MINISTRY OF POWER
GOVERNMENT OF INDIA

STATE ENERGY EFFICIENCY ACTION PLAN (SEEAP)

JAMMU & KASHMIR - ACTION PLAN

AUGUST 2023

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Azadi Ka Amrit Mahotsav

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(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.

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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. These 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 UT specific energy efficiency action plan to ensure that the allocation of resources is as per the requirement of UT that will help in meeting UT-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 UT of Jammu & Kashmir, SEEAP was developed under the guidelines of Bureau of Energy Efficiency, Ministry of Power, GOI and Power Development Department – Jammu & Kashmir 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 UT of Jammu & Kashmir.

In FY 2020, Jammu & Kashmir has total final energy consumption (TFEC) 3.53 Mtoe in which Non-power or Industrial coal consumption was 0.29%, followed by

46.80% oil consumption, 27.07% in terms of imported coal and 25.84% in terms of electricity. Based on energy consumption and economic growth of UT, total final energy consumption of UT is projected, and it is estimated that TFEC of Jammu & Kashmir in FY 2030 will be 6.90 Mtoe. On the basis of projected GSDP of the UT and projected energy consumption, Industry, Buildings, Transport and Agriculture 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:

Industry Sector:

- Energy Efficiency Intervention in Food Processing and Rubber & Plastic clusters

Buildings Sector:

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

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

Agriculture Sector:

- Transition of conventional diesel pumps to Solar powered pumps
- Replacement of old pumps (10 years old) or less efficient pumps (non-star rated) with 5 Star rated Pumps along with smart control panel

This action plan will result in a total energy consumption reduction of 0.37 Mtoe in the moderate scenario and 0.69 Mtoe in the ambitious scenario in the FY 2031. This plan will also create awareness at the mass level and create a market potential of approximate rupees 1,275 Crore in the field of energy efficiency and reduce the CO_2 emission by 1.17 $MtCO_2$ in moderate scenario and 2.17 $MtCO_2$ in ambitious scenario by FY 2031.

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. The size of the Indian economy in Fiscal Year (FY) 2020 was estimated to be INR 145 Lakh Crores at constant prices of 2011-12.[1] 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, 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.[2] India's primary energy supply in FY 2020 was recorded at 946.08 MTOE, with coal and crude oil being the largest contributors to the total primary energy. India's per capita emissions in FY 2020 were 1.82 tCO_2, having increased by 7% from its 2016 level of 1.7 tCO_2.[3] While India's per capita energy consumption and per capita emissions are well below the global average per capita emissions, it is greatly threatened by global warming and climate change.

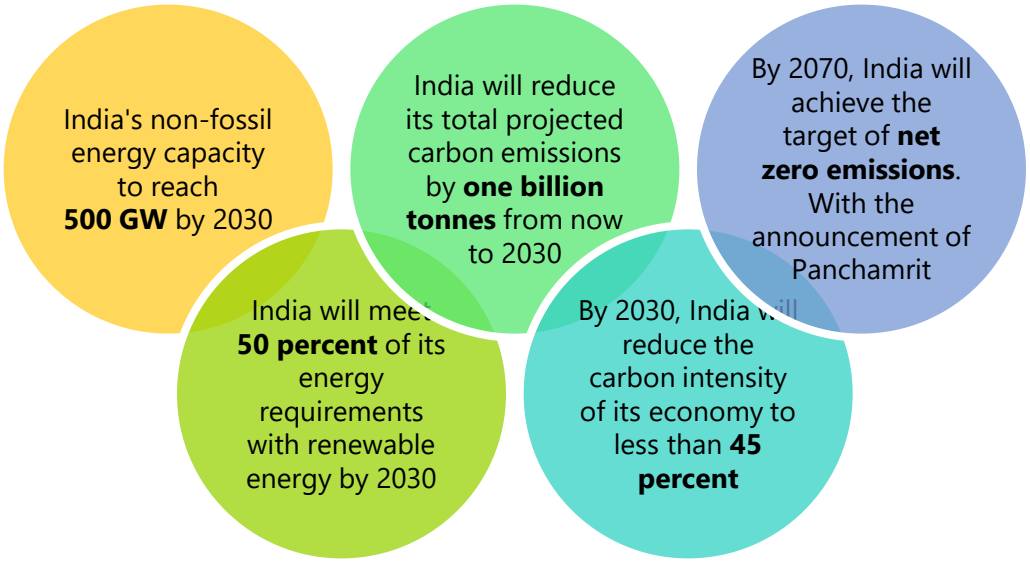
India has set ambitious economic goals for the future and achieving these goals is expected to result in significant increase in the country's energy demand and emissions. In view of this, India has also set ambitious goals for energy and climate performance. The country has also emphasized the importance of energy transition towards decarbonization 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

[1] *https://mospi.gov.in/sites/default/files/press_release/PressNoteNAD_28feb23final.pdf*
[2] *https://iea.blob.core.windows.net/assets/4ed140c1-c3f3-4fd9-acae-789a4e14a23c/WorldEnergyOutlook2021.pdf*
[3] *Calculated using primary energy input data from NITI Aayog and population projection data from MoHFW*

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:



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

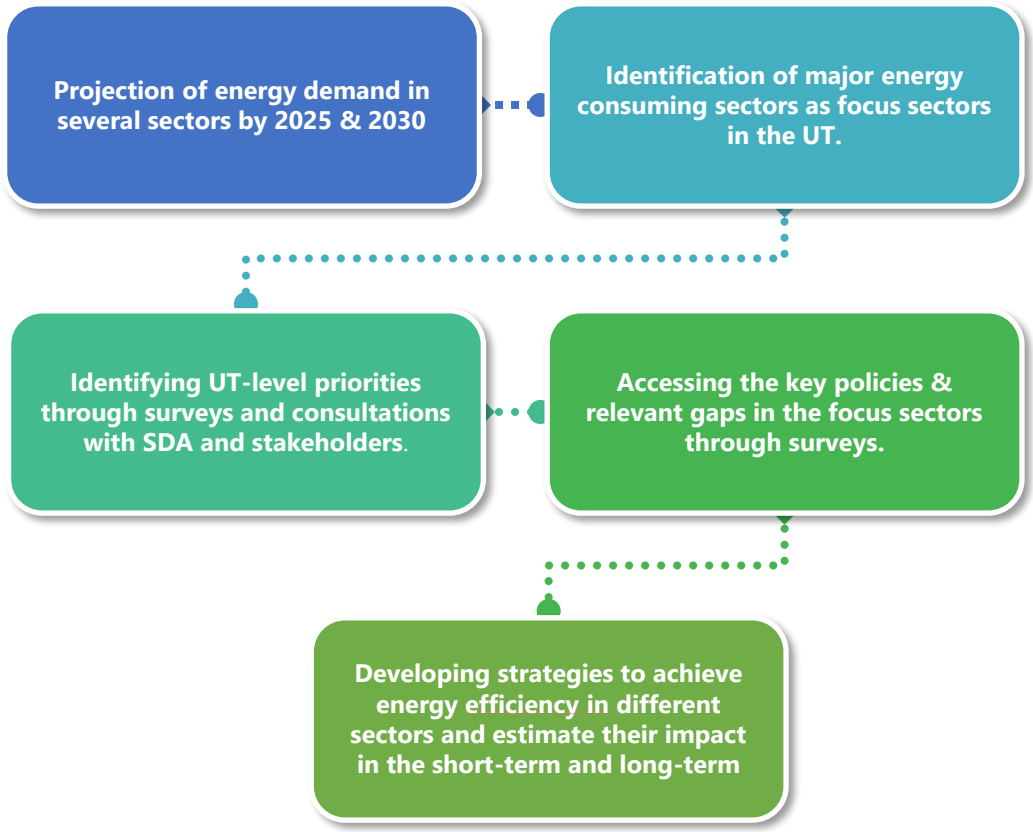
participate in the schemes to facilitate the achievement of the overall goal of reducing the energy intensity of the country.

On 1st November 2021, during the 26th United Nations Climate Change Conference of the Parties (COP26) in Glasgow, Prime Minister Narendra Modi introduced the idea of 'Lifestyle for the Environment (LIFE)'. He urged 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.

1.3. About SEEAP

The State Energy Efficiency Action Plan for Jammu & Kashmir is being developed by identification of focus sectors, to ensure that the allocation of resources is as per the requirement of Jammu & Kashmir and estimate the potential of energy conservation in sectors that are predominant in Jammu & Kashmir. 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 FY 2031 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 Jammu & Kashmir 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 UT of Jammu & Kashmir is situated in the northern part of India. The earlier State of Jammu and Kashmir was reorganized into two union territories, Jammu & Kashmir and Ladakh, with effect from 31 October 2019. Union Territory (UT) of Jammu and Kashmir lies to the north of Himachal Pradesh and Punjab and west of Union Territory of Ladakh. Jammu and Kashmir's economy is primarily services-based and agriculture-oriented. The union territory of Jammu and Kashmir consists of two divisions: Jammu Division and Kashmir Division and is further divided into 20 districts.

Figure 1: Geographic location of Jammu & Kashmir and its Districts

The vast majority of the union territory is mountainous, and the physiography is divided into five zones that are closely associated with the structural components of the western Himalayas. The natural beauty and picturesque locations have made it a favored destination for tourists across the world. Jammu is famous for its temples, while Kashmir Valley is known for its lakes and gardens. Jammu & Kashmir has agro-climatic conditions best suited for horticulture and floriculture. Horticulture is the mainstay of the rural economy, providing employment to large numbers of local inhabitants.

