Assessment of the Infrastructure Development in Delhi-Mumbai Industrial Corridor in Gujarat: A Focus on Power Requirements

Author: -

Ar. Reshma Shukla

Assistant Professor, Faculty of Architecture & Planning

Parul University, Vadodara, Gujarat, India.

Co-Author:-

Ar. Chintan Patel

Associate Professor, Faculty of Architecture & Planning

Parul University, Vadodara, Gujarat, India.

Abstract

The Delhi-Mumbai Industrial Corridor (DMIC) stands as a cornerstone of India's ambitious vision for economic growth and industrial development. This study meticulously assesses the infrastructure development within the Gujarat segment of the DMIC, with a specific emphasis on the critical aspect of power requirements. The objective is to evaluate the current state of power infrastructure, identify challenges, and propose strategic recommendations for ensuring a sustainable and robust power supply to support the burgeoning industrial activities. Its a project that aims to develop effective industrial infrastructure along a dedicated freight corridor, and Gujarat is a key state in it. With an emphasis on power needs, the trends in power consumption and the adequacy of the infrastructure in Gujarat's industrial sector are crucial.

Keywords: Industrialization, DMIC, Gujarat Power,

1 Introduction

Economic advancement is mostly driven by electricity. In the Indian economy, there has traditionally been a stronger relationship than unity between GDP growth and the spread of electric power. But current patterns are changing this dynamic. India's power industry mostly uses coal, taking use of the country's vast domestic coal reserves. But because of its reliance on coal, the industry is very carbon-intensive and raises a lot of greenhouse gas emissions. Moreover, more than 70% of India's oil and over half of its natural gas needs are imported, making the country's developing economy vulnerable to interruptions in the supply of energy.

The Indian economy is becoming more and more susceptible to disruptions in the energy supply due to its increasing development trajectory. Owing to the electrical grid's instability, especially when it comes to business operations, there is an increasing reliance on diesel-fueled captive power generation. A deliberate effort is being made to diversify energy imports and encourage the development of local energy resources in light of these vulnerabilities. By reducing reliance on diesel-based alternatives and enhancing grid stability, this two-pronged strategy aims to pave the path for a more robust and sustainable energy future.

1.1 Industrialization in Gujarat

Gujarat, which occupies 5% of the nation's area and represents the pinnacle of industrial and urban growth in India, is a state. But it has a much bigger effect, adding about 8% to the country's GDP, demonstrating its enormous economic significance. The state's supremacy is clearly seen in the 2017–18 Annual Survey of Industries (ASI), as it secured the first spot in terms of industrial production, making up almost 17% of the total output of the country.

In terms of India's international commerce, the state is crucial as well, serving as a stimulant for the country's exports, of which it accounts for more than 20%. The state's ports play a pivotal role, expertly supervising an astounding forty percent of the country's freight traffic, thereby further enhancing its significance in trade and business.

The multifaceted economic supremacy of Gujarat firmly establishes it as a driving force propelling India's industrial and commercial landscape forward.

Gujarat has established itself as an industrial powerhouse, dominating industries including cement, textiles, engineering, gems and jewellery, petrochemicals, automobiles and auto parts, pharmaceuticals, and more. Among its many achievements is the fact that the state is home to several multinational behemoths, with over 100 Fortune 500 businesses. Micro, Small, and Medium-Sized Businesses (MSMEs) make up a significant portion of the state's industrial landscape's overall supply chain. These MSMEs are essential to the state's industrial development since they function as supplementary businesses to major industries. Gujarat has more than 100 MSME multiproduct activity clusters, and the state's MSMEs increased by 60% in the years 2014 to 2015.

Gujarat has gained prominence as a refuge for investments and industry due to the deliberate actions of the State Government aimed at promoting economic expansion. To help investors choose appropriate sites for building industries, the state established the Investor Support System. This program provides layered maps with GIS capabilities

that show available industrial property and speeds up investor approval procedures. Furthermore, the state is taking proactive measures in areas including tax compliance, registration, and expediting company creation processes.

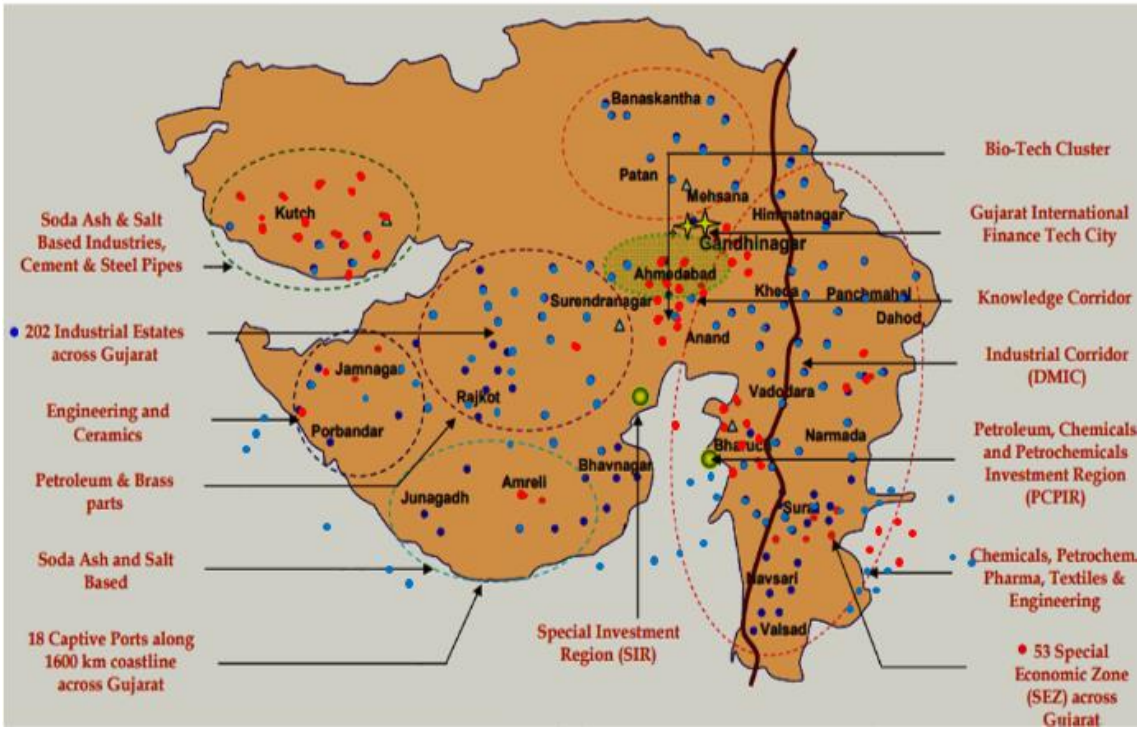


Figure 1 Sector wise Investment Potential in Gujarat

Source :- (IBEF , June 2021)

1.2 Power Sectors of the Gujarat State

a) Gujarat is planning large investments in order to promote a much stronger and more pronounced economic stimulus.

b) The anticipated rates of industrialization, along with increased urbanization and income levels, are expected to result in significantly increased electricity consumption.

c) It is estimated that by 2030, the amount of energy required will be around 2.5 times that of the current generation.

d) Given that a sizable section is now dependent on imports, Gujarat has to make sure that its fuel requirements are met.

e) The assumed availability of power at a price that is competitive might establish Gujarat as a hub for industry and improve the standard of living for its people at the same time.

