MINISTRY OF POWER
GOVERNMENT OF INDIA

सत्यमेव जयते

EE&REM
Energy Efficiency &
Renewable Energy Management Centre

STATE ENERGY EFFICIENCY ACTION PLAN (SEEAP)

DELHI - ACTION PLAN

SEPTEMBER 2024

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सत्यमेव जयते

Azadi Ka Amrit Mahotsav

ऊर्जा दक्षता ब्यूरो
(विद्युत मंत्रालय, भारत सरकार)
BUREAU OF ENERGY EFFICIENCY
(Ministry of Power, Government of India)

Foreword

The Bureau of Energy Efficiency (BEE), under the Ministry of Power, Government of India, has been actively working to promote energy efficiency across various sectors of the Indian economy through initiatives like the National Strategic Plan for Energy Efficiency and the National Mission ROSHANEE. These efforts align with India's commitment to doubling its energy efficiency improvement rate by 2030, as declared at the G20 summit.

To harness the vast potential for energy efficiency in sectors such as industry, buildings, agriculture, and transport, the State Energy Efficiency Action Plan (SEEAP) has been developed. SEEAP aims to establish clear state-wise focus areas and develop actionable strategies to mainstream energy efficiency interventions.

This report provides valuable insights for policymakers, government agencies, and other stakeholders to implement effective programs and achieve India's climate goals. It also serves as a platform for knowledge sharing and scaling up energy efficiency activities nationwide.

I am pleased to announce that most States/UTs have formed State Level Steering Committees (SLSCs) under the leadership of Chief Secretaries. These committees will play a crucial role in developing mechanisms to implement the identified action plans.

I encourage all stakeholders to review this document and contribute their valuable feedback to further enhance its effectiveness in promoting energy efficiency at the state level.

October, 2024

(Dr. Srikant Nagulapalli)

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ACKNOWLEDGEMENT

The development of "State Energy Efficiency Action Plan (SEEAP)" is an important step towards the Central-State collaboration for mainstreaming energy efficiency at the state level to achieve India's climate commitments. This strategic document has been prepared based on collaboration of Bureau of Energy Efficiency, Ministry of Power, Government of India along with State Designated Agencies and different stakeholder and ministries in the state level.

The ASSOCHAM team extends its profound thanks to Shri Pankaj Agarwal, Secretary, Ministry of Power, Government of India and Shri Srikant Nagulpalli, Director General, Bureau of Energy Efficiency (BEE), for their leadership and guidance during the execution of the assignment. The ASSOCHAM team recognizes and extends its sincere gratitude to Shri Milind Deore, Secretary, BEE, for his invaluable inputs provided during the execution of the assignment. The team acknowledges the co-operation and the support extended by Shri Abhishek Sharma, Director, BEE for supervising the assignment throughout the execution phase. The team appreciates Shri Vikash Kumar Jha, Project Engineer, BEE for his continuous support in coordination with various stakeholders.

The ASSOCHAM team extends its sincere gratitude to Shri Ravi Dhawan, Special Secretary, Power Department, Government of Delhi for their valuable guidance towards the execution of the assignment. We also acknowledge the support provided by Shri A.K Jha, Executive Officer, Shri Sunil Kumar Gupta, Manager, and Shri Shyam Kumar, Manager (Technical), Energy Efficiency & Renewable Energy Management Centre (EE&REM Centre), Department of Power, Government of NCT of Delhi for successfully completing the project. The team also extends its sincere thanks to all UT government departments and stakeholders of the NCT of Delhi for their valuable input towards the completion of the earmarked project tasks.

The ASSOCHAM team extends its sincere gratitude to all government and private sector participants of the physical survey whose inputs have been considered as part of the report. The team also extends its gratitude to the industry associations, building sector professionals and other stakeholders who were extensively consulted as part of the project.

Finally, ASSOCHAM is grateful to the in-house team of ASSOCHAM for their consistent efforts in bringing this report to fruition

Associated Chambers of Commerce and Industry of India (ASSOCHAM)

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Increasing energy demand naturally strains the country's resources and impacts the environment. This warrants decoupling the country's economic growth and energy demand. This is also echoed through India's Intended Nationally Determined Contribution submitted in the run-up to the Paris Climate Conference, where the government has highlighted energy conservation as a key mitigation strategy. The Government of India in the 26th session of the Conference of the Parties (COP26) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Glasgow, United Kingdom in 2021, presented the five nectar elements (Panchamrit) of India's climate action including the target of net-zero emissions by 2070 and get 50% of its energy from renewable resources by 2030.

In meeting the national level targets, States/UTs play a vital role in transitions to low-carbon development pathways. Bureau of Energy Efficiency under the guidance of Ministry of Power developed state specific energy efficiency action plan to ensure that the allocation of resources is as per the requirement of State, that will help in meeting state-specific goals on sustainable development.

The State Energy Efficiency Action Plan for a particular State/UT developed by identifying focus sectors of the State/UT and estimating the potential of energy conservation in sectors which are predominant in the region. The State Energy Efficiency Action Plan is developed for a short term-plan for a tenure of 5 years and a long-term plan targeting high-impact energy efficiency by the year 2030.

For the NCT of Delhi, SEEAP was developed under the guidelines of Bureau of Energy Efficiency, Ministry of Power, GOI and Energy Efficiency & Renewable Energy Management Centre (EE&REM) and inputs & suggestions from various government departments and sector experts were considered. The objective of the State Energy Efficiency Action Plan is to arrive at sector-specific approaches for energy efficiency for the NCT of Delhi.

In FY 2020, NCT of Delhi has total final energy consumption (TFEC) 6.34 Mtoe in which Oil consumption was 43.37%, followed by 40.06% electricity consumption and 16.56% in terms of Gas.

Based on energy consumption and economic growth of the UT, total final energy consumption of UT is projected, and it is estimated that TFEC of NCT of Delhi in FY 2030 will be 22.42 Mtoe. On the basis of projected GSDP of the UT and projected energy consumption, Buildings, Transport and Industry sectors were identified as focus sectors and sector specific strategies were analyzed. List of sector specific focused strategies to ensure that the allocation of resources is as per the requirement of the UT is listed below:

Buildings Sector:

- Effective Implementation of Energy Conservation & Sustainable Building Code (ECSBC)
- Replacement program for inefficient appliances
- BEE Star Rating and Shunya Rating of Buildings

Transport Sector:

- Infrastructure development for EV charging stations and incentives to consumers for quick transition to EVs.
- Ethanol Blending program
- Promotion of Standard and Labelling program of Tyres for Fuel Efficiency in Vehicles

Industry Sector:

- Energy Efficiency Intervention in Machinery & Food Processing clusters

This action plan will result in a total energy consumption reduction of 0.584 Mtoe in the moderate scenario and 1.004 Mtoe in the ambitious scenario in the FY 2030. This plan will also create awareness at the mass level and create a market potential of approximate rupees 1,848 Crore in the field of energy efficiency and reduce the CO_2 emission 1.844 $MtCO_2$ in moderate scenario and 3.142 $MtCO_2$ in ambitious scenario by FY 2030.

1. Introduction

1.1. Background

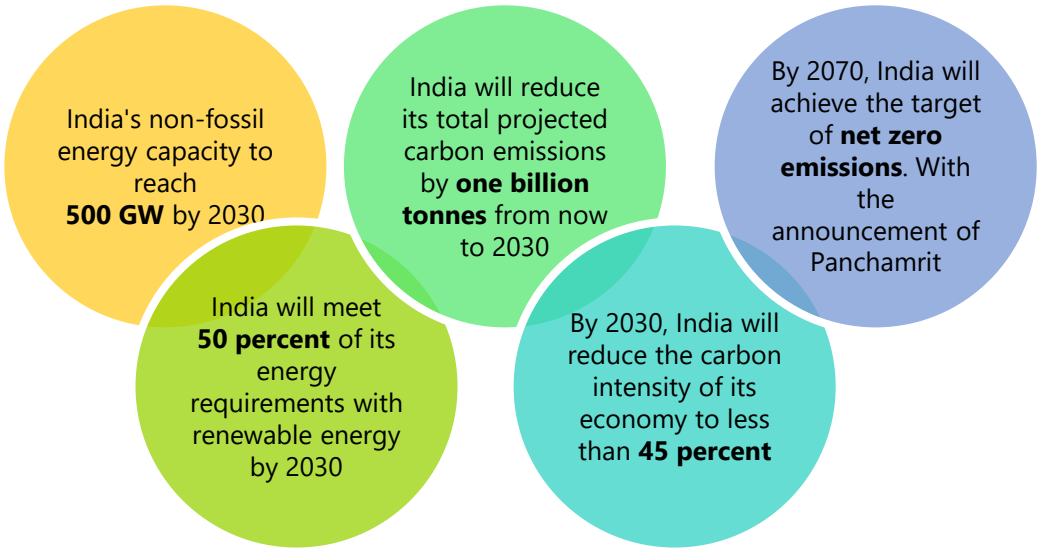
India's economy is characterized by an emerging and developing market. In 2019, India became the fifth-largest economy in the world in nominal terms, surpassing United Kingdom and behind the United States, China, Japan and Germany[1]. The size of the Indian economy in Fiscal Year (FY) 2020 was INR 145 Lakh Crores at constant prices of 2011-12[2]. With the growth of the Indian economy, the demand for energy has increased significantly, resulting in high energy levels in some sectors and increase in the country's emissions.

As per International Energy Agency's (IEA) World Energy Outlook 2021 report[3], India currently has a share of 6.1% in the global primary energy consumption, which is projected to increase to 9.8% by the year 2050.India's Final Energy Consumption in FY 2020 was recorded at 533.44 Mtoe (as per Domestic Conversion Factors)[1], with coal and crude oil being the largest contributors to the total energy consumption. India's per capita energy consumption and per capita emissions are well below the global average per capita emissions. However, India continuously taking steps to reduce the energy consumption and emissions and ensure sustainable growth of nation.

India has set ambitious economic goals for the future and achieving these goals is expected to result in significant increase in the country's energy demand and emissions. In view of this, India has also set ambitious goals for energy and climate performance. The country has also emphasized the importance of energy transition towards de-carbonization of the economy and has recently emerged as one of the world leaders in Energy Transition. States and Union Territories of the country have a key role to play in the fulfilment of these goals. The key strategy adopted by the Government of India is the efficient use of energy resources and their conservation. This is essential since the efficient use of energy and its conservation is the least-cost option to meet the increasing energy demand, reduce wasteful consumption and in leading the country's economic growth in sustainable manner.

1.2. India's Nationally Determined Contributions (NDCs)

In the 2016 Paris Climate Conference, India in its Nationally Determined Contributions (NDCs) had committed that it will reduce the emission intensity of its GDP by 33% to 35% by 2030 from 2005 level. In the Conference of Parties (COP -26) at Glasgow, UK, India announced the Panchamrit, which lists down five ambitions:



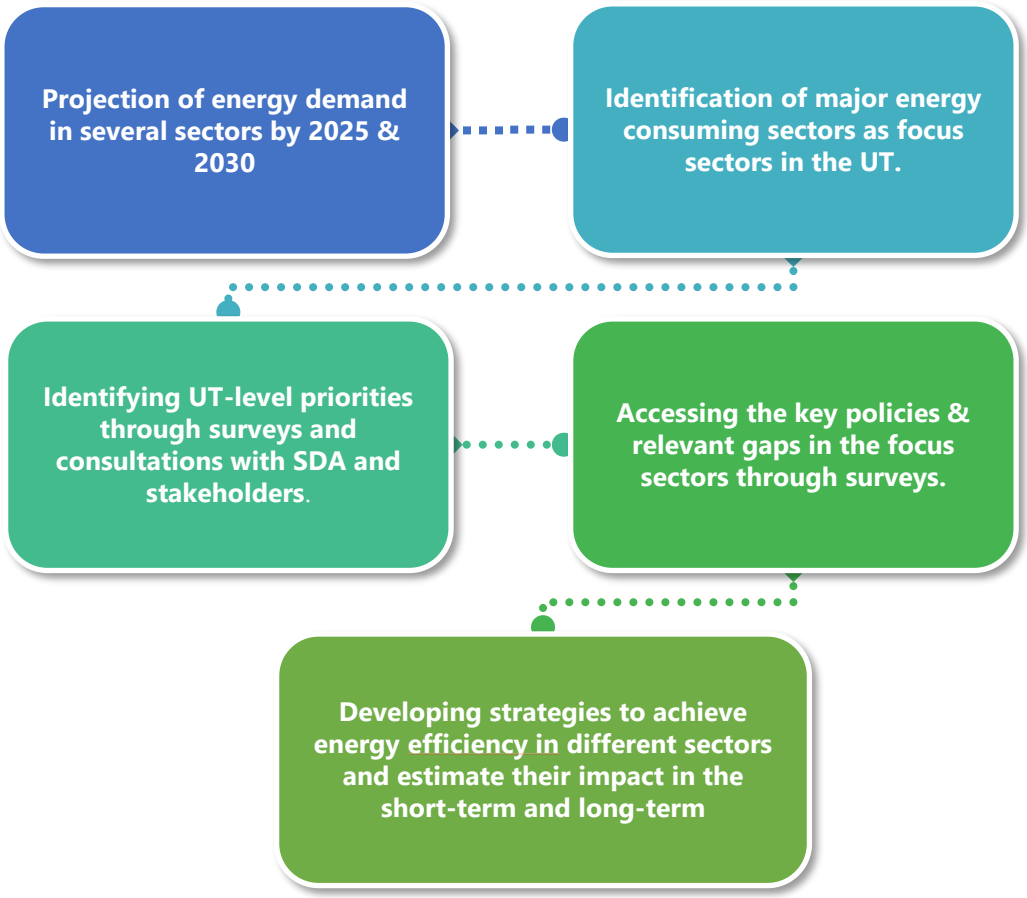
Along with the idea of '**Lifestyle for the Environment (LiFE)**'. It is advised to individuals and institutions across the world to support LiFE as a global movement, aimed at promoting mindful and deliberate utilization instead of mindless and destructive consumption to safeguard the environment. This means making choices that are better for the environment, such as using renewable energy sources, reducing waste, and conserving resources. The program aims to teach people about the impact their daily actions have on the environment and provide them with the tools and resources they need to adopt eco-friendlier practices.

India's earlier target of 33% to 35% reduction in emission intensity from 2005 level by 2030 has been revised to approximately 45%. In view of the enhanced target under Panchamrit, India's energy efficiency efforts need to be increased and States and UTs have a vital role in India's energy efficiency policy implementation and in meeting state-specific goals on sustainable development in the most energy-efficient way. It is imperative that the States and UTs actively participate in the schemes to facilitate the achievement of the overall goal of reducing the energy intensity of the country.

1.3. About SEEAP

The State Energy Efficiency Action Plan for the NCT of Delhi has been developed by identification of focus sector, to ensure that the allocation of resources is as per the requirement of the NCT of Delhi and estimate the potential of energy conservation in sectors that are predominant in the NCT of Delhi such as Buildings, Transport, and Industries. The State Energy Efficiency Action Plan has been developed in two parts, a short term-plan for a tenure of 5 years and a long-term plan targeting high impact energy efficiency by the year 2030 to achieve the targets committed in COP-26. This State Energy Efficiency Action Plan has been developed under the guidance and support of stakeholder departments/agencies of the NCT of Delhi and will be implemented by them in the UT after its adoption.

Expected Outcomes of State Energy Efficiency Action Plan (SEEAP)



1.4. State Profile

The National Capital Territory (NCT) of Delhi is a metropolitan territory in Northern India that houses the National Capital City of New Delhi, India's second most populous metropolis after Mumbai. The National Capital Territory of Delhi is part of the Union Territory's administrative division.

It has been bordered by the state of Uttar Pradesh from the east and Haryana from all other sides. Delhi covers an area of 1,483 sq. km, which makes it the largest city in terms of area in the country.