Table 1: Basic Statistics of Jammu & Kashmir

S. No.	Particulars	Unit	Number
1	Area	Sq. Km	2,22,236
2	No. of Districts	Number	20
3	No. of Divisions	Number	2
4	(Population 2011 Census)		
A	Total Population	Lakh	125.41
B	Rural Population		91.08
C	% of Rural to Total Population	%	72.62
D	% of Urban to Total Population	%	27.38
5	Municipal Corporations	Number	2
6	Tehsils	Number	82
7	Panchayats	Number	4,198
8	Density	People/Sq. Km	56

Source: *J&K at a Glance: www.jk.gov.in/jammukashmir*

1.5. State Energy Scenario

Jammu & Kashmir is endowed with abundant natural resources that have the potential to provide ample energy to the UT. The UT's energy mix is diverse, with both conventional and renewable sources of energy contributing to its overall energy supply. However, renewable sources are contributing majorly with respect to conventional sources. An overview of the UT's energy scenario of Jammu & Kashmir is as follows:

Power Generation

Jammu & Kashmir has major hydroelectric power plants for electricity generation and solar power as renewable sources of energy.

For the UT of Jammu & Kashmir, power generation plants are owned and operated by the UT government, central government, and independent power producers. The electricity generation from UT-owned power plants is looked after by J&K State Power Development Corporation Ltd. which was carved out of the Power Development Department in 1995.

The estimated hydropower potential of the UT is 20,000 Megawatts (MW), of which about 16,475 MW have been identified. This comprises 11,283 MW in the Chenab basin, 3,084 MW in the Jhelum basin 500 MW in Ravi Basin and 1,608 MW in the Indus basin. Out of the identified potential, only 3,263.46 MW (19.80% of identified potential) has been exploited so far, consisting of 1,211.96 MW in from 21 hydropower projects of the UT of Jammu & Kashmir, 2,009 MW in Central Sector from 7 projects, and 42.5 MW in the private sector from 4 projects. Apart from Hydro- electric power plants, Jammu & Kashmir has other energy source power plants as well like Natural Gas plants, Renewable energy plants, Diesel power plants, etc. however the dominating power generating plants are Hydroelectric plants due to their abundant potential in the UT.

S.No.	Power Plant Category	Capacity (MW)	%-Contribution
1	Hydroelectric power plant	3,263.46	89.1%
2	Renewable energy power plant	200	5.5%

S.No.	Power Plant Category	Capacity (MW)	%-Contribution
3	Natural Gas power plant	175	4.7%
4	Diesel power plant	26	0.7%
Total power plant capacity (MW)		**3,664.46**	

Table 2: Power plant capacities of J&K[4]

Hydroelectric power plants are contributing 89% of total power plant capacity, following are the hydropower plant generation capacities in the UT on the basis of ownership:

- Operated by JKPDCL: 1,211.96 MW
- Operated by Independent Power Producers: 42.5 MW
- Operated by NHPC (National Hydroelectric Power Corporation): 2,009 MW

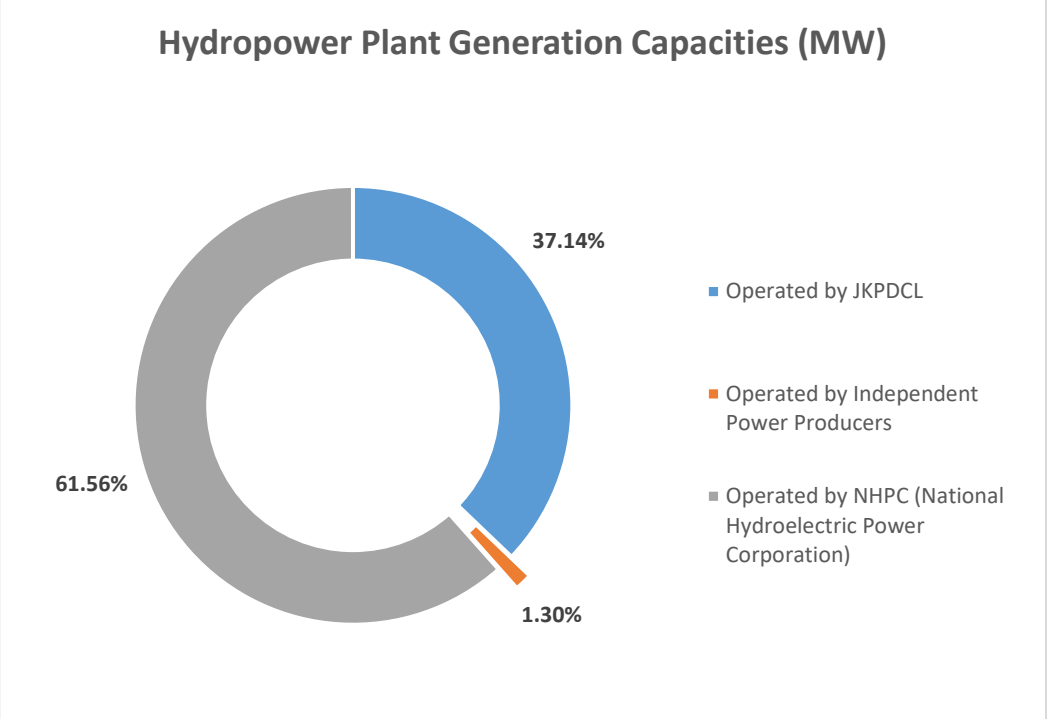


Figure 2: Hydropower plant capacities - Ownership (MW)

Bifurcation of **Hydropower** plants owned by **UT, Central Government & Independent Power Producers:**

[4] *https://pdd.jk.gov.in & NITI Aayog Dashboard*

Table 3: Hydropower plant capacities (UT of J&K)[5]

Power Plant	Configuration	Installed Capacity (MW)
HYDROPOWER PLANTS BY UT SECTOR		
Jhelum River Basin		
Lower Jhelum	3 x 35	105
Upper Sindh-I	2x11.3	22.6
Ganderbal	2x3 2x4.5	15
Upper Sindh-II	3x35	105
Pahalgam	3x1.5	4.5
Karnah	2x1	2
Chenab Basin		
Chenani-I	5x4.66	23.30
Chennai-II	2x1	2
Chennai-III	3x2.5	7.50
Bhaderwah	3x0.5	1.5
Baghlihar Power Project	3x150 + 3x150	900
Ravi Basin		
Sewa-III	3x3	9
Indus Basin		
Iqbal	3x1.25	3.75
Hunder	2x0.20	0.40
Sumoor	2x0.05	0.10
Igo-Mercellong	2x1.50	3
Haftal	2x0.50	1
Marpachoo	3x0.25	0.75
Bazgo	2x0.15	0.30
Stakna	2x2	4
Sanjak	1 x 1.26	1.26
Total Capacity (MW)		**1,211.96 MW**
HYDROPOWER PLANTS BY CENTRAL SECTOR		
Salal HEP	6x115	690
Uri -I	4x120	480
Dul-Hasti	3x130	390
Uri-II	2x120	240
Chutak	4x11	44
Nimo-Bazgoo	3x15	45
Sewa-II	3x40	120
Total Capacity (MW)		**2,009 MW**

[5] *http://www.jkspdc.nic.in/beta/operational_projects.html*

HYDROPOWER PLANTS BY INDEPENDENT POWER PRODUCERS		
Independent power	42.5	42.5
Total Capacity (MW)		**42.5 MW**
TOTAL HYDROPOWER PLANTS (MW)		**3,263.46 MW**

Renewable Energy

Jammu & Kashmir (J&K) has significant renewable energy potential, primarily in the form of hydropower, solar, and wind energy. However, the UT faces several challenges in harnessing its renewable energy potential due to its complex terrain, inadequate transmission infrastructure, and security concerns.

Currently, the total installed renewable energy capacity in J&K is around 1,266 MW, out of which 1,235 MW is from hydropower, 27 MW from solar, and 4.5 MW from wind energy. The UT government has set a target of installing 7,500 MW of renewable energy capacity by 2025, with a focus on solar, wind, and small hydropower projects.

In recent years, J&K has taken several initiatives to promote renewable energy, such as offering various incentives and subsidies to investors, setting up a dedicated department for renewable energy, and implementing net metering policies to encourage rooftop solar installations. The UT has also signed several agreements with central government agencies and private developers to set up large-scale renewable energy projects.

Despite these efforts, there is still a long way to go to achieve UT's renewable energy targets. J&K needs to address its transmission infrastructure constraints, improve its policy framework for renewable energy, and attract more private sector investment to unlock its full renewable energy potential.

Solar Energy: Jammu and Kashmir (J&K) has significant potential for solar energy due to its high solar irradiation levels and vast open areas. However, UT's solar energy scenario is still in its early stages of development.

As of 2021, J&K has a total installed solar capacity of around 59.42 MW, which is a small fraction of its total power capacity. The UT has set a target of achieving 4500 MW of solar power capacity by 2022, which is an ambitious goal.

J&K's solar energy development has been hindered by various factors such as the high cost of solar energy projects, the lack of adequate infrastructure, and the limited availability of skilled manpower. Moreover, UT has challenging terrain with many remote and inaccessible areas, making it difficult to build and maintain solar energy projects.

To overcome these challenges, the UT government has taken several steps to promote solar energy, including offering financial incentives, simplifying regulations, and promoting public-private partnerships. The government has also announced plans to set up a 500 MW solar park in UT, which will be one of the largest solar parks in the country.

Wind Energy: Jammu and Kashmir (J&K) has significant potential for wind power generation, especially in its hilly areas and along its coastline. However, UT's wind power scenario is still in its early stages of development. As of 2021, J&K has a total installed wind power capacity of around 28.5 MW, which is a small fraction of its total power capacity. UT has set a target of achieving 4500 MW of renewable energy capacity by 2022, which includes wind power as well.

J&K's wind power development has been hindered by various factors such as the high cost of wind energy projects, the lack of adequate infrastructure, and the limited availability of skilled manpower. Moreover, UT has challenging terrain with many remote and inaccessible areas, making it difficult to build and maintain wind energy projects.

To overcome these challenges, the UT government has taken several steps to promote wind power, including offering financial incentives, simplifying regulations, and promoting public-private partnerships. The government has also announced plans to set up a 2000 MW wind power project in the UT, which will be one of the largest wind power projects in the country.

