State Energy Efficiency Action Plan - Odisha

JANUARY 2025

सत्यमेव जयते

विद्युत मंत्रालय
MINISTRY OF
POWER

EIC (E)-cum-PCEI (O)
Department of Energy

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सत्यमेव जयते

Azadi Ka Amrit Mahotsav

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

Foreword

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

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

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

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

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

October, 2024

(Dr. Srikant Nagulapalli)

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RIGHT TO INFORMATION

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 project team extends its profound gratitude to Shri Pankaj Agarwal, Secretary of the Ministry of Power, Government of India, and Mr. Shrikant Nagulpalli, Director General of the Bureau of Energy Efficiency (BEE), for their exceptional leadership and guidance during the execution of the assignment. The team also recognizes and expresses its sincere appreciation to Mr. Milind Bhikanrao Deore, Secretary of BEE, for his invaluable contributions and insights throughout the assignment's execution. The team acknowledges the cooperation and unwavering support provided by Mr. Abhishek Sharma, Joint Director of BEE, for his supervisory role during the entire execution phase. The team also expresses its appreciation to Mr. Vikash Kumar Jha, Project Engineer at BEE, for his continuous support and effective coordination with various stakeholders.

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

Lastly, we would like to thank internal team members for their hard work, dedication, and professionalism. Their collective efforts, expertise, and commitment to excellence have been the backbone of this project. In conclusion, this project stands as a testament to what can be achieved through collaborative efforts and shared goals.

PricewaterhouseCoopers Private Limited

State Energy Efficiency Action Plan – East Zone

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Table of Contents

List of Tables

List of Figures

Abbreviations

Abbreviation List	Full Form
GDP	Gross Domestic product
PAT	Perform, Achieve and Trade
EE	Energy efficiency
ECSBC	Energy Conservation and Sustainability Buildings Code
EV	Electric Vehicle
DISCOM	Distribution Company
UT	Union Territory
UJALA	Unnat Jyoti by Affordable LEDs for all
LPG	Liquified petroleum gas
HSD	High speed diesel
LDO	Light diesel oil
FO	Furnace oil
GSDP	Gross state domestic product
SEC	Specific energy consumption
MSME	Micro, small and medium enterprises
ICE	Internal combustion engine
HDV	Heavy duty vehicle
SEEAP	State energy efficiency action plan
NDC	Nationally determined contributions
COP	Conference of parties
MW	Megawatt
MU	Million units
INR	Indian Rupee
CAGR	Compound annual growth rate
FY	Financial Year
DPIIT	Department for Promotion of Industry and Internal Trade
FDI	Foreign direct investment
UNNATEE	Unlocking National Energy Efficiency Potential
DC	Designated Consumer
NTPC	National Thermal Power Corporation
BEE	Bureau of Energy Efficiency
SME	Small and medium enterprise
IIT	Indian Institute of Technology
ECM	Energy Conservation Measures
BEEP	Buildings Energy Efficiency Programme
DSM	Demand side management
ECBC	Energy Conservation Building Codes
ULB	Urban Local Bodies
SDA	State Designated Agencies
PWD	Public Works Department
EV	Electric Vehicle
PM	Prime Minister
ESCO	Energy Services Company
GCV	Gross Calorific Value
TOE	Tonnes of oil equivalent
MTOE	Million tonnes of oil equivalent
SAIL	Steel Authority of India Limited
DMA	Directorate of Municipal Administration
DSM	Demand-side management
ECSBC	Energy Conservation and Sustainability Building Code
EEFP	Energy Efficiency Financing Platform
EESL	Energy Efficiency Services Limited
ESCO	Energy Service Company