1.2.1 Industry structure (power distribution structure)

Reforms and the Electricity Act of 2003 changed the electricity industry in the 1990s, making it a competitive market with many of buyers and sellers. Regulatory agencies were set up to provide supervision. Entities were established by the federal and state governments to promote the electricity industry. The state of Gujarat had substantial transformations that resulted in the unbundling of the Gujarat Electricity Board (GEB) on April 1, 2005. As a result,

different tasks including as trading, generating, transmission, and distribution were handled by seven different organizations.

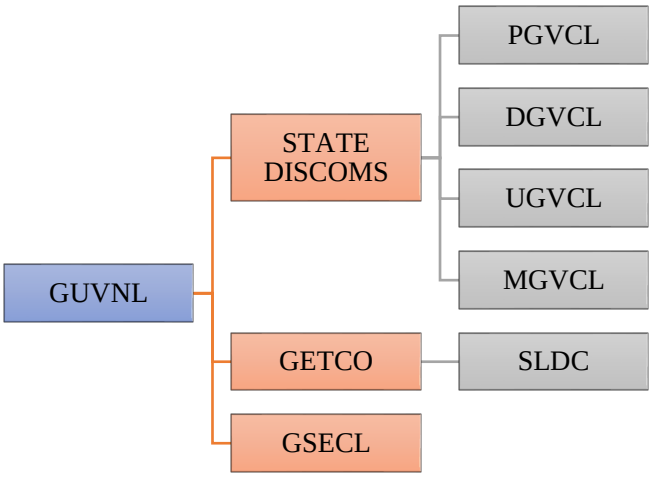


Figure 2 Gujarat Electricity Administration

Source: (Energy Sector of Gujarat, 2017)

1.3 Power Distribution Sector

Four areas make up Gujarat, and each is overseen by a state distribution firm that is in charge of providing power. Distribution was now done in part by private companies; Torrent Power handled Surat, Ahmedabad, Gandhinagar, and Dahej. The state's energy capacity was around 94,025 MUs in 2015–16. About 78,147 MUs were allocated by State Discoms and Torrent Power, which were managed by the State Load Dispatch Center. Through this partnership between public and private organizations, the electrical distribution network is strengthened and a dependable supply of energy is provided to households and businesses.

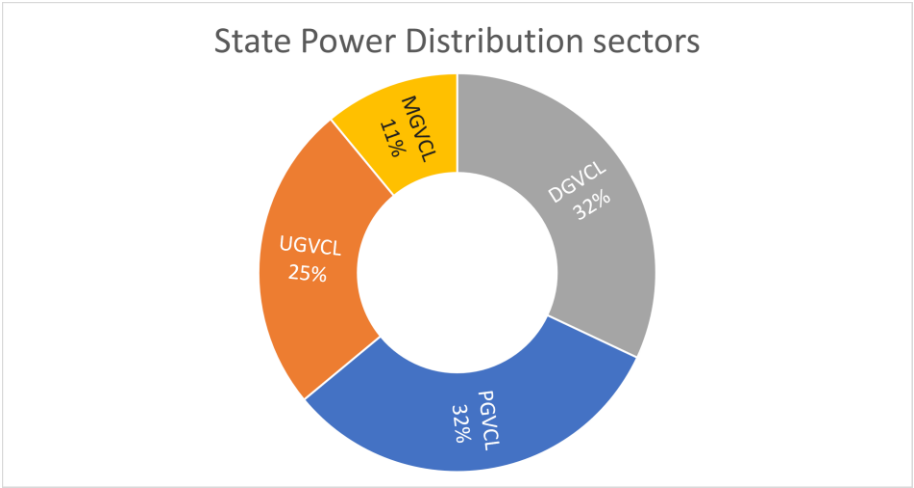


Figure 3 State Power Distribution sectors

Source: (STATE LOAD DESPATCH CENTRE, 2021-22)

2 Power Generation and Distribution

2.1 Power generation

Gujarat has enormous possibilities for energy-related investments. Taking advantage of the state's liberalized policies, a number of Indian and international companies are investing in electricity production projects. Gujarat is making significant investments in green energy. By 2022, the state wants to generate 30,000 MW of renewable energy. Gujarat has reduced transmission and distribution losses and made investments in infrastructure and technology to ensure a 24x7 electricity supply. The predominance of private companies in the generating sector is the state's power circumstances. About three quarters of all power is generated by the private sector, followed by state utilities at three quarters and central plants at three thirds.

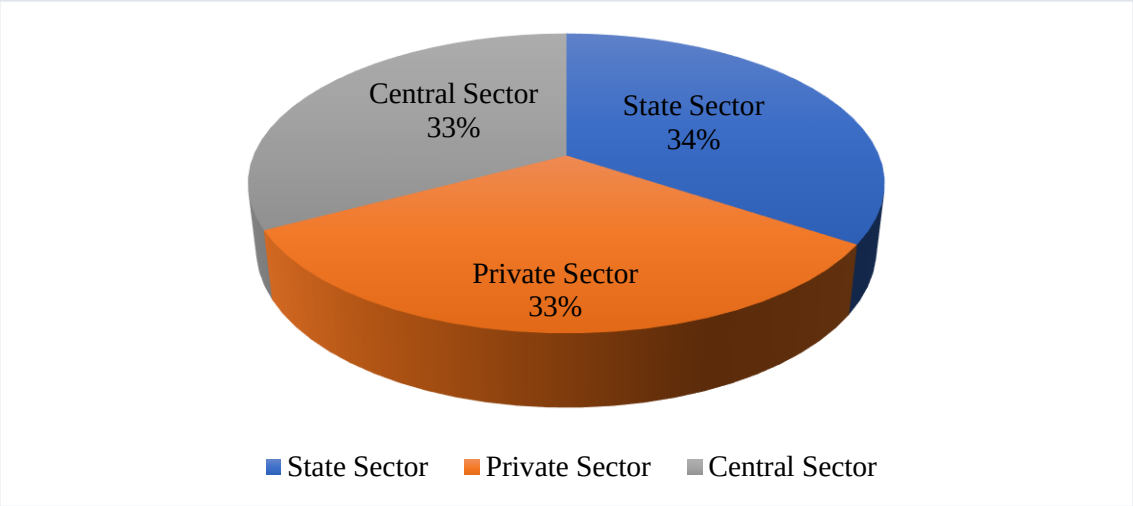


Figure 4 Installed Capacity of Power Sectors

Source: (STATE LOAD DESPATCH CENTRE, 2021-22)

2.2 Gujarat State's Installed Capacity

a) The state intends to increase its generation capacity to match the current demand and supply requirements.

b) This includes addressing existing scenarios and fulfilling the demand from future consumers.

c) Presently, the installed capacity stands at approximately 25,174 MW, with 19,791 MW from conventional sources and 5,383 MW from renewable sources.

d) Gujarat accounts for almost 9% of the total installed capacity in the country.

Gujarat has taken the lead in implementing climate-efficient initiatives through the adoption of various policies. for promoting sustainable energy sources. Installed capacity of various Renewable Energy Sources are

- Wind 4205 MW
- Solar 1127 MW
- Biomass 41.2 MW
- Mini Hydel 9.6 MW

Another important factor that contributes to the favourable power situation in the state is the strong presence of private companies in the power generation sector. The private sector accounts for about 48% of the total power generation, followed by state utilities at 36%, and central plants contributing 16%.