Bioenergy: Jammu and Kashmir (J&K) has significant potential for bioenergy production, especially in the form of biomass and biogas. However, UTs bioenergy scenario is still in its early stages of development. As of 2021, J&K has a few small-scale bioenergy projects, including biogas plants and biomass-based power plants. However, the total installed bioenergy capacity in UT is relatively low.

J&K's bioenergy development has been hindered by various factors such as the lack of adequate infrastructure, limited availability of feedstocks, and low awareness about the benefits of bioenergy. Moreover, UT has a challenging terrain with many remote and inaccessible areas, making it difficult to establish and maintain bioenergy projects.

To overcome these challenges, the UT government has taken several steps to promote bioenergy, including offering financial incentives, simplifying regulations, and promoting public-private partnerships. The government has also announced plans to set up a few large-scale bioenergy projects, including biomass-based power plants and biogas plants.

1.6. Energy Consumption Scenario (TFEC)

Primary Energy Demand

Table 4: Primary Energy Consumption (Mtoe)[6]

Primary Energy Consumption (MTOE)						
Source/Year	**FY2015**	**FY2016**	**FY2017**	**FY2018**	**FY2019**	**FY2020**
Oil	1.79	2.05	1.95	1.89	1.61	1.65
Coal (Non-Power/Industry)	0.03	0.02	0.01	0.04	0.02	0.01
Coal (Imported)	0.78	0.78	0.74	0.81	0.90	0.96
Coal (Captive)	0.00	0.00	0.00	0.00	0.00	0.00
Gas	0.00	0.00	0.00	0.00	0.00	0.00
Total	**2.61**	**2.86**	**2.70**	**2.73**	**2.54**	**2.62**

Oil Consumption: As of March 2020, the UT of Jammu & Kashmir consumed around 1,644 thousand tonne of petroleum products (equivalent to 1.65 Mtoe), which includes LPG, Kerosene, Petrol, Diesel, Furnace Oil, Low Sulphur Heavy Stoke and Pet Coke annually.

LPG is a clean-burning fuel commonly used for cooking and heating, while Kerosene is mainly used as a fuel for lighting and heating appliances. Petrol and diesel are the primary fuels used in transportation, while Furnace Oil is used for heating and power generation. Low Sulphur Heavy Stock (LSHS) is a residual fuel oil used in industrial boilers and power plants, while Pet Coke is a solid fuel used in cement and power plants.

This consumption of petroleum products indicates the high level of energy usage in Jammu & Kashmir, which is essential for UT's economic and social development. However, it also highlights the UT's dependence on fossil fuels, which has significant environmental and economic implications.

The continued reliance on fossil fuels can contribute to air pollution, climate change, and other environmental issues, while also making UT vulnerable to fluctuations in global oil prices. Therefore, there is a need to explore alternative

[6] *Coal (Coal Directory of India), Oil (Ministry of Petroleum & Natural Gas), Gas (MoPNG) and Electricity (CEA)*

energy sources and promote energy conservation measures to reduce UT's dependence on petroleum products.

Coal Consumption: As of March 2020, the majority of the coal consumed by the UT, around 1.72 million tonne, was imported coal, which indicates UT's dependence on imported coal to meet its energy needs. The imported coal consumption for Jammu & Kashmir is calculated using the average percentage of the industry sector's GSVA in UT and multiplying it with the total coal import (248 million tonne) in India. This method provides an approximation of the quantity of imported coal used by the industry sector in Jammu & Kashmir.

The remaining coal consumption can be classified into two categories: coal (non-power/industry) and coal (captive). Coal (non-power/industry) refers to the coal consumed by non-power industries, such as cement, Manufacturing, and other industries, for their production processes. The UT consumed 0.02 million tonne of coal (non-power/industry), which is equivalent to 0.01 Mtoe.

Coal (captive) refers to the coal consumed by industries for their captive use, such as for power generation or production processes. The UT consumed 0.02 million tonne of coal (captive), which is equivalent to 0.01Mtoe.

Gas Consumption: The consumption of natural gas in UT was minimal, with a total supplied gas (CNG) of 1,060 tonne equivalent to 0.001 Mtoe as of March 2022.

Natural gas is a clean-burning fuel that can be used in various applications such as power generation, heating, and transportation. However, the consumption of natural gas in Jammu & Kashmir seems to be significantly low and it approaches zero, and UT mainly relies on other sources of energy like petrol, diesel, LPG, and hydropower.

Overall, UT was heavily reliant on hydropower for electricity generation, with a growing focus on solar & wind power.

Secondary Energy Demand

Electricity Consumption: As of March 2020, the total electricity consumption in Jammu & Kashmir was 10,623 GWh per year. The peak demand usually occurs during the summer months when the use of air conditioning and other cooling appliances is more prevalent.

The UT had an installed capacity of around 3,664 MW as of March 2020, which included hydropower, and renewable energy sources (Small Hydro Project & Solar Energy).

Jammu & Kashmir energy mix includes a range of energy sources to meet the UT's electricity demand. While there is a significant dependence on hydropower, such renewable energy sources provide hope for a sustainable growth.

1.7. Overview of Institutional framework and stakeholder mapping

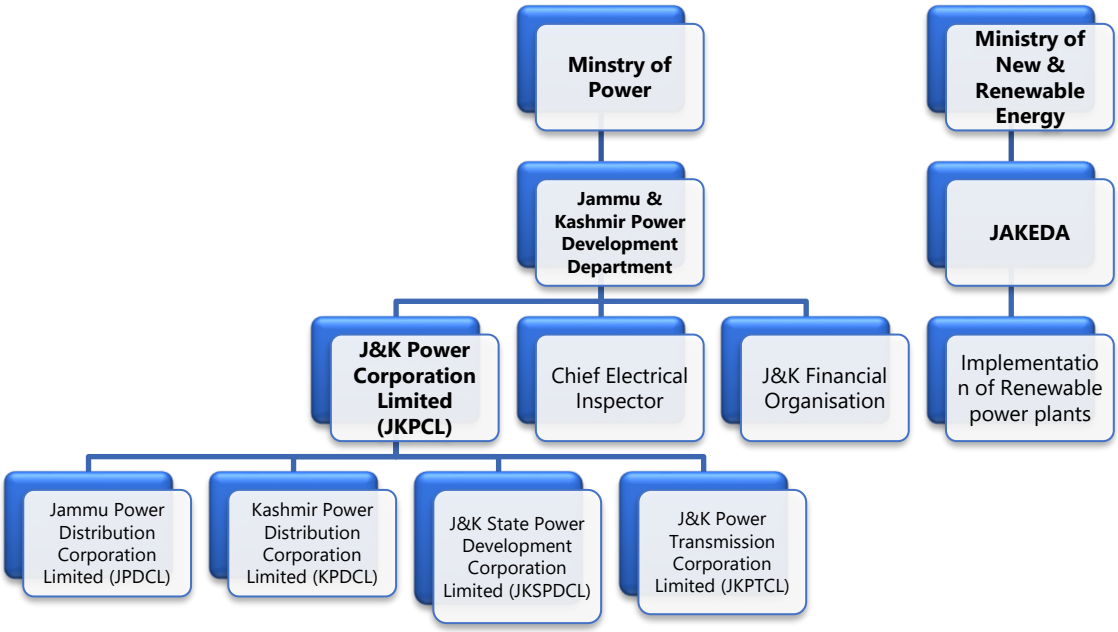
The Energy Conservation (EC) Act of 2001 establishes a legal framework for developing and executing energy efficiency (EE) policies and programs. The Act authorizes the Bureau of Energy Efficiency (BEE) to develop national policies and programs, and State Designated Agencies (SDAs) to administer EE programs and enforce EE norms and regulations at UT level.

Presently, Jammu & Kashmir Power Development Department (JKPDD) looks after Transmission and Distribution functions. Two Electric Maintenance and Rural Electrification (EM&RE) wings look after distribution in Jammu and Kashmir provinces. Two more System and Operation (S&O) wings look after Transmission in the UT.

Vision of Jammu & Kashmir Power Development Department is Healthy and efficient power sector in J&K with reliable power generation, transmission and distribution. Continuing with their mission, ensuring optimal harnessing of hydel, thermal, solar and geo-thermal power generation and creating efficient transmission & distribution systems through appropriate strategies & plans so

as to achieve desirable benchmark of services with specific focus on reduction of T&D losses.

The power institutional framework of Jammu & Kashmir is represented below:



The Power Development Department of Govt. UT of J&K is responsible for making policy decisions involving optimum utilization of electric power sector resources of the region, thereby improving the life of the people of the Union Territory. It manages Electricity Generation, Transmission and Distribution through its four companies viz. **JKSPDCL, JKPCL, JKPTCL, JPDCL & KPDCL**, and has the following objectives & responsibilities:

- Supply of un-interrupted and quality power of consumers
- Electrification of un-electrical/de-electrified/partially electrified villages/hamlets.
- Reduction of T&D/AT&C losses.
- Preparation of Strategic plan to reduce power deficit.

J&K Power Corporation Limited (JKPCL)

Jammu and Kashmir Power Corporation Limited (J&K Power Trading Corporation), mandated with power purchase management of J&K and Ladakh. Jammu and Kashmir Power Corporation Limited (JKPCL) is assigned with the task of testing of consumer meters, CT/PT meters up to 33KV level including energy meters of Independent Power Producers (IPPs) located within J&K.

J&K State Power Development Corporation Limited (JKSPDCL):

The Corporation was incorporated to takeover, execute, complete, operate and maintain all power stations and power projects of UT. The assets of all the power projects in UT, both existing and under implementation were transferred to the Corporation.

Jammu Power Distribution Corporation Limited (JPDCL):

JPDCL is mandated with development and management of Electric Power Supply at sub-transmission and distribution level in Jammu region of UT of J&K.

Kashmir Power Distribution Corporation Limited (KPDCL):

KPDCL with functional responsibilities for generation, transmission, distribution and trading of electricity with complete autonomous operations. KPDCL is mandated with development and management of Electric Power Supply at sub-transmission and distribution level in Kashmir province.