FEEED	Framework for Energy Efficient Economic Development
GCRT	Grid Connected Rooftop System
GDP	Gross Domestic Product
GST	Goods and Services Tax
PCEI	Principal Chief Electrical inspector
NMRP	National Motor replacement Program
GWh	Giga-Watt Hour
HP	Horsepower
HPSV	High Pressure Sodium Lamp
OREDA	Odisha Renewable Energy Development Agency
OPGC	Odisha Power generation corporation Limited
OHPC	Odisha hydro power corporation Ltd
GRIDCO	Grid corporation of Orissa Limited
OPTCL	Odisha Power transmission Company Limited
PPP	Public Private Partnership
OERC	Odisha electricity regulatory commission
OTPC	Odisha Thermal Power Corporation
OCPL	Odisha Coal and Power Limited
GEDCOL	Green Energy development corporation Limited
TPNODL	TP Northern Odisha Distribution Limited
TPWODL	TP Western Odisha Distribution Limited
TPCODL	TP Central Odisha Distribution Limited
TPSODL	TP Southern Odisha Distribution Limited
kW	Kilowatt
LED	Light-emitting diode
MNRE	Ministry of New and Renewable Energy
MSME	Micro, Small and Medium Enterprise
Mt	Mega-ton
SMNP	Smart meter national program
NAMA	Nationally appropriate mitigation actions
MTOE	Million tons of oil equivalent
MTEE	Market Transformation for Energy Efficiency
MU	Million Units
MuDSM	Municipal Demand-side management
MW	Mega-Watt
IEA	International Energy Agency
NMEEE	National Mission for Enhanced Energy Efficiency
PAT	Perform, Achieve and Trade
SDA	State-Designated Agency
SIDBI	Small Industries Development Bank of India
SLNP	Street Lighting National Programme
SME	Small and Medium Enterprise
UJALA	Unnat Jyoti by Affordable LEDs for All

Executive Summary

India is a diverse country with diverse energy consumption patterns in different states/UTs. Broadly, the energy consumption is divided in five major sectors i.e., Buildings, Transportation, Municipalities and DISCOMs, Agriculture and Industries. Although India remains progressive and one of the front runners to achieve its Energy Efficiency (EE) potential, through innovative programmes such as the PAT scheme, Standards & Labelling, UJALA scheme, Energy Conservation Building Code, Electric Vehicle mission and Smart metering etc. However, at a state level, there is still an immense potential to be realized from large-scale implementation of EE interventions in various afore-mentioned demand sectors.

Therefore, there is a dire need for a focused sector-based energy efficiency approach by states/UTs. In view of this, the Bureau of energy efficiency has taken on this endeavor to state specific Energy Efficiency Action Plan through identification of focus sector, undertaking gap analysis, adopting best practices followed in peer group with implementation plan strategy; that can act as platform for developing State's Energy Policy and Programms.

The overall scope of work for this assignment is as follows: -

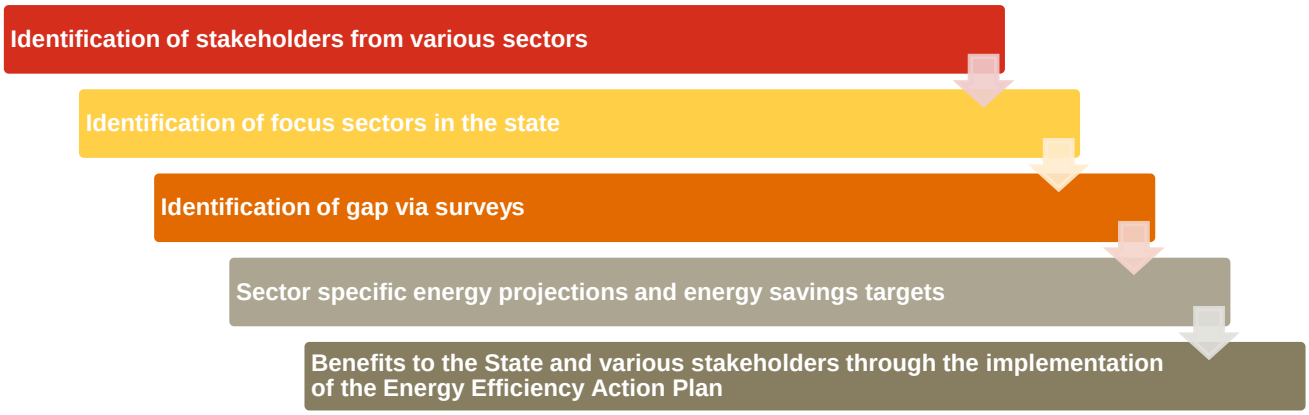

Figure 1: Broad scope of work

State context

Odisha is the 8th largest state by area located on the eastern side of India. Odisha is one of the fastest growing Indian states with GSDP growing at a CAGR of 6.3% from 2016-17 to 2020-21. (From 2011-12 prices) Odisha contributes approximately 2.7% to the national GDP[1].