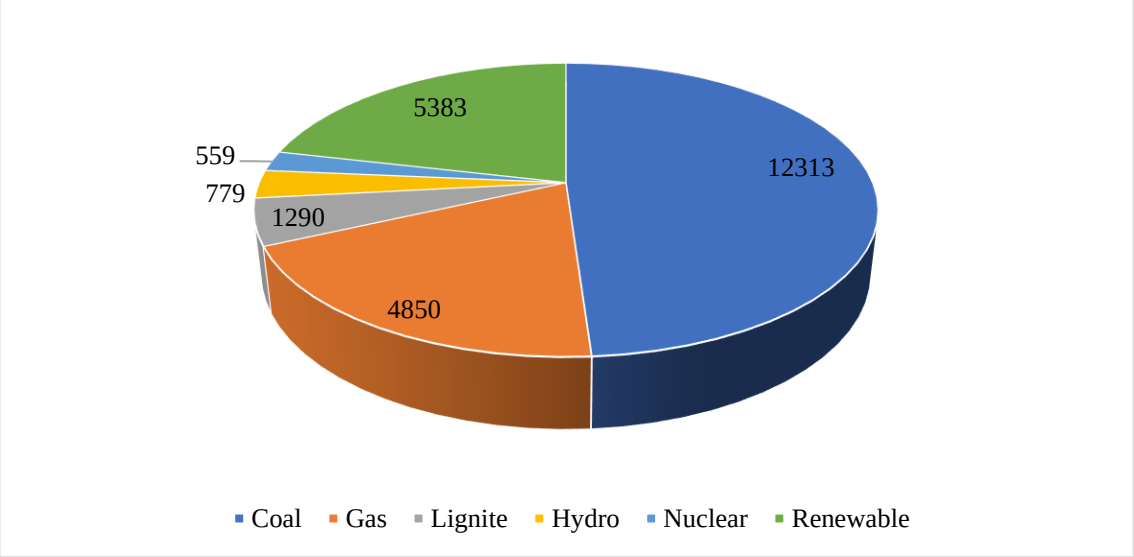


Figure 5 Fuel wise installed capacity

Source: - (STATE LOAD DESPATCH CENTRE, 2021-22)

Gujarat, India, has around 42,208 megawatts of installed electricity capacity at the end of the fiscal year 2022. India was the third-largest producer and user of energy worldwide in 2021. At that time, the nation's installed capacity for its electric system was around 382 gigawatts. Approximately 75% of the power produced by this total capacity came from fossil sources.

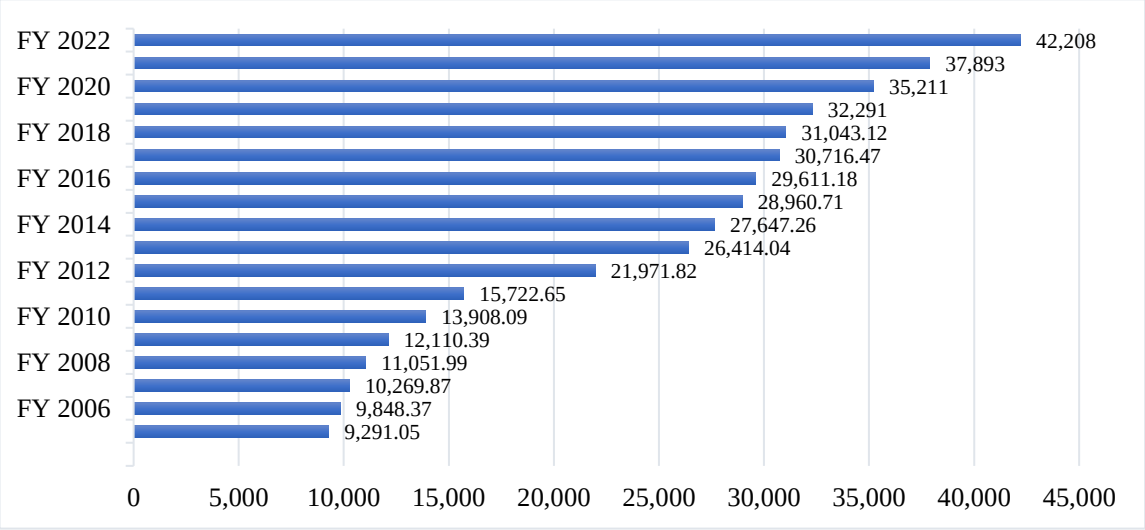


Figure 6 Installed Power Capacity in Gujarat, 2005-2022

Source: - (STATE LOAD DESPATCH CENTRE, 2021-22)

2.3 Electricity Consumption:

Gujarat experienced a rise in industrial energy use in 2020, with 30,809.710 gigawatt-hours (GWh) used, compared to 23,384.700 GWh in 2019. With 24 observational cases, the yearly updated data for Gujarat's industrial power usage from March 1996 to 2020 averages about 19,977.575 GWh. The data was at its lowest point in 1996, at 6,762.130 GWh, and at its highest position in 2017, 34,063.710 GWh. The Central power Authority, via CEIC, is responsible for the active maintenance and reporting of these industrial power consumption statistics in Gujarat.

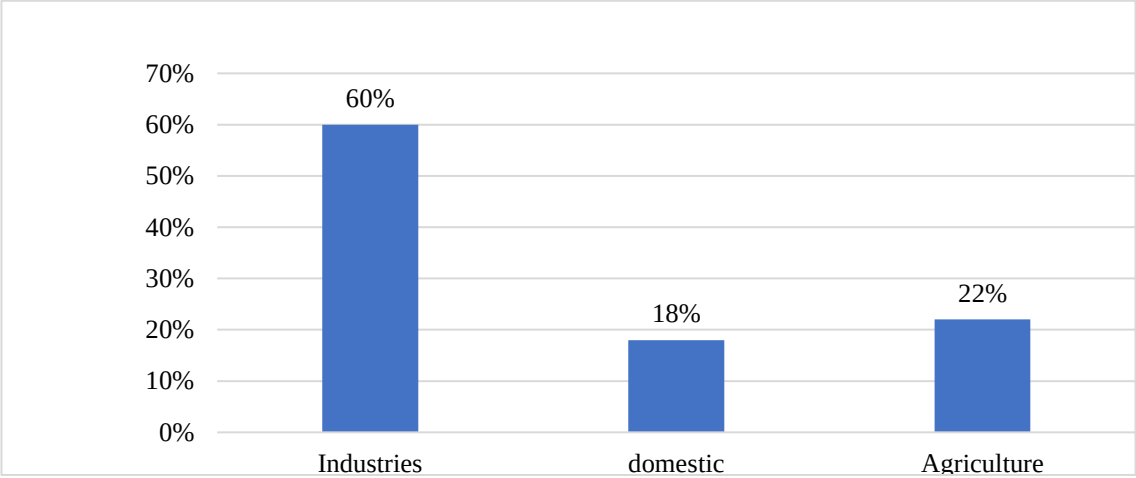


Figure 7 Power Consumption

Source:- (Energy Sector in Gujarat, 2017)

2.4 Conventional Capacity

In recent years, capacity growth has been greatly aided by the adoption of new rules and policies. Notably, the growth in generation capacity has come from both renewable sources like solar and wind power and coal-based thermal facilities. Two of the biggest power projects in the nation are located in Gujarat: the 4620 MW Adani Mundra Project and the 4000 MW Tata Power Mundra UMPP.