J&K Power Transmission Corporation Limited (JKPTCL)

Jammu &Kashmir Power Transmission Corporation Limited (JKPTCL) has the mandate of inter-state and intra-state transmission of electricity in UT of J&K. Jammu looks after the Transmission Network of entire UT of J&K and is entrusted with the Job of Construction, Operation & Maintenance of Grid Stations along with 220KV & 132KV Transmission Lines. Besides, it is responsible for the transmission of power from PGCIL owned Grid Stations and Local generation from power stations owned by JKPDC, at 220KV & 132KV level to the distribution utility of Power Development Department in the entire Jammu and Kashmir Province.

Stakeholder Mapping for the UT of Jammu & Kashmir:

SECTORS	NAME OF DEPARTMENTS
SDA	Power Development Department, Jammu & Kashmir
Transport	J&K Transport Department
	Motor Vehicle Department
	J&K Road Transport Corporation (JKSRTC)
Building	Housing and Urban Development Department (HUDD)
	Town Planning Organization, Jammu
	Town Planning Organization, Kashmir
	Directorate of Rural Development Department, Jammu
	Directorate of Rural Development Department, Kashmir
	Jammu Development Authority (JDA)
	Srinagar Development Authority (SDA)
	J&K Public Works Department (B&R)
	Jammu And Kashmir Projects Construction Corporation Limited (JKPCCL)
	J&K Police Housing Corporation (JKPHC)
	J&K Architect Organization
Municipalities	Jammu Municipal Corporation (JMC), Jammu
	Srinagar Municipal Corporation (SMC), Srinagar
	Directorate of Urban Local Bodies, Kashmir
	Directorate of Urban Local Bodies, Jammu,
DISCOMs	Jammu and Kashmir Power Development Corporation (JKPDCL)
	Jammu Power Distribution Corp. Ltd. (JPDCL)
	Kashmir Power Distribution Corp. Ltd. (KPDCL)
Power Corporations	J&K Power Transmission Corporation Limited (JKPTCL)
	Jammu & Kashmir Power Corporation Limited (JKPCL)
Industries	Directorate of Industries and Commerce, Kashmir
	Directorate of Industries and Commerce, Jammu

Agriculture	Directorate of Horticulture, Srinagar
	Directorate of Agriculture Production & Farmers Welfare, Jammu
	Department of Agriculture & Farmers Welfare, Kashmir
	Directorate of Horticulture, Jammu
Associated Societies	The Associated Chambers of Commerce and Industry (ASSOCHAM)
	Confederation of Real Estate Developers' Associations of India (CREDAI)
	Real Estate Regulatory Authority (RERA)
	Society for Advancement in Agriculture Rural Development (SAARD)
	Small Industries and Manufacturers Association (SIMA)
	Indian industries association (IIA)
Others	Jammu & Kashmir Energy Development Agency (JAKEDA)
	Jammu Smart City Limited
	J&K Jal Shakti Department
	The Directorate of Health Services, Jammu
	The Directorate of Health Services, Kashmir
	Directorate of Economics and Statistics
	Department of Health & Family Welfare
	Department of Science and Technology
	Forest Ecology and Environment Department
	Planning Development & Monitoring Department (PD & MD)

2. Identification of Focus Sectors

The economic sectors of the UT of Jammu & Kashmir can be broadly classified into the sectors namely Industry, Building, 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 state/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 UT's priorities and towards sectors that have the highest potential for energy savings and emissions reductions.

2.1. Methodology of Focus Sector Identification

The methodology used to determine the focus sectors in the UT of Jammu & Kashmir includes multiple factors. The first factor is the energy consumption profile of UT. This information provides a clear understanding of where energy is being used and which sectors are consuming the most. The analysis reveals that the industry sector is the largest energy consumer in UT.

The second factor is the input from stakeholders. Stakeholders include individuals, organizations, and communities that have a vested interest in energy consumption and production in UT. Their inputs are valuable as they have a direct impact on the sector they represent.

The third factor is priority areas of UT. Priority areas are determined based on UT's development goals, energy policies, and future aspirations. These priority areas help in identifying sectors that require immediate attention and support.

After considering these factors, the focus sectors are identified, which are the Industry, Buildings, and Transport sectors. The industry sector is the primary focus as it is the largest energy consumer in UT. The buildings sector is important as it accounts for a significant amount of energy consumption in the domestic and

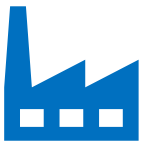
commercial sectors. The Transport sector is also a critical focus as it is one of the largest energy consumers and relies heavily on fossil fuels (oil).

Stakeholder Consultation

Inputs and suggestions from stakeholders identified for the UT of Jammu & Kashmir 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 the UT of Jammu & Kashmir.



Industry

Buildings

Transport

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

3. Projections and Forecasting

Economic and energy projections for the UT of Jammu & Kashmir 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 state and in aligning the state 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 the UT of Jammu & Kashmir was recorded at INR 1.14 Lakh Crore in FY 2020 and is projected to reach INR 2.07 Lakh Crore in FY 2031, at constant prices of 2011-12. The GSDP for the period FY 2023-FY 2031 is forecasted by taking reference of the GSDP growth rate recorded in the years FY 2015-FY 2020. The historic and forecasted GSDP for the UT of Jammu & Kashmir is shown in the figure below:

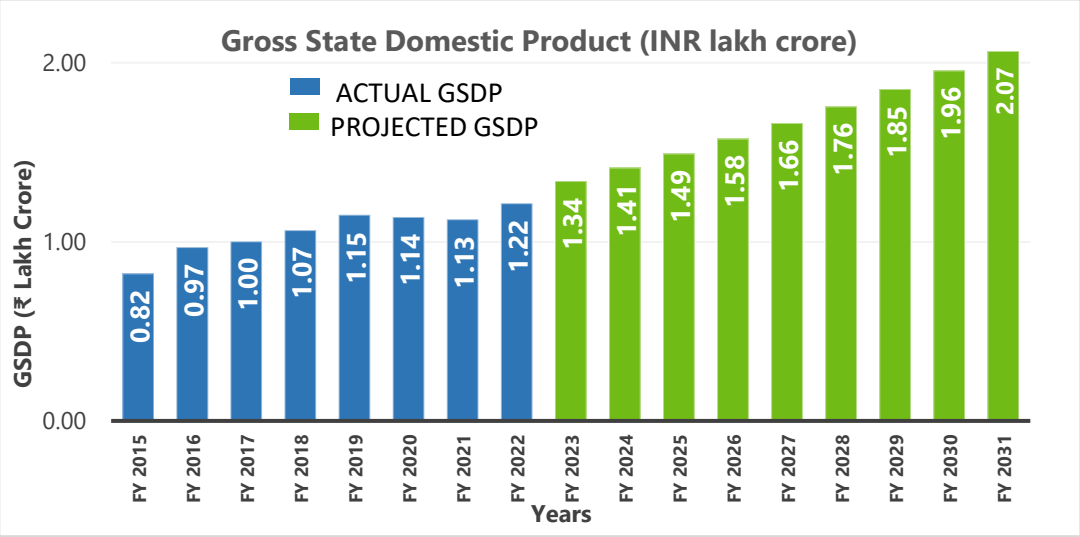


Figure 3: GSDP Projection of Jammu & Kashmir

The Total Final Energy Consumption (TFEC) has been projected for the UT up to FY 2031 considering the historic average energy intensity (Mtoe/ INR Lakh Crore) from FY 2015 to FY 2020 along with the historic and projected GSDP growth for the UT of Jammu & Kashmir. 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 6.90 MTOE in FY 2031 from 3.53 MTOE in FY 2020.

INDUSTRY SECTOR

4. Focus Sector-1: Industry

4.1. Current Scenario

Jammu & Kashmir is the newly formed Union territory of Indian union created under the Jammu & Kashmir Reorganization Act, 2019. The UT of Jammu & Kashmir has made progress in industrial development over the last decades.

Jammu & Kashmir announced its first industrial policy in 1995 and then 1998. However, the comprehensive policy was announced in 2004 and then 2016 and later in 2021. **The Jammu & Kashmir Industrial Policy 2021** is aimed at creating a beneficial ecosystem for industry, which attracts investment in focus sectors leading to sustainable, equitable, environmentally friendly and balanced development.

Following are the major industries in Jammu & Kashmir:[7]

1. Manufacturing
2. Food Processing
3. Pharmaceuticals & Healthcare
4. Handlooms & Handicrafts
5. Information technology

Rapid strides have been observed in various sectors such as infrastructure, power, health, education, agriculture, tourism, industrialization, investment opportunities, skill development, employment and above all, individual security, gender parity, social justice, welfare and empowerment in the region.

4.2. 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.

[7] *J&K Industrial Policy 2021-2030*

Strategy #1: Energy Efficiency Interventions in Food Processing Units & Rubber and Plastic Manufacturing

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 Food Processing Units & Rubber and Plastic Manufacturing. 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 a 20% SEC reduction strategy in moderate scenario and 30% SEC reduction will be covered in the ambitious scenario. The strategy is expected to result in energy savings of 0.021 MTOE and 0.031 MTOE in the moderate and ambitious scenarios respectively.

Table 5: Moderate and ambitious scenarios

Sector	Baseline SEC (toe/tonne)	Moderate SEC (toe/tonne)	Ambitious SEC (toe/tonne)	Energy saving in moderate scenario (Mtoe)	Energy saving in ambitious scenario (Mtoe)
Food Processing Units	0.000033	0.000026	0.000023	**0.012**	**0.018**
Rubber and Plastic Manufacturing	0.0000004	0.0000003	0.0000002	**0.008**	**0.013**

Implementing agency(s) – Bureau of Energy Efficiency (BEE); PDD, Directorate of Industries.