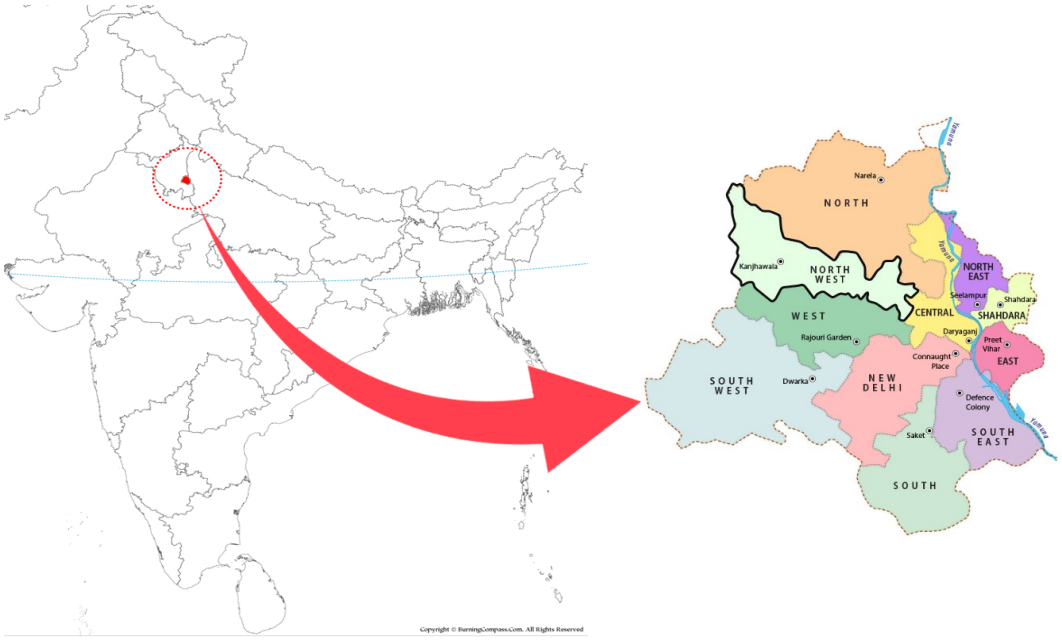


Figure 1: Political Map of NCT of Delhi on the Map of India

According to the 2011 Census of India, Delhi has a population of around 167.88 Lakhs.[1] The projected population by 2031 is 245.52 Lakhs. As per the 2011 Census, the density of population in Delhi worked out at 11,320 persons per sq.km.

[1] *Census of India 2011: main.mohfw.gov.in/sites/default/files/Population%20Projection%20Report%202011-2036%20-%20upload_compressed_0.pdf*

The Literacy Rate of 75.29% in 1991 increased to 86.20% in the 2011 Census. The per-capita consumption of the consumers in Delhi is more than 1,561 kWh per annum as against the national average of 1,122 kWh 2016-17.[2]

NCT of Delhi is one of the fastest growing cities in the country. Due to rapid pace of urbanization, the landscape of Delhi has undergone a change from a rural majority to urban.

Table 1: Basic Statistics of NCT of Delhi

S. NO.	PARTICULARS	UNIT	NUMBER
1	Geographical Area	Sq. Km	1,483
2	Rural Area		369.35
3	Urban Area		1,113.65
4	No. of Districts	Number	11
5	Rural Villages		112
6	Urban Villages		13
7	Total Population (Census 2011)	Lakh	167.88
11	% of Rural to Total Population	%	2.50%
12	% of Urban to Total Population	%	97.50%
16	Households	Lakh	33.41

The following figure illustrates the trend of the Gross State Domestic Product for the NCT of Delhi from FY 2015 to FY 2023.[3]

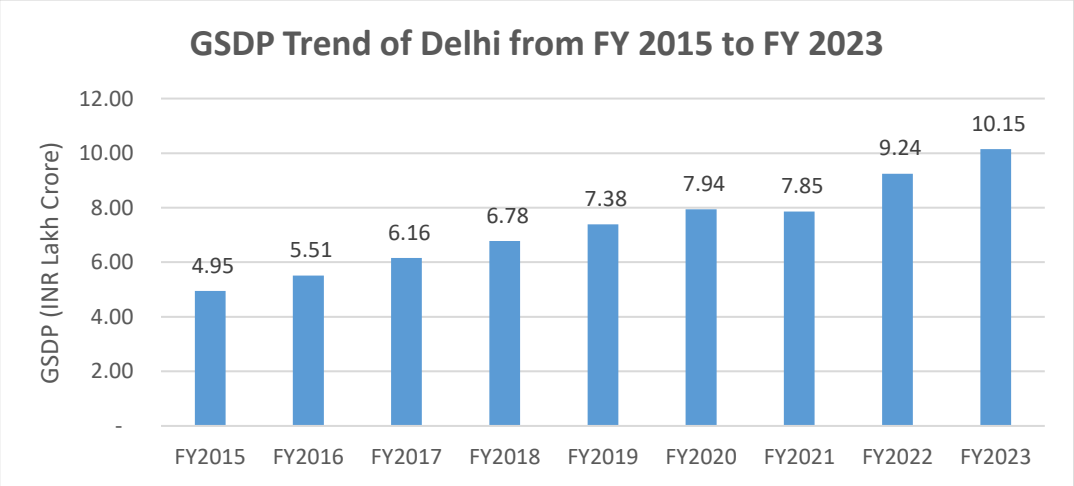


Figure 2: GSDP Trend of NCT of Delhi (₹ Lakhs)

[2] ***Economic Survey of Delhi 2020-21:*** *http://delhiplanning.nic.in/content/economic-survey-delhi-2020-21-english*
[3] **MOSPI**: https://www.mospi.gov.in/GSVA-NSVA

Major Industries in NCT of Delhi:

Industrial development in NCT of Delhi provides a secure basis for rapid growth of income and makes Delhi's per capita income grow at a higher pace in the last many years. Delhi is a major trading hub in the country and has excellent public infrastructure & communication facility for promotion of Business. NCT of Delhi also ranked on the top in the UTs in SDG-9 i.e., "Inclusive Sustainable Industrialization, Foster Innovation" as per the assessment made by NITI Aayog in its report on SDG India Index 3.0.

There is a total of 1,78,079 MSMEs registered in NCT of Delhi. This includes 1,56,843 micro enterprises, 18,715 small and 2521 medium enterprises. Delhi is registered in three Major Industry groups (i) textiles product, (ii) Basic Metal & Alloy, followed by (iii) Metal products and Parts Machinery.

1.5. State Energy Scenario

NCT of Delhi, as the national capital and the hub of commercial activity in the Northern Region, has a significant demand for power. Better road transport, telecommunication, regular power supply and economic policies have attracted industrial activities and services, thereby raising the demand for power. The priority in the energy sector in Delhi is mainly to maintain uninterrupted power supply and to take care of the increasing power demand.

According to the Central Electricity Authority (CEA) report on Load Generation Balance Report 2020-21, NCT of Delhi consumes more electricity than Himachal Pradesh, Jammu and Kashmir, Uttarakhand, Chhattisgarh, Goa, Kerala, Bihar, Jharkhand, Odisha, Sikkim, and all Northeastern states combined. NCT of Delhi has installed a total capacity of 1920 MW in FY 2019 Gas based thermal power plants as coal-based power generation plant has been shut down in the UT.

Table 2: Power Plant Capacity in NCT of Delhi

S.No.	Companies/Station	Location	Units
1.	Indraprastha Power Generation Company Limited (IPGCL)		
	a. Gas Turbine Power Station (GTPS)	Ring Road, near WHO office, ITO	90 MW
2.	Pragati Power Corporation Limited (PPCL)		

S.No.	Companies/Station	Location	Units
	b. Pragati-I Power Station	Ring Road, near WHO office, ITO	330 MW
	c. Pragati-III Power Station, Bawana	Bawana	1500 MW
	Total		**1920 MW**

Source: EE&REM Centre, Department of Power, GNCTD

The following 2 thermal power stations have been closed due to environmental concerns:

Table 3: Power Plants Closed due to Environmental Concerns

S.No.	Name of the Power Plant	Location	Status
1.	Rajghat Thermal Powerhouse	Rajghat	Closed
2.	Indraprastha Thermal Power Station	Ring Road, near	Closed

Source: EE&REM Centre, Department of Power, GNCTD

In the current scenario, Delhi imports approximately 3 times the generated power to meet the demand of electricity.

Table 4: Requirement of Power in Delhi

S. No.	Peak Load	Requirement (MW)
1.	Peak Load in 2021-2022	7323
2.	All-time Peak Load in 2019-2020	7409
3.	Peak Load in 2022-2023	7695
4.	Peak Load in 2023-2024	7438
5.	Peak Load in 2024-2025 (until August 2024)	8656

Source: EE&REM Centre, Department of Power, GNCTD

The major fossil fuel consumption in NCT of Delhi are Petrol, Diesel, LPG and CNG.

Electricity Consumption: The number of electricity consumers in NCT of Delhi has grown by 71.92% during the last ten years. Electricity consumers have increased 17.08 lakh consumers from 2010-11 to 2017-18. Domestic sector is main energy guzzler of the UT, it has surpassed commercial and industrial sectors. In Delhi, BSES Rajdhani Power Limited (BRPL), BSES Yamuna Power Limited (BYPL), Tata Power Delhi Distribution Limited (TPDDL) and New Delhi Municipal Council (NDMC) are currently working as DISCOMs in NCT of Delhi. In comparison to other states & UTs, AT&C losses and distribution losses are low, which is well below the national average and is close to the global standards. The four DISCOMs of NCT of Delhi have submitted their Energy Sales in FY 2019-20 detailed breakup of which is depicted as follows:

Table 5: Sale of Energy in Delhi in 2019-20

S. No	DISCOM	Energy Sales (MU)
1	BSES Yamuna Power Limited (BYPL)	6,658
2	BSES Rajdhani Power Limited (BRPL)	12,549.5
3	Tata Power Delhi Distribution Limited (TPDDL)	9,086
4	New Delhi Municipal Council (NDMC)	1,272.05
Total		**29,565.5**

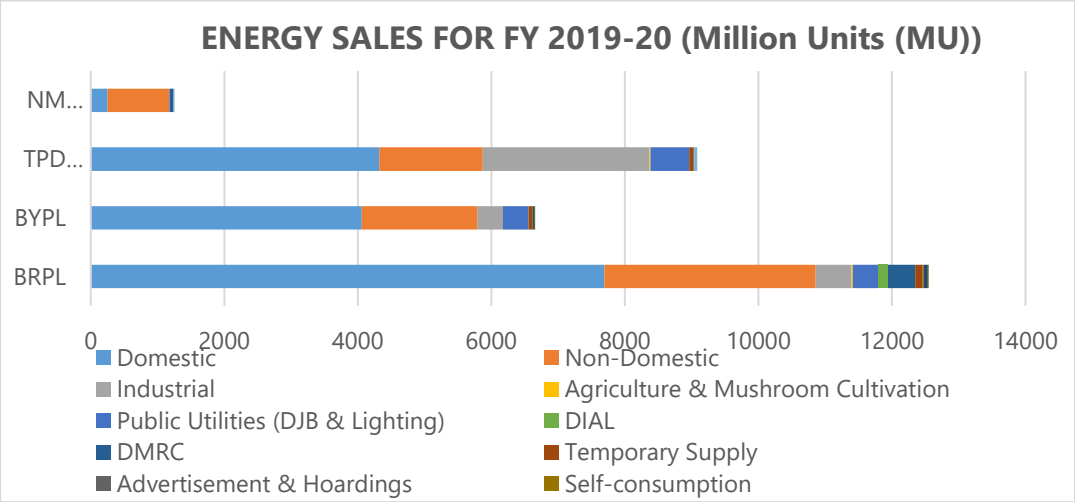


Figure 3: Energy Sales for FY 2019-20 by DISCOMs of NCT of Delhi

Source: Executive Summaries 2019-20 of BRPL, BYPL, TPDDL and NDMC

The BSES Rajdhani Power Limited has been able to reduce its T&D losses to 7.2% as on March 31, 2020, which is well below the national average and is close to the global standards.4 BRPL has submitted the actual AT&C loss of 8.58% and Distribution Loss of 7.02% for FY 2019-20.

Renewable Energy Scenario:

The NCT of Delhi has a high potential for the promotion and development of non-conventional energy initiatives, particularly in the solar and waste-to-energy sectors. For the development of renewable energy generation, the Government of Delhi (GNCTD) and the Delhi Electricity Regulatory Commission (DERC) have already enacted liberal rules on pricing setting and net metering for renewable energy.

Delhi is blessed with almost 300 sunny days and the rooftop space available for solar panels is estimated to be 31 sq. km, giving Delhi a solar energy potential of 2500

[4] *BRPL – 19th Annual Report 2019-20*

MWp (annual Generation approx. 3,500 million kWh). Of this potential, 26% is in the government/public sector, 25% in commercial/ industrial sector, and 49% in domestic sector.[5]

The installed capacity for Waste to Energy Plants in NCT of Delhi is 52 MW as indicated in the following table:

Disposal of Municipal Solid Waste is a very challenging issue. In order to overcome this problem 'Waste-to-Energy' Plants are being set-up at various locations like Timarpur- Okhla, Ghazipur, Narela- Bawana in Delhi to generate electricity. In this line, setting up of 'Waste-to-Energy' plants at Tehkhand (25 MW) is under progress, 15 MW WTE plant at Bhalswa is proposed and 8 MW expansion of existing WTE plant at Ghazipur has also been planned. However, it can also be observed that a huge electricity demand can still be met by renewable energy generation, since the UT generates 93 percent of electricity through non-renewable energy sources. Further, strengthening the renewable energy portfolio of the UT will support in reducing the GHG emission resulting from excessive consumption of non-renewable energy sources.

Table 6: Installed Capacity of Waste to Energy Plants in NCT of Delhi (FY 2020)

S.No.	Type	Installed Capacity (MW)
1	Solar Pv	165
2	Waste To Energy	52

Source: Energy Statistics of India 2021

Additionally, solar power of 1,195 MW is expected to increase in the upcoming years for which Delhi DISCOMs have already signed power purchase agreements to promote use of green power through solar in Delhi, Government of NCT. The total generation from

Source: Energy Statistics of India

[5] *Delhi Solar Policy 2016*

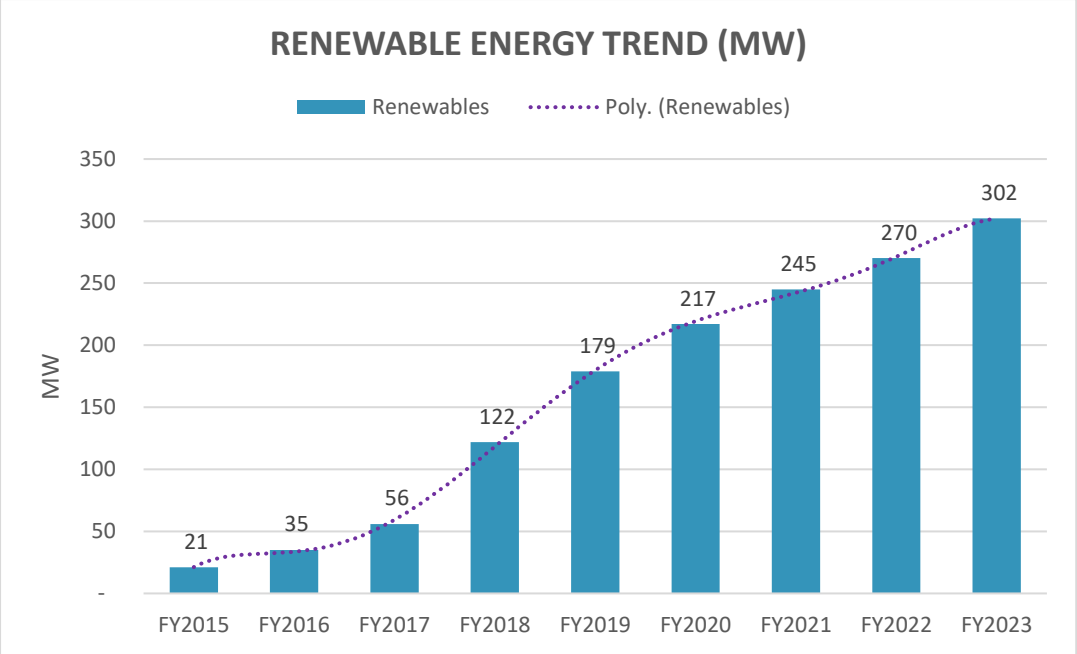


Figure 4: Renewable Energy Trend (MW)

renewable and non-renewable sources is represented in the below figure which represents that the majority of the energy is being catered by non-renewable energy sources in the UT.[6]

Renewable energy growth is a result of initiatives taken by the UT administration in the implementation of policies and incentive schemes related to renewable energy sources.