Torrent Power oversees conventional power installations of 3130 MW in capacity, dispersed throughout the state. State utilities have added an impressive 7,214 MW of coal capacity, 1,429 MW of gas capacity, 2424 MW of wind power, and 1127 MW of solar power in the last six years. According to their 2022 strategy, the state utilities plan to add 3540 MW from conventional sources. Concurrently, the state expects to have access to an estimated 8000 MW of renewable energy..

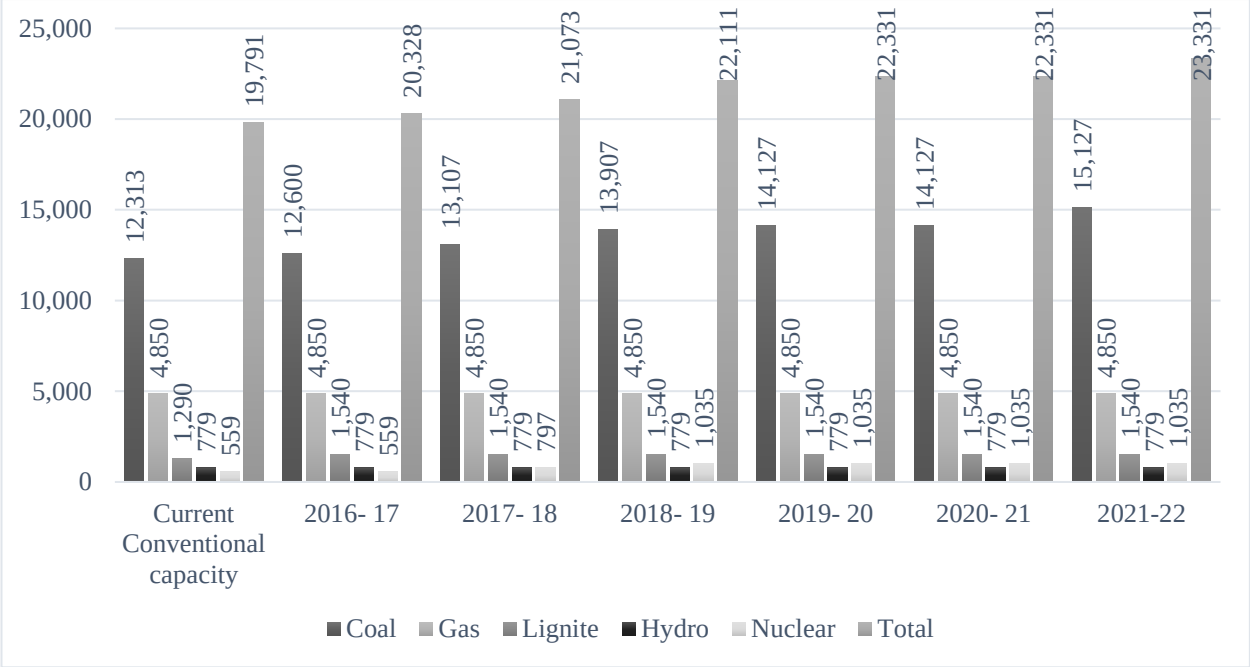


Figure 8 conventional Capacity

Source:- :- (Power Generation, 2021-22)

2.5 Thermal Power Stations – Sectors

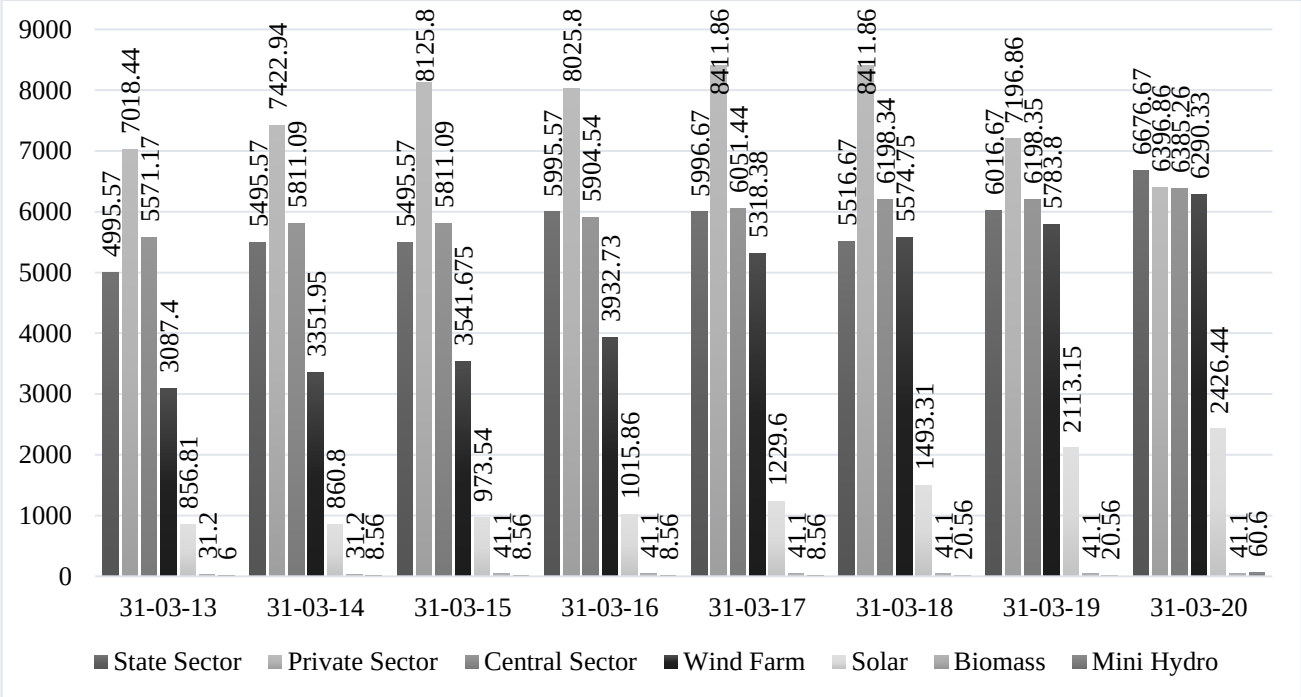


Figure 9 Sector wise installed capacity

Source:- (Power Generation, 2021-22)