Actionable items:

Several action items will need to be adopted by the relevant departments and implementing agencies for achieving 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 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 Union Territory 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 Jammu & Kashmir 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 Union Territory 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 Union Territory level GSDP.
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. The UT Government shall issue directives to all units in state which are above a limit of connected load, to implement ISO 500001 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 3star rated or purchased/installed before 2015 with BEE 5-Star rated appliances. Phase wise plan can be executed through DISCOMs or listed ESCOs in UT.
8. **Capacity building & technical training programs on Energy Auditor Courses-** BEE (Bureau of Energy Efficiency) certification is a program implemented by the Government of India to promote energy efficiency in various sectors. This certification aims to ensure that professionals possess

the necessary skills and knowledge to conduct energy audits effectively in the UT of Jammu & Kashmir. Energy auditors certified by BEE are responsible for assessing energy consumption patterns, energy management, identifying energy-saving opportunities, and providing recommendations for energy efficiency improvements. Since there are few BEE certified Energy Managers and Auditors are located in Jammu & Kashmir hence State Designated Agency (SDA) with the support of Bureau of Energy Efficiency (BEE) shall conduct various training programs for the energy auditors to increase the local presence of such trained & qualified auditors. These programs are designed to meet the requirements of BEE's certification process and cover topics such as energy auditing methodologies, energy conservation opportunities, and regulatory compliance.

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:

Setting up a Sector Specific Energy Efficiecy Cell (SSEEC) in Dept. of Industries

- The wokring 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 UT of JK 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 from specific type of industries on their operations, enrgy effciiency goals and will report the same to the SSEEC at the end of each quarter.

Industry Level Energy Manager/Auditor

- The industry level energy auditor and energy manager will be responsible for sharing data with the cluster level cell for specifc industry in the specified format.

BUILDINGS SECTOR

5. Focus Sector 2: Buildings

5.1. Current Scenario

In Jammu & Kashmir, around 27% of the population resides in urban areas as per census 2011. This is due to the dependence of people on the agricultural economy. Despite this fact, the power consumption in the building sector is gradually increasing. The energy consumption in the urban areas is significantly high due to the growing demand of energy in the building sector.

The government of Jammu & Kashmir has adopted the ECSBC, however it is not notified yet. The ECSBC is applicable to all new commercial buildings, including buildings for office, hotels, and healthcare facilities, with a connected load of 50 kW or more, or a connected load of 60 kVA or more. The code mandates certain energy-efficient building design and construction practices, including requirements for building envelopes, lighting, air conditioning, and ventilation systems, and renewable energy utilization.

It is expected that after implementation of ECBC and ENS in the UT, the rate of increment of electricity usage may decrease. Currently the code is not notified yet, however with the support of agencies, the ECBC cell is established in the UT and process for making the code mandatory being followed.

To facilitate the implementation of the ECSBC, the government of Jammu & Kashmir has established a State Designated Agency (SDA) for energy efficiency. The SDA is responsible for providing technical assistance to building owners and developers to ensure compliance with the provisions.

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 building sector "Energy Conservation and Sustainable Building Code (ECSBC)" has been introduced. The ECSBC code will be applicable for both commercial and residential buildings.

The building sector is a major energy guzzling sector in Jammu & Kashmir. As per the graph it can be witnessed that the energy consumption in building sector is continuously increasing since FY 2015.

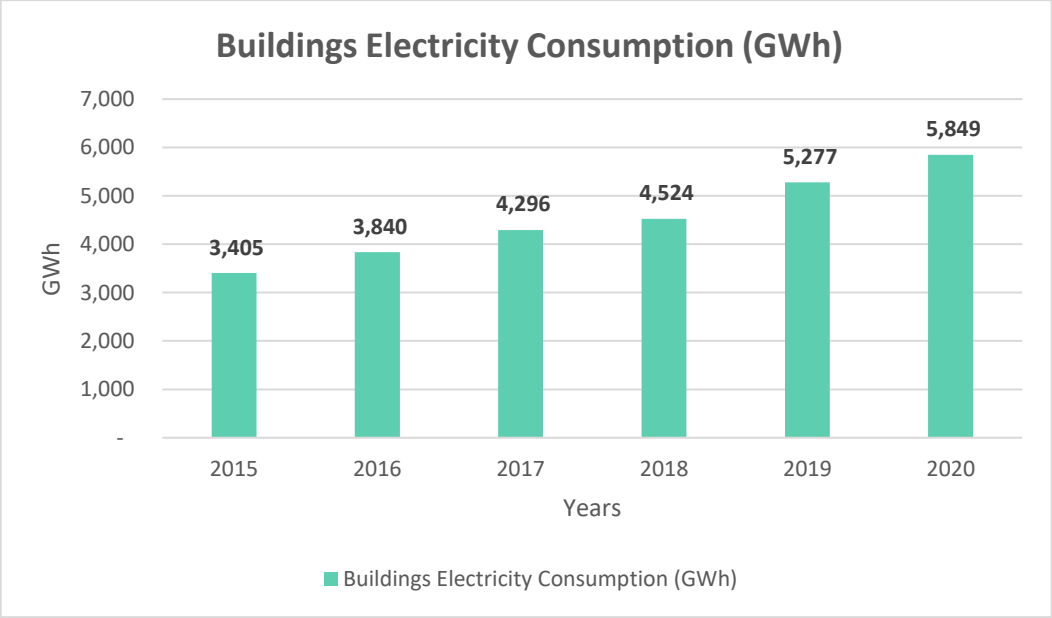
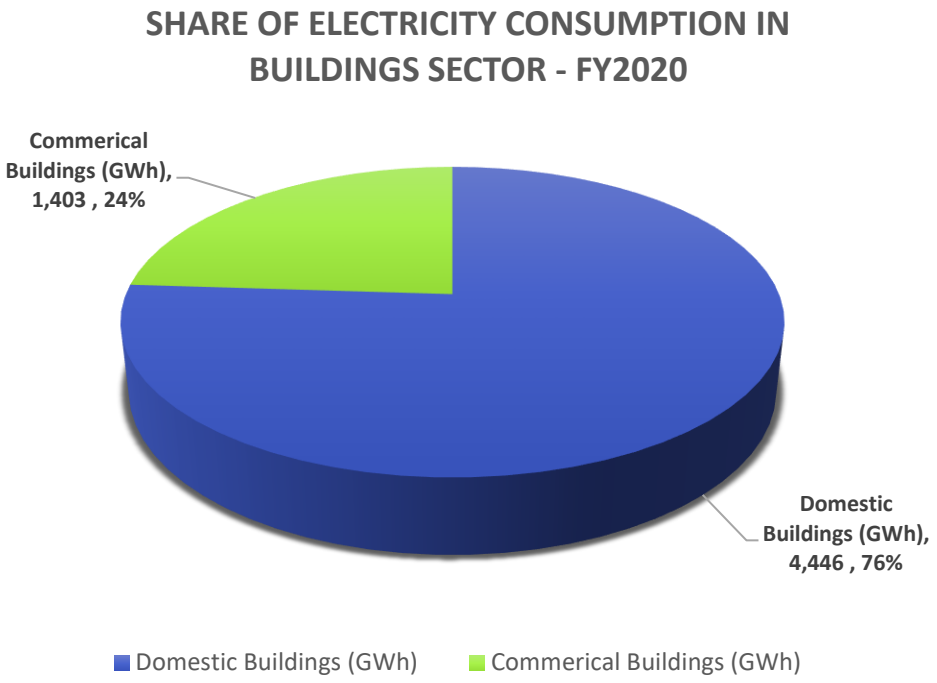


Figure 4: Electricity Consumption in the Buildings Sector (GWh)

The commercial sector supports urbanization in Jammu & Kashmir, but still caters to only 13% of the total electricity consumption in the building sector. The domestic sector on the other hand, retains around 42% of the electricity consumption, this indicates that the UT 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 some of electricity consumption can be eradicated.

The sharing pattern of electricity consumption of the commercial and domestic sector for FY 2020 is represented in the following figure:



The table below showing the Percentage of Inhabited Villages Electrified up to ending FY 2020 in UT of J&K:

Table 6: Percentage of Inhabited Villages Electrified up to ending FY 2020 in UT of J&K[8]

S.No.	District	Total Inhabited villages	No. of villages electrified	Percentage Electrified (%)
1	Anantnag	335	335	100.00
2	Kulgam	226	226	100.00
3	Pulwama	319	319	100.00
4	Shopian	226	226	100.00
5	Srinagar	11	11	100.00
6	Ganderbal	113	113	100.00
7	Budgam	462	462	100.00
8	Baramulla	509	509	100.00

[8] *Digest of Statistics 2020-21*

9	Bandipora	119	119	100.00
10	Kupwara	353	349	98.87
Total Kashmir Division		**2673**	**2669**	**99.85 %**
11	Jammu	780	780	100.00
12	Samba	345	345	100.00
13	Udhampur	325	325	100.00
14	Reasi	253	253	100.00
15	Doda	402	402	100.00
16	Ramban	127	127	100.00
17	Kishtwar	155	155	100.00
18	Kathua	496	496	100.00
19	Rajouri	375	375	100.00
20	Poonch	170	170	100.00
Total Jammu Division		**3428**	**3428**	**100**
Total UT of J&K		**6101**	**6097**	**99.93**

Above table represents that **99.93%** of the total villages gets electrified in the year (2020-21) which shows the electrification strength of the power development department. Since the electrification in villages is getting around 100%, the electricity demand must rise with respect to the time.

5.2. 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)

Jammu & Kashmir is in the process of adopting Eco-Niwas Samhita (ENS) for residential buildings. However, in the 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 states/UTs, ECBC and ENS will work as energy efficiency building code.

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.