To promote use of green power through solar in Delhi, Government of NCT of Delhi approved "Delhi Solar Policy-2016" with the aim to install 2000 MW Solar installation by 2025. The policy has provision of mandatory solar installation on all Govt. buildings having rooftop size of 500 sq. m or above.

This policy also aims at providing Generation-Based Incentives for the domestic segment where solar power costs are yet to achieve parity for most users, as well as tax exemptions and waivers for all consumers. To adopt solar on mass scale in residential sector, generation-based Incentive (GBI) was offered for a period of 3 years.

[6] *NITI Aayog India Energy Dashboards*

Oil & Gas Consumption:

Oil has a major share in energy consumption of the UT. It contributes around 43.3% of total energy consumption in UT. With the increment in the CNG based vehicles in UT, consumption of oil shows a continuous decrease in oil consumption.

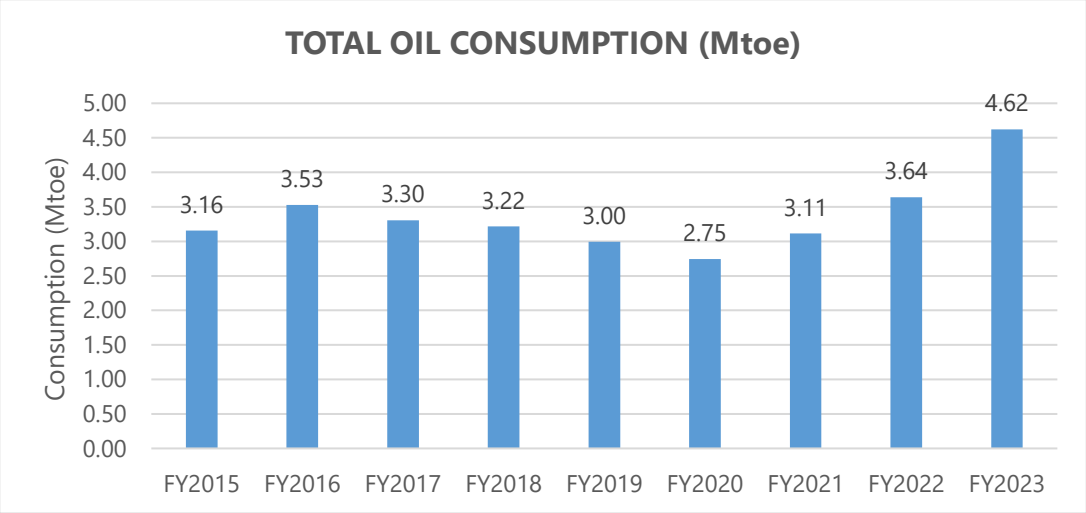


Figure 5: Total Oil Consumption (Mtoe)

Gas consumption is approximately 16% of total energy consumption and showing and upward slope in the consumption pattern.

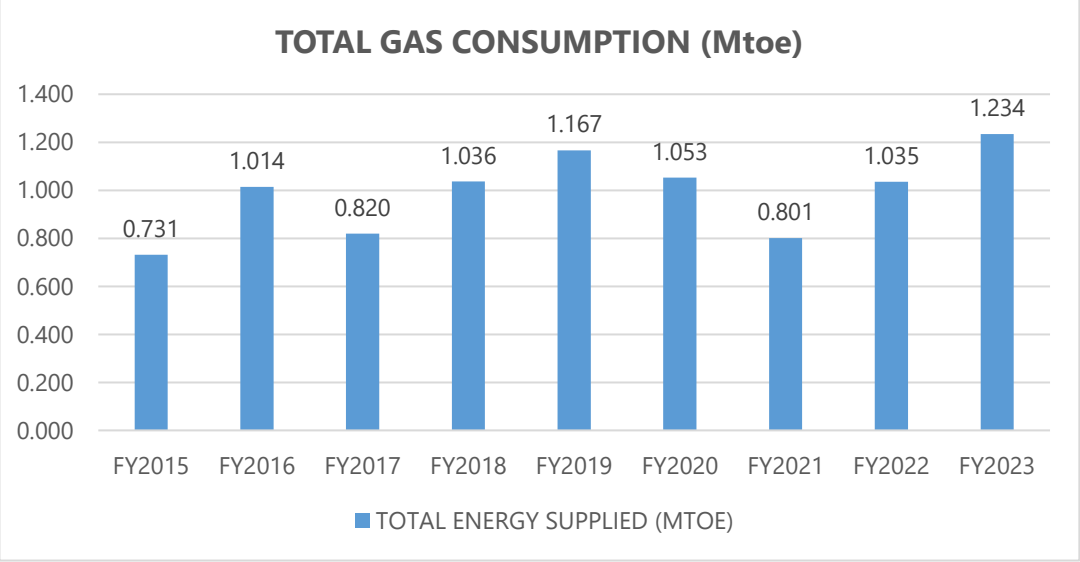


Figure 6: Total Gas Consumption (Mtoe)

Total Final Energy Consumption (TFEC)

The total final energy consumption of the UT is 6.34 Mote in FY2020. In TFEC it is indicated that electricity consumption is increasing every year in UT, however oil and gas consumption varies. The variation in oil & gas consumption depends on the activities planned in NCT of Delhi and the number of domestic and international events and visitor's transportation contribution in the UT.

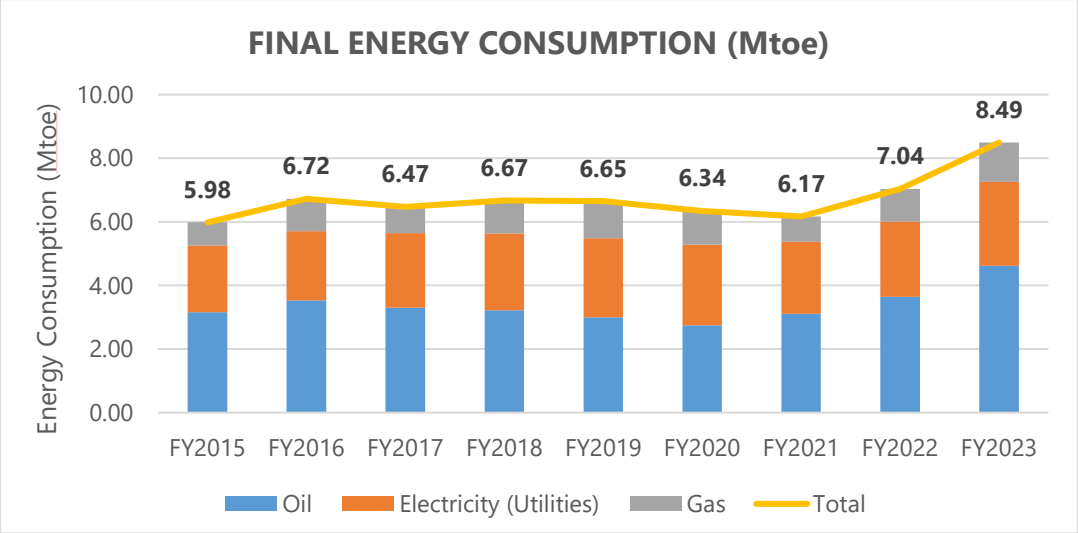


Figure 7: Final Energy Consumption (Mtoe)

In FY 2020 Oil consumption was around 43.30% of total final energy consumption while electricity consumption was around 40.09% of TFEC and Gas consumption was around 16.61% of TFEC.

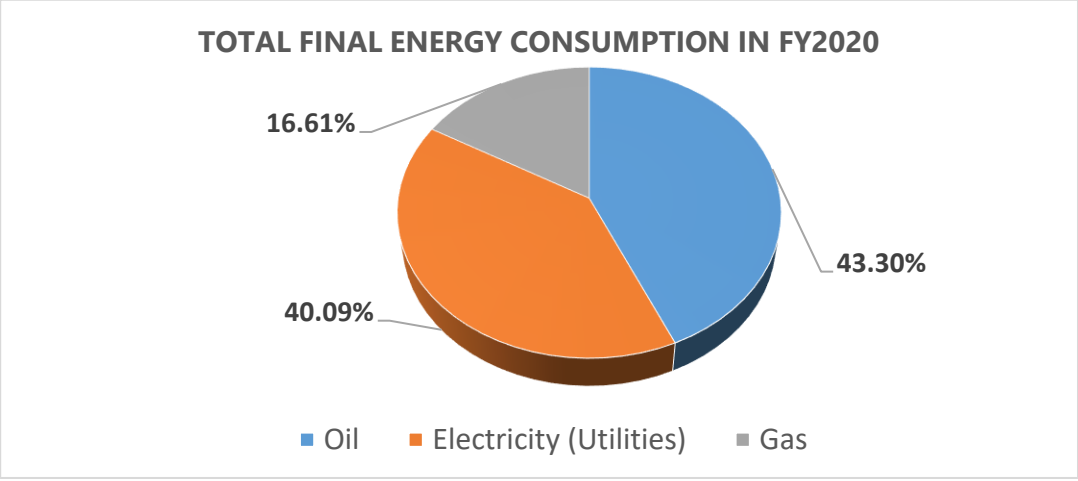


Figure 8: Total Final Energy Consumption in FY2020

1.6. Overview of Institutional Framework and Stakeholder Mapping

The Energy Conservation (EC) Act of 2001 establishes a legal framework for developing and executing energy efficiency (EE) policies and programmes. The Act authorizes the Bureau of Energy Efficiency (BEE) to develop national policies and programmes, and State Designated Agencies (SDAs) to administer EE programmes and enforce EE norms and regulations at the State/UT level. As a UT with diminishing rural areas and agricultural activities, the focus on the energy front in NCT of Delhi is primarily on ensuring uninterrupted power supply and meeting rising power demand due to phenomenal population growth caused by migration, as well as increased commercial activities. As part of the reform process, the government has delegated the various functions of the former Delhi Vidyut Board (DVB) to the following entities:

- Holding Company: Delhi Power Company Limited (DPCL)
- Transmission Company: Delhi Transco Limited (DTL) – operates and maintains power transmission network of 400 kV & 220 kV
- Generation Companies: Indraprastha Power Generation Company Limited (IPGCL) & Pragati Power Corporation Limited (PPCL) – gas-based power plants in Delhi
- In Delhi, BSES Rajdhani Power Limited (BRPL), BSES Yamuna Power Limited (BYPL), Tata Power Delhi Distribution Limited (TPDDL) and New Delhi Municipal Council (NDMC) are currently working as DISCOMs in NCT of Delhi.
    - TATA Power Delhi Distribution Limited (TPDDL)- operating in North Delhi
    - BSES Rajdhani Power Limited (BRPL)- operating in South and West Delhi
    - BSES Yamuna Power Limited (BYPL)- operating in East and Central Delhi
    - New Delhi Municipal Council (NDMC)- government owned deemed licensee

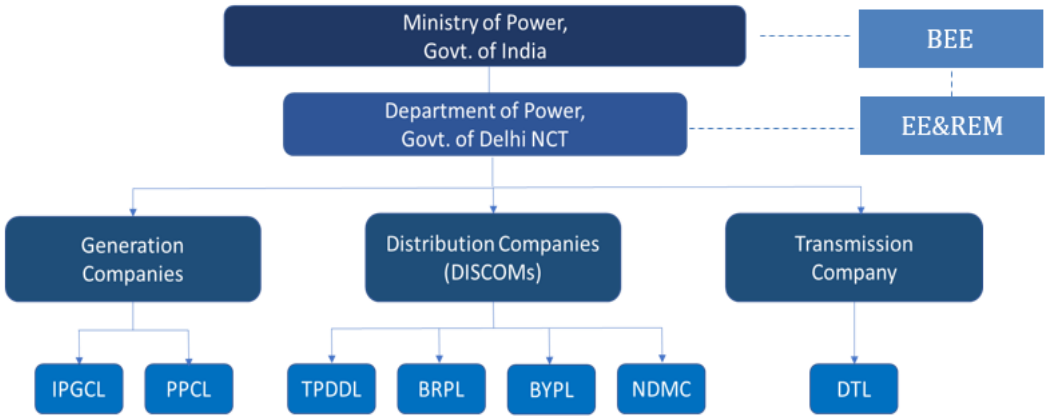


Figure 9: Institutional Framework of Energy for NCT of Delhi

The Energy Efficiency and Renewable Energy Management Centre (EE&REM) is a sub-division of the Department of Power of the Government of the National Capital Territory of Delhi (GNCTD) that serves as the State Nodal Agency (SNA) for any solar energy generating system with a capacity of 1kWp or more. Similarly, in the NCT of Delhi, the Delhi Electricity Regulatory Commission (DERC) regulates Renewable Purchase Obligation (RPO) and Renewable Energy Certificates (REC). It aims at making Delhi, a solar city, providing training, research and development facility for the planning and implementation of programs for energy efficiency and energy conservation and formulating policies and programmes for the promotion, development and implementation of renewable and alternate energy devices and technologies. The agency also takes up the systematic assessment of potential of various kinds of non- conventional energy sources.

