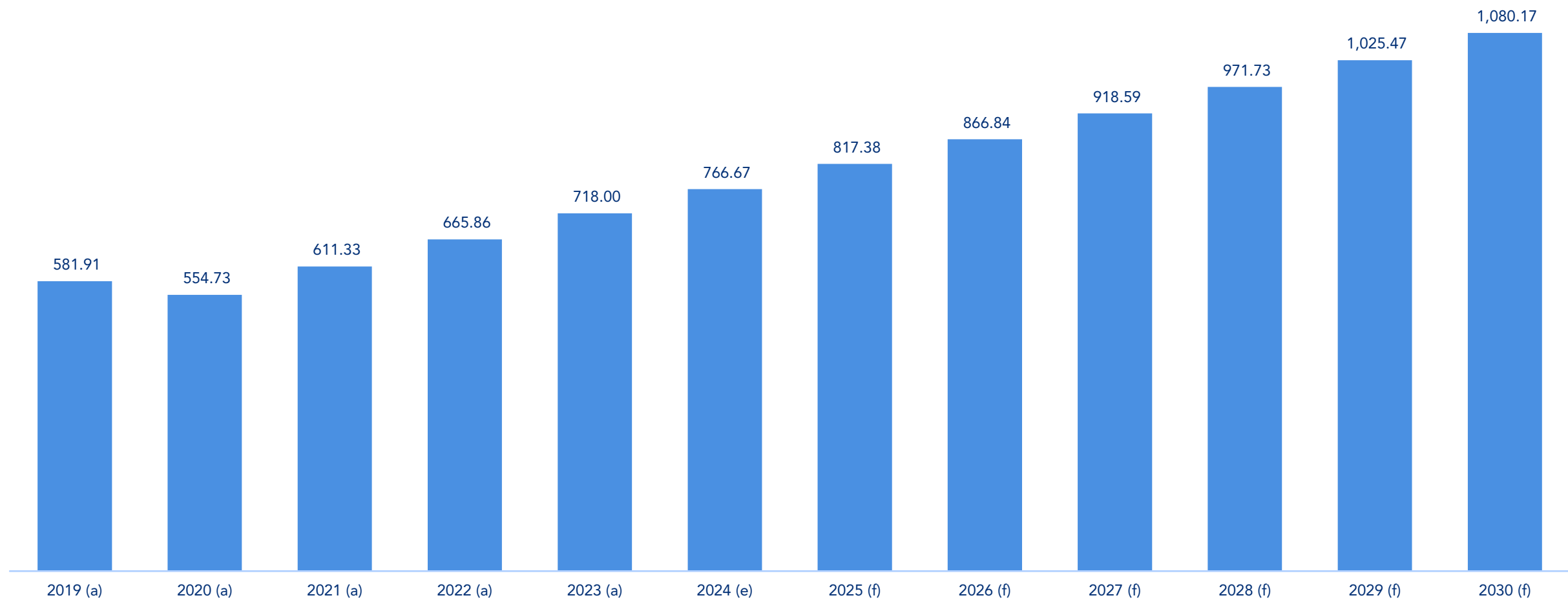
3.1.4 Special Focus on Major Schemes





3.1.1 DISTRIBUTION LINES LENGTH BY VOLTAGE IN CKM, TILL 2030

CAGR (2024 TO 2030): 5.88%



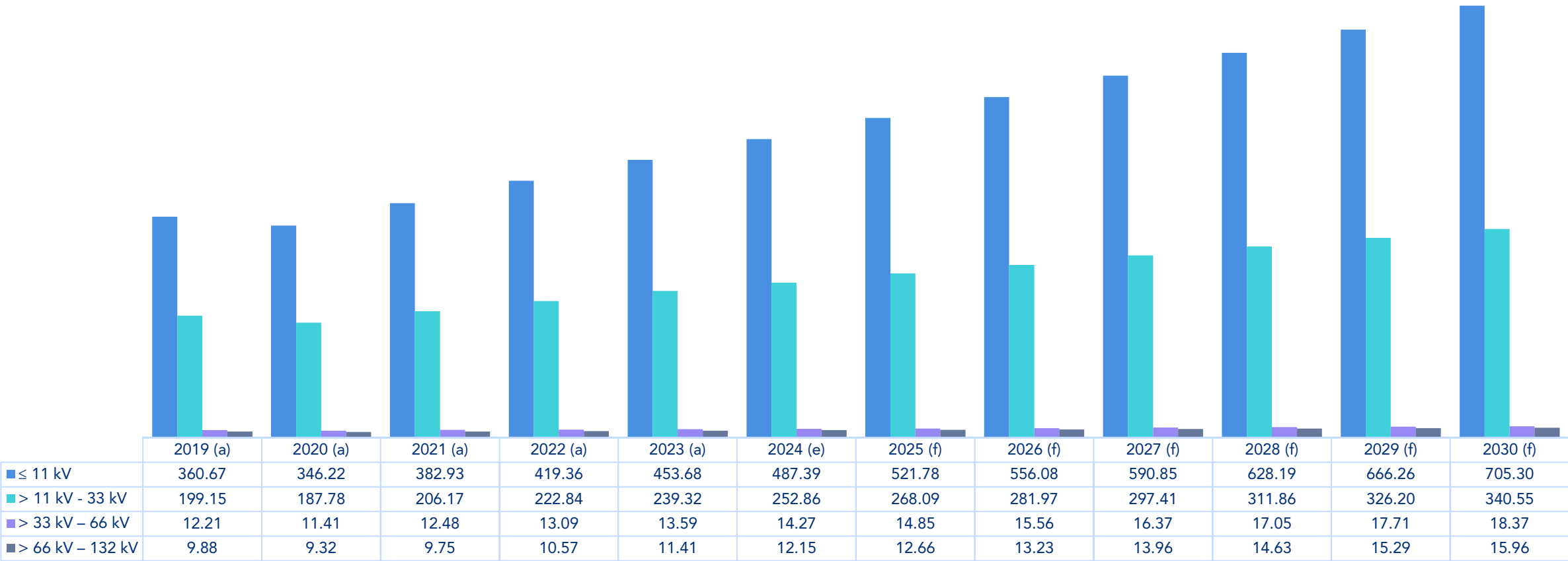
Source: Mordor Intelligence





3.1.1 DISTRIBUTION LINES LENGTH BY VOLTAGE IN CKM, TILL 2030

CAGR (2024 TO 2030): 5.88%



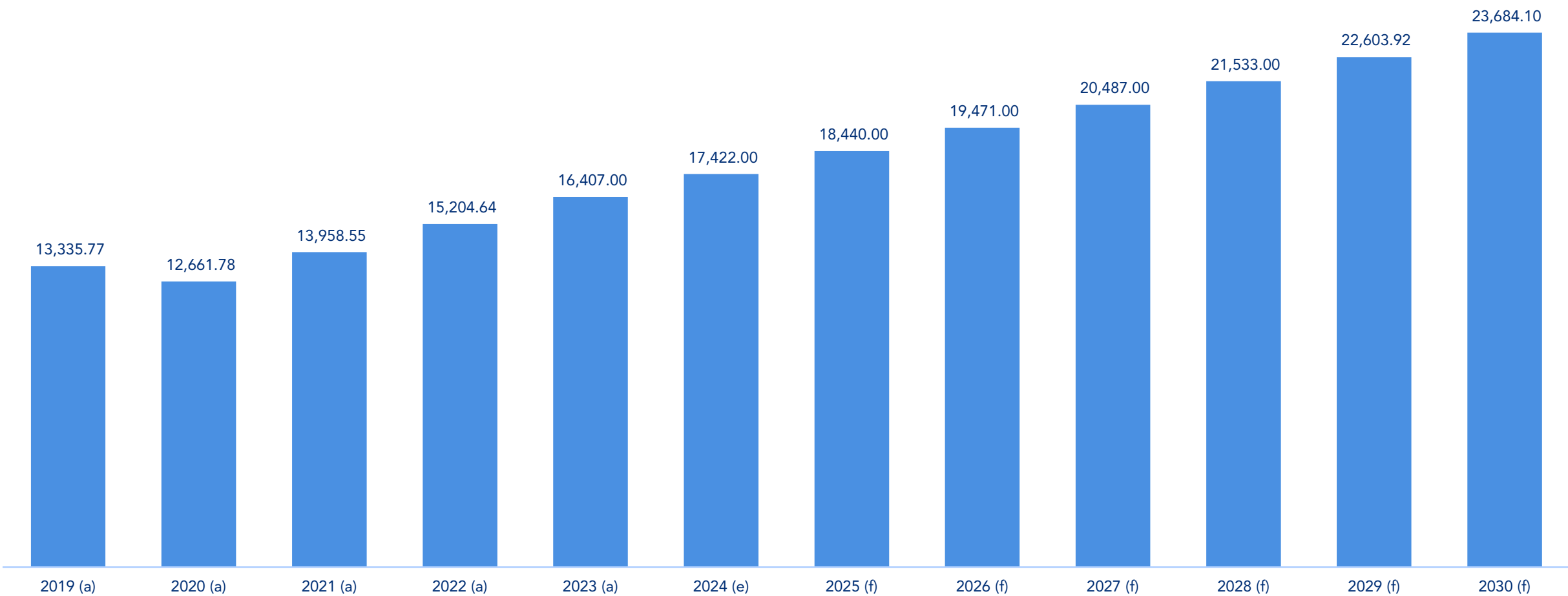
Source: Mordor Intelligence





3.1.2 DISTRIBUTION LINES INVESTMENT BY VOLTAGE IN USD MILLION, TILL 2030

CAGR (2024 TO 2030): 5.25%



Source: Mordor Intelligence





3.1.2 DISTRIBUTION LINES INVESTMENT BY VOLTAGE IN USD MILLION, TILL 2030

CAGR (2024 TO 2030): 5.25%



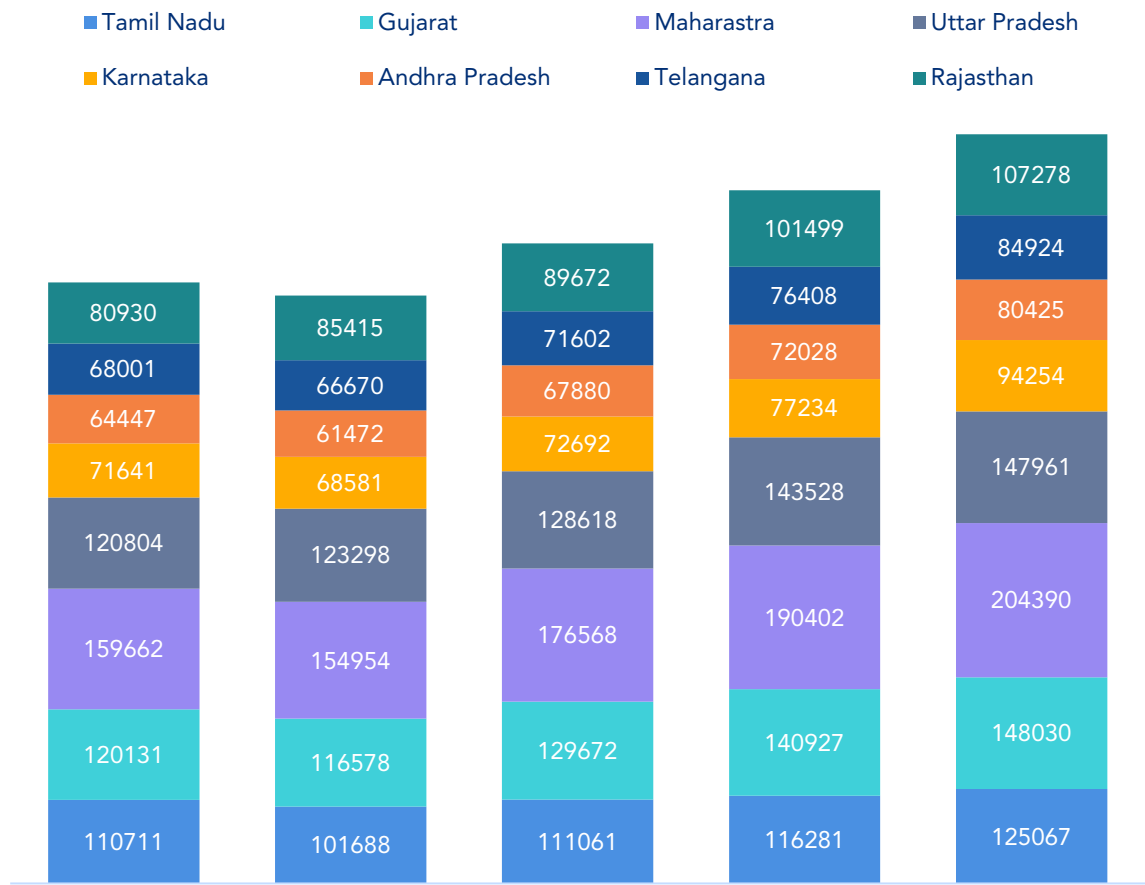
Source: Mordor Intelligence



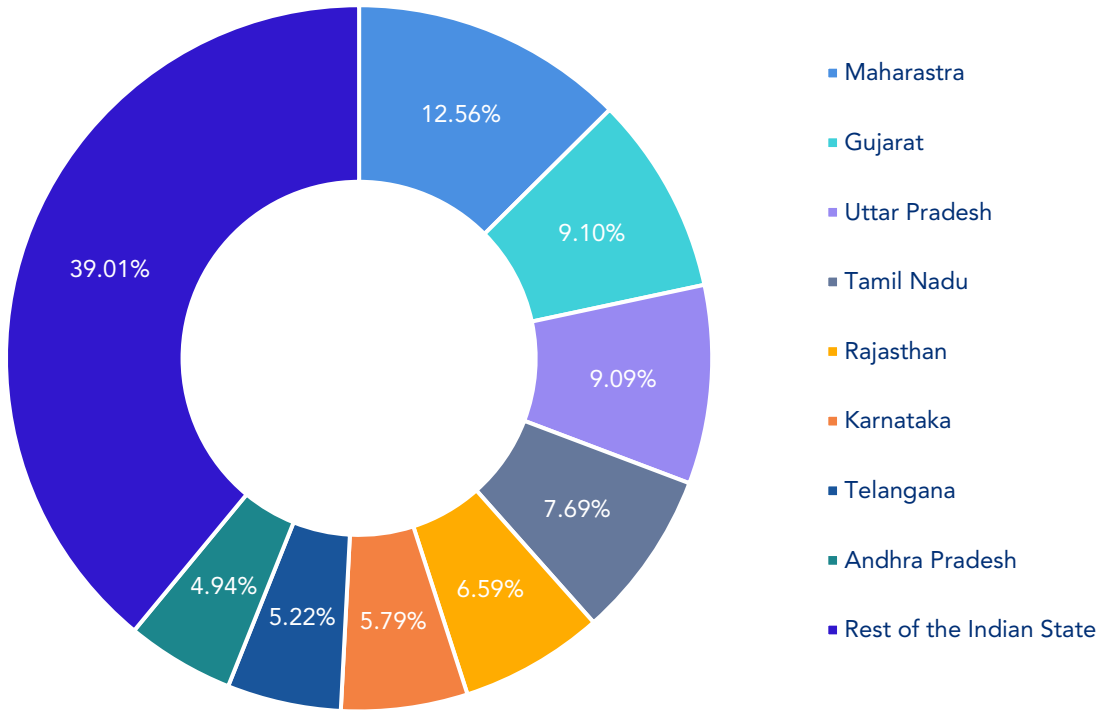


3.1.3 INVESTMENT BY KEY STATES

ELECTRICITY REQUIREMENT IN MILLION UNITS (MU), BY SELECTED KEY INDIAN STATES, 2019-20 - 2023-24



SHARE OF ELECTRICITY REQUIREMENT IN %, BY INDIAN STATES, 2023-2024



Source: Indian Climate & Energy Dashboard – NITI Aayog





3.1.3 INVESTMENT BY KEY STATES

INVESTMENT BY KEY STATES

STRATEGIC IMPORTANCE OF POWER DISTRIBUTION IN INDIA'S ENERGY ECOSYSTEM

- India's power distribution sector is the backbone of its energy ecosystem, facilitating the last-mile delivery of electricity to consumers. It is critical in supporting the country's ambitious economic growth goals and its transition towards clean energy.
- Despite significant progress in generation capacity and renewable energy adoption, the distribution sector remains fragile, with challenges like high Aggregate Technical and Commercial (AT&C) losses, aging infrastructure, and financially stressed distribution companies (DISCOMs). This creates a significant investment opportunity for global and domestic players to modernize the sector, improve efficiency, and enhance financial sustainability.

Key States with High Power Consumption

- India's power consumption is heavily concentrated in a few key states, including Maharashtra, Uttar Pradesh, Tamil Nadu, Gujarat, Rajasthan, Andhra Pradesh, Telangana, and Karnataka, which collectively account for a substantial share of the national electricity demand. Notably, according to the data from the Indian Climate & Energy Dashboard – NITI Aayog, the electricity requirement in these eight states contributes to over 60% or 992,329 million units of the country's power requirement in 2023-24.
- Particularly, Maharashtra, as the largest power-consuming state, recording about 204390 million units in 2023-24, is characterized by its extensive industrial and urban load centers. Investments in advanced grid technologies, energy storage solutions, and efficient metering systems are highly attractive in the region. In September 2024, the Maharashtra State Electricity Distribution Company Limited (MSEDCL) sanctioned INR 313 crore to strengthen the underground power network and power distribution in Nagpur district.