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 of commercial buildings in the Union Territory is projected to be 3,289 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 50 kW or more. It has been taken into consideration that around 5% of the buildings in the Union Territory have connected load of 50 kW or more. Considering this percentage, the Total

Incremental Electrical Consumption contributing to buildings having load >50 kW is estimated to be almost 164 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 **41 GWh** and **58 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 total incremental electricity consumption is projected to be around 8,720 GWh based on the anticipated household electricity demand by FY2031. 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 FY2031. The strategy is expected to result in electricity savings of 41.85 GWh in the moderate scenario and that of 61.38 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	0.004	0.005
Energy Saving Potential (MTOE) in ENS	0.0036	0.0053
Total	**0.0076**	**0.010**

Implementing Agency: Bureau of Energy Efficiency, PDD, HUDD, JK PWD.

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 State/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 ESCBC 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 & green 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 SDA 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 UT and publish its case studies for the understanding of stakeholders. Initially upcoming government building can be taken as a pilot project and 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 Jammu & Kashmir 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 Jammu & Kashmir 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 become 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 UT of Jammu & Kashmir.

8. **Incorporation of Smart Metering & Off-grid renewable energy systems-** In buildings & other focus sectors, by incorporating smart metering and off-grid renewable energy systems, Jammu & Kashmir can enhance energy efficiency, promote renewable energy adoption, and improve energy access in both grid-connected and remote areas. Smart metering involves the installation of advanced digital meters that enable two-way communication between the utility company and consumers. Some potential benefits of smart metering in Jammu & Kashmir include Accurate Billing, Demand Response, Environmental Sustainability, and many more.

Strategy #2 Replacement program for inefficient (below than 3 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 Program 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 Program 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 below table:

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

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. Ballast

Mandatory Appliances	Voluntary Appliances
5. Room Air Conditioner (Cassette, Floor Standing) 6. Direct Cool Refrigerator 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	6. Computers (Laptop/Notebooks) 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 Union Territory 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 penetrations 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 this Table 17.

Table 9: Appliances taken into consideration for the strategy

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

According to the study conducted by CLASP (Collaborative Labeling and Appliance Standards Program)[9] 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 0.056 MTOE in the moderate scenario and 0.074 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)	0.056	0.074

Implementing Agency- PDD**,** DISCOMs, ESCOs

Actionable Items:

[9]https://www.clasp.ngo/wp-content/uploads/2021/01/2007-05_IndiaLabelingProgramImpacts.pdf

The action items to be carried out 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 to ensure effective implementation:

1. **Development of state-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 replacement scheme so ESCOs and PPA models can be analyzed in details. 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 Union Territory is required.
2. **Issuance of directive to government offices and buildings in the UT to replace all existing inefficient appliances (lower than 3 Star Rated) with BEE 5-star rated appliances-** UT Government shall issue directives to all government offices and buildings owned by UT government to replace all appliances which are lower than 3star rated or purchased/installed before 2015 with BEE 5-Star rated appliances.
3. **Phase-wise plan for replacement of existing inefficient appliances (lower than 3 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 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. The UT 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 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.

Implementing Agency: Bureau of Energy Efficiency; PDD; HUDD, PWD

Actionable Items:

1. **Issuance of directives to all government departments to conduct energy audits and target to achieve BEE Star Rating for their buildings**-
   The UT Government shall issue directives to all government departments and buildings owned by the 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. 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 Union Territory.

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.

5.3. Energy Saving Targets & Monitoring Mechanism

The proposed strategies can together achieve maximum potential energy savings of 0.085 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 buildings sector under the two scenarios are shown in below table:

Table 11: 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	0.007	0.010
Replacement program for inefficient appliances	0.056	0.074
BEE Star Rating and Shunya Rating of Buildings	0.0005	0.0007
Total	**0.064**	**0.085**

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 Union Territory and the energy savings achieved from these strategies.

- Regular reporting and updating of dashboards can be done with the support of SDA 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.

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 clustur energy efficiency cells in the state/UT 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 from specific type of buildings, industries on their operations, energy effciiency goals and will report the same to the SSEEC at the end of each quarter.

Building Level Energy Manager/Auditor

- The building level energy auditor and energy manager will be responsible for sharing data with the cluster level cell for specifc building type in the specified format.

TRANSPORT SECTOR

6. Focus Sector 3: Transport

6.1. Current Scenario

Being a tourist spot Jammu & Kashmir receives heavy in-flow traffic of vehicles throughout the year. Most of the oil consumption in the UT goes into the transportation sector. The Jammu & Kashmir government to promote sustainable transportation is taking several steps. One of these steps includes promotion of Electric vehicles however the EV policy is not launched yet.

Adding to that, the sectoral transport share of the UT is led by 2-wheelers in the UT which holds around 52% of the total registered vehicles (FY 2021). Further, 4-wheelers are contributing a substantial share of around 37% of total vehicles. The data for the number of vehicles has been sourced from the Vahan Dashboard. The number of registered vehicles in the UT has increased from 11,25,704 in FY 2017 to 17,94,649 in FY 2021, with an Average Annual Growth Rate (AAGR) of **10.98%.**

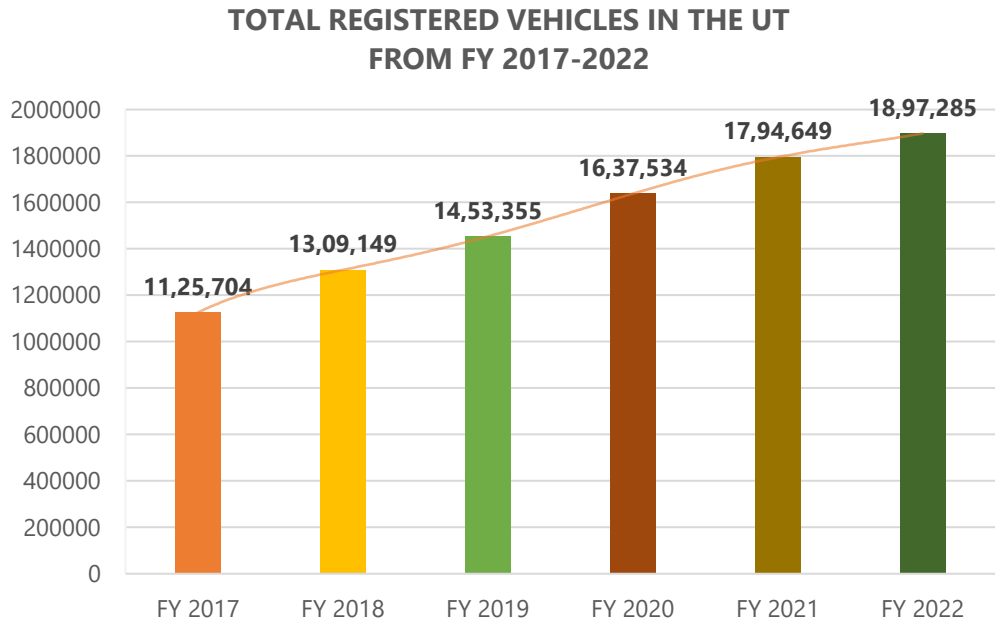


Figure 5: Total registered vehicles in the UT of Jammu & Kashmir[10]

[10] *https://vahan.parivahan.gov.in/vahan4dashboard/*

This AAGR is further treated as CAGR to project the number of registered vehicles by the years 2025 and 2030, with base year as 2021.