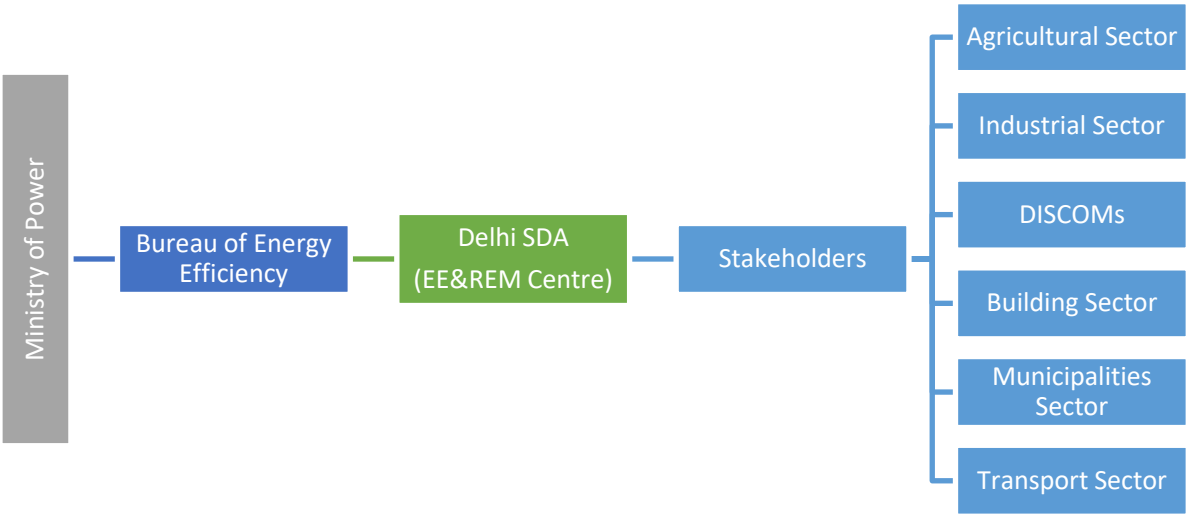


Figure 10: Institution Framework of Delhi for Energy Efficiency

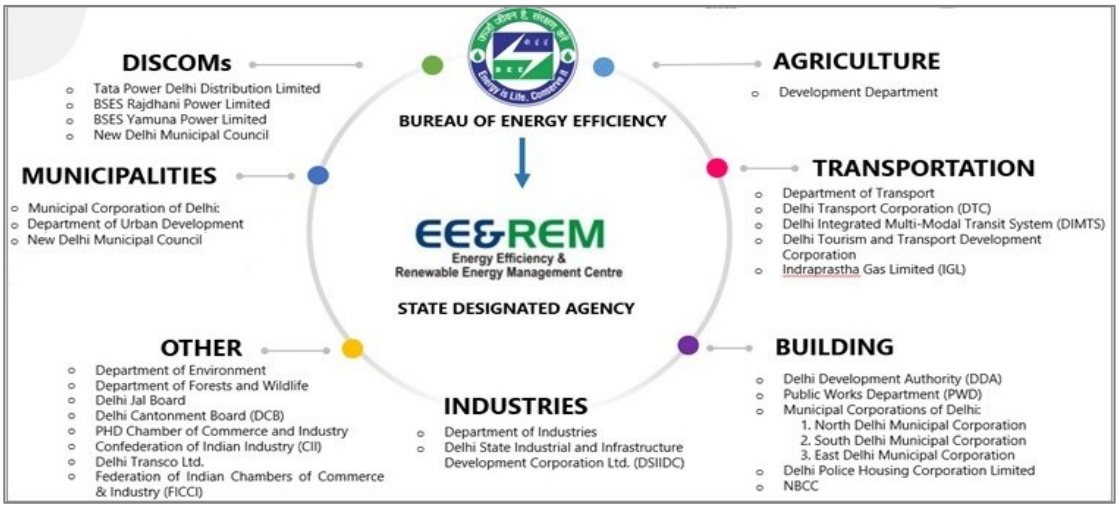


Figure 11: List of government departments Involved in SEEAP for the NCT of Delhi

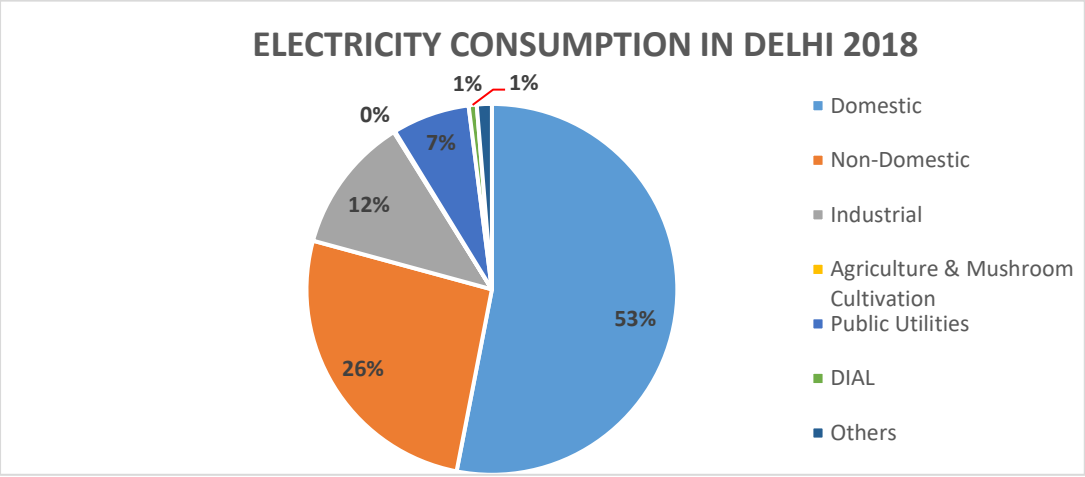
2. Identification of Focus Sectors

The economic sectors of a UT can be broadly classified into sectors namely Industry, Buildings, Transport, Agriculture, Municipalities and DISCOMs, and Cross Sectors.

Identification of focus sectors or focus areas is important because it is a general characteristic of a UT that a major portion of energy is being consumed by a few particular energy-guzzling sectors. Focusing efforts towards these sectors is necessary to ensure that the allocation of resources is as per the UT's priorities and towards sectors that have the highest potential of energy savings and emissions reductions.

2.1. Methodology of Focus Sector Identification

The focus sectors of the UT have been identified based on the energy consumption profile in the UT, inputs from stakeholder consultation, and priority areas of a UT. In NCT of Delhi the major energy consumption is oil which is mostly consumed in the transportation of public. The second largest consumption is of electricity which is being consumed in the residential sectors. As per DERC data, the domestic sector consumes approximately 53% electricity. Hence the buildings sector (domestic & Commercial) collectively consumes around 79% electricity in UT and become major energy guzzling sector.



Source: DERC Annual Report 2018-19

Figure 12: Electricity Consumption in Delhi 2018

Stakeholder Consultation

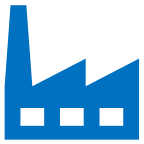
Inputs and suggestions from stakeholders identified for the NCT of Delhi were invited at different stages in the development of the action plan. Feedback and inputs received from stakeholders play a key role in highlighting the areas of focus in their respective sectors going forward and helps understand the implementation of practices and the feasibility of proposed energy efficiency strategies within the sector.

2.2. Identified Focus Sectors

Based on the above parameters and other important considerations, the following have been identified as the focus sectors for devising energy efficiency strategies in NCT of Delhi.

Buildings

Transport



Industry

Total Final Energy Consumption (TFEC) of the focus sectors Industry, Buildings & Transport is contributing a major portion of the total energy consumption of the UT for FY 2020.

3. Projections and Forecasting

Economic and energy projections for the NCT of Delhi to the target year FY 2031 are performed in order to predict the future growth patterns of the respective sectors and to assess the impact of possible energy efficiency interventions in these sectors. The Gross State Domestic Product (GSDP) projections and the energy consumption projections form the basis of defining the actions for energy conservation in UT, which is important in developing the consumption reduction targets for the UT and in aligning the UT with the national goals.

Fiscal Year (FY 2020), implying the period from April 2019-March 2020 has been selected as the base year for projections in this study keeping in view the years FY 2021 and FY 2022 being pandemic years.

The Gross State Domestic Product (GSDP) of NCT of Delhi was recorded at INR 7.94 Lakh Crore in FY 2020 and is projected to reach INR 21.83 Lakh Crore in FY 2031, at constant prices of 2011-12. The years. The GSDP for the period FY 2023-FY 2031 is forecasted by taking weightage of the GSDP growth rate recorded in the years FY 2015-FY 2020 and the projection of GSDP growth rate by vision document of UT. The historic and forecasted GSDP for NCT of Delhi is shown in the figure below.

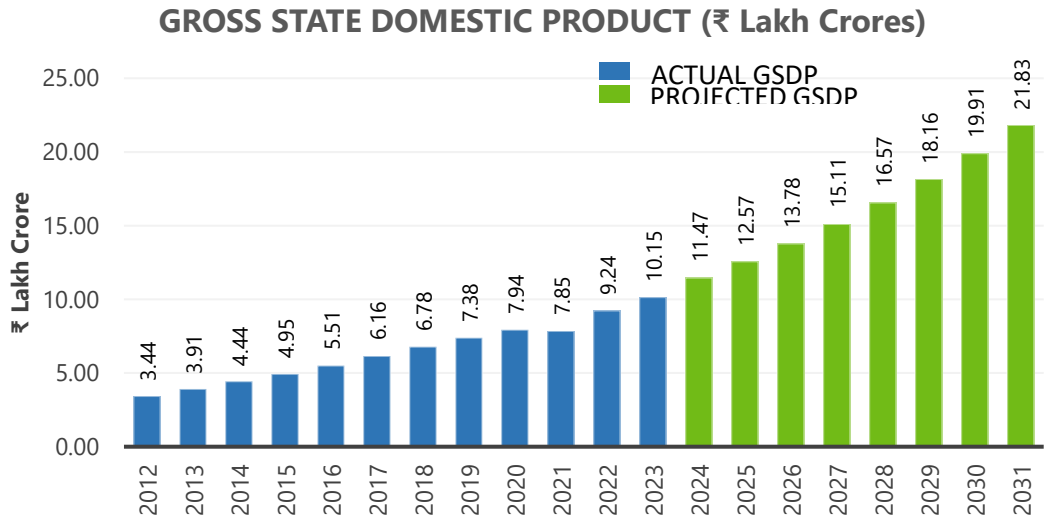


Figure 13: GSDP Projection of NCT of Delhi

The Total Final Energy Consumption (TFEC) has been projected for UT up to FY 2031 taking into account the historic average energy intensity (Mtoe/ INR Lakh Crore) from FY 2015 to FY 2020 along with the historic and projected GSDP growth for NCT of Delhi. The methodology used to project the energy consumption takes into consideration economic aspects along with the total final energy consumption trend of the UT.

The Total Final Energy Consumption of the UT in the Business-As-Usual (BAU) scenario is projected to reach 22.42 Mtoe in FY 2031 from 6.34 Mtoe in FY 2020, with a projected CAGR of 4.85%.

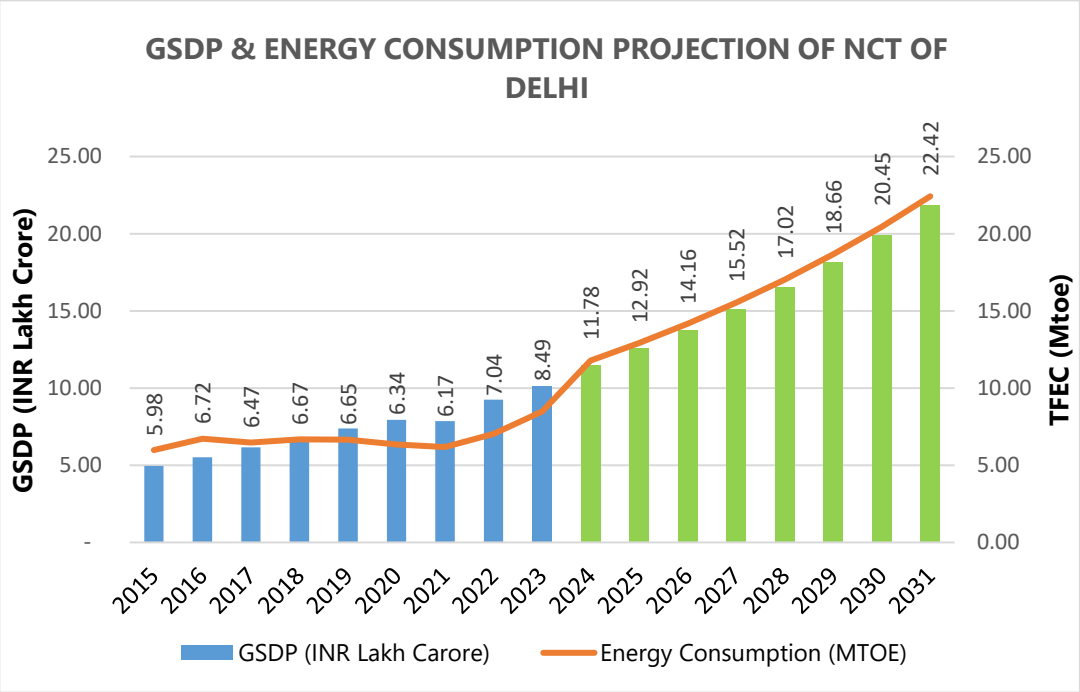


Figure 14: GSDP & Energy Consumption Projection of NCT of Delhi

BUILDINGS SECTOR

4. Focus Sector 1 – Buildings

4.1. Current Scenario

In the NCT of Delhi, over 16.37 million Population i.e., 98 % of total population (16.79 million) of Delhi is residing in urban areas. As per the 2011 Census, out of 46.1 lakh houses in Delhi, out of which 40.9 lakh were occupied, 77.6% were being used for residential purposes and the remaining is used for non-residential and commercial purposes.

In Delhi, DDA prepares and notifies the Building Byelaws and provisions of ECBC-2007 have already been included in the byelaws for some building types by DDA. So far, DDA has included the provisions of ECBC in Unified Building Byelaws (UBBL 2016). The Notification of ECBC-2017 Compliance in UT has not been released and rules & regulation for ECBC compliance is yet to be finalized.

However, as the most of commercial buildings in Delhi are related to government offices and head offices of various industries. All of these buildings follow the Green Building guideline as green buildings incorporate the ECBC norms in its rating system, hence the automatically follow the ECBC Compliance. As per the data received from the Bureau of Energy Efficiency (BEE), the National Capital Territory (NCT) of Delhi has a total of 286 certified green buildings under various certification programs. The breakdown of these certifications is as follows:

Certifications Category	No of Buildings
IGBC	193
GRIHA	1
USGBC (LEED)	59
BEE Star Rating	33
TOTAL	286

In terms of sector-specific certifications, the distribution of BEE Star Rated buildings in Delhi is as follows:

UT	BPO	Hospital	Office	Grand Total
Delhi	1	2	30	33

Delhi has made significant progress in green building certification leading to more green building footprint in the territory.

Further, Bureau of Energy Efficiency (BEE), GoI has also launched Eco-Niwas Samhita (ENS) for residential buildings and residential part of mixed land used projects build on plot area ≥ 500 square meters in 2018. In the first phase minimum standards for the building envelope were launched to limit heat gain or heat loss of the residential building comprising adequate day lighting potential and ventilation. BEE, GoI developed Eco-Niwas Samhita part–II for setting up minimum standards for the Electromechanical Equipment for efficient use of energy in residential buildings. The provisions of ENS must be incorporated in Unified Building Byelaws (UBBL).

In Recent, The Energy Conservation (Amendment) Act, 2022. A unified code for the buildings sector "Energy Conservation and Sustainable Building Code (ECSBC)" has been introduced. The ECSBC code will be applicable for both commercial and residential buildings. The buildings sector is a major energy guzzling sector in NCT of Delhi. As per the graph below it can be witnessed that the energy consumption in the buildings sector has been continuously increasing since FY 2015. The increase in urbanization is very rapid and the demand in the domestic sector is major in terms of buildings and electricity requirement.

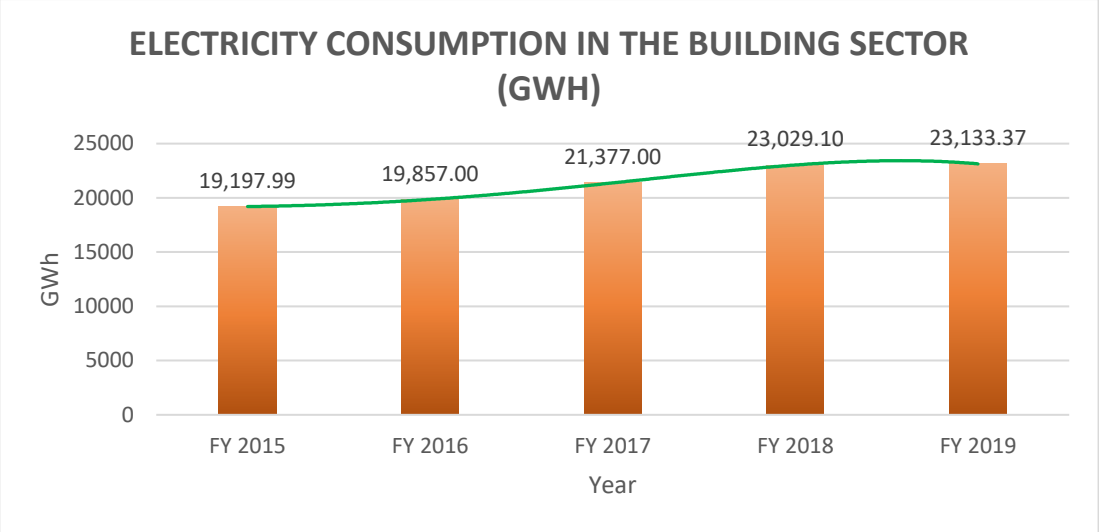


Figure 15: Electricity Consumption in the Building Sector (GWh)

The commercial sector supports urbanization in the NCT of Delhi, but still caters to only 29% of the total electricity consumption in the building sector. The domestic sector on the other hand, retains 71% of the electricity consumption, this indicates that the NCT of Delhi, requires a policy to encourage energy efficiency in the domestic sector, it may be noted that even if a fraction of the domestic sector is addressed by following energy efficiency plans, then a huge sum of electricity consumption can be reduced. The sharing pattern of electricity consumption of the commercial and domestic sector for FY 2020 is represented in the following figure:

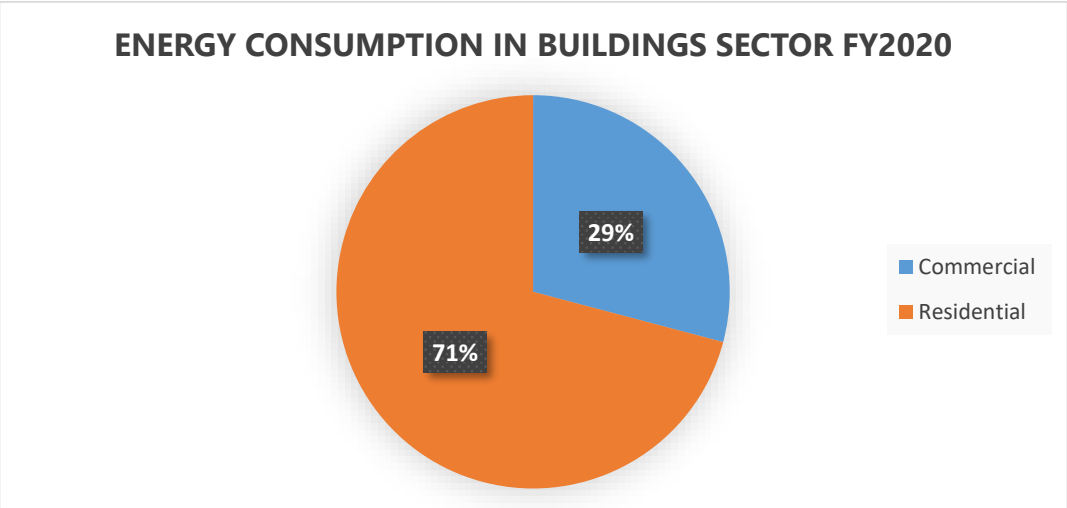


Figure 16: Energy Consumption in Buildings Sector Fy2020

Sector	Number of Building Units	Air-Conditioned Building Units[$]
Domestic	49,43,237	27%
Commercial	9,89,277	33%
TOTAL	**59,23,514**	

**All figures are for FY 2019 from DERC Annual Report*
$ Units with connections above 2kW considered as air-conditioned unit
Number of connections are considered as no of building

4.2. Energy Efficiency Strategies in the Buildings Sector

This section presents the proposed strategies in the domestic buildings and commercial buildings sector along with their impact in terms of energy saving potential. The following strategies are proposed in the building sector, as part of the State Energy Efficiency Action Plan:

1. **Effective Implementation of ECSBC**
2. **Replacement program for inefficient appliances**
3. **Promotion of BEE Star Rating and Shunya Rating of Buildings**

Although programs like Standards & Labelling and ECBC are prevalent in the UT, the proposed strategies focus on enhancing the extent of their implementation by increasing the penetration of technology into the population and rate of implementation of these strategies.