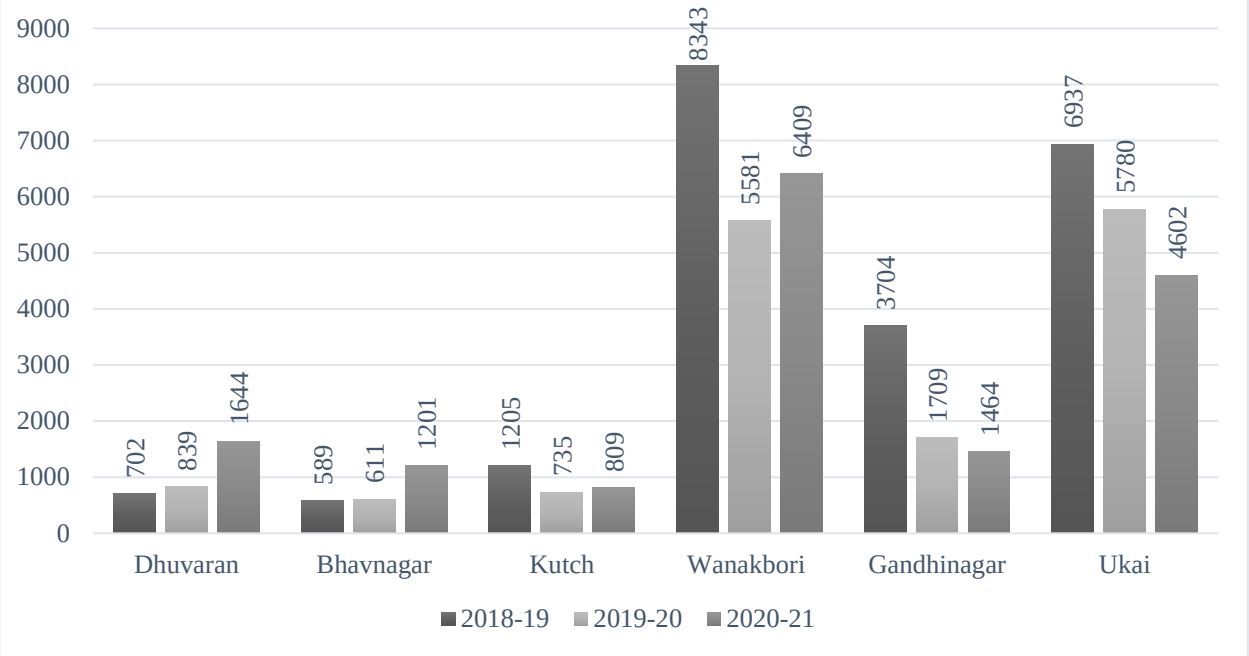


Figure 10 Thermal Power station installed capacity

Source: :- (Power Generation, 2021-22)

2.6 Comfortable Power Scenario

Gujarat is on the brink of an infrastructure revolution.

The state's gross domestic product has grown at a steady 9.3% annual pace during the last 10 years. The state is working on large-scale development initiatives for important zones such as SIRs, PCPIR, and DMIC with the goal of changing the industrial environment inside its boundaries.

- Gujarat's GIFT, India's first Special Economic Zone for international financial services, is leading the way and opening up new prospects.
- The State's peak demand is expected to increase at a compound annual growth rate of 6.3% to 21,847 MW by FY 2022 as a result of its rapid expansion.
- The state has made strategic preparations to meet the impending demand.
- By 2022, the state must have 8000 MW of renewable energy due to the focus placed by the Indian government on encouraging renewable energy.

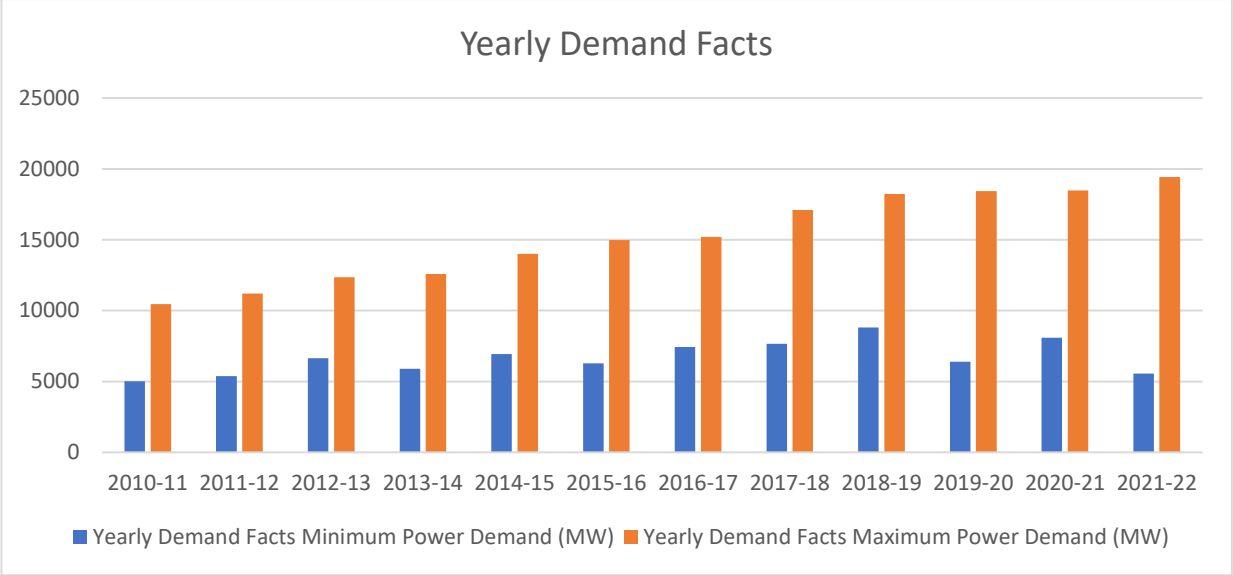


Figure 11 Yearly Power Demand

Source:- :- (STATE LOAD DESPATCH CENTRE, 2021-22)

2.7 Electricity Consumption

Gujarat's industrial power usage in 2020 was 30,809.710 GWh, a significant rise above the 23,384.700 GWh recorded in 2019. Gujarat updates its industrial electricity use data once a year. With 24 data points covering the period from March 1996 to 2020, the average consumption was 19,977.575 GWh.

The data indicates a variation in consumption during this period of time, with 6,762.130 GWh in 1996 being the lowest reported usage and 34,063.710 GWh in 2017. These variances are a reflection of how the industrial environment has changed throughout time, as well as how energy demands have changed.

The data for industrial electricity consumption in Gujarat continues to be actively monitored and reported by the Central Electricity Authority (CEA), indicating its significance as a key metric in tracking the state's industrial energy usage trends.