- Out of the INR 313 crore, MSEDCL has already issued work orders worth INR 238 crore and will soon float tenders worth INR 75 crore. As per the Chairman and managing director of MSEDCL, the approval has also been given for works worth INR 46 crore for laying underground electricity wires in the Nagpur South-West assembly constituency. Such developments are likely to attract players in the power distribution sector in the coming years.
- Further, states such as Tamil Nadu, with its leadership in renewable energy generation, particularly wind, require enhanced grid infrastructure for stability and distribution network upgrades. Meanwhile, Gujarat's reputation for DISCOM efficiency and policy-driven renewable energy adoption presents a low-risk, high-reward investment environment.
- Besides, states like Uttar Pradesh and Rajasthan, although facing high AT&C losses, are increasingly focused on privatization or public-private partnership, improving infrastructure, and presenting lucrative opportunities for institutional investors looking to participate in transformative projects.
- Notable, in January 2025, Uttar Pradesh Power Corporation is seeking consultants and advisers to facilitate the privatization or public-private partnership of two loss-making discoms, Dakshinanchal Vidyut Vitran Nigam Ltd and Purvanchal Vidyut Vitran Nigam Ltd, to enhance efficiency and service quality.

Source: Mordor Intelligence





3.1.3 INVESTMENT BY KEY STATES

GOVERNMENT POLICIES AND REFORMS

- Uttar Pradesh's initiative aims to rejuvenate its two underperforming discoms. While the state leans towards a public-private partnership model, specifics on shareholding remain undecided. The government is poised to act on the consultant's recommendations for the new distribution framework, driven by a vision of reduced losses and enhanced service quality. Such proactive measures signal a burgeoning investment landscape in these states.
- Widespread power theft and inefficiencies in India's energy infrastructure have propelled the adoption of smart meters. Research from the International Journal for Legal Research and Analysis highlighted Aggregate Technical and Commercial Losses ranging from 15-65%, averaging 34% annually. Such losses, compounded by the economic ramifications of unauthorized power tapping, have long plagued energy companies. In response, the Indian government's Advanced Metering Infrastructure (AMI) program seeks to revamp the energy grid, usher in prepaid metering, and bolster the profitability of energy firms.
- With initiatives like smart metering and liberalized FDI policies, India is tackling energy inefficiencies head-on. These measures not only enhance the financial health of distribution companies but also cultivate a stable and transparent environment, amplifying investor confidence and promising sustained growth in the power sector.

INSTITUTIONAL FUNDING: THE ROLE OF WORLD BANK, ADB, AND OTHERS

- Institutions like the World Bank, Asian Development Bank (ADB), and International Finance Corporation (IFC) are crucial in bolstering investments in India's power distribution sector. They offer concessional funding, risk mitigation, and technical assistance, especially for projects aimed at boosting the financial and operational performance of DISCOMs.
- For instance, ADB has significantly invested in smart metering projects throughout India. Meanwhile, the World Bank has supported rural electrification and grid modernization initiatives. These institutions also prioritize funding for green energy projects, helping DISCOMs manage the growing influx of renewable energy sources while ensuring grid stability.
- Earlier in 2021, ADB inked a USD 100 million loan deal with the Indian government, targeting the modernization of Bengaluru's power distribution. ADB also extended a USD 90 million non-sovereign loan to the Bangalore Electricity Supply Company Limited (BESCOM).
- The project encompasses converting 7,200 km of overhead lines to underground cables, laying down 2,800 km of fiber optic cables for smart metering and automation, and installing 1,700 automated ring main units. The goal is to slash technical and commercial losses by 30%, enhance BESCOM's operational and financial prowess, and roll out a novel financing model that merges sovereign and non-sovereign loans.
- In October 2024, ADB unveiled a USD 241 million loan to modernize power distribution in West Bengal. The focus is upgrading current networks to cater to the surging electricity demand in urban and rural locales. These funds are set to flow through the State Bank of India (SBI) and the National Bank for Agriculture and Rural Development (NABARD). Both banks will extend loans to developers and end-users nationwide, facilitating the installation of rooftop solar systems.
- In November 2023, the Asian Development Bank (ADB) approved a policy-based loan of USD 250 million, aiming to bolster India's power sector. Following suit, in July 2024, the World Bank greenlit a substantial USD 1.5 billion financing package, marking its second operation to expedite India's transition to low-carbon energy solutions.

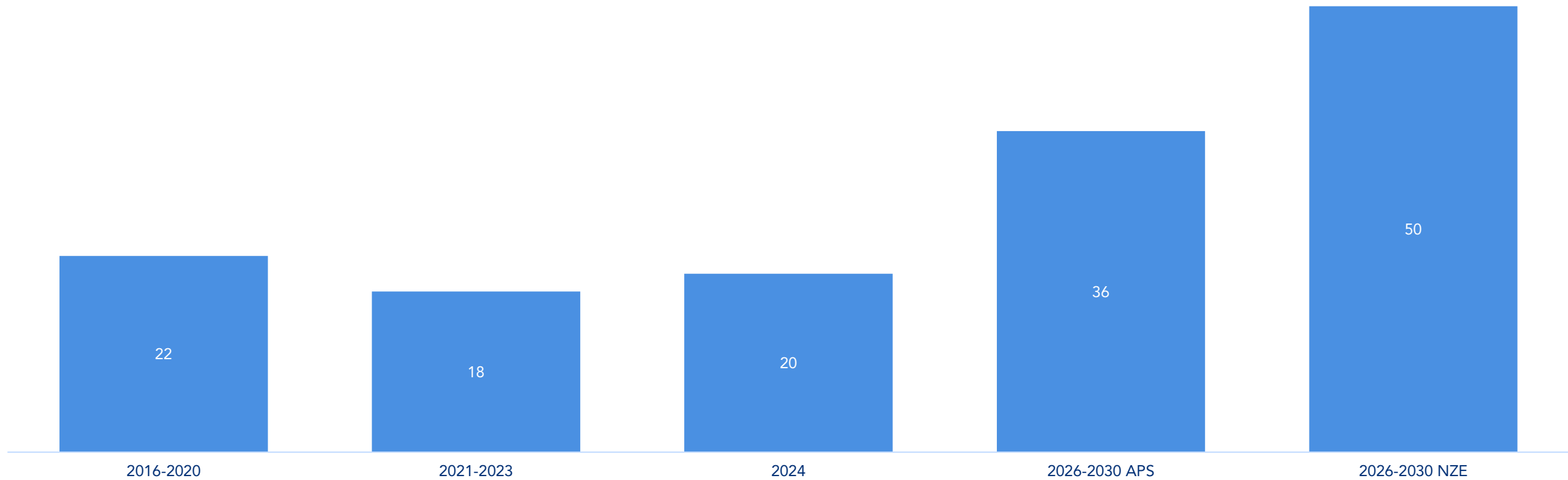
Source: Mordor Intelligence





3.1.3 INVESTMENT BY KEY STATES

GRIDS AND STORAGE INVESTMENT – HISTORIC AND FORECAST IN THE ANNOUNCED PLEDGES SCENARIO AND THE NET ZERO EMISSIONS BY 2050 SCENARIO, IN USD BILLION, INDIA, 2016-2030



Source: International Energy Agency (IEA)



3.1.3 INVESTMENT BY KEY STATES

INSTITUTIONAL FUNDING: THE ROLE OF WORLD BANK, ADB, AND OTHERS

- In 2023-2024, foreign direct investment (FDI) surged by 144%, reaching USD 1.7 billion, up from USD 697.92 million the prior year. This uptick is bolstered by the endeavors of the Power Finance Corporation (PFC), REC Limited, and the Indian Renewable Energy Development Agency (IREDA), all working to realize the "Viksit Bharat" vision and hasten the green energy transition.

CHALLENGES: FINANCIAL STRESS AND OPERATIONAL INEFFICIENCIES

- The financial health of DISCOMs remains a critical challenge. Many state-owned DISCOMs face significant debt burdens and operate under cost-revenue mismatches due to outdated tariff structures, high transmission losses, and theft. These issues deter private investment and necessitate structural reforms.
- Besides, regulatory uncertainties, such as delays in tariff revisions and policy inconsistencies across states, further compound the risks. Despite these challenges, the central government's push for privatization and operational reforms is gradually improving the sector's viability for long-term investments.

OPPORTUNITY: ADOPTION OF SMART GRIDS AND DIGITAL TRANSFORMATION

- The smart grid is an integral way to improve power distribution, especially for the thermal power sector in India as well as for the rest of the world, ensuring that with digital technology, the right amount of power reaches the right place and the management of the flow of power becomes far more efficient.
- Investments in digital technology not only optimize power consumption but also facilitate the integration of renewable energy into the grid. With the aid of smart meters and real-time data analytics, energy losses are curtailed, and grid stability is achieved.
- Smart grids foster better communication between utilities and consumers, which paves the way for initiatives that curtail power consumption during peak hours, leading to more efficient electricity usage and an optimized grid operation.

CONCLUSION: A SECTOR POISED FOR TRANSFORMATION

- India power distribution sector stands at a pivotal juncture, balancing challenges with burgeoning opportunities. As the economy expands and energy demands surge, the nation's commitment to renewable energy becomes more pronounced.
- States like Maharashtra, Tamil Nadu, Gujarat, Uttar Pradesh, and Rajasthan present a tapestry of opportunities spanning industrial, urban, and rural domains.

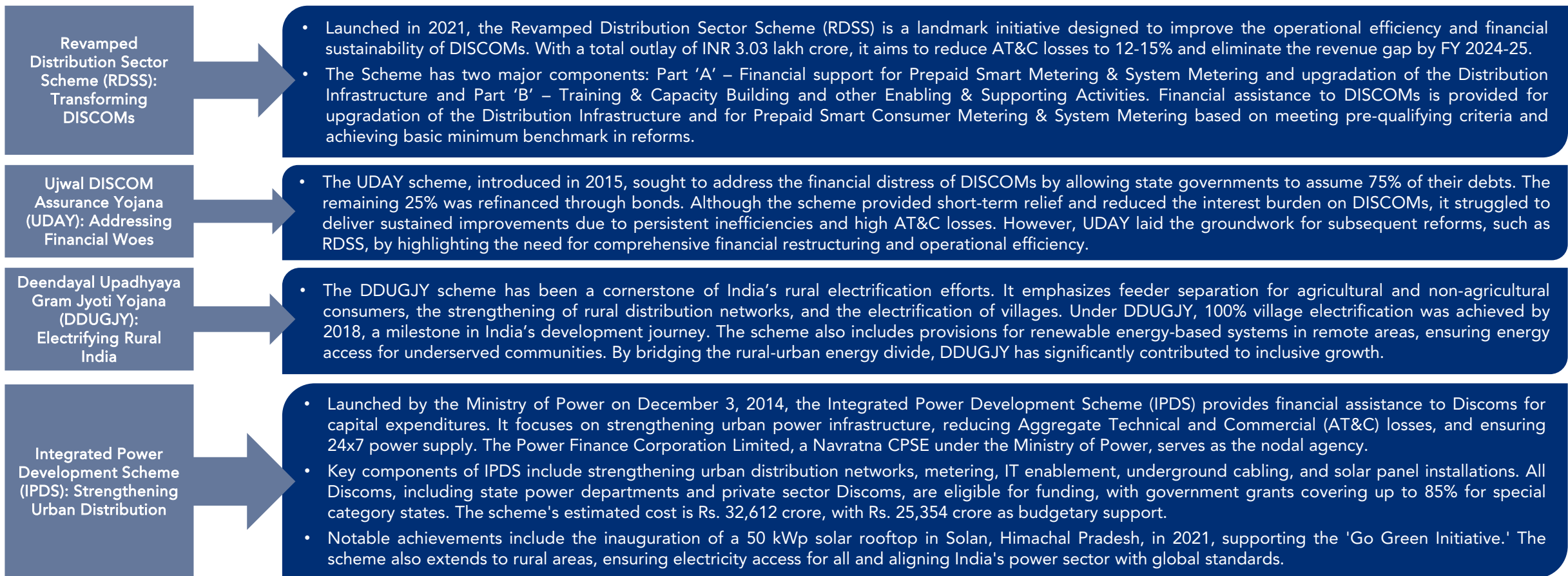




3.1.4 SPECIAL FOCUS ON MAJOR SCHEMES

SPECIAL FOCUS ON MAJOR SCHEMES

• The power distribution sector in India is crucial for ensuring energy access, reliability, and efficiency. However, it has long faced challenges like high Aggregate Technical and Commercial (AT&C) losses, outdated infrastructure, and the weak financial condition of DISCOMs. To address these issues, the Government of India has implemented structural reforms and launched various schemes to revitalize the sector. With the nation's increasing energy demand and a stronger emphasis on renewable energy integration, the power distribution sector is undergoing a major transformation, driven by government initiatives, private sector participation, and the adoption of advanced technologies.





3.1.4 SPECIAL FOCUS ON MAJOR SCHEMES

Supportive Policies and Frameworks for Investments

- The power distribution sector has been bolstered by progressive policies and regulatory frameworks, creating a conducive environment for investments. Key measures include:
 - Electricity (Amendment) Bill 2022: The proposed amendments focus on increasing competition in the distribution sector by allowing multiple licensees and promoting open access.
 - National Electricity Policy (NEP): The NEP outlines a roadmap for achieving reliable, affordable, and sustainable power for all.
 - Renewable Energy Push: India's commitment to achieving 500 GW of renewable energy capacity by 2030 demands significant investments in grid modernization and energy storage systems.
- These measures, combined with state-level incentives, have attracted private sector participation and foreign direct investment (FDI) in the distribution segment.

Augmentation of Equipment and Infrastructure

- Modernizing infrastructure is crucial for addressing challenges in the distribution sector. The Advanced Metering Infrastructure (AMI) initiative, rolling out smart meters in urban and rural areas, aims to enhance energy accounting, reduce theft, and enable prepaid billing. The Revamped Distribution Sector Scheme (RDSS), with an outlay exceeding INR 3 lac crores, targets the installation of 250 million smart meters and AMI infrastructure across Indian utilities.

- Upgrading substations with advanced switchgear, transformers, and automation technologies improves grid reliability and efficiency. Rising demand for substations is driven by the expanding transmission & distribution (T&D) network and renewable energy integration, supported by government schemes like the RDSS. Utilities are adopting advanced designs, digital technologies, and eco-friendly solutions to meet these needs.
- In conclusion, the augmentation of equipment and infrastructure, driven by initiatives like AMI, smart metering, and digital substations, is transforming the distribution sector. These advancements address challenges while paving the way for a more efficient, reliable, and sustainable energy ecosystem.

Capex Fuels Modernization in the Power Distribution Sector

- The distribution sector's Capex requirements are substantial, driven by infrastructure modernization, technology adoption, and renewable energy integration. For example, India's Smart Meter National Program (SMNP) is aiming to replace 25 crore conventional electricity meters with prepaid smart meters, along with upgrading infrastructure like feeders and transformers, with an estimated capital expenditure capex) of INR 1.5 lakh crore slated for implementation over the next five fiscal years.
- This initiative is expected to provide significant improvements in operational and financial efficiencies for distribution companies (discoms). The Smart Meter National Program (SMNP) uses a flexible spending plan and a secure payment system to lower risks usually found in big projects. These steps aim to get more private companies involved and speed up the installation of smart meters.





3.1.4 SPECIAL FOCUS ON MAJOR SCHEMES

Capex Fuels Modernization in the Power Distribution Sector

- Further, this initiative will make billing and payment collection easier for distribution companies (discoms). The SMNP also helps track electricity usage in real time, reduces power theft, and makes supply schedules better. Overall, it brings important improvements through its modernization efforts. In the SMNP framework, state discoms will divide their areas among private concessionaires. The companies will handle buying, setting up, and maintaining smart meters for a 10-year period.
- Contracts will be given out through open auctions where bids are based on the amount per smart meter that concessionaires will receive annually. Discoms will fund these concessionaires from the money they collect from consumers, and they will also get grants from the central government for each smart meter installed. Overall, Capex investments like those in the SMNP are vital for modernizing the distribution sector. They not only enhance operational efficiency and financial stability but also pave the way for a more sustainable and technologically advanced energy ecosystem.

Opportunities and Challenges - The distribution sector presents a wide array of opportunities in areas such as smart grids, energy storage, and renewable integration.

However, challenges remain, including:

- High AT&C Losses: States with poorly performing DISCOMs continue to grapple with inefficiencies and financial stress.
- Regulatory Delays: Inconsistent policy implementation at the state level can hinder investment flows.
- Consumer Behavior: Resistance to smart meter adoption and prepaid billing in certain regions poses operational challenges.
- Despite these hurdles, the sector's long-term growth prospects remain robust, driven by India's energy transition and ambitious electrification goals.