Odisha is well-equipped with physical and social infrastructure with well-connected road and rail networks, airports, power, ports etc. Odisha has about 30 districts with 114 urban local bodies. Rourkela and Angul are the major Industrial towns in Odisha. Odisha is also amongst the top 10 states in India with highest number of MSMEs. Odisha is a power surplus state with 4 distribution companies serving their industrial, commercial, and residential consumers

From an energy standpoint – Coal used in captive powerplants of Odisha is the most prominent source of energy followed by coal used I oil in the form of LPG, Petrol, Kerosene, HSD, LDO & FO). Following figure illustrates the energy supply and consumption flow in the state: -

[1] IBEF Report Odisha

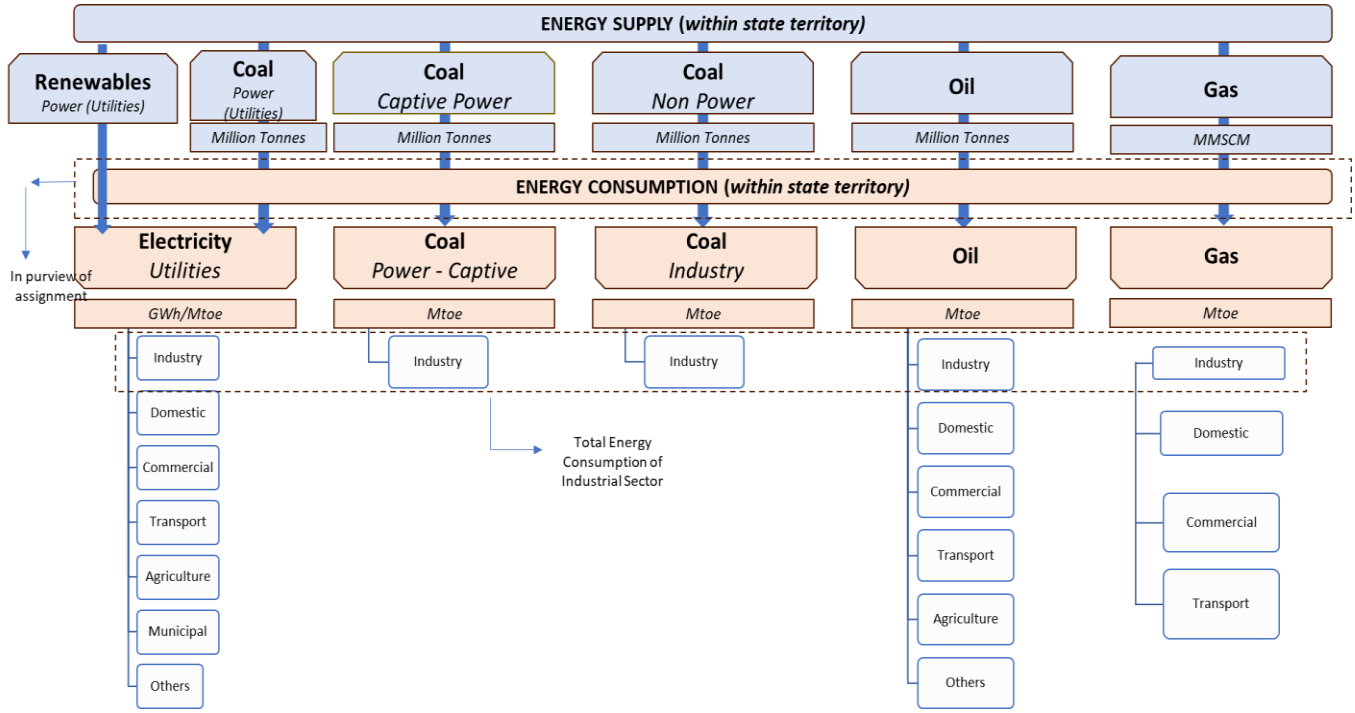

Figure 2: Energy flow in the state (supply and consumption)

From a consumption standpoint - the total energy consumption of Odisha for the year has been estimated to be approximately 23.59 Mtoe for the year 2019-20. It is pertinent to mention here that captive coal consumption is the major contributor to final energy consumption of Odisha followed by coal (non-power industry coal). Following figure illustrates the same: -