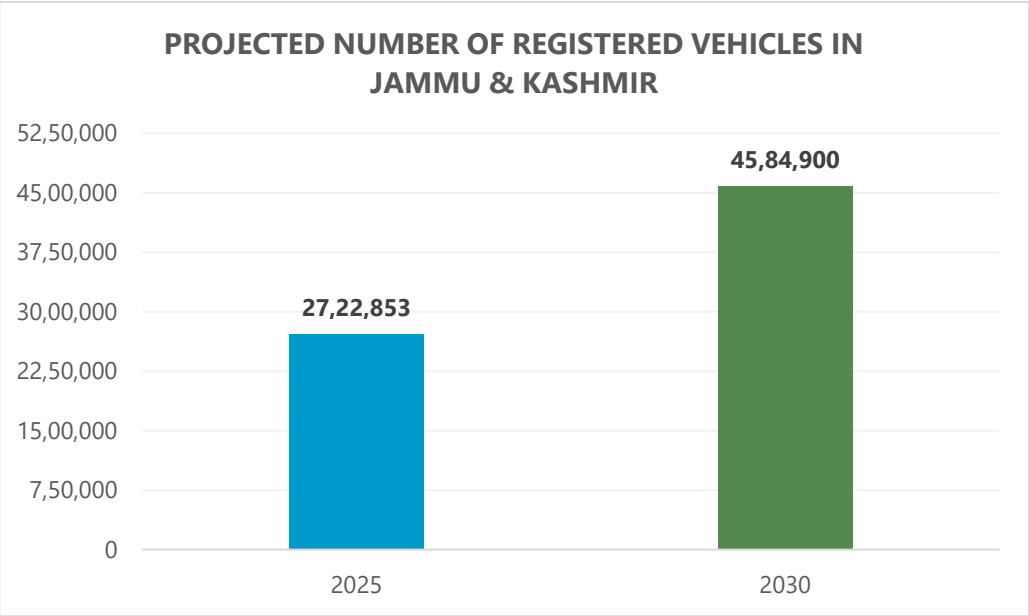


Figure 6: Projected number of registered vehicles

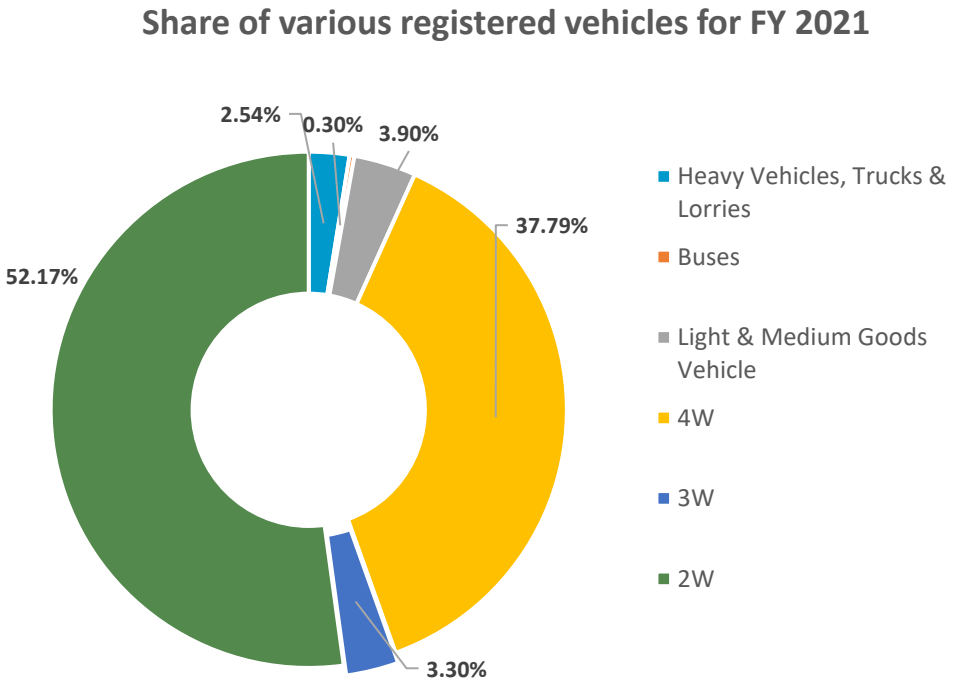


Figure 7: Share of vehicle types for no. of registered vehicles

2-Wheleers (52%) make up the largest share in the vehicle category type. The next-highest is 4-Wheelers at 38% share. Hence, targeting two-wheelers and

four-wheelers for transition to electric vehicles can bring about significant reduction in primary energy consumption in the transport sector of Jammu & Kashmir.

Adding to that, the sectoral transport share of the UT is led by 2W (2 Wheelers) which holds 52% of the total registered vehicles. Further, the two-wheeler sector also shows potential of transition when compared with the market availability. The data for the number of vehicles has been sourced from the Vahan Dashboard. The number of registered vehicles in the UT has increased from 11,25,704 in FY 2017 to 33,22,590 in FY 2022, with an average Annual Growth Rate (AAGR) of 7.66%. In the study, tractors, ambulances, tankers and private trailers have been excluded which is negligible in the numbers as compared to the total registered vehicles.

6.2. Strategies in the Transport Sector:

As per the stakeholder consultation with relevant department, the long-term strategy for Electric Vehicle Transition has been under the design phase. The policy and the proposed strategy encompass several 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 UT. 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 below table:

Table 12: EV transition considerations for moderate and ambitious scenarios

Moderate Scenario	Ambitious Scenario
• 15% of conventional 2-Wheelers convert to electric by 2031 • 15% of conventional 4-Wheelers convert to electric by 2031 • 15% buses in the UT to transition to electric buses by 2031 • 15% of 3-Wheelers to convert to electric by 2031 • 15% of heavy vehicles (trucks and lorries) to convert to electric by 2031	• 30% of conventional 2-Wheelers convert to electric by 2031 • 30% of conventional 4-Wheelers convert to electric by 2031 • 30% buses in the UT to transition to electric buses by 2031 • 30% of 3-Wheelers to convert to electric by 2031 • 30% of heavy vehicles (trucks and lorries) to convert to electric by 2031

The EV transition strategy can result in potential energy savings of 0.18 MTOE and 0.35 MTOE in the moderate scenario and ambitious scenario respectively.

Table 13: Energy Savings Potential

Particulars	Moderate Scenario	Ambitious Scenario
Energy Saving Potential (MTOE)	0.18	0.35

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 Jammu & Kashmir. 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 Jammu & Kashmir.
- Public-private partnerships: The government can enter into 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.

By implementing some or all these regulatory mechanisms, the Jammu & Kashmir 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

Establishment of a wide network of charging stations and swappable battery station is on high priority. The proposed policy should recognize the importance of charging infrastructure for the growth of the EV industry and aims to create a robust charging infrastructure network across the Union Territory.

The policy should envision the establishment of charging stations at various locations such as public places, commercial and residential buildings, parking lots, highways, and other strategic locations. The UT government plans to provide incentives for the establishment of charging stations, including subsidies and other benefits, to encourage private players to invest in charging infrastructure.

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).

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.

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 0.11 MTOE and 0.22 MTOE in the moderate and ambitious scenarios respectively.

Table 14: Moderate and ambitious scenarios for Ethanol blending

Particulars	Moderate Scenario	Ambitious Scenario
Energy Saving Potential (MTOE)	0.11	0.22

Implementing Agency: UT's Transport Department & Individual Government 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 about fuel efficiency in vehicles can be an effective way to encourage the adoption of more fuel-efficient tyres by consumers.

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 Union Territory 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 about 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.

6.3. Energy Saving Targets & Monitoring Mechanism

Based on the proposed strategies for the transport sector, the total energy saving estimated is 0.29 MTOE in the moderate scenario and 0.57 MTOE 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 15 Moderate and ambitious scenarios for Transport Sector

Strategies	Energy Savings in 2031 under moderate scenario (Mtoe)	Energy Savings in 2031 under ambitious scenario (Mtoe)
Transition to electric vehicles	0.18	0.35
Ethanol blending	0.11	0.22
Total	**0.29**	**0.57**

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 Union Territory.

- 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 Union Territory.
- 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 clustur energy efficiency cells in the state 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.

AGRICULTURE SECTOR

7. Focus Sector 4: Agriculture

7.1. Current Scenario

Agriculture is the main occupation of the people of Jammu and Kashmir and therefore has an important place in the economy of the UT. According to the 2011 Census, 72.62 per cent of the population lives in rural areas. The UT of Jammu and Kashmir has a total geographical area of 2,22,236 sq.km out of which 739 sq.km is net sown area (about 19.55%).

Table 16: Land Use Statistics of Jammu and Kashmir Area in "Sq.km"[11]

LAND USE	AREA (SQ. KM)	PERCENTAGE
TOTAL GEOGRAPHICAL AREA	2,22,236	NA
REPORTING AREA FOR LAND UTILIZATION	37,810	100.00
NET SOWN AREA	739	19.55
BARREN & UNCULTIVABLE LAND	585	15.47
PERMANENT PASTURE & GRAZING LAND	128	3.39
CULTIVABLE WASTE LAND	150	3.97
MISC. (LAND NOT INCLUDED IN NET SOWN AREA)	67	1.77
CURRENT FALLOW LAND	65	1.72
FORESTS	2,023	53.50
FALLOW LAND OTHER THAN CURRENT	23	0.61

Against all these odds, the farmers of Jammu & Kashmir are constantly endeavoring to fully utilize the agricultural potential of the UT to increase food production and to supplement the income by producing quality cash crops. The main sources of electricity consumption in this sector are agricultural machinery/ equipment and pump sets in the UT. Different forms of energy are used for different purposes, which includes the use of diesel, electricity, and renewable

[11] *Digest of Statistics 2019-20*

fuels for activities on the farm. Below table represents the data received from the District Agriculture department of Jammu & Kashmir:

Table 17: Irrigation pumps used in Jammu Province[12]

S.No.	District	No. of Diesel Pumps Installed	No. of Electric Pumps Installed
1.	Jammu	1,345	19,261
2.	Kathua	8	36
3.	Samba	3,500	3,800
4.	Rajouri	0	0
5.	Poonch	40	0
6.	Reasi	90	69
7.	Udhampur	12	0
8.	Ramban	41	0
9.	Doda	20	0
10.	Kisthwar	4	0
Total		**5,060**	**23,166**

Among the 10 districts in Jammu province, Jammu only achieved the target of PM KUSUM by installing 42 solar pumps and grid connected solar, however solar pumps were installed independently as well in the following districts.

Table 18 Solar Pumps Installed

S.No.	District	No. of Solar Pumps Installed
1.	Jammu	42
2.	Kathua	48
3.	Samba	11

Electric Pumps/Tube wells installed in Kashmir province for year **2019-20**[13]**:**

Table 19 Electric Pumps/Tube wells installed in Kashmir province for year 2019-20

S.No.	District	No. of Electric Pumps/Tube wells
1.	Srinagar	162
2.	Ganderbal	77

[12] *Department of Agriculture*
[13] *Digest of Statistics 2019-20*

3.	Budgam	75
4.	Anantnag	113
5.	Kulgam	0
6.	Pulwama	124
7.	Shopian	0
8.	Baramulla	137
9.	Bandipura	122
10.	Kupwara	82
Total		**892**

7.2. Energy Efficiency Strategies in the Agriculture Sector:

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

1. Transition of conventional diesel pumps to Solar powered pumps
2. Replacement of inefficient (non-star rated) pumps with BEE 5 Star Rated Pumps along with smart control panel

Strategy #1 Transition of conventional diesel pumps to Solar powered pumps

Implementation period: Till FY2024

The proposed strategy in the agriculture sector is to transition from conventional diesel pumps to solar-powered pumps by FY2024. This strategy is in line with the country's target to replace diesel with renewable energy sources in the agricultural sector to achieve the goal of zero diesel use by FY2024. This transition is necessary to reduce the sector's dependence on fossil fuels and move towards a more sustainable and environmentally friendly energy source.

The first scenario is the moderate scenario, which aims to transition 75% of diesel-powered pumps to solar pumps by 2024. This scenario aims to achieve a

significant reduction in the energy consumption of pumps used in irrigation, leading to significant energy savings.

The second scenario is the ambitious scenario, which aims to transition 100% of diesel-powered pumps to solar pumps by 2024. This scenario is the ideal goal and aims to achieve maximum energy savings in the agriculture sector by eliminating the use of diesel-powered pumps. This scenario will not only lead to energy savings but will also contribute to reducing carbon emissions, improving air quality and environmental sustainability.

It is also essential to note that the transition to solar-powered pumps will reduce the operational and maintenance costs as solar pumps do not require regular fuel refilling and have fewer moving parts, resulting in less wear and tear. Moreover, the installation of solar pumps will also provide an additional source of income for farmers, as they can sell excess electricity generated by the solar panels back to the grid.