Strategy #1 Effective Implementation of ECSBC (previously known as ECBC & ENS)

NCT of Delhi is in the process of adopting Energy Conservation Building Code (ECBC) for commercial buildings and Eco-Niwas Samhita (ENS) for residential buildings. However, in a recent EC Act Amendment 2022, unified code "Energy Conservation and Sustainable Building Code" (ECSBC) is introduced which will cover both commercial and residential buildings. Till the implementation of ECSBC in UT, ECBC and ENS will be known as ECSBC. Effective implementation of Energy Conservation and Sustainable Building Code (ECSBC) by increasing the penetration of ECBC and ENS compliant buildings in the UT is proposed for upcoming commercial and domestic buildings in the UT as a strategy for energy savings in the building sector.

In order to estimate the savings through ECBC, the electricity consumption of the commercial buildings sector was projected till FY 2031. After forecasting the energy demand in the commercial building sector from FY 2023 to FY 2031, the annual increment in the electricity consumption in the commercial buildings sector was projected.

The total incremental electricity consumption in commercial buildings in the UT is projected to be 1846.01 GWh between FY 2023 to FY 2031. This increment in electricity consumption accounts for all the categories of commercial buildings of varying loads. The Energy Conservation Building Code (ECBC) sets minimum energy standards for commercial buildings having a connected load of 100 kW or more. It has been taken into consideration that around 5% of the buildings in the UT have connected load of 100 kW or more. Considering this percentage, the Total Incremental Electrical Consumption contributing to buildings having load >100kW is estimated to be almost 92.30 GWh. Based on the energy savings percentage from ECBC and ECBC+, the moderate and ambitious savings in the commercial building sector are found to be **23.08 GWh** and **32.31 GWh** respectively. An effective approach to reduce long-term unnecessary electricity usage in residential buildings is by making them more energy efficient. Implementing Energy-saving measures as per Eco Niwas Samhita (ENS) can be helpful in achieving this goal in the residential sector.

In the residential sector, by FY 2031, the electricity consumption is projected to be around 31021.72 GWh. The overall incremental electrical consumption is estimated to be 12550 GWh based on the anticipated household electricity demand by FY2031. In order to assess the savings that can be achieved from successful implementation of ENS, it is assumed that 4% of all the residential building stock would be ENS compliant by 2031. The strategy is expected to result in electricity savings of 100.40 GWh in the moderate scenario and that of 175.70 GWh in the ambitious scenario. The cumulative energy savings expected from the enhanced implementation of ECBC and ENS in the UT is shown below:

Table 7: Moderate and ambitious scenarios for effective implementation of ECSBC

Particulars	Moderate Scenario	Ambitious Scenario
Energy Saving Potential (Mtoe) in ECBC	0.0020	0.0028
Energy Saving Potential (Mtoe) in ENS	0.0086	0.0151
Total	**0.0106**	**0.0179**

Implementing Agency: Bureau of Energy Efficiency, EE&REM, DDA, MCDs,

Actionable Items:

1. **Setting-up of effective enforcement plan with ULBs and SDA as monitoring agencies-** Effective implementation of ECBC and ENS depends on the effectiveness of rules & regulation adopted by the UT. To ensure the same role & responsibility of all concerned departments, check points, monitoring mechanism and penalties must be properly defined in ECSBC rules & regulations. SDA being an extended arm of Bureau of Energy Efficiency shall monitor the process of ECSBC compliance and record the data of total energy savings achieved through the implementation of ECSBC.
2. **Development and maintenance of ECSBC compliance portal, directory of energy efficient materials/technologies** – For effective and aggressive implementation, it is proposed that the UT shall has its own ECSBC online portal to aid in quick ECBC & ENS approval and monitoring process online. The portal would ensure a faster process of compliance application, third party verification and certification. The portal may also contain educational resources, directory of materials and vendors and user-friendly guides for enhanced awareness and capacity building of developers and professionals. Investment would be needed in the development and annual maintenance of the ECSBC portal for which EE&REM will be the implementing agency.
3. **Market Outreach for ECBC compliant Products, Radio Jingles, Social Media Awareness** – Market outreach for ECBC compliance products or products utilized in sustainable construction such as building materials used in passive building design would enable a conducive market for such materials which will promote construction practices necessary to comply with ECBC and ENS guidelines. The market outreach can take place through professional conventions and seminars, radio jingles and awareness campaigns on social media.

4. **Pilot projects for Super ECBC buildings as case studies (initial 20 Buildings)** – It is proposed that the UT government also undertake the development of Super-ECBC buildings in the UT and publish its case studies for the understanding of stakeholders. Initially upcoming government building can be taken as a pilot project and the best energy efficient technologies can be implemented to achieve the Super ECBC level. Case Study can be published in social media to encourage developers and other stakeholders to make Super ECBC compliant buildings.
5. **Home Energy Auditor Training, compliance structure and incentive on energy savings for first few residential projects** – BEE has developed a Home Energy Auditing tool. SDA may run awareness and capacity development programs in NCT of Delhi to train building professionals about the benefit of auditing and implementation of Energy Conservation Measures (ECMs) in residential houses. SDA may encourage RWAs by providing some incentive based on energy savings on implementation of ECMs in their societies. These action items will help in the promotion of ENS in the NCT of Delhi and create technical capacity of the professionals.
6. **Periodic upgradation of PWD Schedule of Rates (SoR) to incorporate latest energy efficient materials and technologies**

   Regular upgradation of PWD Schedule of Rates (SoR) to incorporate latest energy efficient materials and technologies is required as technologies in the field of energy efficiency is developing on some very regular intervals. Adoption of new innovative technologies becomes easier if it is mentioned in PWD Schedule of Rates (SoR) document.
7. **Inclusion of curriculum on energy efficiency in buildings, in universities and Schools**

   Raising awareness about energy conservation among children is crucial. To instill a fundamental understanding of this concept and promote a behavioral shift in children, it is suggested that the curriculum on energy efficiency and conservation be developed and integrated into schools and universities in the National Capital Territory (NCT) of Delhi.
8. **Installation of solar panels on rooftops**

The installation of rooftop solar panels is crucial for promoting sustainable energy practices and reducing reliance on conventional energy sources. Solar power generation enables buildings to produce clean and renewable electricity, contributing to a greener energy landscape and reducing greenhouse gas emissions. Additionally, solar panels on rooftops offer economic benefits, such as lower electricity bills and increased participation in the clean energy revolution.

Strategy #2 Replacement program for inefficient (below than 5 Star Rated) appliances

Implementation Timeline: Long Term (Till FY 2031)

The Standards & Labelling (S&L) Programme[28] of Bureau of Energy Efficiency (BEE) has seen a successful implementation across the country, leading to significant savings in energy through mandatory and voluntary use of energy efficient electrical appliances by consumers in a wide range of applications. The S&L programme encompasses appliances and equipment that have applications in multiple sectors, however the buildings sector is the most widely covered sector in terms of types and number of appliances. At present, the S&L Programme covers 38 appliances, with 16 appliances subject to mandatory regulation and the remaining 22 appliances subject to voluntary regulation. The list of mandatory and voluntary appliances is given in the table below:

Table 8: List of mandatory and voluntary appliances under S&L Programme

Mandatory Appliances	Voluntary Appliances
1. Room Air Conditioners	1. General Purpose Induction Motors
2. Frost-free refrigerators	2. Agriculture Pump Sets
3. Tubular Florescent Lamps	3. LPG Stove
4. Distribution Transformer	4. Office Equipment's (Printers & Copier)
5. Room Air Conditioner (Cassette, Floor Standing)	5. Ballast
6. Direct Cool Refrigerator	6. Computers (Laptop/Notebooks)
7. Color TV	

8. Electric Geysers 9. Variable Capacity Inverter Air Conditioners 10. LED Lamps 11. Ceiling Fans 12. Light commercial AC 13. Deep Freezers 14. Washing Machine 15. Chillers 16. UHD Color TV	7. Diesel Engine driven mono set pumps 8. Solid State Inverter 9. Microwave Oven 10. Solar Water Heater 11. Diesel Generator Set 12. Grid Connected solar Inverter 13. Commercial Beverage Coolers 14. Air Compressor 15. High Energy Li-Battery 16. Side by Side/Multi Door Refrigerator 17. Pedestal Fan 18. Induction Hob 19. Tires 20. Solar Photovoltaic 21. Table/Wall Fan 22. Packaged Boiler

The current strategy has been proposed for the complete buildings sector covering both Domestic and Commercial Buildings. However, a majority of the mandatory and voluntary appliances have a significantly higher penetration in the domestic buildings sector than in the commercial buildings sector.

The electricity consumption pattern varies greatly between urban and rural areas. This is due to the variation in type and number of appliances being used by urban and rural residents. This entails the inclusion of the number of urban and rural households in the savings calculation. Based on the estimated population of the UT as per the report "Population Projections for India and States 2011 – 2036" and Household Size as per census, the number of households were estimated out for urban and rural regions. Different categories of appliances have different penetration among the urban and rural households, based on the usage pattern. Some

appliances viz. Fans, refrigerators, washing machines, LEDs, air-conditioners, and microwaves have higher penetration as compared to other appliances. Considering the study given in the report "Impact Assessment of BEE's Standard & Labeling Program", penetration of different appliances among urban and rural areas was estimated. List of appliances considered in strategies is mentioned in below table:

Table 9: Appliances taken into consideration for the strategy

Window AC	Colour TV - LCD/Plasma/LED
Split AC	Washing Machines
Refrigerator-DC	TFL (Tubular Flourescent Light)
Refrigerator-Frost Free	Electric Geysers
Ceiling Fans	LPG Stoves
Coulor TV CRT	Computer/Laptop/Notebooks

According to the study conducted by CLASP (Collaborative Labeling and Appliance Standards Program) to assess consumer awareness of energy labelling, 48% of consumers are aware of the scheme and 15% have some knowledge of it. Appropriate number of 3-Star rated appliances have been taken from the calculation of total number of appliances. Saving strategies in the moderate scenario include replacement of 3-star rated equipment to 5-star rated appliances, whereas in the ambitious scenario, replacement of non-star rated to 5-star rated equipment has been considered as a saving strategy. The percentage savings achieved upon transitioning from non-Star to 5-Star Labelled equipment's (efficiency) were taken into account for calculating savings in above mentioned scenarios.

The strategy is estimated to result in energy savings of 0.17 Mtoe in the moderate scenario and 0.34 Mtoe in the ambitious scenario till FY 2031.

Table 10: Moderate and ambitious scenarios for deepening of S&L Programme

Particulars	Moderate Scenario	Ambitious Scenario
Energy Saving Potential (Mtoe)	0.17	0.34

Implementing Agency- EE&REM**,** DISCOMs, ESCOs

Actionable Items:

The action items to be carried out in order to implement the strategy at ground level mainly involve dissemination of the scheme's guidelines and specification amongst stakeholders such as manufacturers, retailers and consumers in a way that can ensure meeting the implementation timeline proposed for the strategy. The following action items are suggested in order to ensure effective implementation:

1. **Development of UT-specific implementation models and identification of relevant agencies-** A detailed phase-wise plan needs to layout based on consumer's priority and reachability. It is important to develop a transparent model that can reach out to every household in the UT. Financial implications will play a major role in the replacement scheme so ESCOs and PPA models can we analyzed in detail. UJALA scheme is a successful case study in this area, can be referred for the development of UT specific plan. Identification of implementing departments and agencies and listing of ESCOs in the UT is required.
2. **Issuance of directive to government offices and buildings in the UT to replace all existing inefficient appliances (lower than 5 Star Rated) with BEE 5-star rated appliances-** State Government shall issue directives to all government offices and buildings owned by UT government to replace all appliances which are lower than 5-star rated or purchased/installed before 2015 with BEE 5-Star rated appliances. The Power Department will provide advisory support to the Public Works Department (PWD) for the installation of new BLDC (Brushless Direct Current) fans.
3. **Phase-wise plan for replacement of existing inefficient appliances (lower than 5 Star Rated) with BEE 5-star rated appliances in all buildings, through DSM schemes** Development of phase-wise Demand Side Management (DSM) plan based on the consumer's priority and market scenario shall be developed in consultation with DISCOMs. Implementation can be done with the support of DISCOM's and various ESCOs listed with the UT government.
4. **Workshops & Campaigns on behavioral change interventions for energy conservation –** Capacity building of these stakeholders is key to develop a market environment for energy efficient appliances. State Government shall

organize workshops at various levels to encourage people for behavioral change and run mass campaigns to reach out maximum people to increase awareness about benefits of behavioral changes and promote Lifestyle for Environment (LiFE). Workshops and campaigns shall be carried out to target maximum people by organizing through online platforms, print media, social media, nukkad nataks, and radio jingles etc.

Strategy #3 Promotion of BEE Star Rating and Shunya Rating of Buildings

Implementation period: Long Term (Till FY 2031)

The Star Rating and Shunya Rating of buildings is currently at a voluntary stage which is used as a benchmarking system for buildings in order to classify them in terms of 'Star-Rating' & 'Shunya Rating' on the basis of their energy performance. It is proposed that to promote Star Rating & Shunya Rating in all government & commercial buildings and conduct an assessment for their energy performance along with the ECBC Compliance process. Assessment of buildings on a scale of 1-5 stars or Shunya Rating will promote the development of energy efficient buildings in the UT. Certification of Star Rating or Shunya Rating can be provided based on this assessment.

Table 11: Moderate and ambitious scenarios for BEE Star Rating and Shunya Rating of Buildings

Particulars	Moderate Scenario	Ambitious Scenario
Energy Saving Potential (Mtoe)	0.0003	0.0004

Implementing Agency: Bureau of Energy Efficiency; EE&REM; Department of Housing & Urban Development

Actionable Items:

1. **Issuance of directives to all government departments to conduct energy audits and target to achieve BEE Star Rating for their buildings**-

   UT Government shall issue directives to all government departments and buildings owned by UT government to conduct energy audit and implement energy conservations measures and target to achieve BEE Star Rating or Shunya Rating for their buildings.

2. **Periodic energy audits for commercial buildings on load basis and incentives on achieving specific level of star rating for buildings**-

   A notification from UT Government shall be issued for conducting mandatory energy audits of commercial buildings based on their connected load and incentives can be given on the achievement of star rated energy efficient buildings to encourage more building owners to reduce their EPI and save more energy.