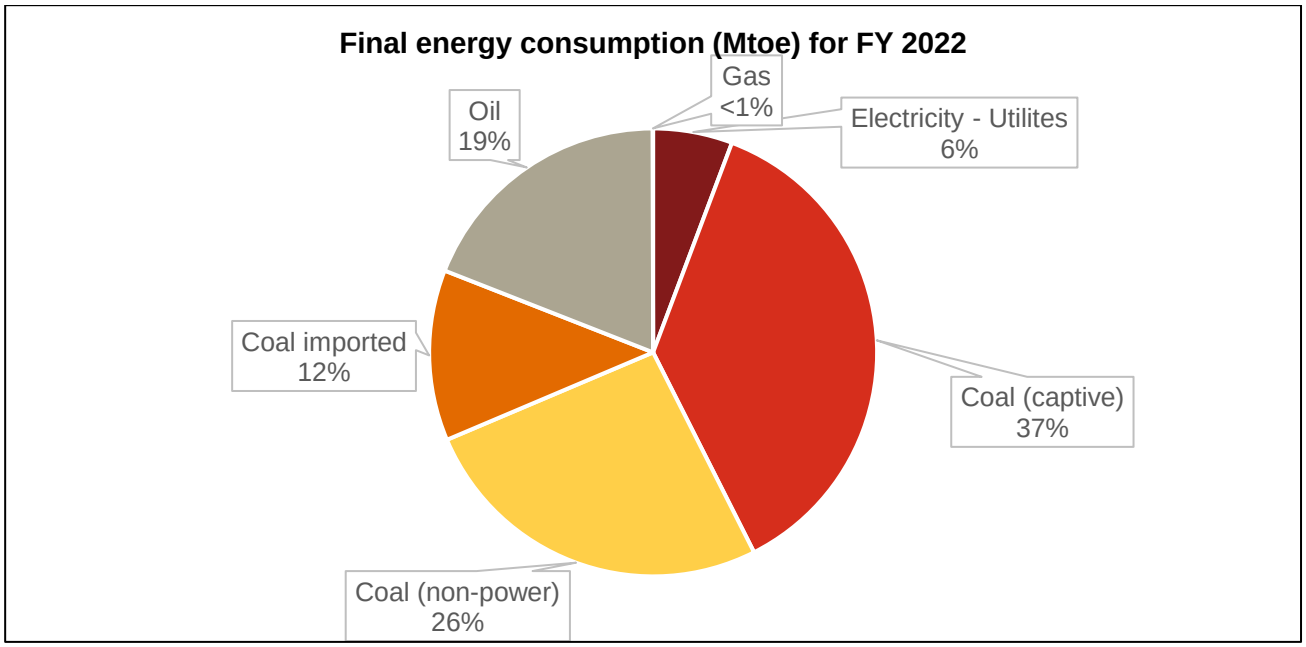

Figure 3: Fuel-wise split of total final energy consumption in Odisha

Assumptions:

This does not include aviation, DISCOM T&D losses, domestic navigation, Pet Coke, Paraffin waxes, petroleum jelly, LSWR, MTBE and reformate, BGO, Benzene, MTO, CBFS and Sulfur etc.

Identification of focus sectors

For identifying the major energy guzzling sectors in the state, energy consumption data of a number of sectors was researched and analyzed. This data was gathered via primary consultations with the various stakeholders and through secondary domain research.

Based on this assessment, following sectors were identified as the most energy intensive in the state: -

Figure 4: Identified focus sectors

Projection and forecasting

It has long been axiomatic that economic growth and energy demand are linked. As an economy grows – its energy demand increases; if energy is constrained, GDP growth pulls back in turn. Following graph forecasts Odisha's GSDP and its energy consumption from 2022 to 2030: -