In addition to the benefits mentioned above, the transition to solar-powered pumps will also lead to increased reliability and stability of power supply, as solar energy is available throughout the day and is not subject to disruptions in fuel supply.

Overall, the transition from conventional diesel pumps to solar-powered pumps will lead to a total savings of 0.0009 MTOE in moderate scenario and 0.0012 MTOE in ambitious scenario.

Table 20: Energy Savings Potential in Transition of conventional diesel pumps to Solar powered pumps

Particulars	Moderate Scenario	Ambitious Scenario
Energy Saving Potential (MTOE)	0.0009	0.0012

Actionable items:

1. **Greater outreach to relevant stakeholders:** It is crucial to engage and inform all relevant stakeholders, including farmers, Panchayat officials, and other key players in the agriculture sector, about the benefits of the PM KUSUM Yojana. This can be done through awareness campaigns, workshops, and meetings at the local level. This will help ensure that everyone is aware of the program and its benefits and can work together to implement it effectively.

2. **Capacity building of Panchayat/Block level officials:** It is important to provide training and capacity building programs to Panchayat and Block level officials to ensure effective implementation of the program. This can include training on the technical aspects as well as on the administrative aspects of the program. This will enable officials to provide the necessary support and guidance to farmers and other stakeholders in their respective areas and ensure the successful implementation of the program.

Strategy #2 Replacement of inefficient (non-star rated) pumps with BEE 5 Star Rated Pumps along with smart control panel

Implementation period: Long-term (Till FY2031)

This strategy aims to reduce energy consumption and increase the efficiency of the pumps used in irrigation. The implementation period for this strategy is long-term, until FY2031. During this period, two scenarios have been proposed. The first scenario is the moderate scenario, which aims to replace 50% of the inefficient electric-powered pumps with BEE Star rated pumps by FY2031. This scenario aims to achieve significant energy savings and improve the efficiency of pumps used in irrigation.

BEE Star rated pumps are designed to consume less energy and operate efficiently, resulting in cost savings for farmers in terms of lower electricity bills and reduced maintenance costs.

The second scenario is the ambitious scenario, which aims to replace 70% of the inefficient electric-powered pumps with BEE Star rated pumps by FY2031. This

scenario is the ideal goal and aims to achieve maximum energy savings in the agriculture sector by replacing the majority of inefficient pumps with energy-efficient ones.

Overall, this strategy will lead to a total saving of 0.0004 MTOE in moderate scenario and 0.0006 MTOE in ambitious scenario.

Table 21: Energy Savings Potential in Replacement of inefficient (non-star rated) pumps with BEE 5 Star Rated Pumps along with smart control panel

Particulars	Moderate Scenario	Ambitious Scenario
Energy Saving Potential (MTOE)	0.0004	0.0006

Actionable items:

Development of a phase-wise plan to implement Demand Side Management (DSM) scheme for replacing existing inefficient pumps through Energy Service Companies (ESCOs).

1. The plan should include the identification of inefficient pumps, the assessment of the feasibility of the replacement of these pumps with energy-efficient ones, and the selection of ESCOs for the implementation of the DSM scheme.
2. The plan should be developed in consultation with relevant stakeholders, including farmers, pump manufacturers, and ESCOs, to ensure that the implementation of the DSM scheme is feasible, cost-effective and leads to energy savings.

Other Actionable item for Horticulture:

1. **Solar-powered Control Atmosphere System (CAS):** Control Atmosphere System (CAS) typically refers to a system that utilizes solar energy to power and maintain controlled atmospheres in various applications, such as food storage, agriculture or horticulture sectors.

Benefits:

1. Renewable Energy: By harnessing solar power, a solar-powered CAS reduces reliance on fossil fuels and helps mitigate greenhouse gas emissions.
2. Energy Efficiency: Solar-powered systems can be designed to be energy-efficient, optimizing the use of available solar energy to maintain the desired atmospheric conditions.
3. Cost Savings: Solar energy is a free and abundant resource, reducing operational costs by minimizing or eliminating the need for grid electricity.
4. Remote Operation: Solar-powered CAS systems can be particularly advantageous in remote or off-grid locations where access to electricity infrastructure is limited or expensive.

7.3. Energy Saving Targets & Monitoring Mechanism

Based on the two strategies proposed for the agriculture sector, the total energy saving estimated is 0.0013 MTOE in the moderate scenario and 0.0018 MTOE 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 Agriculture Sector.

Table 22 Moderate and ambitious scenarios for Agriculture Sector

Strategies	Energy Savings in 2031 under moderate scenario (Mtoe)	Energy Savings in 2031 under ambitious scenario (Mtoe)
Transition of conventional diesel pumps to Solar powered pumps	0.0009	0.0012
Replacement of inefficient (non-star rated) pumps with BEE 5 Star Rated Pumps along with smart control panel	0.0004	0.0006

Total	**0.0013**	**0.0018**

Monitoring Mechanism:

The monitoring framework for achieving the target of the agriculture sector can be easily set up by defining annual reduction targets of the sector.

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 clustur energy efficiency cells in Jammu & Kashmir and share the same with the SDA for tracking the achievement of the targeted goal.

Cluster Level Energy Efficiency Cell (CLEEC)

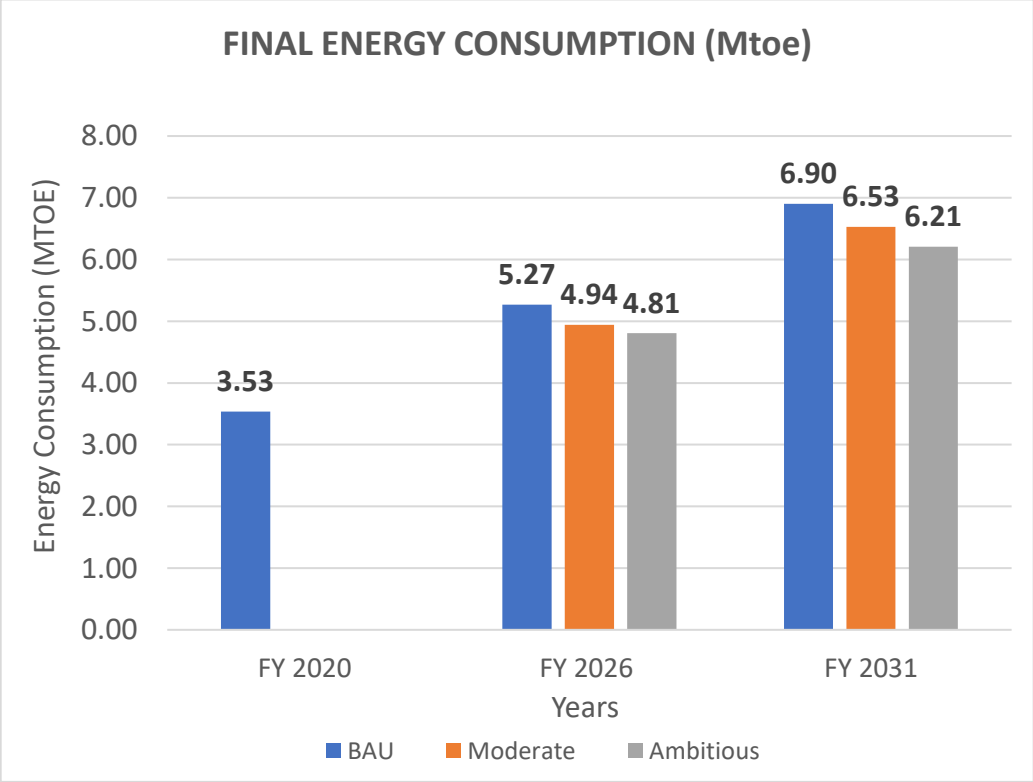
- The CLEEC will be responsible for gathering information about the transition of conventional diesel pumps to solar-powered pumps and the replacement of inefficient pumps with BEE 5 Star Rated Pumps along with smart control panels. The CLEEC will report the data to the SSEEC at the end of each quarter, including the number of pumps replaced, energy consumption data, and any other relevant information.

Regular Review and Monitoring

- The SSEEC will review the progress of the program on a regular basis, ensuring that the targeted goals are being met. The SSEEC will also provide regular feedback to the CLEECs and the SDA to ensure that the program is running smoothly and that any issues are addressed in a timely manner.

8. Investment Potential in Focus Sectors

The energy saved because of the proposed strategies in all sectors will lead to avoidance of generation of equivalent amount. 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. 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 tonne 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 scenarios for the estimation of maximum investment potential. Total energy saving potential by implementing various strategies in Jammu & Kashmir is shown in the graph below:



It is estimated that with the implementation of various proposed strategies of Building, Transport, Agriculture and Industry Sectors, energy saving of 0.37 MTOE in moderate scenario and 0.69 MTOE in ambitious scenario can be achieved.

Table 23 Moderate and ambitious scenarios for Focused Sector

Sectors	Energy Saving (Mtoe) -FY2031		Emission Reduction (MtCo2e) -FY2031		Investment Potential (INR Crores)
	Moderate	Ambitious	Moderate	Ambitious	
Industry	0.02	0.03	0.066	0.099	58.47
Buildings	0.064	0.084	0.200	0.266	156.18
Transport	0.29	0.57	0.899	1.799	1,057
Agriculture	0.0013	0.0018	0.004	0.006	3.28
Total	**0.37**	**0.69**	**1.17**	**2.17**	**1,275.40**

9. The Way Forward

The state energy efficiency action plan, through research and interaction with various stakeholders, identifies the need, opportunity, and the potential of energy efficiency in the UT of Jammu & Kashmir. While addressing the key focus sectors – Industry, Buildings, Transport and Agriculture, the action plan envisages to analyze consumption pattern, growth rates in alignment with GDP growth rate of the Union Territory and potential strategies for achieving savings.

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