3. **Capacity Building of Architects & Building Professionals and Developers**-

   Capacity building programs of Architects & Building Professionals and Developers will ensure to increase the technical capacity of and awareness about innovative technologies. Capacity building of these stakeholders is key to developing a market environment for energy efficient buildings. The capacity building programs can be taken up periodically, preferably quarterly. Capacity building workshops may be carried out either district-wise or zone-wise and target maximum stakeholder to participant in these programs.

4. **Market Outreach for Star & Shunya Rating by Radio Jingles, Social Media Awareness-**

   Promotion of the Star & Shunya Rating is an important part of promoting energy efficiency in buildings. In order to increase awareness about these rating program, promotion campaigns shall be carried to reach masses by advertising in print media, social media, conduct nukkad nataks, plays and run radio jingles etc.

5. **Mandatory minimum set point of 24 degrees for air conditioners in all government buildings –** The Bureau of Energy Efficiency has been raising awareness on the energy savings and cost benefit of lowering the operating set point of air conditioners and have advised consumers across the country to maintain set point on or above 24 degrees Celsius to ensure optimal temperature and energy consumption from the use of air conditioners. It is recommended that government departments take the lead in the implementation of this practice across the UT.
6. **Transformation of iconic government buildings to Net-Zero energy buildings -**Transforming government buildings to net zero will ensure maximum energy performance of these buildings. It will further boost the market and professional environment of sustainable construction products, energy efficient appliances, and energy audit and consulting services. The SOR of government construction projects can be regularly updated with energy efficient and climate responsible materials through the help of this strategy.

4.3. Energy Saving Targets & Monitoring Mechanism

The proposed strategies can together achieve maximum potential energy savings of 0.36 Mtoe by FY 2031. The energy saving and emissions reduction targets for the short term (till FY 2026) and long term (till FY 2031) for the industry sector under the two scenarios are shown in below table:

Table 12: Moderate and ambitious scenarios energy savings for buildings sector

Action Plan	Energy Savings in 2031 under moderate scenario (Mtoe)	Energy Savings in 2031 under ambitious scenario (Mtoe)
Effective implementation of ECSBC	0.0106	0.0179
Replacement program for inefficient appliances	0.1688	0.3376
BEE Star Rating and Shunya Rating of Buildings	0.0003	0.0004
Total	**0.1797**	**0.3559**

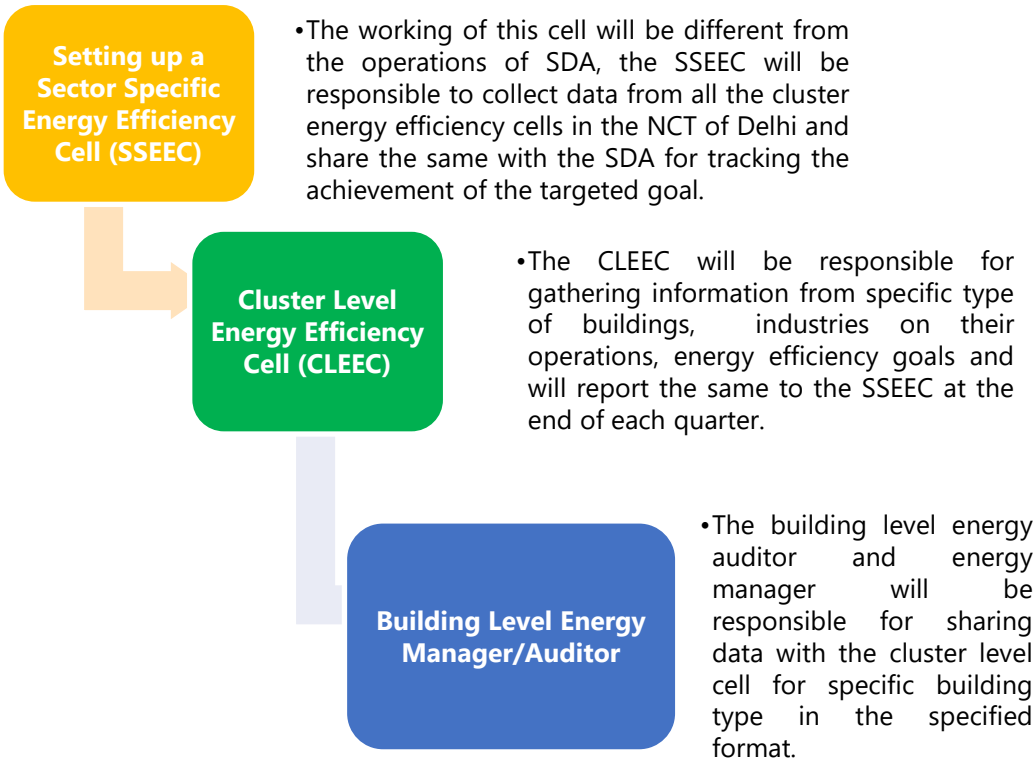
Monitoring Mechanism:

The monitoring framework for achieving the target of the building sector can be easily set up by defining annual reduction targets of the sectoral reduction goal. Monitoring of points mentioned below through the dashboard will support in monitoring of energy efficiency initiatives in the UT.

- Development of strategy-specific dashboards to monitor the impact and track progress of ECBC buildings, ENS buildings, Net Zero buildings in the UT and the energy savings achieved from these strategies.
- Regular reporting and updating of dashboard can be done with the support of EE&REM or ECBC/ENS cell.

- Development of dashboard to monitor the sale of different star-labelled appliances sold in a year categorized according to star rating level.

Mechanism for data collection and reporting from various clusters and various energy efficiency initiatives may be done through Setting up a Sector Specific Energy Efficiency Cell (SSEEC), Cluster Level Energy Efficiency Cell (CLEEC) and Building Level Energy Manager/Auditor.



TRANSPORT SECTOR

5. Focus Sector 2 – Transport

5.1. Current Scenario

The total number of motor vehicles including 2 Wheelers, 3 Wheelers, LMVs, 4 Wheelers, Buses and Heavy Vehicles registered in NCT of Delhi as in 2018 was 110.58 lakh, showing the growth of 6.6% to the previous year. Buses, Cabs and Auto are the backbone of public transport in Delhi, which runs on CNG/Electricity. The Transportation sector in Delhi is growing, with the rise in the total usage of electricity, several policies are being made for the NCT of Delhi to reduce the energy consumption in the transportation sector.

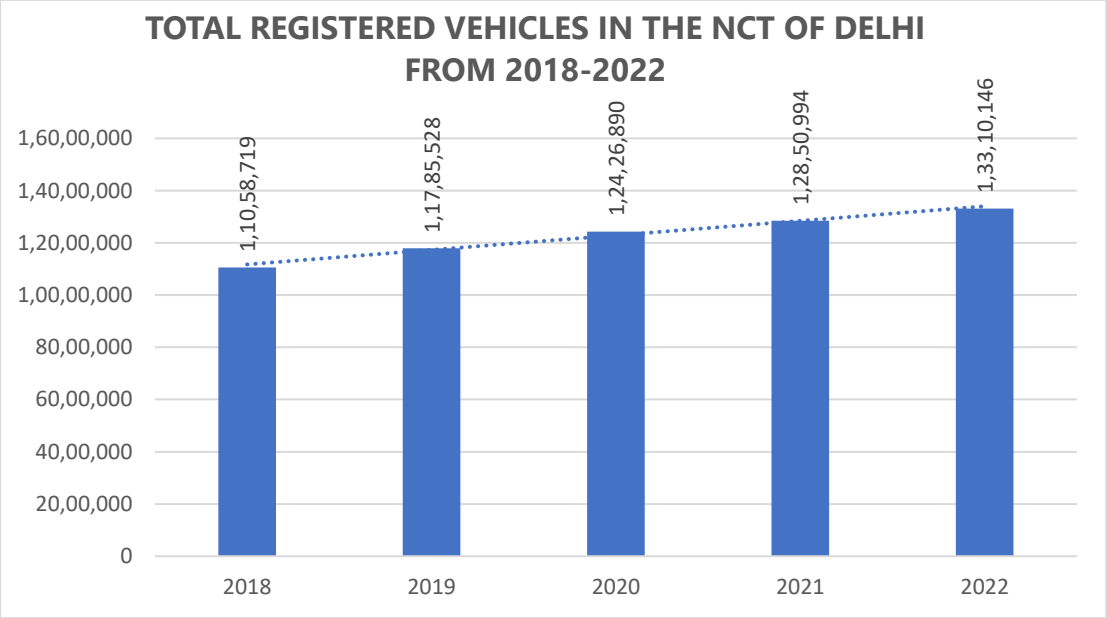


Figure 17: Total No. of Registered Vehicles in the NCT of Delhi

The break-up of the various type of vehicle shows that the two-wheelers (67%) make up the largest share in the vehicle category type.

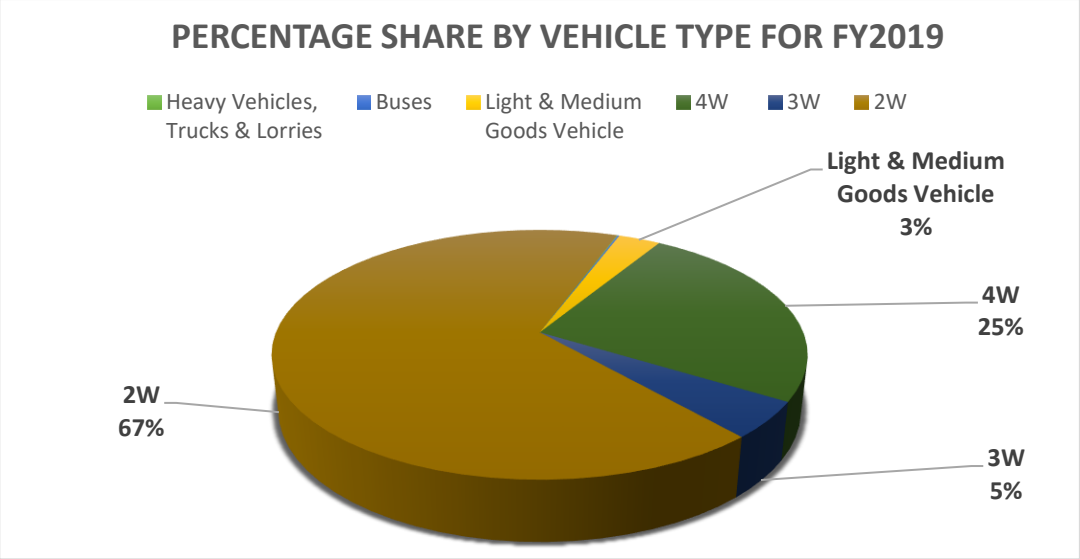


Figure 18: Percentage Share by Vehicle Type For FY2019

The next-highest is four-wheeler vehicles at 25%. Delhi EV Policy is targeting the all categories of vehicles and encouraging the transion of large percentage on vehicles into electic vehicles.

Delhi is adopting electric vehicles at very rapid rate. Most of the government departments are purchasing electric vehicles for their departments and private transporters are also including EVs in their existing fleet. DMRC procured 100 AC E-buses to be operated on 10 new routes under FAME-2 scheme. Similarly, Delhi Transport Corporation (DTC) also added 1600 electric buses fleet operating in the Union Territory, and set a target of reaching 5,000 EV buses by 2025[7]. In order to encourage more people towards EV section, UT & Central government continuously developing a robust EV Charging infrastructure in Delhi.

In terms of EV charging infrastructure, the cumulative updates in the BSES Rajdhani Power Ltd (BRPL) area are as follows:

Table 13: EV Charging Infrastructure in BRPL Area

S No	E - Vehicle	Values
1	Four-wheeler	16
2	Three-wheeler	12
3	E-rickshaw	1
	Total	**29**

[7] *As per the data provided by the office of Delhi Transport Corporation (DTC)*

The Charging points in the BRPL area include:

Table 14: EV Charging Points in BRPL Area

S No	Particulars	Points
1	Public charging points[8]	1219
2	Private charging points[9]	942
3	Captive charging points	278
4	Battery swapping stations	184

The total number of EV connections is 2,365, with a total EV load of 66 MW.

As of July 2024, the cumulative updates on EV charging installations in the BSES Yamuna Power Limited (BYPL) area are as follows:

Table 15: EV Charging Infrastructure in BYPL Area[10]

S No	Particulars	Points	Location
1	Public	604	126
2	Semi Public	42	12
3	Private Single Window	389	118
4	Captive charging	187	132
5	Battery swapping	48	44

In addition, Tata Power-DDL has made significant strides, with a total of 1,959 EV charging connections installed by July 2024[11].

These developments on EV charging infrastructure reflect Delhi's commitment to fostering a sustainable electric mobility ecosystem, bolstered by an expanding network of charging stations to accommodate the growing number of electric vehicles on the road.

[8] Public Charging stations set up as per MoP guidelines published in FY19 / Shared by BRPL
[9] Private Charging program launched on 8th Nov 2021 / Shared by BRPL
[10] Data as shared by BYPL
[11] Data as shared by TPDDL

While electric vehicle infrastructure is rapidly expanding, overall vehicle registrations in the Union Territory have also shown consistent growth.

The data sourced from the Vahan Dashboard indicates that the number of registered vehicles in the UT have increased from with an Average Annual Growth Rate (AAGR) of 4.87% from FY2018 to FY 2021. This AAGR is further treated as CAGR to project the number of vehicles in FY 2030.

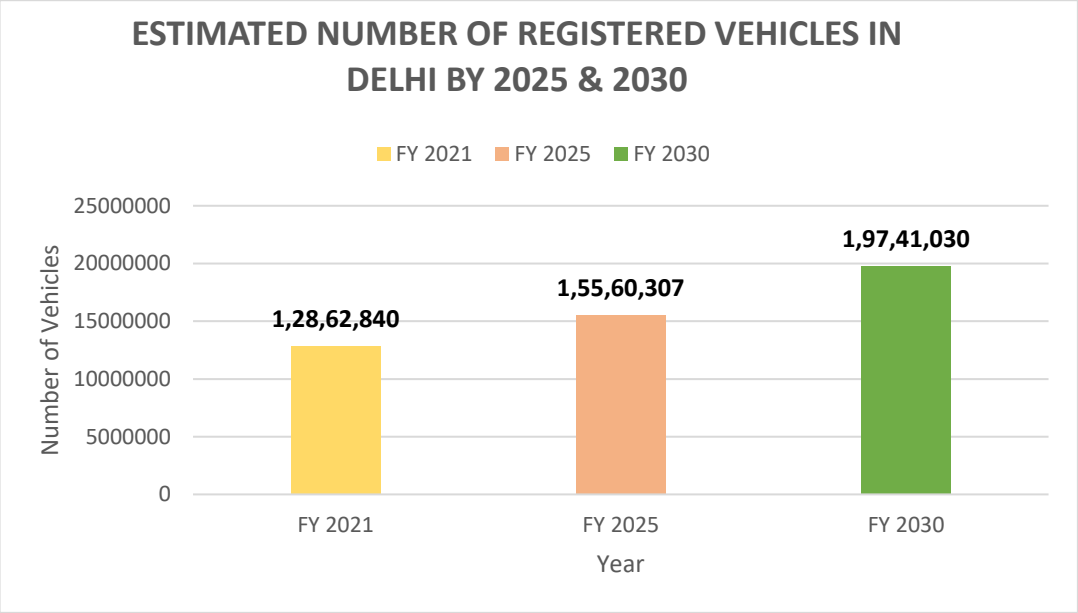


Figure 19: Projected Number of Registered Vehicles in Delhi by 2030

5.2. Strategies in the Transport Sector

In line with the Delhi EV Policy 2020, the long-term strategy for Electric Vehicle Transition has been proposed for NCT of Delhi. The policy and the proposed strategy encompass a number of aspects of the transport sector ranging from incentives to consumers to undergo EV transition, converting UT's bus fleet to electric, electric transition in logistics transport, and development of charging station across the NCT of Delhi. Ethanol blending in petrol is proposed as another strategy to bring about emissions reduction in the transport sector. The strategy has been proposed in line with the national policy on ethanol blending.