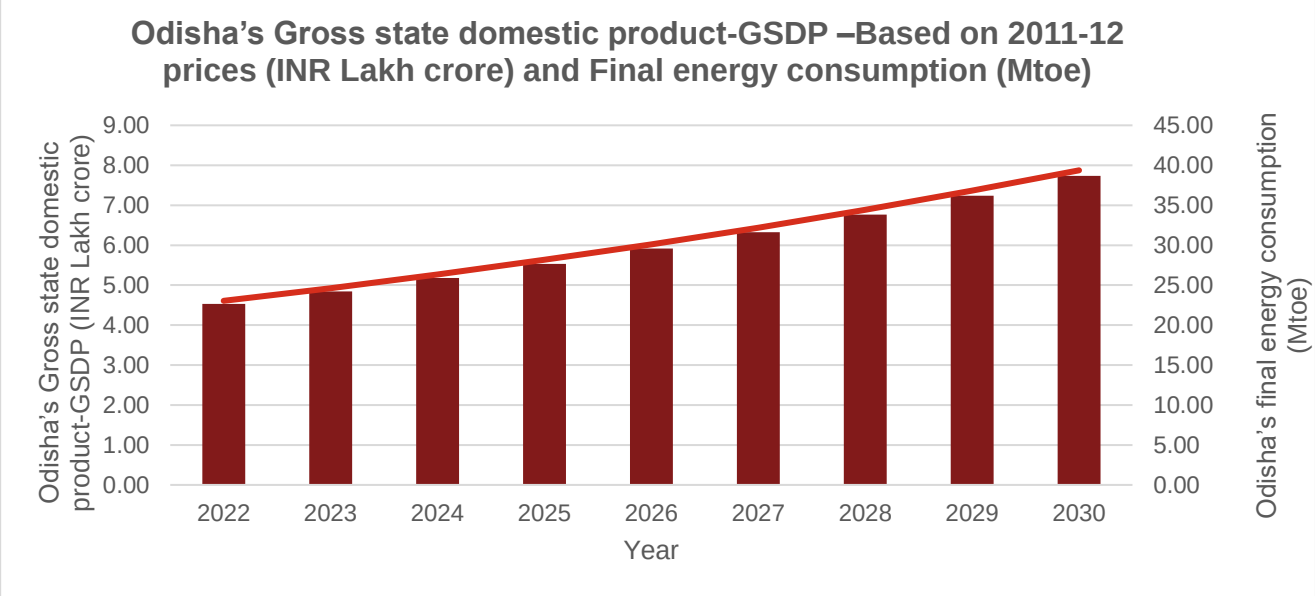

Figure 5: Energy consumption and GDP forecasting of Odisha

The baseline energy consumption intensity for FY2022 was calculated (8.43) and multiplied with forecasted GSDP to obtain final energy consumption trend till 2030.

Focus sector 1 - Industries

Energy efficiency potential in the sector

The estimated energy efficiency potential projected for the year 2030 in the industrial sector in Odisha is as follows: -

Action Plan	Energy Savings in 2030 under moderate scenario (Mtoe)	Energy Savings in 2030 under ambitious scenario (Mtoe)
Action plan 1	0.5	1.24

Action plan 2	0.16	0.28

Table 1: Energy efficiency potential in industry sector

The afore-mentioned moderate and ambitious scenarios have been discussed in detail in section 4.2 of the report.

Energy efficiency strategies in the sector

Action plan 1 – Deepening and widening of PAT scheme: It is recommended that the threshold for the PAT criteria in terms of energy consumption may be lowered so as to accommodate more cement and sponge iron units present within the state. Following table illustrates the energy efficiency that can be achieved via this strategy: -

Sector	Baseline SEC (toe/tonne)	Moderate SEC (toe/tonne)	Ambitious SEC (toe/tonne)	Production in 2030 (tonnes)	Energy saving in moderate scenario (ktoe)	Energy saving in ambitious scenario (ktoe)
Iron and steel sector	0.6284 (toe/tonne)	0.447(toe/tonne)	0.380(toe/tonne)	529607	**181.4**	**347.89**
Aluminium	0.33	0.265	0.2	9845	**320**	**896**
Coal Mining	14.71 tonne/MT	13.24 tonne/MT	11.77 tonne/MT	221	**73.3 (toe)**	**205.24 (toe)**

Table 2 : Deepening and widening of PAT scheme potential in Odisha

(Note: For the moderate and Ambitious SEC assigned to cement and sponge iron non-PAT units - It is assumed that all the existing units will achieve the moderate SEC target in 50% units and achieve ambitious SEC target in 70% units.)

Action plan 2 -: Manufacturing MSME may be looked at more carefully from the lens of energy efficiency. A number of MSME industry clusters are there in Odisha that are energy intensive. It is recommended that sponge iron, rice mills, sea-food processing and plastic extrusion industries cluster may be incentivized or prompted to adopt energy efficient technologies. Following table illustrates the energy efficiency that can be achieved via this strategy: -

Sector	Baseline SEC (toe/tonne)	Moderate SEC (toe/tonne)	Ambitious SEC (toe/tonne)	Production in 2030 [2](tonnes)	Energy saving in moderate scenario (toe)	Energy saving in ambitious scenario (toe)
Sponge Iron	0.7624	0.7	0.68	4968658	151528	265175
Rice Mills	0.09	0.087	0.082	1416051	6850.2	14385.5
Sea-food processing industries	0.15	0.11	0.10	132555	2549	4997
Plastic extrusion plants	0.456	0.041	0.036	141533	323.3	905.3

Table 3: Energy efficiency potential in key SME sectors of odisha

(Note: For the moderate scenario, 50% penetration of energy efficient motors in sponge iron units,50% penetration of energy efficient motors in rice mills, 50% energy efficient refrigeration systems in seafood processing industries and 50%penetration of VFD in extrusion motors is considered)

[2] https://ibm.gov.in/IBMPortal/

For the ambitious scenario,70% penetration of energy efficient motors in sponge iron units ,70% penetration of energy efficient motors in rice mills and 70% energy efficient refrigeration systems in seafood processing industries and 70% penetration of VFD in extrusion motors of Plastic processing units is considered.)