Conclusion

- India's power distribution sector is at a critical juncture, with reforms and modernization efforts paving the way for a more efficient, reliable, and sustainable energy ecosystem. Schemes such as RDSS, UDAY, DDUGJY, and IPDS have provided a strong foundation for growth, while supportive policies and technological advancements are attracting significant investments.
- For investors and stakeholders, the sector offers immense potential, mainly in smart infrastructure, renewable integration, and digital transformation. With continued government support and private sector participation, India's distribution sector is set to play a pivotal role in achieving the country's energy aspirations.





3.2 SPECIAL FOCUS ON POLICIES IMPACTING THE POWER DISTRIBUTION

Policy Name	Overview	Impact
PM Surya Ghar: Muft Bijli Yojana	- The Government of India has approved the PM Surya Ghar: Muft Bijli Yojana on 29th February 2024 to increase the share of solar rooftop capacity and empower residential households to generate their own electricity. The scheme has an outlay of Rs 75,021 crore and is to be implemented till FY 2026-27. The scheme will be implemented by a National Programme Implementation Agency (NPIA) at the National level and by the State Implementation Agencies (SIAs) at the state level. - The Distribution Utility (DISCOMs or Power/Energy Departments, as the case may be) shall be the State Implementation Agencies (SIA) at the State/UT level. Under the scheme, the DISCOMs shall be required to put in place several facilitative measures for the promotion of rooftop solar in their respective areas, such as availability of net meters, timely inspection and commissioning of installations, vendor registration, and management, interdepartmental convergence for solarizing government building, etc.	- Through this scheme, the households will be able to save electricity bills as well as earn additional income through sale of surplus power to DISCOMs. A 3 kW system will be able to generate more than 300 units a month on an average for a household. - The proposed scheme will result in addition of 30 GW of solar capacity through rooftop solar in the residential sector, generating 1000 BUs of electricity and resulting in reduction of 720 million tonnes of CO2 equivalent emissions over the 25-year lifetime of rooftop systems.





3.2 SPECIAL FOCUS ON POLICIES IMPACTING THE POWER DISTRIBUTION

Policy Name	Overview	Impact
Ujwal DISCOM Assurance Yojana	On November 05, 2015, the Government of India launched Ujwal Discom Assurance Yojana Scheme to aid operational and financial turnaround of Power Distribution Companies (DISCOMs) owned by any state. This scheme was established with a vision to provide affordable and accessible 24x7 power to all. It also aims to provide a solution for revenue-side efficiency and cost-side efficiency. Moreover, the scheme envisages reform measures in the following sectors: generation, transmission, distribution, coal, and energy efficiency. Initially, the scheme was targeted for four years until 2019, providing revival package for electricity distribution companies; however, after understanding impact and prospect of this scheme, the government launched 'UDAY 2.0' as the next leg of reforms in the power distribution sector, under the Union Budget 2020-21.	Under UDAY, smart meters were to be installed as a measure to improve operational efficiency. This would have helped in reducing the commercial losses due to theft, billing issues and collection issues. The Standing Committee on Energy observed that smart meters are efficient in reducing AT&C losses significantly, specifically in areas where the frequency of manual meter reading and collection is low. As of January 2025, smart metering works covering 19.79 crores Smart Consumer meters and system metering works covering 52.53 lakh Distribution Transformer (DT) meters and 2.1 lakh Feeder meters have been approved. Further, Loss Reduction works worth INR 1.48 trillion have been sanctioned for 32 States/ UTs.





3.2 SPECIAL FOCUS ON POLICIES IMPACTING THE POWER DISTRIBUTION

Policy Name	Overview	Impact
Power System Development Fund (PSDF)	- The Government approved the scheme for the operationalization of the Power System Development Fund (PSDF) in January 2014. - On July 2023, the sanction of the president is conveyed for the continuation of the scheme for the operationalization of the Power System Development Fund (PSDF) for the 15th finance commission cycle from FY 2021-2022 to FY 2025-2026. - An Outlay of INR 110 billion has been approved to facilitate the execution of projects through PSDF from FY 2021-2022 to FY 2025-2026. In addition, INR 20 billion has been kept to meet contingent requirements. - The objective of the PSDF is to utilize the funds to bring improvement in the security & reliability of the Indian power system. - The funding from the PSDF will be utilized for projects which are primarily aimed at maintaining the reliable and secure operation of the grid and for the removal of congestion in the transmission corridors, which will finally lead to the overall development of the power sector in the country.	- Continuation of this project will create necessary support for integration of renewable energy such as solar, wind, hybrid system, and will help in the creation of adequate energy storage capacity. - This project will help in installation of reactive energy generators for improvement of voltage profile in the grid. - In addition, projects related to renovation and modernization of transmission and distribution systems for relieving congestion will be funded by PSDF.





3.2 SPECIAL FOCUS ON POLICIES IMPACTING THE POWER DISTRIBUTION

Policy Name	Overview	Impact
Electricity (Late Payment Surcharge and Related Matters) Rules of 2022	- The Government of India has amended the Electricity (Late Payment Surcharge and Related Matters) Rules of 2022 to ensure an adequate supply of electricity to meet the growing demand in the country. The amendments will enhance the reliability of power supply for all consumers. - The Union Minister for Power and New & Renewable Energy stated that a key amendment that has been made is related to surplus power, which is within the declared generation capacity but not requisitioned by distribution companies. The Minister said that some power generators were not offering this surplus power in the market, thus resulting in unused power capacity at the national level. - Power generators who do not offer their surplus power will now not be eligible to claim capacity or fixed charges corresponding to that surplus quantum. Additionally, the surplus power cannot be offered for sale in the power exchange at a price of more than 120 percent of the energy charge plus the applicable transmission charge.	- The Power and New & Renewable Energy Minister stated that the Electricity (Late Payment Surcharge and Related Matters) Rules were introduced to tackle cash flow challenges faced mainly by generation companies and transmission companies and to promote timely payments across the power sector. - Since their notification, there has been significant progress in recovering outstanding dues, with most distribution companies now adhering to regular payment schedules. The total unpaid bills have reduced from around INR 1.4 trillion in June 2022 to around INR 480 billion in February 2024.





3.2 SPECIAL FOCUS ON POLICIES IMPACTING THE POWER DISTRIBUTION

Policy Name	Overview	Impact
Revamped Distribution Sector Scheme: Reforms-Based and Result-Linked	- The government of India has approved the Revamped Distribution Sector Scheme (RDSS) to help DISCOMs improve their operational efficiencies and financial sustainability by providing result-linked financial assistance to DISCOMs to strengthen supply infrastructure based on meeting pre-qualifying criteria and achieving basic minimum benchmarks. The scheme has an outlay of INR 3,03,758 crore over 5 years, i.e. FY 2021-22 to FY 2025-26. The outlay includes an estimated Government Budgetary Support (GBS) of INR 97,631 Crore. The Scheme has the following components: - Part A – Financial support for Prepaid Smart Metering & System Metering and up-gradation of the Distribution Infrastructure. - Part B – Training & Capacity Building and other Enabling & Supporting Activities. Some of the salient features are as below: - Prepaid Smart Metering to be prioritized for - 500 AMRUT cities, with AT&C Losses > 15% - All Union Territories - MSMEs, Industrial, and Commercial consumers - All Government offices at the Block level and above - Other areas with high loss - Prepaid Smart metering for remaining consumers and areas is proposed to be taken up by the respective DISCOMs in a phased manner.	- Reduction of AT&C losses to pan-India levels of 12-15% by 2024-25. - Reduction of ACS-ARR gap to zero by 2024-25. - Improvement in the quality, reliability, and affordability of power supply to consumers through a financially sustainable and operationally efficient distribution sector.





3.2 SPECIAL FOCUS ON POLICIES IMPACTING THE POWER DISTRIBUTION

Policy Name	Overview	Impact
Revamped Distribution Sector Scheme: Reforms-Based and Result-Linked	- Prepaid Smart metering and system metering are proposed to be implemented through PPP on TOTEX (CAPEX+OPEX) mode. - Part A of the scheme also provides financial assistance to DISCOMs for infrastructure creation and undertaking reforms to achieve the desired results towards improvement in operational efficiency and financial sustainability. - Provision of feeder segregation for unsegregated feeders. Thereafter these feeders are to be solarized under KUSUM – leading to cheap/ free daytime power for irrigation. - The pre-qualifying criteria need to be mandatorily met with the DISCOMs before they can be evaluated based on the Result Evaluation Matrix. Thereafter, performance based on the Result Evaluation Matrix shall form the basis for the release of funds under the scheme. - For Prepaid Smart metering, a grant of INR 900, or 15% of the cost per consumer meter (whichever is lower), shall be available for “Other than Special Category” States. For “Special Category” States, the grant of INR 1350 or 22.5% of the cost per consumer (whichever is lower) shall be available. - To incentivize the States/UTs to fast-track installation of prepaid Smart Meters by December 2023, an additional incentive of 7.5% of the cost per consumer meter or INR 450 (whichever is lower) shall be available. For “Special Category” States, the additional incentive shall be 11.25% or Rs. 675 per consumer meter (whichever is lower). - For works other than smart metering, the maximum financial assistance given to DISCOMs of “Other than Special Category” States will be 60% of the approved cost, while for the DISCOMs in special category states, the maximum financial assistance will be 90% of the approved cost.	- Reduction of AT&C losses to pan-India levels of 12-15% by 2024-25. - Reduction of ACS-ARR gap to zero by 2024-25. - Improvement in the quality, reliability, and affordability of power supply to consumers through a financially sustainable and operationally efficient distribution sector.





3.2.1 FUNDS SANCTIONED AND RELEASED - RDSS

Government of India launched a reform-based result-oriented scheme of Revamped Distribution Sector Scheme (RDSS) on 30.06.2021 to bring about financial discipline in the distribution sector and to strengthen the distribution infrastructure for providing uninterrupted power supply to the consumers, with an outlay of INR 3,03,758 crores and Gross Budgetary Support (GBS) of INR 97,631 crores over a period of five years from Financial Year (FY) 2021-22 to FY 2025-26.

The scheme is applicable to all State-owned Discoms and State/UT Power Departments. Till Dec 2023, with continuous engagement with the stakeholders, action plan and DPR for 30 States/ UTs have been approved by the Government. Till December 2023, DPRs having a total outlay of INR 1,21,778 Crores have been approved for Loss Reduction (LR) works, and INR 1,30,474 Crores have been approved for smart metering works. State-wise details are given below.

Details of sanctioned funds under RDSS

States/UTs	Sanctioned metering cost (INR Crores)	Sanctioned LR cost (INR Crores)	Sanctioned total Outlay (INR Crores)	Sanctioned GBS of Metering Works (INR Crores)	Sanctioned GBS of Infrastructure (INR Crores)	Sanctioned total GBS (INR Crores)
NORTH	38,356	43,292	81,647	7,184	28,818	36,001
NORTHEAST	5,374	5,842	11,215	1,431	5,259	6,691
SOUTH	31,845	20,790	52,636	5,682	12,475	18,157
EAST	15,646	17,964	33,610	2,722	10,898	13,620
WEST	26,326	20,426	46,752	4,820	12,256	17,074
CENTRAL	12,874	13,001	25,875	2,286	7,801	10,087
UT	54	462	516	12	416	428

*LR - Loss reduction Infrastructure strengthening works

*GBS - Gross Budgetary Support

North includes HP, Uttarakhand, Punjab, Haryana, Rajasthan, UP, Delhi, Jammu & Kashmir, Ladakh

Northeast includes AP, Assam, Manipur, Meghalaya, Nagaland, Tripura, Mizoram

South Includes Andhra Pradesh, Kerala, Tamil Nadu and Puducherry

UT includes the Andaman and Nicobar Islands

East includes Bihar, Jharkhand, West Bengal, and Sikkim

West includes Gujarat, Goa, and Maharashtra

Central includes Chhattisgarh and Madhya Pradesh





3.2.1 FUNDS SANCTIONED AND RELEASED - RDSS

About 19.79 crores of pre-paid consumer smart meters are planned to be deployed across States. These States/UTs also plan to deploy around 52 Lakh Distribution Transformer (DT) smart meters and 1.88 Lakh feeder smart meters under RDSS. Details are given below:

States/UTs	Consumer Meters Sanctioned Qty (Nos.), Phase I	Consumer Meters Sanctioned Qty (Nos.), Phase II	Total Consumer Meters (Nos.) {A}	DT Meters (Nos.) {B}	Feeder Meters (Nos.) {C}	Total Meters (Nos.) – A+B+C
NORTH	22863339	32967675	55831014	2311284	69565	58211863
NORTHEAST	30,61,763	53,58,963	84,20,726	1,34,017	6,414	85,61,157
SOUTH	1,89,57,292	3,03,44,682	4,93,01,974	8,56,360	41,837	5,02,00,171
EAST	75,29,780	1,70,24,175	2,45,53,955	5,78,886	20,160	2,51,53,001
WEST	1,88,31,250	2,19,56,528	4,07,87,778	7,19,761	35,270	4,15,42,809
CENTRAL	74,16,546	1,15,25,671	1,89,42,217	6,17,147	15,131	1,95,74,495
UT	66,858	16,715	83,573	1,148	114	84,835

*LR - Loss reduction Infrastructure strengthening works

*GBS - Gross Budgetary Support

North includes HP, Uttarakhand, Punjab, Haryana, UP, Rajasthan, Delhi, Jammu & Kashmir, Ladakh

Northeast includes AP, Assam, Manipur, Meghalaya, Nagaland, Tripura, Mizoram

South Includes Andhra Pradesh, Kerala, Tamil Nadu and Puducherry

UT includes the Andaman and Nicobar Islands

East includes Bihar, Jharkhand, West Bengal, and Sikkim

West includes Gujarat, Goa, and Maharashtra

Central includes Chhattisgarh and Madhya Pradesh





3.2.1 FUNDS SANCTIONED AND RELEASED - RDSS

Out of total sanction cost under RDSS, INR 5,897.22 crores have been released since the launch of the scheme up to 06-12-2023 as per the scheme guidelines. State/UT wise, year wise details are given below:

States/UTs	DISCOM	FY 21-22 Fund Released	FY 22-23 Fund Released	FY 22-23 Fund Utilized	Total Lapsed on 31.03.2023	FY 23-24 Fund Released	Fund utilized 2023-24 till date	Cumulative Fund released
NORTH	NDMC, DHBVNL, UHBVNL, HPSEBL, JPDCL, KPDCL, Ladakh PD, PSPCL, UPCL, AVVNL, JdVVNL, JVVNL, MVVNL, DVVNL, PsVVNL, PuVVNL, KESCO	361.84	975.55	147.65	827.91	1802.49	899.36	2311.98
NORTHEAST	Arunachal PD, APDCL, MSPDCL, MePDCL, P&E Dept. Mizoram, TSECL	0	204.1	43.98	160.12	417.34	294.27	461.32
SOUTH	TANGEDCO, PED, KSEBL, TCED, APSPDCL, APCPDCL, APEPDCL	274.19	339.82	-23.75	363.57	560.25	454.49	810.69
EAST	NBPDCL, SBPDCL, JBVNL, WBSEDCL, Sikkim PD	0	524.69	4.43	520.26	747.42	350.52	751.85
WEST	GED, UGVCL, MGVL, PGVCL, DGVCL, MSEDCL, BEST	177.98	430.97	-137.89	568.86	729.53	519.53	769.62
CENTRAL	CSPDCL, MPPoKVVCL (East), MPPaKVVCL (West), MPMKVVCL (Central)	0	384.26	247.5	136.76	523.8	611.09	771.3
UT		0	0	0	20.48	0	20.48	

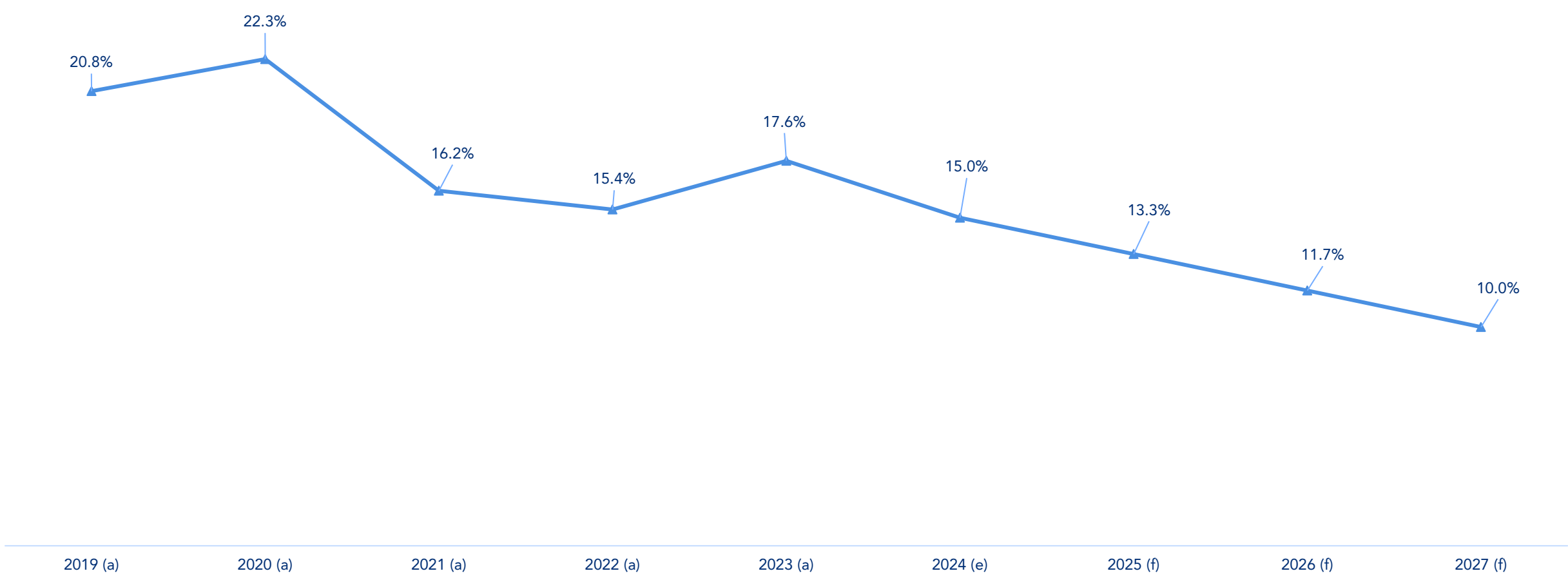
The scheme will continue up to FY 2025-26. The target of the scheme is to reduce AT&C losses to pan-India levels of 12-15% and eliminate the ACS-ARR gaps by 2024-25. This would help bring financial viability to the DISCOMs and improve the power sector as a whole. The reform measures taken under RDSS, along with the other initiatives of this Ministry, have resulted in the AT&C losses of DISCOMs coming down from 22.32% in FY 2021 to 16.44% in FY 2022. Further, the reduction in AT&C losses has resulted in a reduction in the Gap between ACS and ARR, which has declined from INR 0.69/kWh in FY2021 to INR 0.15/kWh in FY2022.