Strategy #1 Infrastructure Development for EV charging stations and Incentives to Consumers for quick transition to EVs

Implementation Period: Long Term (Till FY 2031)

The transition to Electric Vehicles (EVs) across all segments of vehicles will be instrumental in decarbonization of the sector and in bringing significant savings in fossil-fuel based energy consumption. In this strategy, it is proposed to convert new vehicles registered in the UT till FY 2031 to electric vehicles along two different scenario trajectories, namely moderate scenario and ambitious scenario. The highest EV conversion rate is proposed for 2-wheelers because of it having the highest share in registered vehicles and taking into consideration the availability and affordability of 2-Wheeler electric vehicles. The EV conversion considerations for moderate and ambitious scenarios are given in the below table.

Table 16: EV transition considerations for moderate and ambitious scenarios

Moderate Scenario	Ambitious Scenario
• 70% of conventional 2-Wheelers convert to electric by 2031 • 30% of conventional 4-Wheelers convert to electric by 2031 • 75% buses in the UT to transition to electric buses by 2031 • 75% of 3-Wheelers to convert to electric by 2031 • 25% of heavy vehicles (trucks and lorries) to convert to electric by 2031	• 90% of conventional 2-Wheelers convert to electric by 2031 • 50% of conventional 4-Wheelers convert to electric by 2031 • 100% buses in the UT to transition to electric buses by 2031 • 100% of 3-Wheelers to convert to electric by 2031 • 50% of heavy vehicles (trucks and lorries) to convert to electric by 2031

The EV transition strategy can result in potential energy savings of 0.113 Mtoe and 0.156 Mtoe in the moderate scenario and ambitious scenario respectively.

Table 17: Energy Savings and Emission Reduction Potential

Particulars	Moderate Scenario	Ambitious Scenario
Energy Saving Potential (Mtoe)	0.113	0.156

Implementing Agency: EER&EM, DISCOMs, PSUs and private sector

Actionable Items:

1. **Establishment of regulatory mechanism to develop EV charging Infrastructure** - There are several regulatory mechanisms that can be put in place to develop EV charging infrastructure in Delhi. Some possible approaches are mentioned below:
    - Incentives for private companies to install charging infrastructure: The government can provide incentives such as tax breaks or subsidies to private companies that install EV charging infrastructure in Delhi.
    - Public-private partnerships: The government can enter partnerships with private companies to develop and operate EV charging infrastructure. This can include agreements on revenue sharing, investment, and maintenance.
    - Zoning regulations: The government can zone certain areas of the city for EV charging infrastructure, such as near highways or in commercial areas, to ensure that the infrastructure is developed where it is most needed.
    - Time-of-use pricing: The government can introduce time-of-use pricing for EV charging to encourage drivers to charge their vehicles during off-peak hours when electricity is cheaper.
    - For determining the location of the charging infrastructure and for managing the significant impact of the load management. DISCOMs can be a part of the technical committee for the determination of the location along with load of the charging stations.

By implementing some or all of these regulatory mechanisms, the Delhi government can encourage the development of a robust EV charging infrastructure that will help to support the transition to electric vehicles in the UT.

2. Pilot projects on Battery Swapping stations -

As per the Delhi EV Policy 2020, Establishment of a wide network of charging stations and swappable battery station is on high priority, However, charging station infrastructure is developing at a rapid rate but battery swapping option need bit

more focus. It is proposed to develop 18,000 EV charging stations and battery swapping stations by 2025 and 30,000 EV charging stations and battery swapping stations by 2031 across Delhi. In the short term (till FY 2026). Out of the 18,000 chargers, it is proposed that 5,000 chargers will be of Level-1 type for 2-wheelers and 3,000 chargers shall be of Level-2 and DC type for 4-Wheelers and heavy vehicles along with pilot projects on battery swapping stations shall be established. Large number of charging stations recommended for 2 wheelers, keeping in view the high share of 2-Wheelers in the overall registered vehicles in the UT and the conversion of 90% 2-Wheelers to electric under the ambitious scenario. The installed EV charging stations are proposed to have a part of their charging load to be catered by renewable energy systems which would lead to savings in the upstream costs of the charging infrastructure.

To ensure a shorter period of return of investment (ROI), it is proposed that the EV chargers be installed in places with higher density of vehicles and commuting population such as public recreation places, malls and shopping complexes, public offices, Multi-Level Car Parking (MLCP), parking areas of bus stands, railway stations, metro stations and airports. Other action items include awareness programs for energy conservation technologies in the transport sector, and the introduction of demonstration or pilot projects on alternative fuel vehicles. Pilot projects will build the readiness of the UT in adapting to vehicles run by alternative fuels such as Hydrogen Fuel Cell Vehicles (HCV). The awareness programs and pilot projects include:

3. **Pilot projects on Hydrogen Fuel Cell Vehicles (HCVs)**

   Pilot projects on hydrogen fuel cell vehicles (HCVs) can be an effective way to explore the potential of this technology and to identify any barriers or challenges to its widespread adoption. The results of the pilot project should be shared with stakeholders, including the public, to raise awareness of the potential of HCVs.

4. **Installation of solar panels on rooftops or carports**

   The installation of solar panels on rooftops or carports offers a dual-purpose solution. It promotes clean energy for electric vehicles (EVs) and charging

stations while reducing fossil fuel dependency and greenhouse gas emissions. This initiative provides shaded parking, vehicle protection, and grid-connected electricity generation.

Strategy #2 Ethanol Blending Program

Implementation Period: Long Term (Till FY 2031)

The Ethanol Blending Program is proposed to ensure mixing of ethanol in motor spirit (petrol) in a fixed ratio to offset a part of the energy consumed by petrol and bring about reduction in emissions. In the proposed strategy and in line with the country's target of 20% blending of ethanol blending in petrol by 2031, a 10% blending target is suggested in the moderate scenario and a 20% blending target is suggested in the ambitious scenario. The ethanol blending can lead to potential fossil fuel energy savings of 0.21 Mtoe and 0.32 Mtoe in the moderate and ambitious scenarios respectively.

Table 18: Moderate and ambitious scenarios for ethanol blending

Particulars	Moderate Scenario	Ambitious Scenario
Energy Saving Potential (Mtoe)	0.21	0.32

Implementing Agency: Transport Department & Individual Departments

Actionable Items:

1. **Financial Assistance on Biofuel production plants (Capital Subsidy for MSMEs)–**

   To ensure a steady supply of ethanol for blending with petrol, it is recommended to offer financial assistance for the installation of biofuel production plants. Micro, small, and medium-sized enterprises (MSMEs) interested in setting up these plants could receive capital subsidies. The aim is to establish a strong supply chain for feedstock to meet production targets and create a supportive environment for ethanol blending in fuel. By promoting the growth of biofuel industries, new technologies can be introduced, and the market can be strengthened.

Strategy #3 Promotion of Standard and Labelling program of Tyres for Fuel Efficiency in Vehicles

The Bureau of Energy Efficiency (BEE) in India has implemented a standard and labeling program for tyres to promote fuel efficiency in vehicles The promotion of a standard and labeling program for tyres with regard to fuel efficiency in vehicles can be an effective way to encourage the adoption of more fuel-efficient tyres by consumers. In the proposed strategy, a replacement of tyres in 5% of the vehicles estimated by FY2031 in moderate scenario and 10% in ambitious scenario has been suggested. The strategy can lead to potential fossil fuel energy savings of 0.032 Mtoe and 0.063 Mtoe in the moderate and ambitious scenarios respectively.

Table 19: Moderate and Ambitious scenario for tyre replacement

Particulars	Moderate Scenario	Ambitious Scenario
Energy Saving Potential (Mtoe)	0.032	0.063

Implementing agency(s) – Bureau of Energy Efficiency (BEE); EER&EM

Actionable Items:

1. **Awareness campaigns:** The first step is to create awareness among consumers about the importance of fuel-efficient tyres and the benefits of using them. This can be done through advertising campaigns, social media, and other public outreach efforts. The government can provide education to consumers on how to maintain their tyres for optimal fuel efficiency. This can include tips on proper inflation, regular rotation, and alignment.

2. **Capacity Building of Tyre Manufacturer and Vehicle OEMs-** Capacity building workshops shall be organized in the NCT of Delhi to enhance the knowledge of Tyre Manufacturers and Vehicle OEMs about Star Rating of Tyre and its benefits and compliance methodology to encourage them to produce or use star rated tyres.

By promoting a standard and labeling program for tyres with regard to fuel efficiency, consumers can make informed decisions about which tyres to purchase, and manufacturers can be encouraged to develop more fuel-efficient tyre

technology. This can result in significant reductions in fuel consumption and greenhouse gas emissions, contributing to a more sustainable future.

5.3. Energy Saving Targets & Monitoring Mechanism

On the basis of the three strategies proposed for the transport sector, the total energy saving estimated is 0.355 Mtoe in the moderate scenario and 0.534 in ambitious scenarios. The potential savings under moderate and ambitious scenarios is the overall estimated savings from individual strategies under the respective scenarios and can be considered as the energy saving targets for FY 2031 for the Transport Sector.

Table 20: Moderate and ambitious scenarios energy savings for Transport sector

Strategies	Energy Savings in 2031 under moderate scenario (Mtoe)	Energy Savings in 2031 under ambitious scenario (Mtoe)
Standard and Labelling program of Tyres for Fuel Efficiency in Vehicles	0.113	0.156
Standard and Labelling program of Tyres for Fuel Efficiency in Vehicles	0.210	0.315
Standard and Labelling program of Tyres for Fuel Efficiency in Vehicles	0.032	0.063
Total	**0.355**	**0.534**

Monitoring Mechanism:

The monitoring framework for achieving the target of the transport sector can be easily set up by defining annual reduction targets of the sector. Monitoring of points mentioned below through the dashboard will support in monitoring of energy efficiency initiatives in the UT.

- Development of dashboard to monitor the sale of electric vehicles sold in a year categorized under 2-wheelers, 3-wheelers, 4-wheelers, buses, and heavy vehicles.
- The dashboard can also include city-wise mapping of EV charging infrastructure across the UT.
- The dashboard may be scalable to include alternative fuel vehicles such as Hydrogen Fuel Cell Vehicles.

Mechanism for data collection and reporting from various clusters and various energy efficiency initiatives may be done through Setting up a Sector Specific Energy Efficiency Cell (SSEEC) and Cluster Level Energy Efficiency Cell (CLEEC).

Setting up a Sector Specific Energy Efficiency Cell (SSEEC)

- The working of this cell will be different from the operations of SDA, the SSEEC will be responsible to collect data from all the cluster energy efficiency cells in the NCT of Delhi and share the same with the SDA for tracking the achievement of the targeted goal.

Cluster Level Energy Efficiency Cell (CLEEC)

- The CLEEC will be responsible for gathering information and will report the same to the SSEEC at the end of each quarter.

INDUSTRY SECTOR

6. Focus Sector 3- Industry

6.1. Current Scenario

Delhi State Industrial Infrastructure Development Corporation (DSIIDC) is the Agency for development, operation, and maintenance of all industrial estates in the NCT of Delhi. There is a total of 1,78,079 MSME registered in Delhi. This includes 1,56,843 micro enterprises, 18,715 small and 2,521 medium enterprises.[4] There are 29 approved industrial areas and four flatted factory complexes in the NCT of Delhi.

Delhi is registered in three Major Industry groups, which are as follows:[12]

i. Textiles Products
ii. Basic Metal & Alloy
iii. Metal Products and Parts Machinery

The government of Delhi has evolved over the years the role of a facilitator in the development of the industries in the NCT of Delhi. The mission is to promote, encourage and develop environmentally friendly MSMEs in the NCT of Delhi. It has recorded a rapid growth in production, exports, and employment. This Sector has proven vast potential to play a leading role in the overall development of the national economy.

6.2. Energy Efficiency Strategies in the Industry Sector

This section presents the proposed strategies in the prominent sectors and focus areas identified in the industry sector along with their impact in terms of energy efficiency.

Strategy #1: Energy Efficiency Interventions in MSME clusters

Implementation Timeline: Short Term (Till FY 2026) for lower coverage; Long Term (Till FY 2031) for higher coverage.

The strategy is proposed for the Small and Medium Enterprises (SME) sector industries which consist of MSMEs in identified prominent sectors such as Textiles,

[12] *Economic Survey of Delhi 2021-22*

Metal Alloy and Machinery Parts clusters for moderate scenario and in addition to moderate scenario Paper, Rubber Plastic, Leather Products and food products in ambitious scenario. The strategy would involve the implementation of energy efficient technologies and new & innovative decarbonization technologies in the market to enable SMEs to meet their energy saving targets.

It was assumed that 50% of industries will be able to adopt the strategy in a moderate scenario and 70% industries will be covered in the ambitious scenario. The strategy is expected to result in energy savings of 0.055 Mtoe and 0.114 Mtoe in the moderate and ambitious scenarios respectively.

Table 21: Moderate and ambitious scenarios

Particulars	Moderate Scenario	Ambitious Scenario
Energy Saving Potential (Mtoe)	**0.055**	**0.114**

Implementing agency(s) – Bureau of Energy Efficiency (BEE); EER&EM, DSIIDC

Actionable items:

A number of action items will need to be adopted by the relevant departments and implementing agencies to achieve the energy savings estimated for this strategy. These action items include:

1. **Workshops on technology interventions for energy conservations in MSMEs –** It is proposed to organize cluster wise workshops for MSMEs on technology interventions that can be implemented in respective industries. It is important to disseminate technical information about new technologies among owners and maintenance team of MSMEs so that they can implement the latest technologies in their units.
2. **Carrying out energy and resource-mapping studies in MSME clusters** – For the industries not covered under PAT, there is a challenge in reporting accurate energy consumption data for individual clusters or sub-sectors. Understanding of energy consumption patterns in the clusters is necessary to ensure optimized allocation of resources and assess the feasibility of technology implementation in a particular cluster. Energy and resource-mapping studies are comprehensive studies on MSME clusters and sub-sectors that can give insights into the current

status of technology implementation in the cluster, set benchmark energy consumption, design threshold limits for a PAT-like scheme, and analyze the future potential of technology implementation in terms of energy and cost savings. Energy and resource-mapping studies are proposed to be carried out in the prominent MSME clusters and industry sub-sectors of the UT annually to set benchmarks and track progress in the implementation of this strategy.

3. **Demonstration projects on latest Energy Efficiency Technologies in SME clusters –** Demonstration projects are proposed to be carried out every year on a periodic basis in all prominent SME clusters to promote these technologies and make stakeholders aware about the monetary and energy performance impact of these technologies.
4. **Periodic standardized energy audits for MSMEs on load basis and reimbursement of energy audit cost with a maximum cap** – Government of NCT of Delhi shall develop a standard format of energy audit and issue notification for conducting mandatory periodic (in every 3 Years) energy audits by every unit above a certain limit of connected load. The government can also provide reimbursement of energy audit cost with a maximum cap of INR 75,000. Monetary support to small industries and MSMEs can be provided to maintain the standard of conducted energy audit.
5. **Sector-specific policy development for financial assistance on implementation of ECMs suggested in energy audit-** A policy shall be developed at UT level to provide the financial assistance for implementation of ECMs recommended in the energy audits. Policy development shall consider the sector specific requirements, energy saving potential of sector and its importance in UT level GSDP. DISCOMs should be considered as a Nodal Point for the facilitation of Energy Audit to carry out the EE measures.
6. **Issuance of directives for implementation of ISO 50001, Energy Management System in organizations on load basis-** ISO 50001 is an international standard that outlines the requirements for an energy management system (EnMS). It provides a framework for organizations to establish, implement, maintain, and improve energy performance and efficiency. UT Government shall issue directive to all units in UT which are above a limit of

connected load, to implement ISO 50001 and adopt Energy Management System in organizations. Implementation of ISO 50001 can help organizations identify and address energy efficiency opportunities, reduce energy consumption and costs, and improve their environmental performance.

7. **Phase wise plan to implement DSM scheme for replacement of existing inefficient (non-star rated) pumps through DISCOMS-**

   UT government department shall develop a demand side management (DSM) plan to replace all existing pumps which are lower than 3-star rated or purchased/installed before 2015 with BEE 5-Star rated appliances. Phase wise plan can be executed through DISCOMs or listed ESCOs in the UT.

8. **Installation of solar panels on rooftops**

   The integration of rooftop solar installations enables MSME clusters to access sustainable and renewable energy sources, reducing their dependency on traditional electricity grids and promoting a greener and more energy-efficient ecosystem. This shift to solar power not only mitigates the environmental impact of industrial operations but also leads to a significant decrease in carbon emissions, fostering a manufacturing landscape that is more sustainable and environmentally friendly.