Focus sector 2 – Commercial and domestic buildings

Current scenario

The buildings sector in encompasses different types of buildings present in Odisha i.e, domestic (households) and commercial (health facilities, commercial complexes, public buildings etc.).

Energy efficiency strategies in the sector

Action plan 1 – Replacement programme for inefficient appliances: Replacement of inefficient appliances with their efficient counterparts can be considered as a low hanging fruit from and energy efficiency implementation standpoint. This strategy can be implemented in both domestic as well as commercial buildings. As part of the strategy, following appliances have been identified that can be in the contention for replacement: -

Figure 6: Appliances considered for energy efficiency

Following table illustrates the energy efficiency that can be achieved via this strategy: -

Appliance	Inefficient stock in FY2022	Energy saving in moderate scenario (Mtoe)	Energy saving in ambitious scenario (Mtoe)
Fan	98,66,700	**0.03**	**0.06**
AC	15,34,820	**0.012**	**0.02**
Refrigerator	49,33,350	**0.04**	**0.06**
Washing Machine	40,56,310	**0.004**	**0.006**
Television	57,00,760	**0.002**	**0.003**
LPG cookstove	10195590	**0.026**	**0.05**

Table 4: Energy efficiency potential due to appliance energy efficiency

(Note:

- *In moderate scenario, it is assumed that 30% of appliances will be replaced with efficient appliances and 10% switch to electric cookstove. In ambitious scenario, it is assumed 50% appliance replacement with efficient appliance and there will be a 20% switch to electric cook stove*
- *In-efficient appliance stock are 15 years old)*

Action Plan 2 - it is recommended that the new and upcoming commercial and domestic buildings (having a connected load of minimum 100 kW) may be mandated as per the energy conservation and sustainability buildings code (ECSBC) in the state. Following table illustrates the energy efficiency that can be achieved via this strategy: -

Energy saving in moderate scenario (toe)	Energy saving in ambitious scenario (toe)
255.16	**357.23**

Table 5 : Energy savings due to ECSBC implementation

(Note: In moderate scenario, it is assumed ECSBC will be implemented in new commercial buildings more than 100 kW connected load and lead to 25% savings. In ambitious scenario, ECSBC is assumed to be implemented in new commercial buildings more than 100 kW and lead to 35% savings)

Action plan 3 - Under this strategy, it is recommended that periodic energy audits may be carried out at public/commercial buildings on load basis. Directives may be issued to government departments to carry out detailed energy audits at their respective building facilities. Following table illustrates the energy efficiency that can be achieved via this strategy: -

2030 energy consumption in commercial and public buildings sector (Mtoe)	Energy saving in moderate scenario (toe)	Energy saving in ambitious scenario (toe)
357535	**5363.02**	**10726**

Table 6 : Energy savings potential due to mandatory energy audit

(Note: In moderate scenario, it is assumed 5% buildings will have energy audit and in ambitious scenario, it is assumed 10% of buildings will get energy audit. In ambitious scenario, it is assumed that energy audit recommendations implementation will lead to 30% savings.)

Focus sector 3 – Transport

Current scenario

The transport sector is a major consumer of energy in Odisha

Energy efficiency potential in the sector

Following table estimates the energy efficiency potential projected for the year 2030 in the transport sector in Odisha:

Strategy	Energy Savings in 2030 under moderate scenario (Mtoe)	Energy Savings in 2030 under ambitious scenario (Mtoe)
Strategy 1	0.4	0.6
Strategy 2	0.21 (As per policy)	

Table 7: Energy savings potential in Transport sector of odisha

Energy efficiency strategies in the sector

Action Plan 1: **Transition of existing fleet to electric vehicles:** Under this strategy, it is recommended to transition the existing ICE (Internal combustion Engine) fleet (two wheelers, three wheelers, four wheelers, bus and heavy vehicles) to electric vehicles. Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in the year 2030 as per this strategy of transition from ICE to electric vehicles:-

Energy saving in moderate scenario (Mtoe)	Energy saving in ambitious scenario (Mtoe)
0.4	0.6