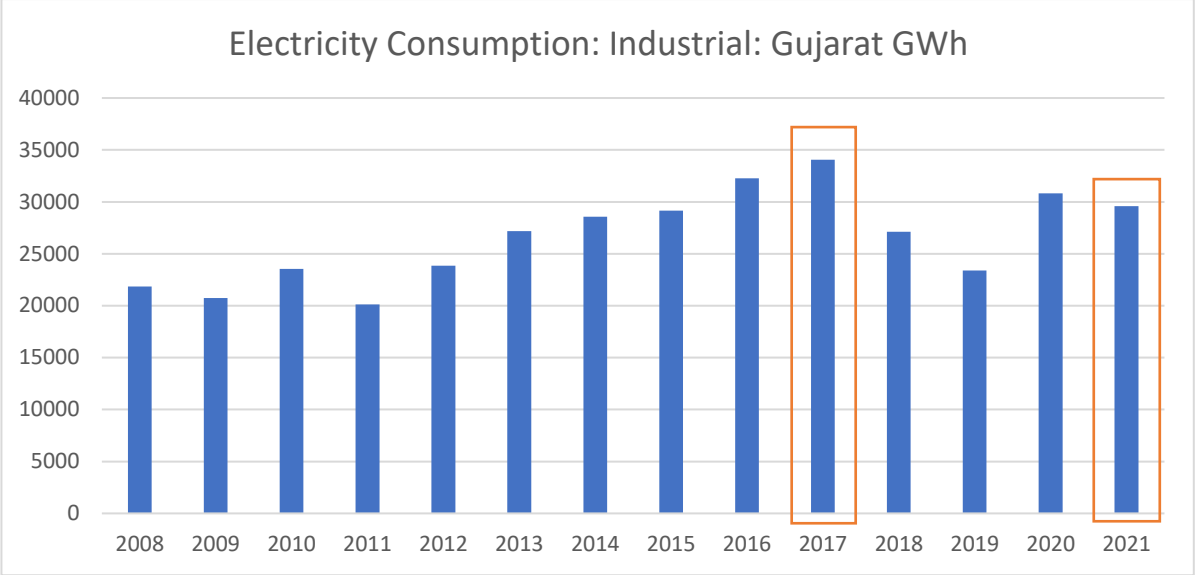


Figure 12 Electricity Consumption Industrial

Source:- (Electricity Consumption: Industrial: Gujarat, 1996 - 2021)

3 The Delhi - Mumbai Industrial Corridor (DMIC), Gujarat.

3.1 DMIC Influences area in Gujarat

Cities in Gujarat, including Palanpur, Mahesana, Ahmedabad, Vadodara, Bharuch, and Valsad, will be traversed by the proposed DFC railway. The DMIC area includes over half (about 62%) of the state. Gujarat boasts a 1600km coastline running along its western edge, as well as an abundance of natural resources. Because of this, it's a fantastic location for future construction regions. Five distinct areas for growth in the DMIC area were identified by analysing the strengths of each region of the state.

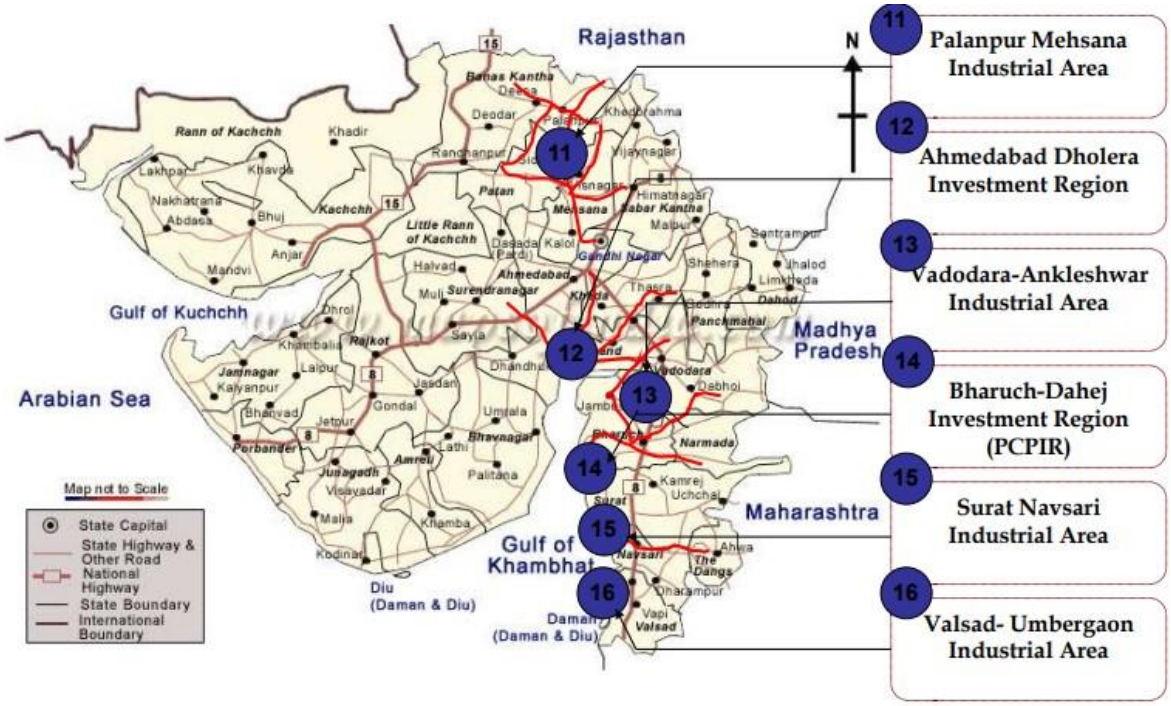


Figure 13 DMIC nodes in Gujarat

Source:- (Presentation)

3.2 Impact of Delhi Mumbai Industrial Corridor on Power Demand

An ambitious project, the Delhi Mumbai Industrial Corridor (DMIC) seeks to develop industrial centres in six states, including Gujarat. The successful implementation of it is expected to result in increased electricity consumption in Gujarat's industrial sector. It is crucial in this setting to carefully match the construction of strong electrical infrastructure with industrial expansion. It is anticipated that the development of new industrial clusters would lead to an increase in the demand for electricity, bringing new opportunities for the power industry.

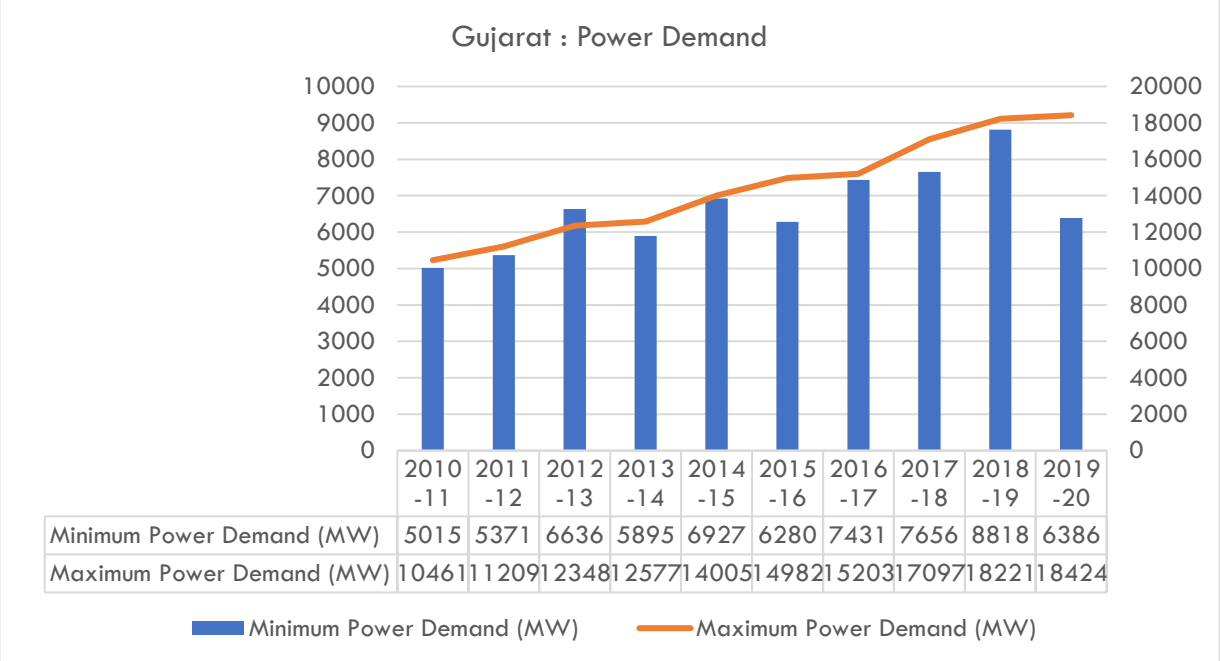
The corridor has the potential to be a catalyst for sustainable industries, with an influence that goes beyond simple industrial expansion. Reducing carbon emissions is the goal of this revolutionary idea, which promotes environmental responsibility. It is expected that the DMIC's development would have an impact outside of the economic sphere and

accelerate Gujarat's transition to renewable energy. Through the integration of responsible power planning with industrial goals, the DMIC not only promises development but also lays the foundation for the state's transition to a greener, more energy-efficient future.