6.3. Energy Saving Targets & Monitoring Mechanism

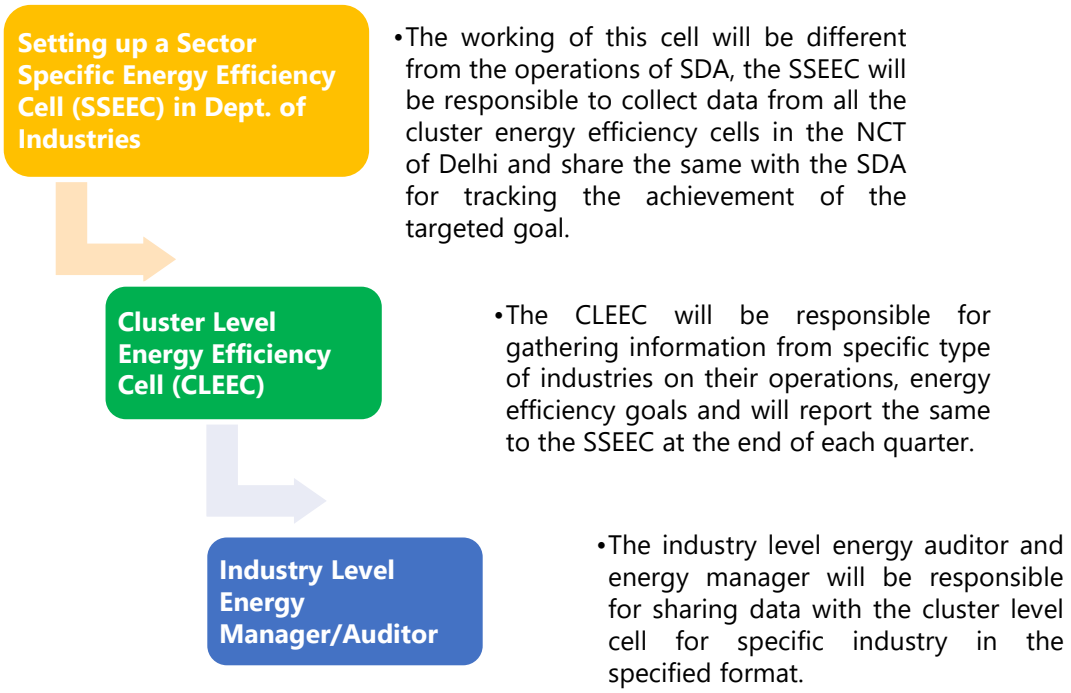
On the basis of the three strategies proposed for the industry sector, the total energy saving estimated is 0.055 Mtoe in the moderate scenario and 0.114 in ambitious scenarios. The potential savings under moderate and ambitious scenarios is the overall estimated savings from individual strategies under the respective scenarios and can be considered as the energy saving targets for FY 2031 for the Industry Sector.

Table 22: Moderate and ambitious scenarios energy savings for Industry sector

Strategies	Energy Savings in 2031 under moderate scenario (Mtoe)	Energy Savings in 2031 under ambitious scenario (Mtoe)
Energy Efficiency Interventions in MSME clusters	0.055	0.114
Total	**0.055**	**0.114**

Monitoring Mechanism:

The monitoring framework for achieving the target of the industry sector can be easily set up by defining annual reduction targets of the sectoral reduction goal. The reduction target verification can be later done for monitoring the following for each quarter:



7.Market Potential in Focus Sectors

The energy saved as a result of the proposed strategies in all sectors will lead to avoided generation of equivalent amount. In order to implement the suggested strategies, there will be a need for investments in energy efficiency projects, development of new policies, and modification of existing policies. In order to estimate the investment potential generated from the suggested strategies in the focus sectors, the equivalent cost of the saved energy in terms of metric tonnes of oil equivalent has been calculated. The Ministry of Power, Government of India, in consultation with the Bureau of Energy Efficiency (BEE) has notified the price of per metric tonne of oil equivalent as INR 18,402 only for the year 2018-19. The same amount has been applied to energy savings under ambitious scenario for the estimation of maximum investment potential. Total energy saving potential by implementing various strategies in NCT of Delhi is shown in the graph below:

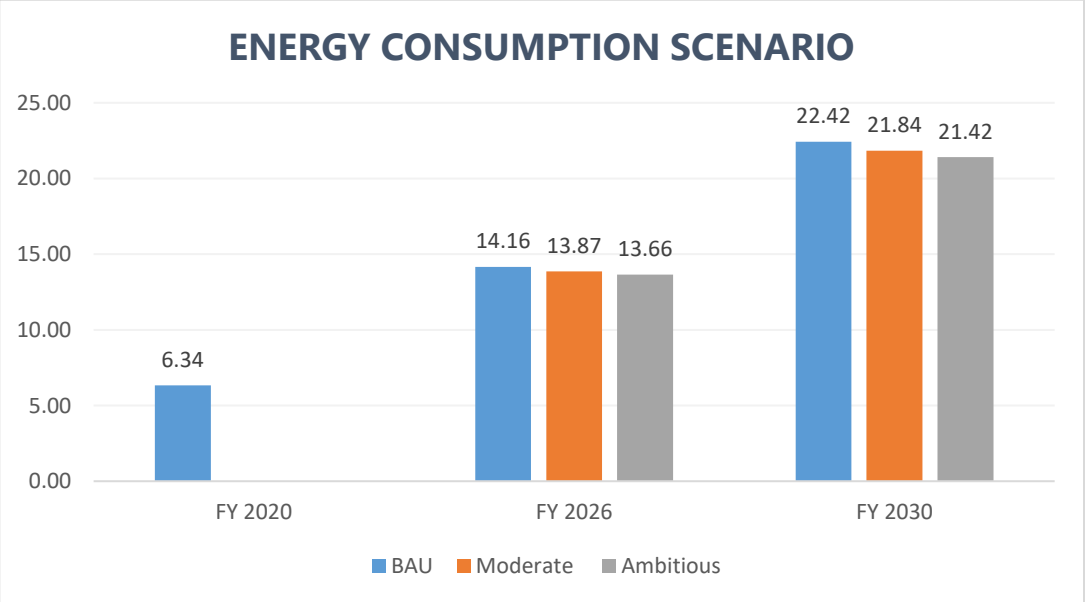


Figure 20: Energy Consumption Scenario (Mtoe)

It is estimated that with the implementation of various proposed strategies of Building, Transport and Industry Sectors, energy saving of 0.589 Mtoe in moderate scenario and 1.004 Mtoe in ambitious scenario can be achieved. This translates to a 2.63% energy saving in the moderate scenario and a 4.48% energy saving in the ambitious scenario by FY2031.

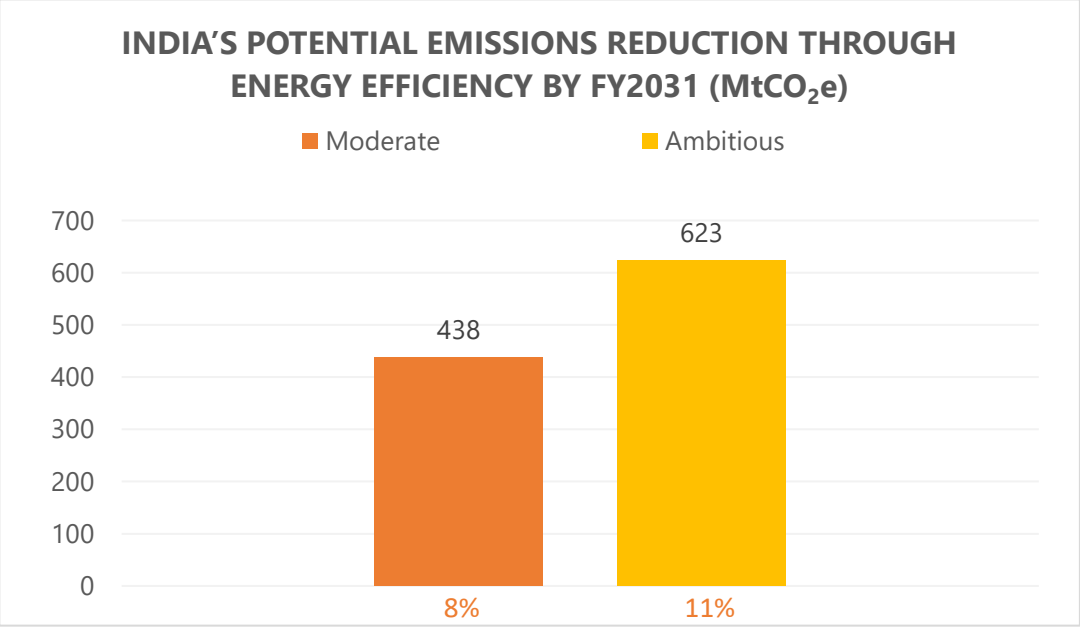
Table 23: Summary of Energy Savings, Emissions Reduction, and Investment potential

Sectors	Energy Saving Potential (Mtoe)		Emission Reduction Potential ($MtCO_2$)		Market Potential (INR Crore)
	Moderate	Ambitious	Moderate	Ambitious	
Buildings	0.180	0.356	0.562	1.114	655
Transport	0.355	0.534	1.111	1.673	983
Industries	0.055	0.114	0.171	0.356	209
Total	0.589	1.004	1.844	3.142	1,848

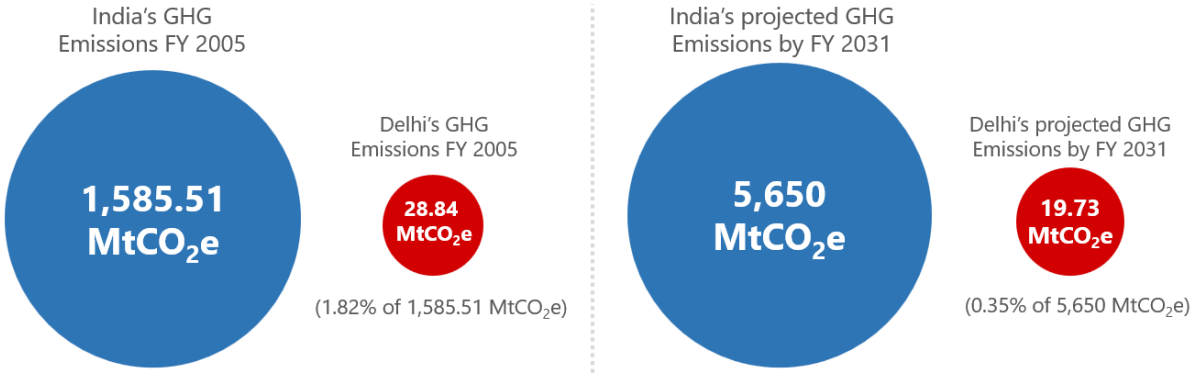
8. Emissions Reduction Potential

India's emissions grew at a CAGR of 4.90% from 1,586 $MtCO_2e$ in 2005 to 2,953 $MtCO_2e$ in 2018.[13] According to the findings of the "India's GHG profile: Results of five climate modelling studies", [14] projected emissions in India by FY2031 are estimated to range from 4.00 to 7.30 $GtCO_2e$. Additionally, per-capita CO_2e emissions in FY2031 are expected to be between 2.77-3.9 tons per capita, which is significantly lower than the global average of 4.22 tons per capita recorded in 2005.

The UNNATEE report, while emphasizing on the energy savings in each of the demand sectors, brings out the emission reduction that is possible through the adoption of efficient energy-saving practices, adoption of novel technologies and better enforcement of existing policy and programmes. The emission savings projections under the moderate and ambitious scenarios are 438 and 623 $MtCO_2e$ respectively by FY2031. This gives a percentage reduction of 8% and 11% in moderate and ambitious scenario respectively out of the total emissions of 5,650 $MtCO_2e$ by FY2031.

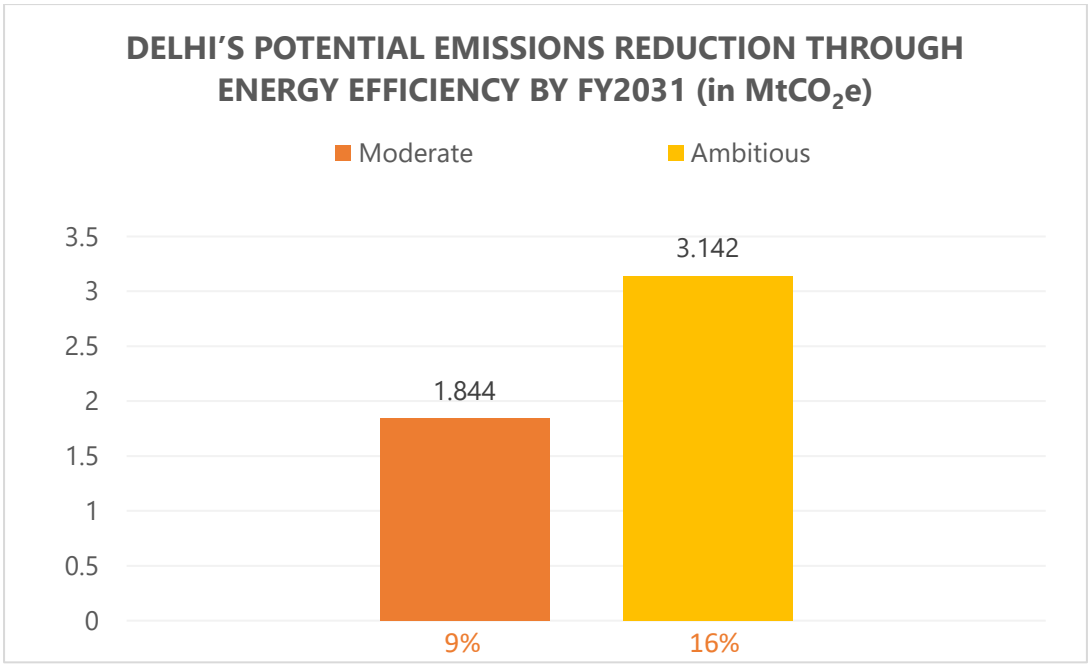


[13] *https://www.ghgplatform-india.org/wp-content/uploads/2022/09/GHGPI_Trend-Analysis_2005-to-2018_India_Sep22.pdf*
[14] *https://moef.gov.in/wp-content/uploads/2018/04/GHG_report_2.pdf*



Delhi's Emissions have been decreasing at CAGR of 1.45% from 28.84 $MtCO_2e$ in 2005 to 23.87 $MtCO_2e$ in 2018. The estimated emission by FY2031 is 19.73 $MtCO_2e$. The per capita emissions have also been decreasing at a CAGR of 3.78% from 1.85 tCO_2e per capita in 2005 to 1.12 tCO_2e per capita in 2018.[15]

Referring to **Table 23**, the NCT of Delhi has a potential emissions reduction of 1.844 and 3.142 $MtCO_2e$ through energy efficiency in moderate and ambitious scenarios respectively by FY2031. These reductions through the energy efficiency measures represent a percentage decrease of 9 % and 16% in the moderate and ambitious scenarios, respectively, compared to the total emissions of 19.73 $MtCO_2e$ estimated by FY2031.



[15] *https://www.ghgplatform-india.org/wp-content/uploads/2022/09/GHGPI_Trend-Analysis_2005-to-2018_Delhi_Sep22.pdf*

9. Way Forward

The state energy efficiency action plan, through the research and interaction with various stakeholders, identifies the need, opportunity, and the potential of energy efficiency in the NCT of Delhi. While addressing the key focus sectors – Industry, Building, and Transport, the action plan envisages to analyse consumption pattern, growth rates in alignment with GDP growth rate of the UT and potential strategies for achieving savings.

The action plan lays out a plan for the UT to implement the strategies, while at the same time being able to monitor implementation. It is imperative that implementation is carried out in the UT through various stakeholders.

A market-based mechanism is anticipated to be developed through the implementation of the action plan which drives energy efficiency through better availability of energy efficiency products, financial instruments for improving the product reach and a wider adoption of energy efficiency schemes and policies curated by both UT and central governments.

A collaborative approach, on the part of the government, industry and academia is the ideal way forward to implement the vision and targets of this action plan and continue to put the country on a high pedestal of energy efficiency achievements at the global platform.

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