3.3 AT&C LOSS IN %

AT&C LOSS IN % , 2019-2027



Source: Mordor Intelligence



3.4 INDIA DISCOMS ANALYSIS

3.4.1 Key Parameters By Discoms, As of FY 2023

3.4.2 Key Dues of Discoms





3.4.1 KEY PARAMETERS BY DISCOMS, AS OF FY 2023

State/UT wise details of AT&C loss (in%) and ACS-ARR GAP (in INR per kWh):

States/UTs	Consumer Meters Sanctioned Qty (Nos.), Phase I	Consumer Meters Sanctioned Qty (Nos.), Phase II	Total Consumer Meters (Nos.) {A}
NORTH	NDMC, DHBVNL, UHBVNL, HPSEBL, PSPCL, AVVNL, JdVVNL, JVVNL, UPCL, MVVNL, DVVNL, PaVVNL, PuVVNL, KESCO, BRPL, BYPL, TPDDL, NPCL, Ladakh PD	281.09	9.8
NORTHEAST	Arunachal PD, APDCL, MSPDCL, MePDCL, P&E Dept. Mizoram, Nagaland PD, TSECL	205.94	4.58
SOUTH	APSPDCL, APCPDCL, APEPDCL, KSEBL, TCED, BESCOM, GESCOM, HESCOM, MESCOM, PED, TANGEDCO, TSNPDCL, TSSPDCL	175.77	4.81
EAST	NBPDCL, SBPDCL, JBVNL, Sikkim PD, WBSEDCL, TPNODL, TPSODL, TPWODL, TPCODL, CESC, IPCL	240.03	1.88
WEST	Torrent Power Ahmedabad, Torrent Power Surat, AEML, GED, MSEDC, BEST, UGVCL, MGVCL, PGVCL, DGVCL, DNHDDPDCL	91.49	2.16
CENTRAL	MPPoKVVCL (East), MPPaKVVCL (West), MPMKVVCL (Central), CSPDCL	79.02	-0.34
UT	Andaman & Nicobar PD	19.81	2.20





3.4.1 KEY PARAMETERS BY DISCOMS, AS OF FY 2023

State/UT wise Total Borrowings (INR Crores), Payables for Purchase of Power (INR Crores), and Payables for Power Purchase (Days): (As on March 31, 2023)

States/UTs	DISCOM	Total Borrowings	Payables for Purchase of Power (RS. CR)	Payables for Power Purchase (Days)
NORTH	DHBVNL, UHBVNL, HPSEBL, PSPCL, AVVNL, JdVVNL, JVVNL, UPCL, MVVNL, DVVNL, PaVVNL, PuVVNL, KESCO, BRPL, BYPL, TPDDL, NPCL	2,00,909	76,197	2,239
NORTHEAST	APDCL, MSPDCL, MePDCL, TSECL	4,215	2,673	490
SOUTH	APSPDCL, APCPDCL, APEPDCL, KSEBL, BESCOM, CHESCOM, GESCOM, HESCOM, MESCOM, TANGEDCO, TSNPDCL, TSSPDCL	2,96,184	1,05,547	1,968
EAST	NBPDCL, SBPDCL, JBVNL, WBSEDCL, TPNODL, TPSODL, TPWODL, TPCODL, CESC, IPCL	61,750	28,941	1,128
WEST	DNHDDPDCL, UGVCL, MGVLCL, PGVCL, DGVCL, MSECL, AEML, Torrent Power Ahmedabad, Torrent Power Surat	66,009	29,413	235
CENTRAL	CSPDCL, MPPoKVVCL (East), MPPaKVVCL (West), MPMKVVCL (Central)	55,313	30,227	798





3.4.2 KEY DUES OF DISCOMS

DISCOM WISE DETAILS OF CURRENT DUES

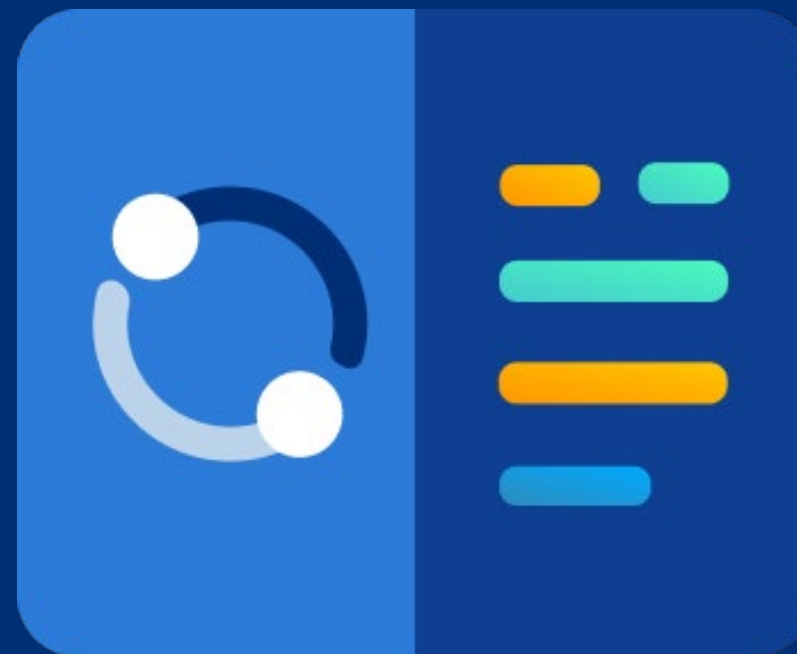
States/UTs	DISCOM	Current dues as on 24-07- 2023 (INR Crores)
NORTH	Himachal Pradesh State Electricity Board Limited, Uttarakhand Power Corporation Limited, Uttar Pradesh Power Corporation Ltd, Punjab State Power Corporation Limited, Haryana Power Purchase Centre, Ajmer Vidyut Vitran Nigam Ltd., Jaipur Vidyut Vitran Nigam Ltd., Jodhpur Vidyut Vitran Nigam Ltd., BSES Rajdhani Power Limited, BSES Yamuna Power Limited, Delhi Tata Power Distribution Limited, The New Delhi Municipal Council, Jammu And Kashmir State Power Trading Company Limited, Chandigarh Electricity Department, Chhattisgarh State Power Distribution Company Limited	8420
NORTHEAST	Arunachal Power Distribution Department, Assam Power Distribution Company Limited, Manipur State Power Distribution Company Limited, Meghalaya Power Distribution Corporation Limited, Tripura State Electricity Corporation Limited, Mizoram Power Department, Nagaland Power Department	358
SOUTH	Andhra Pradesh Central Power Distribution Company Limited, Andhra Pradesh Eastern Power Distribution Company Limited, Andhra Pradesh Power Purchase Coordination Committee, Andhra Pradesh Southern Power Distribution Company Limited, Bangalore Electricity Supply Company Ltd., Chamundeshwari Electricity Supply Corporation Limited, Gulbarga Electricity Supply Company Ltd., Hubli Electricity Supply Company Ltd., Mangalore Electricity Supply Company Ltd., Kerala State Electricity Board Limited, Puducherry Power Department, Tamil Nadu Generation & Distribution Corporation Limited, Telangana State Northern Power Distribution Company, Telangana State Southern Power Distribution Company	9598
EAST	North Bihar Power Distribution Company Ltd., South Bihar Power Distribution Company Ltd, Jharkhand Bijli Vitran Nigam Limited, Sikkim Power Department, Damodar Valley Corporation, West Bengal State Electricity Distribution Company Ltd., Grid Corporation of Odisha	2,724
WEST	Dadra and Nagar Haveli and Daman and Diu Power Distribution Corporation Limited, Goa Power Department, Gujarat Urja Vikas Nigam Limited, Best Undertaking, Maharashtra State Electricity Distribution Co. Ltd	6415
CENTRAL	Madhya Pradesh Power Management Co Ltd	1,623



4 DEEP DIVE INTO INDIA POWER EPC SEGMENT (FOCUSED ON THE POWER DISTRIBUTION SECTOR)

4.1 Power EPC Segment

4.2 Competitive Analysis





4.1 POWER EPC SEGMENT

4.1.1 Overview of Power EPC Market

4.1.2 Power EPC Market Size and Demand Forecast in USD Billion, till 2030

4.1.2.1 Power Transmission

4.1.2.2 Power Distribution

4.1.3 Key Factors Impacting the EPC Market

4.1.4 Standard Business Model Analysis – For Power Distribution EPC Company

4.1.5 Analysis of Market Entry Barriers





4.1.1 OVERVIEW OF POWER EPC MARKET

INTRODUCTION TO INDIA'S POWER EPC SEGMENT

- Engineering, procurement, and construction (EPC) play a pivotal role in shaping a project's trajectory. The breakdown of costs associated with power transmission and distribution (T&D) infrastructure, encompassing EPC, is influenced by various factors:
 - Size,
 - Complexity,
 - Number of transmission and distribution lines, & substations,
 - Location,
 - Topography of land and
 - Prevailing market conditions.
- Typically, equipment expenses constitute about 50-60% of the overall costs. Design and engineering services make up roughly 5-10% of the total expenditure. Civil construction, which encompasses labor, materials, and erection tasks, represents around 15-20% of the total costs.
- In addition to these primary expenses, other financial considerations—such as land acquisition, administrative costs, project management fees, necessary approvals and clearances, and compensations—account for another 15-20% of the overall costs.
- India's EPC segment is key to the nation's energy landscape. EPC companies ensure efficiency, quality, and timely project completion from design to commissioning. India's energy mix, spanning thermal, hydro, nuclear, & renewables, along with electrification and decarbonization goals, positions the Power EPC sector as vital to industrial and infrastructural growth. Urbanization, population growth, and industrialization drive electricity demand.

INTRODUCTION TO INDIA'S POWER EPC SEGMENT

- According to the Central Electricity Authority (CEA), power consumption in India for the fiscal year 2022-23 reached 1,440.310 TWh. The industrial sector was the largest consumer, accounting for 41.23% of the total, followed by the domestic industry at 24.52% and agriculture at 16.93%. Together, these three sectors comprised over 82% of the total consumption. In 2023, power consumption climbed to about 1,500 TWh. Projections suggest that by 2030, India's power demand could soar to between 2,060 and 2,699 TWh. When considering utility-level demand, which includes T&D losses, estimates range from 2,039 to 2,454 TWh.
- With electricity demand set to surge, driven by industrial, domestic, and agricultural needs, India's power EPC segment is on the brink of significant growth. Meeting this demand will necessitate substantial investments in power infrastructure. EPC players are poised to capitalize on opportunities in large-scale power plants, renewable projects, grid modernization, and reducing transmission losses. This is further amplified by government policies backing energy transition and capacity expansion.
- As of 2024, India stands as the world's third-largest power generation market, following China and the United States.

Source: Mordor Intelligence





4.1.1 OVERVIEW OF POWER EPC MARKET

INTRODUCTION TO INDIA'S POWER EPC SEGMENT

- The Indian electricity sector is witnessing rapid expansion. Data from the Indian Climate and Energy Dashboard shows that by 2024, India's installed capacity surpassed 461 GW, bolstered by a 12 GW addition. The generation mix was dominated by fossil fuels at 53.48%, trailed by renewables at 28.4%, hydro at 10.34%, and nuclear at 1.80%.
- The Indian government has set ambitious targets to double the installed capacity in the next decade, with a strong focus on renewable energy. By 2030, India aspires to achieve a renewable power generation capacity of 500 GW. An estimated investment of USD 225-250 billion is projected to realize this vision. These initiatives not only cater to the escalating electricity demand but also unveil a vast opportunity for the power EPC market in India.

POWER PARAMETER DEFINITIONS

- Power parameters are pivotal in shaping the design, execution, and evaluation of energy projects. Key parameters include:
 - Generation Capacity: Measured in megawatts (MW) or gigawatts (GW), this metric indicates a plant's maximum power output. By December 2024, India has installed a capacity exceeding 461 GW, prominently featuring renewables.
 - Transmission Voltages: High-voltage networks operate at levels like 220 kV, 400 kV, and 765 kV AC. Additionally, ± 800 kV HVDC (High Voltage Direct Current) systems facilitate long-distance power transmission with reduced losses.
 - Distribution Efficiency: Metrics such as Aggregate Technical and Commercial (AT&C) losses gauge power loss in the network. Through modernization and reforms, India aims to cut AT&C losses from over 20% to under 15%.
 - Renewable Integration: Indicators like the share of renewable energy and grid stability underscore India's strides towards decarbonization.
 - Grid Frequency: Keeping the grid frequency around 50 Hz is vital for stability and reliability, posing challenges in balancing supply and demand.
- These parameters assist the EPC sector in adhering to technical, operational, and environmental standards, all while increasing network performance and curbing losses.

Source: Mordor Intelligence





4.1.1 OVERVIEW OF POWER EPC MARKET

OVERVIEW OF TRANSMISSION AND DISTRIBUTION NETWORKS IN INDIA

- India boasts one of the world's largest and most intricate power transmission and distribution (T&D) networks, a testament to its swift economic ascent and industrial growth. The Indian power sector is structured in three tiers: generation, transmission, and distribution. With an installed generation capacity exceeding 450 GW in 2024, the T&D infrastructure plays a pivotal role in delivering reliable electricity to nearly 1.4 billion citizens, spanning diverse geographies and climates.
- In India, the transmission segment operates at high and ultra-high voltages, from 132 kV to 765 kV AC and ± 800 kV HVDC. The state-owned Power Grid Corporation of India Limited (PGCIL) oversees the system, managing over 90% of inter-state and inter-regional transmission. Since 2013, India's five regional grids have been synchronized into a unified national grid, allowing for a seamless electricity flow nationwide. This integration not only bolsters reliability but also aids in the incorporation of renewable energies, particularly wind and solar, which are predominantly found in regions like Rajasthan, Gujarat, and Tamil Nadu.
- India's transmission system has seen significant growth recently. As of January 31, 2024, India's power ministry reports the transmission network spans approximately 481,326 circuit kilometers (ckm) of lines and boasts a transformation capacity of 1,225,260 MVA. To further fortify this network, the government has rolled out initiatives like the Green Energy Corridor, designed to streamline renewable energy, alongside projects under the National Infrastructure Pipeline (NIP).
- Moreover, with the country's electricity generation capacities on the rise, substantial investments are being funneled into grid infrastructure. Union Minister Shripad Yesso Naik announced a planned expenditure of Rs 9.12 lakh crore to bolster the nation's power transmission infrastructure by 2032. The National Electricity Plan (Transmission) outlines the transmission strategy up to 2031-32, as highlighted by the Minister of State for Power. Such initiatives present a lucrative opportunity for India's power EPC segments.