Table 8: Energy savings potential due to EV transition strategy

*(Note: As per Odisha's EV policy, under **moderate scenario,20% EV penetration in vehicle mix by 2031** across all category of vehicles is considered, As pe Odisha's EV policy, under **ambitious scenario, 30% EV penetration in vehicle mix by 2031** across all category of vehicles is considered)*

Action plan 2: **Ethanol blending programme:** Under this strategy - it is recommended that, as per the national target, ethanol blending in conventional fuels may be executed. The target already set in this segment is 20%. Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in 2030 as per this strategy: -

Energy saving as per policy (Mtoe)
0.21

Table 9: Energy saving potential due to ethanol bending program

Focus sector 4 – Agriculture

Current scenario

The agriculture sector is a significant energy consumer in Odisha, as in many other Indian states. Energy is required for various agricultural activities such as irrigation, land preparation, harvesting, threshing, and transportation of agricultural produce. In Odisha, the agriculture sector consumes a substantial amount of energy in the form of electricity, diesel, and other fuels.

Energy efficiency potential in the sector

Following table estimates the energy efficiency potential projected for the year 2030 in the transport sector in Odisha:

Strategy	Energy Savings in 2030 under moderate scenario (Mtoe)	Energy Savings in 2030 under ambitious scenario (Mtoe)
Strategy 1	0.25	0.25
Strategy 2	0.004	0.020

Table 10: Energy saving potential in agriculture sector

Energy efficiency strategies in the sector

Action Plan 1 - **Transition of existing diesel pumps to solar based pumps:** Under this strategy, it is recommended that the existing stock of diesel-based pumps may be replaced by solar based pumps by 2025.

Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in the year 2030 as per this strategy of transition from diesel pumps to solar based pumps :-

Diesel pumps estimated inventory by 2025	Energy saving in moderate scenario (Mtoe)	Energy saving in ambitious scenario (Mtoe)
4,95,500	**0.25 (Policy scenario)**	**0.25(Policy scenario)**

Table 11: Energy savings potential due to solar based pump transition

(Note: By 2025, moderate scenario assumes 100% replacement of diesel pumps with solar pumps. By 2025, ambitious scenario assumes 100% replacement with solar pumps)

Action plan 2 - **Replacement of inefficient electric pumps with efficient electric pumps:** Under this strategy, it is recommended that the existing stock of inefficient electric pumps may be replaced by solar based pumps by 2025.

Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in 2030 as per this strategy: -

Inefficient pumps estimated inventory by 2030	Inefficient pumps replaced by Star-Rated pumps in ambitious scenario by 2030	Energy saving in moderate scenario (toe)	Energy saving in ambitious scenario (toe)
552145	551245	4895	20726

Table 12: Energy savings potential in case of replacement of in-efficient pumps

The final energy savings potential has been added and figure below shows the final energy consumption trends in Odisha under the three scenarios in 2025 and 2030.