3.3 Demand Pattern Analysis

Gujarat's electrical industry has grown significantly in the last 20 years, serving a wide range of consumer groups such as the residential, industrial, and agricultural sectors. The increase in average per capita income, rising rates of urbanization, improved accessibility to power, increased economic activity, and more extensive electrification projects have all contributed to a rise in the demand for electricity. These changes have not only resulted in higher energy use but also in changes to the national patterns of power usage.

Concurrently, throughout the past 10 years, several initiatives to improve energy efficiency have been developed and implemented. These projects include a variety of activities aimed at using energy more wisely. The complicated dynamics within Gujarat's expanding electrical environment are shown by the interaction between growing demand and a targeted effort towards energy efficiency. The state travels a road of optimizing electricity generation and consumption to satisfy the demands of its different sectors while assuring appropriate resource management as it adjusts to shifting consumer habits and pursues sustainability.



	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Minimum Power Demand (MW)	5015	5371	6636	5895	6927	6280	7431	7656	8818	6386
Maximum Power Demand (MW)	10461	11209	12348	12577	14005	14982	15203	17097	18221	18424

Figure 14 Power Demand

Source : (Energy Sector in Gujarat, 2017)

The lowest electricity consumption for the 2010–2011 fiscal year was 5015 MW. But during the height of the 2018–2019 season, this number increased dramatically, peaking at 8818 MW. Interestingly, the COVID-19 pandemic had a negative impact on electricity consumption in 2019–2020, causing it to drop to about 6386 MW.

Conversely, 10,461 MW was recorded as the greatest electricity demand in 2010–11. By the fiscal year 2019–20, this threshold had increased significantly, reaching an astounding 18,424 MW. These variations in power demand highlight how dynamic energy consumption trends are, influenced by a range of variables such as the state of the economy and outside events like the pandemic.

3.3.1 Current electricity requirements

Power consumption is a crucial aspect of Gujarat's industrial domain, constituting roughly 60% of the state's overall electricity usage. The energy needs of diverse industries across the region exhibit significant variations. However, certain sectors stand out for their high power consumption, including:

- Cement: 10,000 MW
- Steel: 8,000 MW
- Aluminum: 6,000 MW
- Petrochemicals: 5,000 MW
- Textiles: 4,000 MW

The Gujarat government has laid out several plans and initiatives aimed at closing the power infrastructure deficit within the state by the year 2022

These include:

1) Increasing the installed capacity of power plants
2) Improving transmission and distribution networks
3) Promoting renewable energy sources

The Delhi-Mumbai Industrial Corridor (DMIC) is a game-changing infrastructural project that has the potential to significantly impact Gujarat's electricity consumption pattern. The creation of the DMIC is expected to attract a number of new enterprises to the state, which would undoubtedly increase demand for power. By 2022, the estimated increase in power requirements, which may be ascribed to the growth and development of industry along the DMIC route that crosses Gujarat, is expected to reach 10,000 MW.

Gujarat's industrial energy demands are set to be determined by a complex interplay of elements introduced by the DMIC, a critical aspect that has the potential to affect the trajectory of power consumption. This anticipated increase in electricity consumption is consistent with the DMIC's overarching objective of promoting strong industrial growth, which is in line with its vision for infrastructure development and economic progress.

The projected increase in power consumption in Gujarat's industrial sector is part of a complex network that is entwined with the wide-ranging effects of the DMIC. The corridor's capacity to attract new enterprises, promote economic

activity, and cultivate employment clusters reinforces its significance as a primary catalyst for the anticipated increase in power demands.

To sum up, the DMIC is a critical driver that has the potential to completely change the industrial energy consumption environment in Gujarat. This revolutionary project, which is inextricably linked to the increase in power requirements, not only highlights the state's dedication to infrastructure development but also its potential as a lighthouse of industrial progress.

- The average annual power consumption of the Gujarat industrial sector is around 60 billion kWh.
- The highest power consumption is in the summer months, when demand can reach 70 billion kWh.
- The lowest power consumption is in the winter months, when demand can drop to 50 billion kWh.
- The most power-intensive industries in Gujarat are the cement, steel, aluminum, petrochemicals, and textiles industries.
- The Gujarat government's plans to bridge the power infrastructure gap in the state by 2022 are ambitious, but they are necessary to meet the growing demand for power. The DMIC is a major factor that will drive this growth. The peak electricity demand for Gujarat was **18,875 megawatts**. While Gujarat's peak electricity demand experienced notable fluctuations in the past few months, it generally exhibited a decreasing trend from April 2021 to March 2022.

For both high-tension and low-tension consumers, a staggered weekly holiday protocol has been promptly adopted in accordance with the direction given by Gujarat Urja Vikas Nigam Limited (GUVNL), a state-owned organization. According to a senior GUVNL official, Gujarat's typical peak power consumption is between 18,000 and 19,000 MW, with the industrial sector accounting for 60% of this load. The state can produce 37,000 MW of electricity in total, of which 15,447 MW come from renewable sources.

Surprisingly, the industrial sector has experienced a supplementary demand spike of 7%–8% over the average consumption recorded in January of the preceding year (2021). The average daily consumption of industrial units in the state is between 130 and 133 million units. The State Energy Minister claims that Gujarat's demand has lately surpassed 20,000 MW, setting a new record. Interestingly, the average per capita power consumption in the state is 2150 units, whereas the average consumption in other states is 1150 units.

The State Load Dispatch Centre (SLDC), run by Gujarat Urja Vikas Nigam Limited (GUVNL) under its transmission arm, the Gujarat Energy Transmission Corporation Ltd. (GETCO), announced an impressive milestone. With a minimum demand of 17,204 MW, the state was able to accommodate its highest-ever peak power demand of 20,277 MW on April 8. The prior peak demand was recorded on August 17, 2021, at 19,431 MW.

3.4 Power deficiency in Gujarat

Over the last five years, the power shortfall in Gujarat has progressively risen owing to various factors, including:

1) Escalating Power Requirements from Industries: Gujarat accommodates several significant industrial sectors such as petrochemicals, textiles, and cement. These industries are substantial power consumers, and their power demand is on the rise as they expand and flourish.

2) Surging Urbanization: As one of India's highly urbanized states, Gujarat is experiencing swift urban population growth. This trend is exerting added strain on the power grid, as urban regions tend to consume more electricity than rural areas.

3) Dwindling Generation of Renewable Energy: While Gujarat has historically been at the forefront of renewable energy production in India, the pace of growth in this sector has dwindled in recent times. This decline can be attributed to various factors, including the elevated expenses associated with renewable energy projects and inadequate government backing.