Source: Mordor Intelligence

OVERVIEW OF TRANSMISSION AND DISTRIBUTION NETWORKS IN INDIA

- India's power sector struggles with power distribution, facing challenges like losses, outdated infrastructure, and financial strains on utilities. State electricity distribution companies (DISCOMs) primarily oversee the distribution network, which operates between 400V and 33kV voltages. Notably, India grapples with one of the world's highest aggregate technical and commercial (AT&C) losses, estimated at 20-22%. Major contributors to these losses are outdated equipment, power theft, and inadequate metering.
- To combat these issues, the government introduced the Revamped Distribution Sector Scheme (RDSS), targeting loss reduction, infrastructure modernization, and the promotion of smart metering. Spanning five years from FY 2021-22 to FY 2025-26, the RDSS boasts an outlay of INR 3,03,758 crore, with an anticipated central government grant of INR 97,631 crore. The initiative aspires to curtail AT&C losses to a national benchmark of 12-15% (though 10% by 2030 as per the Distribution Perspective Plan 2030) and eliminate the disparity between Average Cost of Supply (ACS) and Average Revenue Realized (ARR) by FY 2024-25.
- The RDSS is anchored by two main components: Part 'A' is dedicated to financial support for Prepaid Smart Metering, System Metering, and bolstering Distribution Infrastructure. In contrast, Part 'B' centers on Training, Capacity Building, and other Enabling & Supporting Activities. DISCOMs receive financial assistance for upgrading their Distribution Infrastructure and adopting Prepaid Smart Consumer Metering & System Metering, contingent on fulfilling pre-qualifying criteria and achieving essential reform milestones.
- Further, in recent years, the power distribution network has witnessed a significant investment for modernization and upgrade in the country. For instance, in August 2024, Shri Manohar Lal, the Union Minister for Power and Housing & Urban Affairs, reviewed the performance of the nation's Power Distribution Companies and Departments.





4.1.1 OVERVIEW OF POWER EPC MARKET

OVERVIEW OF TRANSMISSION AND DISTRIBUTION NETWORKS IN INDIA

- The review focused on the quality and reliability of power supply in Gurugram and Faridabad, where power demand has surged annually by 8-10%. To address this, the Ministry of Power approved INR 3,600 Crore under the Revamped Distribution Sector Scheme to modernize power distribution infrastructure. Beneficiaries include residents from Manesar and Badshahpur in Gurugram, and Old Faridabad, NIT, Ballabhgarh, and Greater Faridabad.
- The project covers 500 feeders and integrates advanced technology. Key features include 20 new Gas Insulated Substations (12 in Faridabad, 8 in Gurugram), 3,500 km of underground cabling, 5,000 new Distribution Transformers/Compact Substations, and bifurcation of 486 feeders into 821. Network automation enhances fault detection and power restoration. These upgrades improve power supply quality, ensure safety, and enhance aesthetics, mainly in densely populated areas.
- Further, in September 2023, Assam's government greenlit a substantial project worth INR 51.97 billion (USD 624.4 million) aimed at overhauling the state's power distribution system. Funded through the revamped distribution sector program (RDSS), the initiative targets an upgraded distribution system by March 31, 2026, promising benefits to approximately 6.7 million electricity consumers statewide. Additionally, the program includes acquiring 100 MW of renewable energy via a power purchase agreement, with tariffs set by the Solar Energy Corporation of India (SECI). Besides, the Assam Cabinet sanctioned the procurement of wind-solar hybrid power, aligning with the Inter-State Transmission System Tranche-VI Scheme. This strategic move aims to guarantee a stable power supply, especially during peak demand times.

Source: Mordor Intelligence

ROLE OF THE POWER SECTOR IN INDIA

- India's power sector is a linchpin for the nation's economic and industrial advancement. As a major player in one of the world's largest and swiftly expanding energy markets, India significantly influences the global energy narrative. The sector not only powers households and industries but also fuels urbanization, & digitalization and enhances the quality of life for millions.

DRIVING ECONOMIC ACTIVITIES

- With an installed capacity exceeding 450 GW in 2024, India's power sector is pivotal in energizing key industries, from manufacturing and IT to agriculture and services. This energy backbone has bolstered GDP growth and underpins ambitious infrastructure projects, including industrial corridors and Smart Cities. Moreover, the sector is a significant employment generator, creating millions of jobs directly and indirectly.
- In a notable move, the Asian Development Bank (ADB) approved a USD 148.5 million loan in May 2024. This funding aims to modernize Sikkim's power distribution, enhancing the power supply's reliability and resilience. Beyond energy improvements, the initiative targets uplifting over 1,100 women through renewable energy installations and vocational training. Besides, the project plans to equip 24 primary healthcare sub-centers with solar energy systems and energy-efficient tools, bolstering rural healthcare, especially for winter inpatient treatments.

LEADING THE RENEWABLE ENERGY CHARGE

- India's power sector is at the forefront of the nation's ambitious goal to achieve 500 GW of non-fossil fuel capacity by 2030. By prioritizing solar, wind, and hydropower, the sector is reducing its fossil fuel dependence and aligning with India's Paris Agreement commitments. Initiatives like the International Solar Alliance (ISA) highlight India's leadership in the global renewable arena.





4.1.1 OVERVIEW OF POWER EPC MARKET

- Moreover, grid modernization and energy storage advancements are pivotal for the smooth integration of these sustainable sources, highlighting the sector's role in steering India towards a cleaner energy future.

BRIDGING THE URBAN-RURAL DIVIDE

- Rural electrification is a monumental achievement of India's power sector. Initiatives like the Saubhagya Scheme have illuminated millions of rural homes, unlocking access to education, healthcare, and economic opportunities. While challenges persist, electrifying remote areas has notably narrowed the urban-rural gap. This progress is reflected in India's Human Development Index (HDI) score of 0.644 in 2022, ranking 134 out of 193 countries in the UN's 2023-24 report, categorizing India under medium human development.

EMBRACING TECHNOLOGICAL INNOVATIONS

- India's power sector is undergoing a technological renaissance. Deploying smart grids, advanced metering infrastructure, and energy storage systems enhances efficiency and reliability. Smart grids facilitate renewable energy integration and minimize transmission losses. Technologies like lithium-ion batteries play a crucial role in addressing renewable energy intermittencies. Furthermore, integrating artificial intelligence (AI) and data analytics transforms demand forecasting, grid management, and fault detection.

CHALLENGES IN INDIA'S POWER EPC SEGMENT

- Despite its vital role, the Indian Power EPC sector faces numerous challenges, including:
 - **Land Acquisition and Environmental Clearances:** Delays in securing land and meeting regulatory requirements often prolong project timelines.
 - **Financial Constraints:** State-run DISCOMs, burdened by debt and operational inefficiencies, struggle to pay EPC contractors on time, affecting liquidity in the sector.

- **Regulatory Hurdles:** Compliance with multiple layers of government policies can complicate project execution, particularly for renewable energy projects.
- **Technological Adaptation:** The transition to advanced technologies like smart grids and battery storage systems requires significant investment in expertise and infrastructure.
- **Skilled Workforce:** The sector faces a shortage of skilled professionals capable of handling complex, large-scale projects.

OPPORTUNITIES IN INDIA'S POWER EPC SECTOR

- Despite these challenges, the Power EPC sector is poised for significant growth, driven by favorable government policies, technological advancements, and international collaboration. Key opportunities include:
 - **Renewable Energy Integration:** The push for solar, wind, and hybrid renewable projects offers substantial opportunities for EPC players specializing in green energy solutions.
 - **Infrastructure Modernization:** Upgrading aging transmission and distribution networks presents a lucrative market for EPC contractors.
 - **Smart Grid Development:** Adopting digital technologies, such as IoT, AI, and blockchain, for grid management creates demand for specialized EPC solutions.
 - **Global Partnerships:** Collaborations with international firms facilitate the transfer of advanced technologies and best practices into India.
 - **Decentralized Power Systems:** Microgrids and off-grid solutions for rural and remote areas represent an emerging market segment.
 - **Growing FDI Inflow:** Rising FDI in India's power sector brings capital, advanced technologies, and expertise, enabling EPC players to expand in renewable energy, smart grids, and infrastructure upgrades.

Source: Mordor Intelligence





4.1.2 POWER EPC MARKET SIZE AND DEMAND FORECAST IN USD BILLION, TILL 2030

4.1.2.1 Power Transmission

4.1.2.2 Power Distribution

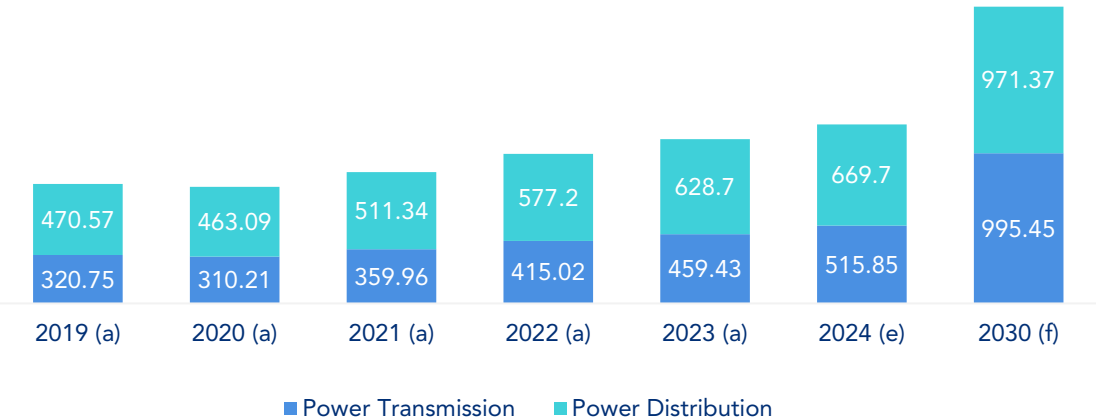




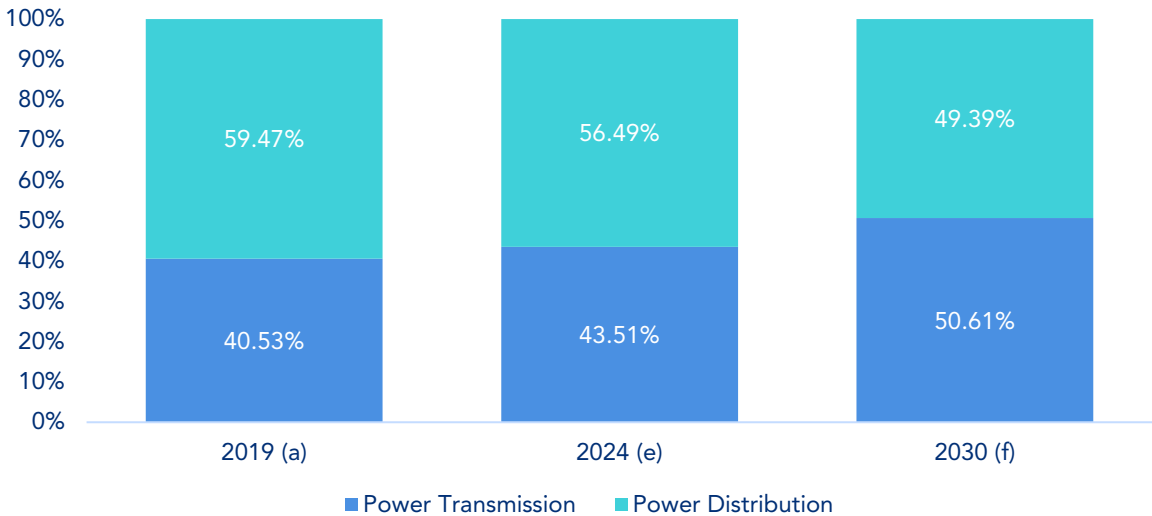
4.1.2 POWER EPC MARKET SIZE AND DEMAND FORECAST IN INR BILLION, TILL 2030

POWER EPC MARKET SIZE AND FORECAST IN INR BILLION, BY SECTOR, INDIA, 2019 - 2030

CAGR (2024 TO 2030): 8.80%



POWER EPC MARKET, SHARE (%), BY SECTOR, INDIA, 2019-2030



	2019 (a)	2020 (a)	2021 (a)	2022 (a)	2023 (a)	2024 (e)	2030 (f)	CAGR (2024-2030)
Power Transmission	320.75	310.21	359.96	415.02	459.43	515.85	995.45	11.58%
Power Distribution	470.57	463.09	511.34	577.20	628.70	669.70	971.37	6.39%
Total	791.32	773.30	871.30	992.22	1,088.13	1,185.56	1,966.82	8.80%

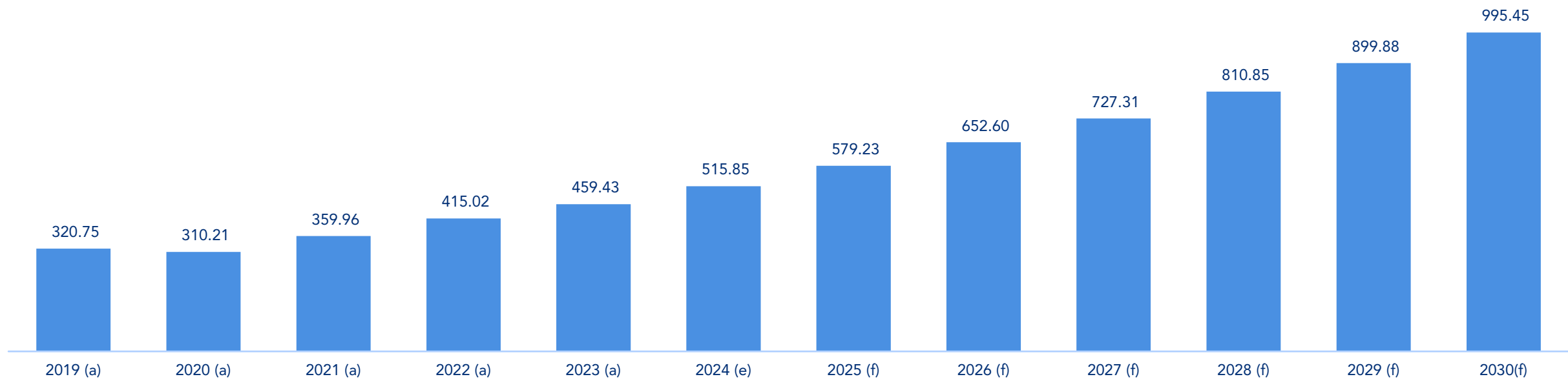
Source: Mordor Intelligence



4.1.2.1 POWER TRANSMISSION

POWER EPC MARKET SIZE AND DEMAND FORECAST IN INR BILLION, POWER TRANSMISSION, INDIA, 2019 - 2030

CAGR (2024 TO 2030): 11.58%



- Union Minister announced a planned expenditure of INR 9.12 lakh crore in November 2024, aimed at bolstering the country's power transmission infrastructure capacity by 2032.
- The National Electricity Plan (Transmission), as outlined by the Minister of State for Power, extends to 2031-32. The Plan envisions adding 1,91,474 circuit kilometers (ckm) of transmission lines and a transformation capacity of 1274 Giga Volt Ampere at voltage levels of 220 kV and above from 2022-23 to 2031-32. Additionally, the Minister highlighted the inclusion of 33.25 GW of High Voltage Direct Current (HVDC) bi-pole links.
- Inter-regional transmission capacity will rise from 119 GW to 143 GW by 2026-27 and to 168 GW by 2031-32. The Plan emphasizes new transmission technologies, cross-border interconnections, and private-sector involvement. These initiatives will unlock vast opportunities for the power EPC market.

Source: Mordor Intelligence

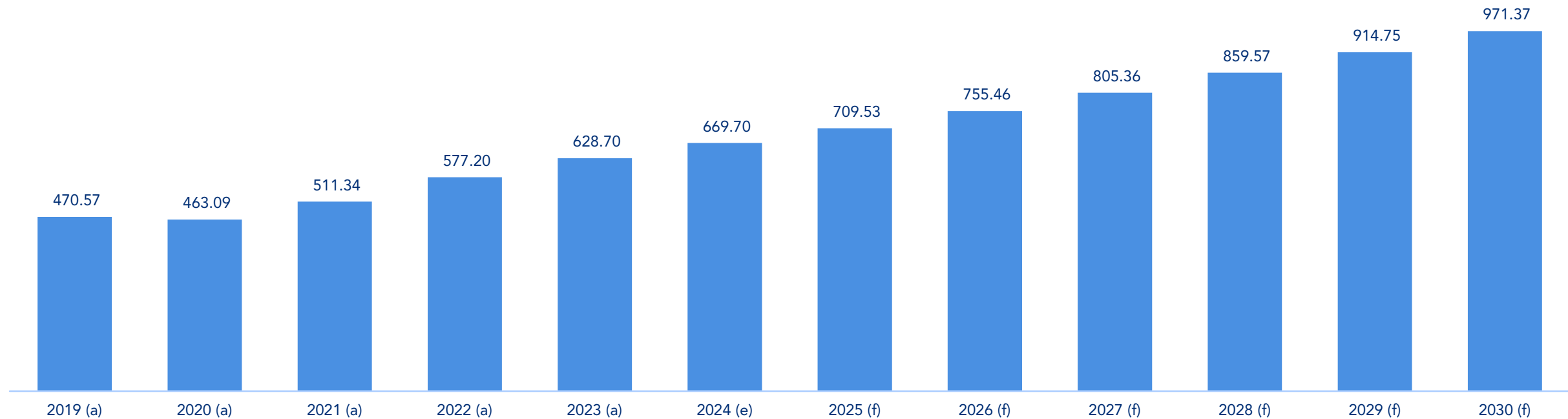




4.1.2.2 POWER DISTRIBUTION

POWER EPC MARKET SIZE AND DEMAND FORECAST IN USD BILLION, POWER DISTRIBUTION, INDIA, 2019 - 2030

CAGR (2024 TO 2030): 6.39%



- In 2021, the government unveiled an INR 3,050 billion initiative spanning five years, targeting power distribution reforms. This ambitious program seeks to curtail losses and bolster the efficiency of distribution companies (discoms). Key components of the scheme encompass upgrading supply systems, implementing prepaid meters, and delineating supply lines for both subsidized and non-subsidized customers. Such measures are set to invigorate the power EPC market, underscoring the pivotal role of T&D investments in bolstering energy access, ensuring grid stability, and enhancing overall efficiency.

Source: Mordor Intelligence





4.1.3 KEY FACTORS IMPACTING THE POWER EPC MARKET

INVESTMENTS IN TRANSMISSION AND DISTRIBUTION (T&D) INFRASTRUCTURE

- The Indian power sector is characterized by its extensive yet evolving transmission and distribution (T&D) networks. Several government initiatives have prioritized the expansion and modernization of T&D infrastructure:
 - Green Energy Corridor: Aiming to integrate renewable energy into the national grid, this initiative necessitated the development of high-capacity transmission lines and substations directly involving EPC contractors.
 - Smart Grids: The adoption of smart grid technologies, including advanced metering infrastructure (AMI), grid automation, and digital substations, has driven demand for EPC firms specializing in advanced energy systems.
 - Reducing T&D Losses: India's T&D losses, though declining, remain above the global average. To reduce these losses below 15%, the government has driven investments in grid optimization projects, benefiting EPC companies.
- Moreover, state-specific initiatives and DISCOM privatization are further expanding the scope of T&D projects, providing consistent opportunities for EPC players.

RIISING ELECTRICITY DEMAND AND CAPACITY EXPANSION

- India's electricity demand is projected to grow significantly, from 1,440 TWh in 2022-23 to 2,060–2,699 TWh by 2030. This growth is driven by industrial expansion, urbanization, rural electrification, and the rising penetration of electric vehicles (EVs). Large-scale capacity additions across generation, transmission, and distribution segments are essential to meet this demand. Key drivers include:
 - Industrial Demand: Accounting for over 41% of total electricity consumption, industries increasingly invest in captive power plants and renewable energy integration, creating demand for EPC expertise.
 - Rural Electrification: Programs like Saubhagya (Pradhan Mantri Sahaj Bijli Har Ghar Yojana) have achieved near-universal electrification, but infrastructure strengthening and last-mile connectivity continue to drive EPC projects.
 - Urban Energy Needs: Rapid urbanization has spurred demand for underground cabling, smart grids, and distributed generation systems, expanding opportunities for EPC contractors.
- The increasing reliance on renewable and hybrid energy systems also creates new project pipelines for EPC companies nationwide.

GOVERNMENT POLICIES AND SCHEMES

- The Indian government has introduced numerous policies and schemes to support the power sector, significantly influencing the EPC market. Key initiatives include:
 - Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY): Aimed at rural electrification and feeder separation, this initiative aided EPC contractors in creating a distribution network. Yet, the program concluded on March 31, 2022.
 - Integrated Power Development Scheme (IPDS): This initiative facilitated upgrades to urban distribution networks, encompassing substation construction, underground cabling, and smart metering, with direct involvement from EPC firms. Nonetheless, IPDS wrapped up in March 2023.

Source: Mordor Intelligence





4.1.3 KEY FACTORS IMPACTING THE POWER EPC MARKET

GOVERNMENT POLICIES AND SCHEMES

- Revamped Distribution Sector Scheme (RDSS): With a budget of INR 3.03 lakh crore, RDSS aims to improve DISCOM operational efficiency and reduce losses, driving significant EPC activity.
- Extension of Pradhan Mantri Urja Suraksha evam Utthaan Mahabhiyaan (PM-KUSSUM): In a bid to amplify solar power installations in rural regions, the government has prolonged the Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) scheme until March 2026.
- Moreover, the government's commitment to achieving 500 GW of renewable energy capacity by 2030 has led to large-scale solar, wind, and hybrid energy projects, further expanding the EPC market.

RENEWABLE ENERGY EXPANSION

- India's renewable energy sector is one of the fastest-growing in the world, with an ambitious target to achieve 50% of its total energy capacity from non-fossil fuel sources by 2030. This shift presents substantial opportunities for EPC companies specializing in renewable energy. Key areas of growth include:
 - Utility-Scale Solar and Wind Projects: Large-scale solar parks and wind farms dominate renewable energy installations, requiring extensive EPC services for design, procurement, and construction. Notably, as of November 2024, Adani Green Energy is investing USD 35 billion over five years in large-scale solar, wind, and hybrid power plants across India. This will not only contribute to India's renewable energy capacity and support the country's growing energy demands but also attract various EPC players.
 - Rooftop Solar and Decentralized Energy Systems: The proliferation of rooftop solar projects, driven by the Smart Cities Mission and net metering policies, has created opportunities for smaller EPC contractors.

- Hybrid and Energy Storage Projects: Hybrid energy systems combining solar, wind, and battery energy storage are gaining traction, offering new avenues for EPC companies to diversify their portfolios.
- Programs like the PM-KUSUM scheme, which focuses on solar irrigation pumps and off-grid systems, further drive renewable EPC projects, mainly in rural areas.

INFRASTRUCTURE FINANCING AND PRIVATE SECTOR PARTICIPATION

- The availability of financing plays a critical role in driving EPC market growth. The Indian government has implemented innovative mechanisms to attract investments in the power sector, including:
 - Infrastructure Investment Trusts (InvITs): Designed to monetize operational assets, InvITs are providing additional funding for new infrastructure projects.
 - Public-Private Partnerships (PPPs): PPPs have become preferred for developing T&D and renewable energy projects, with EPC firms as key stakeholders.
 - International Financing: Organizations like the Asian Development Bank (ADB), World Bank, and Green Climate Fund (GCF) are aiding renewable energy and grid modernization projects in India, creating opportunities for EPC companies.
- The rise of green bonds and climate-focused investments further boost EPC players' project pipelines.

Source: Mordor Intelligence





4.1.3 KEY FACTORS IMPACTING THE POWER EPC MARKET

ENVIRONMENTAL SUSTAINABILITY AND DECARBONIZATION GOALS

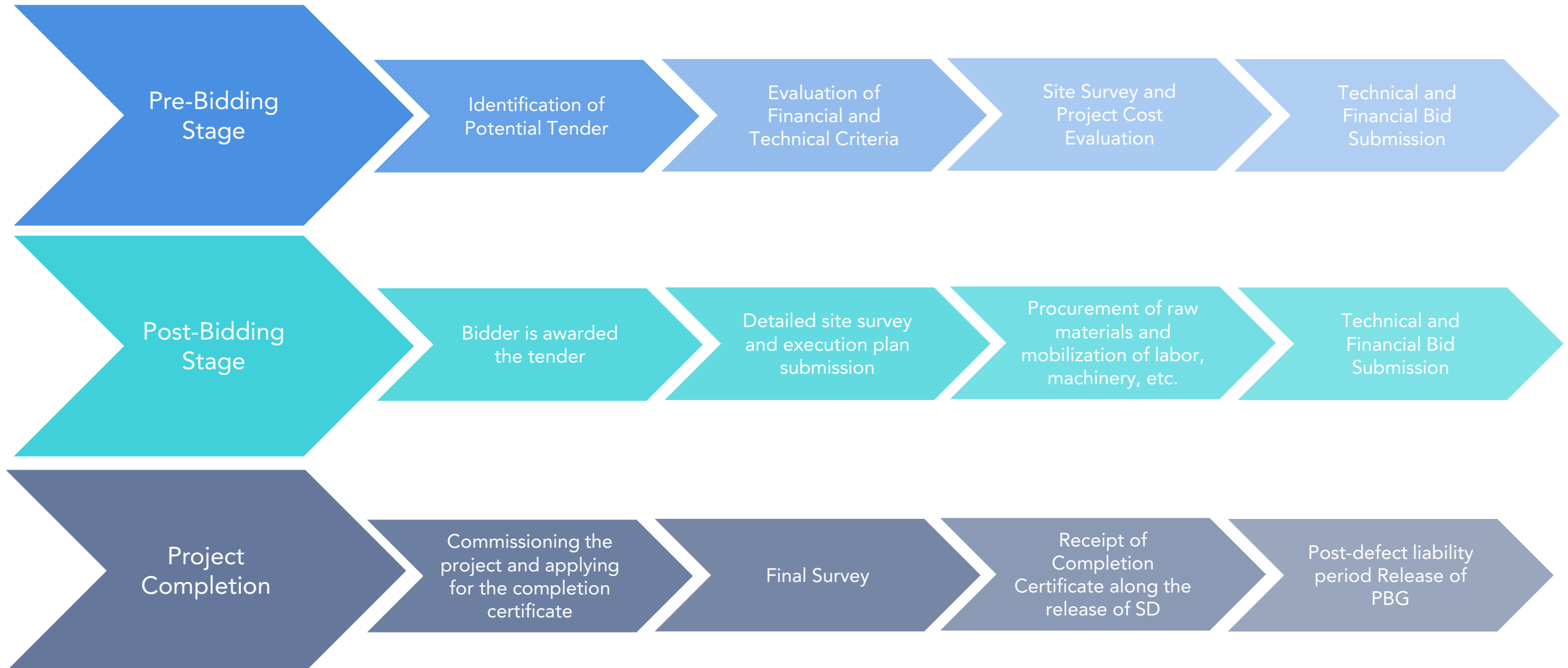
- India is transforming its power sector to meet Paris Agreement goals of reducing emissions and adopting a low-carbon economy. Key focus areas include:
 - **Carbon Capture and Storage (CCS):** Specialized EPC contractors are gaining opportunities through emerging CCS projects. A carbon capture project is underway at NTPC's 500 MW coal-fired power plant (Unit-13) in Vindhyachal Super Thermal Power Station, Madhya Pradesh, India. As of 2024, India plans to launch a national CCUS mission to decarbonize thermal power and cement sectors. Expected in February's budget, the mission aims to halve emissions by 2050 and achieve net zero by 2070, offering incentives for CCUS technology, benefiting power EPC players.
 - **Green Hydrogen:** India's focus on green hydrogen drives EPC projects in hydrogen production and storage. The National Hydrogen Mission aims to meet climate goals and position India as a green hydrogen and ammonia production leader. The mission targets reducing green hydrogen costs to USD 1.5 per kg and achieving five million tonnes annual capacity by 2030, boosting the EPC market.





4.1.4 STANDARD BUSINESS MODEL ANALYSIS – FOR POWER DISTRIBUTION EPC COMPANY

BUSINESS MODEL ANALYSIS FOR A POWER DISTRIBUTION EPC COMPANY



Source: Mordor Intelligence





4.1.4 STANDARD BUSINESS MODEL ANALYSIS – FOR POWER DISTRIBUTION EPC COMPANY

Business Model Aspects in the Power Distribution EPC Market:

- **Pre-bidding Stage:** The pre-bid stage is pivotal in determining the outcome of the projects before any on-site work commences. Businesses work hard to produce precise, compelling, and competitive offers during this phase.
- In other words, the pre-bidding stage entails a comprehensive evaluation of the project, assessing its feasibility, and formulating a robust proposal for submission. This process demands meticulous planning, precise cost estimations, and alignment of the project blueprint with the client's expectations.
- **Facilitating Strategic Decision-Making:** The pre-bidding phase is where critical decisions regarding project feasibility and execution are made. Without comprehensive analysis, companies risk committing to projects that could exceed budgets, timelines, or technical capabilities.
- **Mitigating Risks:** Every industrial project has risks, ranging from unexpected technical difficulties to volatile material costs. Through detailed analyses and accurate forecasts, pre-bid engineering plays a vital role in alleviating these uncertainties. This encompasses scrutinizing process layouts, system designs, and environmental considerations that might influence project execution.
- **Enhancing Bid Competitiveness:** A meticulously researched bid not only showcases expertise but also signals thorough planning and dependability. With pre-bid engineering, bids can incorporate precise designs, competitive cost assessments, and solid risk management strategies — elements that resonate with clients and set one apart from the competition.

Key Stages in the Power Distribution EPC Market:

- **Maximizing Efficiency and Cost-Effectiveness:** Pre-bidding minimizes waste and guarantees the best possible distribution of labor, materials, and time through thorough cost analysis and resource planning. The danger of cost overruns during project execution is reduced by accurate budgeting.
- **Ensuring Compliance:** In the power sector, aligning with industry codes and regulatory benchmarks is imperative. Pre-bid engineering ensures that project proposals resonate with these standards, paving the way for smoother approvals during the execution phase

Project Lifecycle Stages:

- **Final Engineering and Design**
 - **Pre-FEED (Pre-Front-End Engineering Design):** Conduct feasibility studies to assess project viability and identify potential risks early. Develop initial layouts, concepts, and cost estimations to provide a framework for decision-making.
 - **FEED (Front-End Engineering Design):** Ensure refined designs align with technical and commercial requirements. Deliver accurate cost breakdowns and risk mitigation strategies to facilitate subsequent steps.
- **Procurement and Logistics:** Ensured timely delivery and efficient logistics management while procuring all necessary materials and equipment.
- **Construction and Installation:** Adhered to all safety standards and quality control measures during the construction and installation of the power distribution system.
- **Testing and Commissioning:** Conducted thorough tests on the installed equipment and systems to ensure they meet performance specifications and are ready for operation.
- **Handover:** Formally handed over the completed and tested power distribution system to the owner, providing all necessary documentation and training materials.
- **Project Close-Out:** Concluded the project by finalizing all outstanding tasks and ensuring all financial and contractual obligations were met.

Source: Mordor Intelligence





4.1.4 STANDARD BUSINESS MODEL ANALYSIS – FOR POWER DISTRIBUTION EPC COMPANY

- Project Completion is crucial to
 - **Ensuring Operational Readiness:** Completing the project ensures the power distribution system is ready to meet the owner's needs.
 - **Meeting Contractual Obligations:** Timely and budget-compliant project completion is vital for fulfilling contractual obligations and steering clear of penalties.
 - **Building a Strong Reputation:** Successfully wrapped-up projects bolster the EPC contractor's reputation, paving the way for future business.
 - **Meeting Energy Demand:** Finalizing the power distribution system aids in addressing the surging energy demand and enhances the power grid's reliability.
- In the power market, local authorities issue a Completion Certificate (CC) to confirm that a power project adheres to approved plans and standards, making it ready for utility connections.
- A Completion Certificate (CC) serves as a legal affirmation of a project's completion and its adherence to building regulations.
 - ❑ **Utility Connections:** The CC is essential for securing connections to vital utilities such as water, electricity, and drainage.
 - ❑ **Legal Compliance:** It ensures the project aligns with approved plans and meets all required standards.

- ❑ **Possession:** Without a CC, developers are barred from transferring property possession to buyers.
- Once construction concludes, the project's developer or owner must seek the CC from local authorities, like the Municipal Corporation or local development authority. After a thorough inspection, the local authority will grant the CC if all criteria are satisfied.





4.1.5 ANALYSIS OF MARKET ENTRY BARRIERS

ANALYSIS OF POWER EPC MARKET ENTRY BARRIERS IN INDIA

- India's power EPC (Engineering, Procurement, and Construction) market is characterized by rapid growth due to increasing energy demand, government-led initiatives, and private sector participation. However, the market is also highly competitive and capital-intensive, presenting significant barriers for new entrants. These entry barriers stem from high investment requirements, operational complexities, regulatory challenges, and the dominance of well-established players. Some of the key market barriers includes:

Capital Intensity and Financial Challenges

Entering the power EPC market requires substantial financial resources, as projects typically involve large-scale investments. Key financial barriers include:

- Upfront Capital Investments: EPC companies need to invest in specialized equipment, advanced machinery, and state-of-the-art construction technologies. These include tools for high-voltage transmission line installations, transformers, and renewable energy integration.
- Working Capital Needs: Power EPC projects often span years, requiring firms to finance procurement, labor, and operational expenses for prolonged periods. Payment schedules, tied to project milestones, delay cash inflows, further straining liquidity.
- High Cost of Entry: Small and medium-sized enterprises (SMEs) face significant challenges in securing competitive financing due to limited credit history or lack of collateral.

New entrants must have robust financial backing or access to alternative funding sources, like joint ventures or private equity investments, to overcome such barriers.

Dominance of Established Players and Intense Competition

The Indian power EPC market is dominated by key players whose extensive experience and resources create substantial challenges for new entrants:

- Economies of Scale: Established firms benefit from bulk procurement, enabling them to lower costs and maintain competitive pricing.
- Client Relationships: Long-standing relationships with utilities, private developers, and government agencies provide incumbents with a steady pipeline of projects.
- Brand Reputation: Established players are trusted for their track record of delivering projects on time and within budget, a critical factor in the highly risk-averse EPC market.

For new entrants, differentiating their offerings through innovation, cost efficiency, or specialization is essential to compete effectively.