4) Insufficient Transmission and Distribution Infrastructure: The existing transmission and distribution infrastructure in Gujarat is insufficient to match the surging power demand. This inadequacy results in power losses and disruptions, compounding the issue of power scarcity.

Industrial power consumption in last five years

The graph illustrates the steady increase in power deficit in Gujarat over the past five years, which is due to industrial power use. 30,000 GWh was the amount of the shortfall in 2017. But by 2021, this shortfall has ballooned to 42,000 GWh. This significant increase is concerning since it indicates a significant and unsettling increase in the power deficit.

Table 1 Power deficiency in Gujarat due to Industrial power consumption

Year	Total Power Consumption (GWh)	Industrial Power Consumption (GWh)	Power Deficiency (GWh)
2017	78,276	48,276	30,000
2018	83,276	50,276	33,000
2019	88,276	52,276	36,000
2020	93,276	54,276	39,000
2021	98,276	56,276	42,000

Source:- (CENTRAL ELECTRICITY AUTHORITY, 2022)

The rise in Gujarat's power deficit can be attributed to a multitude of variables. The state's industrial sector's rise is one cause. Gujarat is a significant center for industry, and business demand for energy has been rising throughout the state. The underfunding of new power producing capacity is another problem. Power outages have resulted from the state government's inability to keep up with the rising demand for electricity. There are several detrimental effects of Gujarat's growing electricity deficit. It is resulting in power disruptions that are upsetting customers and interrupting companies. Additionally, it is raising the price of power, which is straining the economy of the state.

3.5 Challenges to Power Infrastructure due to DMIC

According to a study by the National Council of Applied Economic Research (NCAER), the development of the six nodes in Gujarat is likely to increase the demand for power in the state by 10%-15% by 2025. This will require the construction of new power plants and the upgrading of existing power infrastructure.

1) **Financial constraints**: It is challenging to secure the funding required for setting up power infrastructure. Many projects have stalled due to a lack of funds.

2) **Environmental sustainability**: The use of conventional power-generating sources like thermal plants generates pollution and greenhouse gases that contribute to global warming. To attain environmental sustainability, renewable sources like solar, wind, and hydro must be explored.

3) **Lack of skilled workforce**: There is a need to have skilled and qualified personnel for the design, installation, and operation of power infrastructure. The lack of local manpower in the industry can stall the development of power plants.

The impact of development at six nodes of Gujarat's DMIC

The development of the six nodes will have varying effects on power generation demand. Nodes in the most industrialized regions, such as Dholera and Shendra, are expected to witness the greatest rise in power consumption. Nodes in less industrialized locations, including Pithampur and Dahej, are expected to have lower increases in electricity consumption.

In general, it is anticipated that the six nodes under construction in Gujarat would have a major effect on the need for electricity generation in the upcoming years. Although the Gujarati government is working to boost the state's capacity for producing electricity, it is crucial to make sure that the demand for power is satisfied in a sustainable way. Inadequate Power Infrastructure's Effect on Industrial Growth "Insufficient power infrastructure can hinder the growth of Gujarat's industrial sector by limiting the potential of existing industries and hindering the growth of new industries." To encourage industrial expansion and draw investors to the area, reliable and consistent electricity supply is essential.

4 Conclusion

To address the urgent issue of power shortages, the state government must take proactive steps to strengthen the power infrastructure. This includes investing in new power generation capacity and improving the efficiency of the existing power grid. It's crucial to work closely with industries to reduce their power consumption as well. Neglecting these actions could worsen the power scarcity problem in Gujarat in the future.

The increasing demand for electricity in Gujarat's industrial sector highlights the immediate need to address the shortcomings in the power infrastructure. Recommendations suggest a multifaceted approach, promoting renewable energy sources, upgrading current infrastructure, modernizing distribution and transmission networks, and resolving resource allocation issues. This comprehensive strategy has the potential to alleviate the ongoing power crisis.

A critical aspect is the development of a long-term plan to ensure a consistent and reliable power supply for the evolving needs of the industrial sector. This plan should consider the changing landscape of industrialization and urbanization in Gujarat, including the expected impact of projects like the Delhi Mumbai Industrial Corridor. With industrialization and urban growth accelerating across the six identified nodes in Gujarat, there will be a substantial increase in power demand. Therefore, proactive measures are essential to meet this rising demand.

In summary, government intervention is vital to tackle the growing power shortage challenge. By investing in new power generation, optimizing the power grid, collaborating with industries, and implementing a comprehensive strategy involving renewable energy and infrastructure improvement, Gujarat can avoid worsening power shortages. Additionally, proactive planning aligned with evolving industrial and urban landscapes, such as the Delhi Mumbai Industrial Corridor, can ensure a resilient and stable power supply, supporting the state's economic growth and the well-being of its residents.

References

Energy Sector in Gujarat. (2017). *Vibrant Gujarat summit.* Energy & Petrochemicals Depatrment. Government of Gujarat.

A Government of Gujarat Undertaking. (n.d.). *Gujarat Petroleum, Chemical and Petrochemical Investment Region (PCPIR)* . Gandhinagar: Gujarat Industrial Development Corporation.

AUTHORITY, C. E. (2022). Retrieved from https://www.ceicdata.com/en/india/electricity-consumption-non-utilities-gujarat/electricity-consumption-industrial-gujarat

CENTRAL ELECTRICITY AUTHORITY. (2022). Retrieved from https://www.ceicdata.com/en/india/electricity-consumption-non-utilities-gujarat/electricity-consumption-industrial-gujarat

(n.d.). *Central Electricity Authority Report.*

(1996 - 2021). *Electricity Consumption: Industrial: Gujarat.* CENTRAL ELECTRICITY AUTHORITY. Retrieved from https://www.ceicdata.com/en/india/electricity-consumption-non-utilities-gujarat/electricity-consumption-industrial-gujarat

Energy Sector of Gujarat. (2017). *Vibrant summit Of Gujarat.* Government of Gujarat.

Government of Gujarat. (2017). *Energy Sector in Gujarat.* Vibrant Gujarat summit.

Government of Gujarat. (2017). *Energy Sector in Gujarat.* Vibrant Gujarat Summit.

Government of Gujarat Undertaking. (October 07, 2013). *Industrial Park Development.* New Delhi: Gujarat Infrastructure Development Board.

Gujarat Industrial Development Corporation. (2022, June). Retrieved from Gujarat Industrial Development Corporation: https://gidc.gujarat.gov.in/

IBEF . (June 2021).

(2021-22). *Power Generation.* GUJARAT STATE ELECTRICITY CORPORATION LIMITED. Retrieved from https://www.gsecl.in/business/power-generation/

Presentation, D. (n.d.). *DMIC* .

(2021-22). *STATE LOAD DESPATCH CENTRE.* Gujarat Energy Transmission Corporation Ltd.

(2021-22). *STATE LOAD DESPATCH CENTRE.* Gujarat Energy Transmission Ltd.

State Load Despatch Centre, G. E. (2021-22). *Annual Report.*

Summit, V. G. (2017). *Gujarat energy transmission corporation limited.* https://www.scribd.com/document/425223265/Research-Report-on-Energy-Sector-in-Gujarat#.