4.1.5 ANALYSIS OF MARKET ENTRY BARRIERS

ANALYSIS OF POWER EPC MARKET ENTRY BARRIERS IN INDIA

Regulatory and Policy Hurdles

India's power sector is governed by a complex web of regulations, policies, and bureaucratic processes. These regulatory barriers include:

- Multiple Clearances: Projects require approvals across various levels, including environmental impact assessments, land acquisition permissions, and construction permits. These processes can lead to delays and increased costs.
- Dynamic Policies: Frequent changes in energy policies, such as tariff revisions, renewable energy mandates, and grid standards, create uncertainty and complicate project planning.
- Labor and Safety Compliance: Adhering to stringent labor laws, safety standards, and environmental guidelines adds to operational complexity, disproportionately affecting smaller players.

Navigating these challenges demands expertise, dedicated teams for compliance, and significant investment in legal and administrative resources.

Skilled Workforce and Technical Expertise

The power EPC industry relies heavily on a skilled and experienced workforce capable of handling complex engineering and construction tasks. Barriers in this domain include:

- Technical Know-How: The integration of renewable energy, advanced grid technologies, and battery energy storage systems (BESS) requires specialized knowledge, which new entrants may lack.
- Recruitment Challenges: Hiring and retaining talent in fields such as power systems engineering, project management, and procurement can be difficult, given the demand for skilled professionals.
- Training Costs: Upskilling employees to meet the latest industry standards in technology and safety is resource-intensive.

Established companies often invest heavily in training and R&D, leaving new entrants at a competitive disadvantage.

Complex Supply Chain Management

The power EPC market requires efficient supply chain management to ensure the timely procurement and delivery of critical components. Barriers in this area include:

- Vendor Relationships: Established players often have long-term relationships with suppliers, enabling them to secure better pricing and prioritize delivery.
- Dependency on Imports: Many advanced components, such as inverters, turbines, and specialized conductors, are imported. New entrants face challenges in managing import-related risks, such as currency fluctuations and logistical delays.
- Logistical Challenges: Transporting heavy equipment to remote or rural project sites requires expertise in logistics and coordination, which may be difficult for smaller or new firms to achieve.

New entrants must develop robust vendor networks and optimize logistics to remain competitive in the market.





4.1.5 ANALYSIS OF MARKET ENTRY BARRIERS

ANALYSIS OF POWER EPC MARKET ENTRY BARRIERS IN INDIA

Market Saturation and Project Pipeline Accessibility

India's power EPC market is competitive, with a limited number of large-scale projects available. Challenges in securing contracts include:

- Pre-Qualification Criteria: Many tenders, especially government projects, have stringent pre-qualification requirements, including prior experience in similar-scale projects, financial stability, and technical capabilities.
- Project Bundling: Government tenders often bundle multiple projects, favoring large firms with the capacity to execute multiple projects simultaneously.
- Renewable Energy Focus: The shift towards renewable energy projects, such as solar and wind farms, requires expertise in renewable technologies and grid integration, which many new entrants may lack.

Payment Delays and Project Risks

The nature of EPC contracts exposes firms to financial risks due to delayed payments and project overruns. Specific challenges include:

- Lengthy Payment Cycles: Payments are tied to project milestones, and delays in approvals or execution can disrupt cash flows.
- Risk of Cost Overruns: Unforeseen issues, such as site conditions or supply chain disruptions, often lead to cost and time overruns.
- Dependency on Government Clients: A significant share of EPC projects is funded by government agencies, which are often slow in disbursing payments.

Efficient financial planning and risk management strategies are acute for navigating these challenges.

High Technology Adoption Barriers

The Indian power sector is rapidly adopting advanced technologies such as smart grids, AI-driven energy management systems, and energy-efficient solutions. Barriers in technology adoption include:

- Cost of Innovation: Investing in research and development to integrate advanced technologies requires significant capital.
- Adaptation Challenges: New entrants may struggle to incorporate new technologies into their operations due to a lack of expertise or financial resources.
- Customer Resistance: Clients may be hesitant to adopt unproven technologies, preferring experienced players with established solutions.

Collaborating with technology providers or focusing on niche technological solutions can help new players overcome these challenges.





4.1.5 ANALYSIS OF MARKET ENTRY BARRIERS

ANALYSIS OF POWER EPC MARKET ENTRY BARRIERS IN INDIA

Land Acquisition and Local Challenges

For large-scale power projects, especially in renewable energy, acquiring suitable land is a significant challenge. Barriers include:

- Land Availability: Identifying and securing land for solar or wind farms, often in remote areas, is difficult due to land ownership disputes and high costs.
- Local Resistance: Opposition from local communities or environmental activists can delay projects and increase costs.

Addressing these barriers requires strong local partnerships and adherence to environmental and social governance (ESG) principles.

- The Indian power EPC market offers immense growth potential, but the barriers to entry are formidable. From high capital requirements and regulatory complexities to intense competition and technical challenges, new entrants must navigate a complex landscape to establish themselves. Success in this market requires robust financial backing, technological innovation, strategic partnerships, and a deep understanding of regulatory frameworks. By leveraging niche opportunities, adopting advanced technologies, and building strong client relationships, new players can position themselves for long-term success in this dynamic and competitive market.

Source: Mordor Intelligence





4.1.6 MARKET DYNAMICS

4.1.6.1 Growth Drivers

4.1.6.2 Threats and Challenges



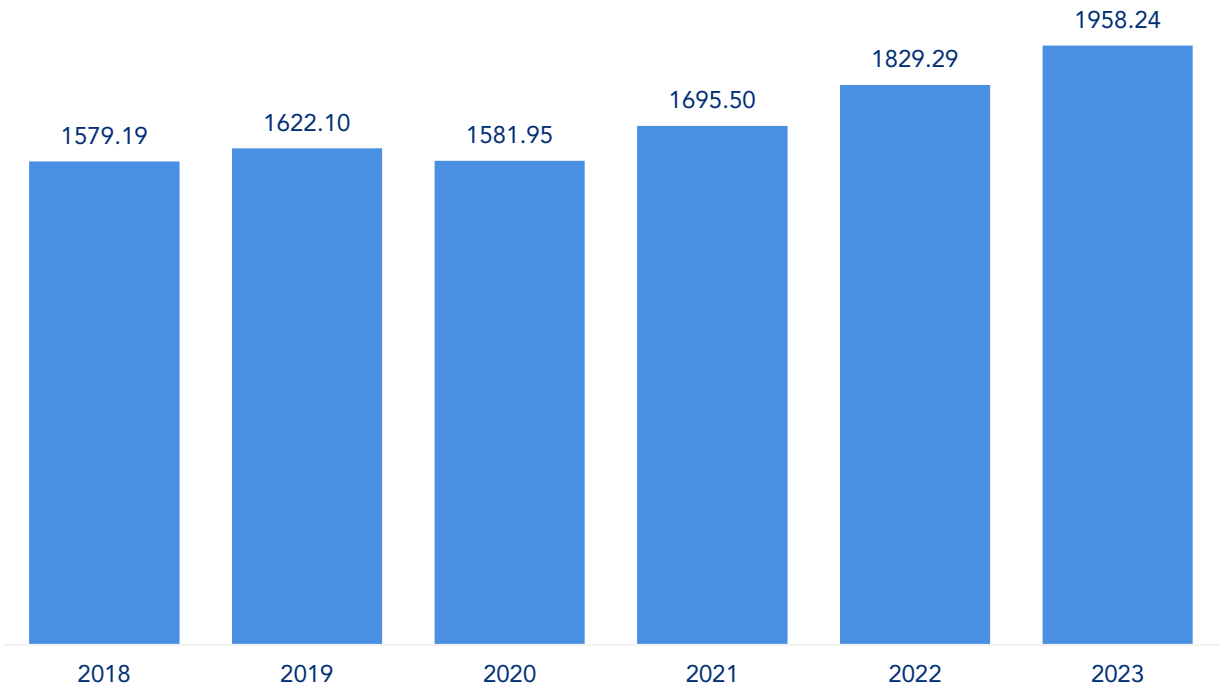


4.1.6.1 GROWTH DRIVERS

- The power EPC market in India has witnessed significant growth in recent years, and one of the key driving forces behind this growth is the rising electricity demand and electricity generation.
- Several factors, including economic growth, urbanization, industrialization, and government policies, influence India's rising electricity demand and generation. According to the Ministry of Finance, India is on track to become the third-largest economy with a GDP of USD 5 trillion by 2028. India's growing economy requires an increased power supply to support expanding and setting up new industries, businesses, manufacturing hubs, and services.
- In India, increasing population growth, which aligns with higher disposable incomes, has led to greater electricity consumption in city households. Rapid urbanization is also increasing the demand for electricity in residential and commercial areas. Expanding infrastructure, such as housing, transportation, and communication networks, requires substantial power demand. These all contribute to one of the prime factors driving the power EPC market in India: the rising power demand and electricity generation. This surge in electricity demand has created a compelling market for distribution grids, which play a pivotal role in facilitating the safe and efficient transmission of electrical energy from power plants to end-users.

ELECTRICITY GENERATION

IN TWH, INDIA, 2019-2023



Source: Energy Institute Statistical Review of World Energy 2024





4.1.6.1 GROWTH DRIVERS

RISING ELECTRICITY DEMAND

- According to the Energy Institute's Statistical Review of World Energy 2024, the electricity generation in India rose from 1829.29 Terawatt hours in 2022 to 1958.24 Terawatt hours in 2023, reaching the highest-ever consumption and registering a growth of around 7% annually. This annual growth rate signifies the increasing electricity demand in India.
- In May 2024, according to India's union power ministry, the country's power demand scaled a new record as it hit 246 GW, surpassing the previous high of 243 GW recorded in September 2023, as much of northern India again grappled with heatwave conditions during the Summer months of 2024. According to the weather department, the national capital recorded a maximum temperature on Thursday at 45.6 degrees Celsius, 5.2 notches above normal. The growing demand followed the increasing use of cooling appliances amid the rising temperatures in households, commercial centers, and office buildings.
- In May 2024, India's power consumption surged by almost 15%, reaching 156.31 billion units (BU), compared to last year. This spike was largely driven by an intense heatwave, prompting widespread use of cooling devices such as air conditioners and desert coolers. Government data revealed that power consumption in May 2023 was 136.50 BU.
- Additionally, industrial growth and the expansion of manufacturing sectors have strained India's electrical infrastructure, necessitating the modernization and expansion of distribution systems, subsequently boosting the power EPC sector. Furthermore, the government's "Make in India" initiative promotes industrial growth and amplifies the nation's electricity needs.
- India is eager to broaden its manufacturing horizons. The nation aims to diversify into new production lines, enhance the industrial capabilities of traditional sectors like automobiles, and cultivate a domestic supply chain ecosystem that can compete on a global scale. With an eye on the future, various national flagship schemes, including the Production-Linked Incentives (PLI) program that spans 14 sectors and state-specific industrial policies, are pushing to elevate manufacturing's contribution to the GDP to 25 percent by 2025.
- Moreover, initiatives like Saubhagya (Pradhan Mantri Sahaj Bijli Har Ghar Yojana) are electrifying rural areas across India. By ensuring electricity access for every household, these initiatives bolster the overall demand and growth of the power EPC, especially the distribution sector market.
- All the above points indicate a rising demand for power and expansion of power distribution sector in India during the forecast period.





4.1.6.1 GROWTH DRIVERS

DISTRIBUTION GRID UPGRADATION AND INVESTMENT

- India is modernizing its electricity distribution grid to meet rising demand and better integrate renewable energy. As of December 31, 2024, the national electric grid's installed capacity hit 462 GW, with a significant contribution from renewable sources, including large hydroelectric plants.
- Historically, India struggled with an aging electricity distribution grid. However, investments are bolstered by government support and a nationwide push for 100% electrification. This investment surge, particularly in grid upgrades, drives the power demand for EPC projects.
- With India's power demand projected to hit 708 GW by 2047, the nation must develop up to 2,100 GW capacity. Achieving this ambitious goal hinges on a robust grid infrastructure, ensuring a reliable power supply and seamless integration of renewable energy.
- As of March 31, 2022, the Central Electricity Authority (CEA) identified 39,965 power substations (66/11 kV, 33/11 kV, and 22/11 kV) nationwide, with a combined installed capacity of 482,810 MVA. The country boasted 230,979 feeders at the 11 kV level, spanning a total of 4,935,279 circuit kilometers. Moreover, in the 2022-23 period, India operated 1.47 million distribution transformers, totaling a capacity of 6.89 million MVA.
- In June 2024, the CEA, collaborating with distribution utilities, unveiled the Distribution Perspective Plan, charting the course through to the fiscal year 2029-30. The 20th Electric Power Survey anticipates that the nation's peak electricity demand will reach 334,811 MW by 2029-30, reflecting a 6.45% annual growth from 2021-22. By 2029-30, the nation's total power substation capacity will rise to 624,332 MVA.
- Further, from 2022-23 to 2029-30, India plans to add 12,192 substations, boosting capacity by an additional 141,522 MVA. Additionally, a strategy is set to introduce 46.5 million new distribution transformers (DTs), pushing the total capacity to 9.28 million MVA by the decade's close.
- In November 2023, Maharashtra State Electricity Distribution Company Limited (MSEDCL) invested INR 7,347 crore to bolster Pune district's electricity infrastructure, addressing the needs of its expanding population. In December 2024, both domestic and commercial consumers of the Punjab State Power Corporation Limited (PSPCL) rejoiced at the inauguration of the upgraded Hathan Power Grid. This enhancement, with a 20 MVA capacity, costs INR 1.52 crores and aims to resolve long-standing issues related to the consistent voltage supply.
- Similarly, in January 2025, Power Grid Corporation of India emerged as the successful bidder in a tariff-based competitive bidding process. The company secured two projects to establish an inter-state transmission system under a build, own, operate, and transfer (BOOT) model. The first project, named "Augmentation of Transformation Capacity at KPS1 (GIS) and KPS2 (GIS) (Phase-V Part B1 and Part B2 Scheme)", focuses on enhancing under-construction substations in Gujarat. The second project, titled "Augmentation of Transformation Capacity by 3x500 MVA, 400/220kV ICTs (6th - 8th) and 1x1500 MVA, 765/400kV ICT (4th) at Bidar PS", centers on boosting capacity at an under-construction substation in Karnataka.

Source: Mordor Intelligence





4.1.6.1 GROWTH DRIVERS

INCREASING HOUSING INFRASTRUCTURE

- As India's population increasingly gravitates towards urban centers, metropolitan housing markets have rebounded and signaled city expansions through new constructions.
- Under the ambitious Pradhan Mantri Awas Yojana (PMAY), the Indian government aims to provide housing for one crore urban poor and middle-class families, backed by a substantial budget of INR 10 trillion (USD 120 billion).
- The 2024-25 budget further strengthens this initiative, allocating an additional INR 790 billion (USD 9.64 billion) to PMAY. In October 2024, the Union Ministry of State for Housing and Urban Affairs revealed that since June 25, 2015, the government has been bolstering state and Union territory efforts by offering central assistance under the PMAY-U scheme. This initiative aims to provide durable housing in urban areas nationwide. Drawing insights from the PMAY-U experience, the government rolled out the 'PMAY-U 2.0: Housing for All' Mission on September 1, 2024. This mission targets urban areas nationwide, aiming to enable eligible beneficiaries to construct, purchase, or rent 10 million affordable houses through its four scheme verticals.
- In addition, the Revamped Distribution Sector Scheme (RDSS), launched by the central government, significantly boosted the power EPC market as utilities accelerated their network expansions. With a hefty budget of INR 3,037.58 billion set aside for the five years from 2021-22 to 2025-26, the RDSS aims to empower discoms financially, ensuring a more reliable and higher quality power supply for end-consumers.
- According to the Central Electricity Authority's (CEA) Distribution Perspective Plan 2030, utilities are poised to make substantial infrastructure developments between 2022 and 2025, with many already greenlit under the RDSS.
- Moreover, ongoing initiatives like the Integrated Power Development Scheme and the Deendayal Upadhyaya Gram Jyoti Yojana have been integrated into the RDSS framework. To aid states in their mission of ensuring uninterrupted power for every household, projects totaling INR 1,850 billion have been rolled out (as of August 2024). These projects, aimed at bolstering the distribution system across various states, encompass developing and upgrading substations, HT and LT lines, agricultural feeder segregation, and advancements like aerial bunched cables and underground cabling.

Source: Mordor Intelligence





4.1.6.1 GROWTH DRIVERS

INCREASING HOUSING INFRASTRUCTURE

- India's housing market drew in a hefty institutional investment of USD 1.15 billion in 2024, marking a 46% annual surge. As noted by Colliers India, a commercial real estate solutions provider, this uptick underscores the robust demand for residential properties. Such momentum is poised to bolster the distribution power EPC market.
- Maharashtra State Electricity Distribution Co. Ltd, a prominent player in India's power distribution landscape, is upgrading its distribution grids. This decision is driven by rising per capita energy consumption, aging distribution lines, significant technical losses from overloading, and the challenges of integrating decentralized solar generation systems.
- Beyond advancements in the electricity grid sector, state governments across India are actively developing industrial zones. These zones, catering to diverse sectors from manufacturing to chemicals, see major companies opting for distribution transformers.
- As of 2024, over 40 industrial parks will emerge in states including Rajasthan, Maharashtra, Madhya Pradesh, and Telangana. These projects are currently at various stages of development. Once operational, these parks are poised to enhance the states' revenues in the coming years.
- In August 2024, the Cabinet approved the establishment of 12 new industrial cities under the National Industrial Corridor Development Programme (NICDP), backed by a substantial investment of INR 28,602 Crore (USD 3.33 billion). This move is poised to enhance India's stature in the global manufacturing arena.
- The NICDP, India's most ambitious infrastructure initiative, seeks to mold urban and industrial growth trajectories. By drawing investments from major anchor industries and Micro, Small, and Medium Enterprises (MSMEs), the NICDP aspires to foster a vibrant industrial ecosystem. These newly established industrial nodes are not just standalone entities; they are pivotal in steering the nation towards its ambitious goal of achieving USD 2 trillion in exports by 2030.

Source: Mordor Intelligence



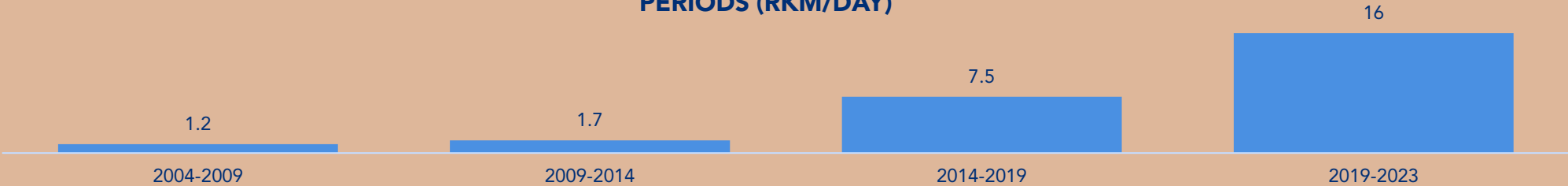


4.1.6.1 GROWTH DRIVERS

RAILWAY ELECTRIFICATION IN INDIA

- According to the Ministry of Railways, Indian Railways completed the electrification of about 40,000 Route Km on Broad gauge (BG) network since 2014-15. As of February 2024, 61,813 Route km on the BG network has been electrified, accounting for 94% of the total Broad Gauge (BG) network of the Indian Railways.
- During 2014-2023, more than INR 433.46 billion was spent on electrification. However, it is likely to take some time for diesel locomotives to be retired and replaced by electric engines, and the trend has firmly shifted to more electric engines than diesel engines. The shift towards electric traction is expected to cut 24% carbon emissions by 2027-2028.
- As of December 2023, Railways had 10,238 electric and 4,543 diesel locomotives. Moreover, as of April 2023, 459 Railway Infrastructure projects (189 New Lines, 39 Gauge Conversion, and 231 Doubling) with a total length of 46,360 km, costing approximately INR 7.18 trillion, were in the planning/approval/construction stage.
- During 2023-2024, nearly INR 80.7 billion were allocated for electrification. Moreover, according to the Ministry of Railways, Indian Railways announced its plans in April 2024 to achieve 100% electrification of its broad-gauge network in the next few months. For this, the interim budget had allocated around INR 65 billion.
- In 2023-2024, the Indian Railways electrified 7,188 kilometres of rail network. The routes that were electrified during this period include:
 - Ahmedabad-Rajkot-Okha (499 km)
 - Bengaluru- Talguppa (371 km)
 - and Bhatinda-Firozpur-Jalandhar (301 km)

AVERAGE ROUTE KILOMETERS (RKM) OF ELECTRIC RAILWAY INSTALLED IN INDIA ACROSS GIVEN PERIODS (RKM/DAY)



Source: Mordor Intelligence





4.1.6.1 GROWTH DRIVERS

RAILWAY ELECTRIFICATION IN INDIA

Railway Electrification During Calendar Year 2024

- Almost 3,210 Rkms were electrified during 2024 & electrified. Moreover, the broad-gauge network of Indian Railways has been extended to 97%.

Station Redevelopment:

- ❑ Under the '*Amrit Bharat Station Scheme*', 1337 stations were identified for redevelopment. Out of 1337 stations, tenders were awarded and work commenced in 1198 railway stations.
- ❑ Other Railway Stations are at different tendering and planning stages.
- In 2023, Indian Railways set a goal of becoming a net-zero carbon emitter by 2030. Consequently, more efforts are required for the rail systems to meet the requirements of net zero, according to the International Energy Agency in its most recent Net Zero 2050 tracking report.





4.1.6.2 KEY RESTRAINTS

HIGH INITIAL INVESTMENT COST, PROJECT HINDRANCE AND SUPPLY CHAIN INTERRUPTIONS	• In India, state-owned DISCOMs cater to 90% of the nation's consumers, accounting for 80% of the electricity supply. However, they are the most vulnerable link in the energy supply chain. These DISCOMs grapple with many challenges, from surging costs and revenue deficits to struggles in managing supply and demand efficiently. • On the supply front, financial strains are exacerbated by costly long-term Power Purchase Agreements (PPAs), frequent renegotiations, and rising coal prices. Additionally, the reliability of supply and the quality of service are compromised by delays in infrastructure upgrades, overlooked maintenance, and a slow shift to competitive bidding. • Regarding revenue, tariff revisions are irregular in some states and can be stalled for seven to ten years, undermining financial stability. Compounding this issue are delayed payments, notably state government subsidies, with significant unpaid dues from government entities like municipal corporations, hospitals, and schools. To navigate these financial hurdles, DISCOMs often turn to costly short-term loans, a temporary fix threatening their long-term viability. • For instance, data from the Ministry of Statistics and Programme Implementation reveals that as of April 2024, out of 50 major projects valued at INR 60,439 crore and being executed by the Power Grid Corporation of India (PGCIL), 18 projects worth INR 29,300 crore are lagging with an average delay of 32 months. Additionally, 8 projects, valued at INR 8,755 crore and awarded under the Tariff Based Competitive Bidding (TBCB) route, are experiencing an average delay of 12 months. • Thus, various factors, including project delays, supply chain hurdles, extended development timelines, approval processes, and rising operational and component costs (like transformers), significantly hinder the progress of power EPC projects, posing challenges to the evolution of a robust power EPC market.
DISTRIBUTION COMPANY – WEAK LINK OF INDIAN POWER SECTOR	• State-owned DISCOMs cater to 90% of Indian consumers, accounting for 80% of the nation's electricity supply. The distribution sector represents the final and crucial link in India's power sector value chain. Over recent years, the distribution sector's financial health has taken a hit, grappling with irregular tariff hikes, elevated AT&C losses, and state governments' delayed subsidy payments. These challenges have directly affected the power offtake by these distribution companies. • Revenue challenges abound, with irregular tariff revisions—sometimes on hold for seven to ten years in certain states—hindering financial sustainability. The situation worsens with delayed payments, notably from state government subsidies. Many unpaid dues come from government entities like municipal corporations, hospitals, and schools. To navigate these financial hurdles, DISCOMs often turn to costly, short-term loans, a temporary fix that threatens their long-term viability. • The government has implemented schemes such as RDSS and late payment surcharge (LPS) to rescue state-run DISCOMs. Moreover, initiating a carbon trading scheme can enhance the incentive to buy green energy. But unless the financial health of distribution utilities (DISCOMS) can be revived, which despite four rounds of fiscal support remain mired in inefficiency and low performance, progress on energy transition can flounder.

Source: Mordor Intelligence



4.2 COMPETITIVE ANALYSIS

4.2.1 Peer Comparison - Company Profiles

4.2.1.1 Rajesh Power Services Limited

4.2.1.2 Vikran Engineering Limited

4.2.1.3 Lumino Industries Limited

4.2.1.4 Anvil Energy Private Limited (erstwhile Anvil Cables Private Limited)

4.2.1.5 Swastika Infra Limited





4.2.1 PEER COMPARISON - COMPANY PROFILES

Company	Established	Headquarters	Company Overview	Employees	Operating Segments
Rajesh Power Services Limited	1971	Gujarat, India	- Founded in 1971, Rajesh Power Services Limited is a prominent player in India's underground power transmission and infrastructure engineering, procurement, and construction (EPC) space. - The company is known for its expertise in high-voltage (HV)/extra-high-voltage (EHV) transmission and distribution systems and is ISO-certified.	940	- Turnkey Projects - O & M Services - Utility Services - Cable And Equipment Testing - Design And Consultancy
Vikran Engineering Limited	2008	Maharashtra, India	- Established in 2008, Vikran Engineering Limited is an emerging infrastructure EPC company that provides end-to-end services from concept to commissioning on a turnkey basis, specializing in power, solar, water, and civil infrastructure sectors. - Their expertise includes power transmission, EHV substations, power distribution, and water extraction and distribution networks. - It has successfully executed projects across 22 states in India, with a cumulative order book exceeding INR 50 billion	NA	- Power Transmission - EHV (GIS/AIS) Substation - Power Distribution - Solar Power - Railway And Metro Electrification - Water Segment
Lumino Industries Limited	1989	Kolkata, India	- Established in 1989, Lumino Industries stands as a prominent integrated power infrastructure firm in India, operating through two primary divisions: Engineering Procurement Construction (EPC) and Manufacturing. - Specializing in the production of overhead transmission line conductors and AB cables, the company caters to both domestic and international markets. - With an installed manufacturing capacity, the firm processes 40,000 MT of aluminum annually, specifically for crafting cables and conductors.	875	- Supply of cables, conductors & other products - Erection, Installation and other services
Anvil Energy Private Limited (erstwhile Anvil Cables Private Limited)	2001	West Bengal, India	- Founded in 2001, Anvil is a wire and cable manufacturer that specializes in power transmission and distribution (T&D), with a focus on aluminum conductors and cables. - The company engages in EPC projects and AMI/SCADA projects.	NA	Manufacture of Aluminum Conductors and Cables
Swastika Infra Limited	2019	Rajasthan, India	- Founded in 2019, the company specializes in laying underground power transmission cables and installing substations for various state and central PSUs. - Primarily, the company executes turnkey projects for power distribution lines, catering directly to government agencies.	86	- Execution of Turnkey Projects - Trading of cables

Source: Company Website, Annual Reports





4.2.1 PEER COMPARISON - COMPANY PROFILES

KEY OFFERINGS OF THE PEERS

Company	Key Offerings
Rajesh Power Services Limited	Underground power transmission, substation construction, and renewable energy projects
Vikran Engineering Limited	EPC for power distribution, transmission, and substations
Lumino Industries Limited	Engineering Procurement Construction (EPC) and Manufacturing
Anvil Energy Private Limited (erstwhile Anvil Cables Private Limited)	Manufacturing and Exporting Electricity Transmission Wires, Cables, and Conductors
Swastika Infra Limited	EPC for power distribution projects and trading in the electrical field

FINANCIAL INFORMATION ON REVENUES FROM OPERATIONS OF MAJOR COMPANIES (FY2021-FY2024)

Company Name	Revenue from Operations (in INR Lakhs)			Y-o-y growth for FY2024 over FY2023	Revenue from Operations CAGR, FY2022-FY2024
	FY2021-22	FY2022-23	FY2023-24		
Rajesh Power Services Limited	14,680.88	20,717.94	28,496.98	37.55%	39.32%
Vikran Engineering Limited	47,421.2	52,430.5	78,595.00	49.9%	28.74%
Lumino Industries Limited	60401.1	76021.2	140731.5	85.12%	52.64%
Anvil Energy Private Limited (erstwhile Anvil Cables Private Limited)	22,522.10	24,888.92	37,983.00	52.61%	29.86%
Swastika Infra Limited	5,903	15,336	20,958	36.66%	88.42%

Source: Company Website, Annual Reports





4.2.1 PEER COMPARISON - COMPANY PROFILES

FINANCIAL INFORMATION ON OPERATING MARGIN (%) OF MAJOR COMPANIES (FY2021-FY2024)

Company Name	Operating Margin (%)		
	FY2021-22	FY2022-23	FY2023-24
Rajesh Power Services Limited	6.85%	5.94%	10.84%
Vikran Engineering Limited	5.31%	15.20%	16.96%
Lumino Industries Limited	8.68%	5.19%	10.14%
Swastika Infra Limited	13.06%	12.95%	12.18%

FINANCIAL INFORMATION ON RETURN ON EQUITY AND CAPITAL EMPLOYED (%) OF MAJOR COMPANIES (FY2021-FY2024)

Company Name	Return on Equity (%)			Return on Capital Employed (%)		
	FY2021-22	FY2022-23	FY2023-24	FY2021-22	FY2022-23	FY2023-24
Rajesh Power Services Limited	6.79%	12.17%	36.41%	11.32%	15.15%	29.99%
Vikran Engineering Limited	7.39%	32.67%	25.69%	12.31%	27.98%	30.37%
Lumino Industries Limited	10.63%	5.56%	21.52%	11.95%	7.73%	19.60%
Anvil Energy Private Limited (erstwhile Anvil Cables Private Limited)	5.31%	5.46%	-	13.64%	11.6%	-
Swastika Infra Limited	32.84%	36.50%	15.52%	25.15%	31.18%	11.70%

Source: Company Website, Annual Reports





4.2.1.1 RAJESH POWER SERVICES LIMITED – KEY FINANCIALS

Particulars	FY2021-22	FY2022-23	FY2023-24
Revenue (in INR Lakhs)	14,680.88	20,717.94	28,496.98
Revenue Growth (%)	31.55%	41.12%	37.55%
Operating Margin (%)	6.85%	5.94%	10.84%
Working Capital (Net Working Capital - NWC)	4,407.52	4,804.36	7,115.93
Gearing Ratio	1.19	1.02	0.92
Return on Equity (%)	6.79%	12.17%	36.41%
Return on Capital Employed (%)	11.32%	15.15%	29.99%
Days Sales Outstanding (DSO)/ Debtor Days	141	103	95

Source: Company Website





4.2.1.2 VIKRAN ENGINEERING LIMITED – KEY FINANCIALS

Particulars	FY2021-22	FY2022-23	FY2023-24
Revenue (in INR Lakhs)	47,421.20	52,430.50	78,594.80
Revenue Growth (%)	40.95%	10.56%	49.90%
Operating Margin (%)	5.31%	15.20%	16.96%
Working Capital (Net Working Capital - NWC)	8,266.00	9,047.20	24,191.80
Gearing Ratio	1.33	1.18	0.63
Return on Equity (%)	7.39%	32.67%	25.69%
Return on Capital Employed (%)	12.31%	27.98%	30.37%
Days Sales Outstanding (DSO)/ Debtor Days	280	258	216

Source: Company Website





4.2.1.3 LUMINO INDUSTRIES LIMITED – KEY FINANCIALS

Particulars	FY2021-22	FY2022-23	FY2023-24
Revenue from Operations (in INR Lakhs)	60401.1	76021.2	140731.5
Revenue Growth (%)	14.62%	25.86%	85.12%
Operating Margin (%)	8.68%	5.19%	10.14%
Working Capital (Net Working Capital - NWC)	33,386.00	28,861.80	38,324.30
Gearing Ratio	0.58	0.81	0.95
Return on Equity (%)	10.63%	5.56%	21.52%
Return on Capital Employed (%)	11.95%	7.73%	19.60%
Days Sales Outstanding (DSO)/ Debtor Days	199	121	92

Source: Company Website





4.2.1.4 ANVIL ENERGY PRIVATE LIMITED (ERSTWHILE ANVIL CABLES PRIVATE LIMITED) – KEY FINANCIALS

Particulars	FY2021-22	FY2022-23	FY2023-24
Revenue from Operations (in INR Lakhs)	22522.1	24888.92	37983
Revenue Growth (%)	6.65%	10.51%	52.61%
Working Capital (Net Working Capital - NWC)	9,440.97	8,980.47	-
Gearing Ratio	0.49	0.44	1.00
Return on Equity (%)	5.31%	5.46%	-
Return on Capital Employed (%)	13.64%	11.6%	-
Days Sales Outstanding (DSO)/ Debtor Days	200	195	-

Source: Company Website





4.2.1.5 SWASTIKA INFRA LIMITED – KEY FINANCIALS

Particulars	FY2021-22	FY2022-23	FY2023-24
Revenue from Operations (in INR Lakhs)	5,903	15,336	20,958
Revenue Growth (%)	148.14%	159.78%	36.66%
Operating Margin (%)	13.06%	12.95%	12.18%
Working Capital (Net Working Capital - NWC)	1,381.39	2,684.22	4,399.17
Gearing Ratio	0.88	0.64	1.74
Return on Equity (%)	32.84%	36.50%	15.52%
Return on Capital Employed (%)	25.15%	31.18%	11.70%
Days Sales Outstanding (DSO)/ Debtor Days	272	58	55



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Employing some of the best and **brightest minds** in India, and leveraging our location to pass on **significant cost savings** to you

Robust Methodology



Gathering intelligence from the right sources & vetting information to provide **actionable insights for decision making**

OUR SERVICES



Data collection (surveys, web scraping) and analysis



Investment Intelligence



Product Intelligence



Market Structure



Market Assessment



Competitive Intelligence



Customer, distributor, supplier intelligence