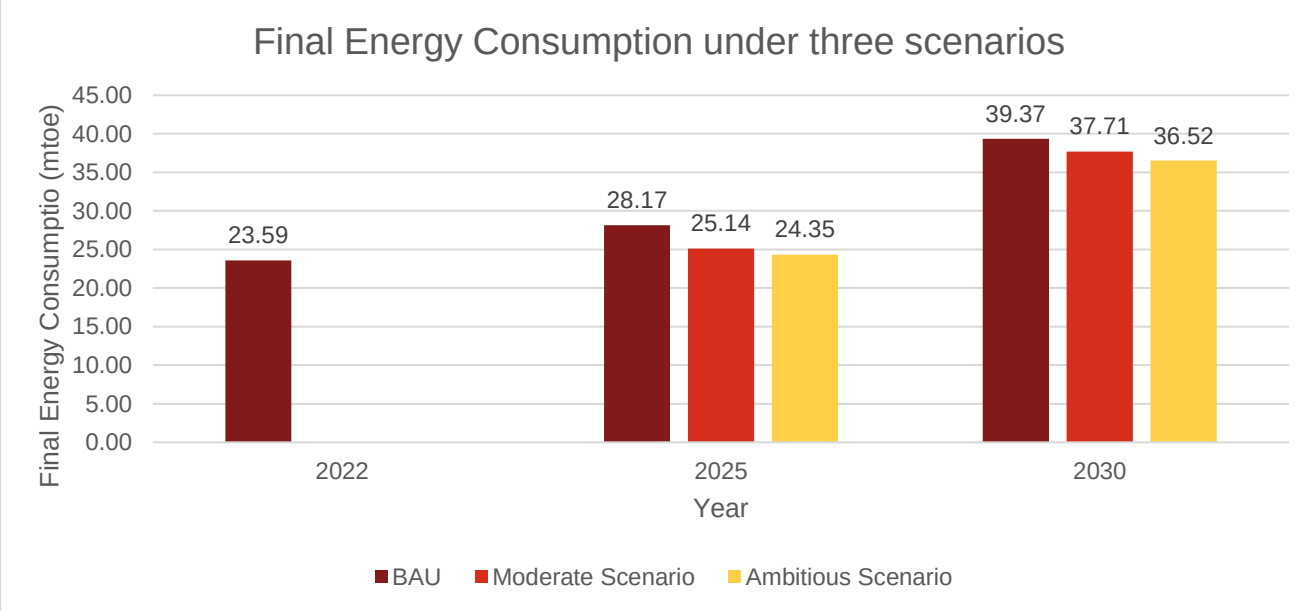

Figure 7: Final Energy Consumption trends in 2025 and 2030 under three scenarios

As observed from above, the energy savings potential is highest in ambitious scenario due to ambitious penetration of efficient technologies and equipment in this scenario. The overall energy savings, GHG emission reduction and investment potential for the state of Odisha is shown below.

Sector	Emissions Reduction (MtCO2) - FY2031		Energy Consumption Reduction (Mtoe) - FY2031		Investment Potential (INR Crores)
	Moderate	Ambitious	Moderate	Ambitious	
	MtCO2 reduction	MtCO2 reduction	Mtoe Reduction	Mtoe Reduction	
Industry	2.07	4.79	0.66	1.53	2814.7
Buildings	0.37	0.66	0.12	0.21	385.7
Transport	1.96	2.62	0.63	0.84	1538.5
Agriculture	0.80	0.85	0.25	0.27	497.6
Total	5.21	8.91	1.66	2.85	5236.4

Table 13: Energy Savings, Emission Reduction, and Investment Potential for Odisha

The energy savings of 1.66 Mtoe and 2.85 Mtoe are calculated by savings from the four focus sectors. The emission reduction is calculated by multiplying the energy savings with a factor of 3.3 MtCO2/Mtoe. For market investment potential, 1 tonne of oil equivalent is taken as value of INR 18,402 and assuming payback period of 3 years.

Introduction

Background and about State Energy Efficiency Action Plan

The objective of the **State Energy Efficiency Action Plan (SEEAP)** is to ensure that the allocation of resources is as per the requirement of the state and to estimate the potential of energy conservation in sectors that are predominant in the region. The current assignment envisions the following:

- Identification of stakeholders from various sectors,
- Identification of focus sectors in a state,
- Identification of gaps through surveys,
- Sector-specific energy projections and energy savings targets
- Benefits to the State and various stakeholders through the implementation of the Energy Efficiency Action Plan

India's Nationally Determined Contributions and Mission LiFE

India's first NDC in **Paris Agreement on Climate Change - 2016** called for **33-35%** reduction of emissions intensity of GDP by 2030 compared to 2005. However, this target has been increased to **45%** in the recent COP26. The five ambitions, also known as **Panchamrit,** that India announced in the recent Conference of Parties (COP-26) at Glasgow, UK, are as follows:

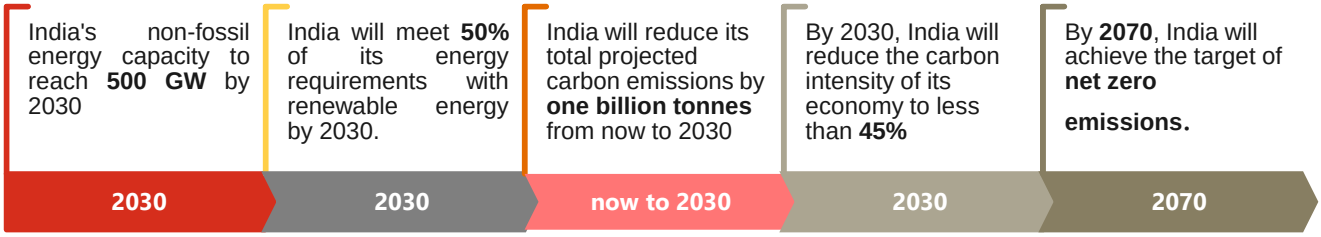

Figure 8:India's NDC

What is Mission LiFE?

Mission LiFE is an India-led global mass movement to nudge individual and community action to protect and preserve the environment. At 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, India shared the mantra of LiFE - Lifestyle for Environment - to combat climate change. India is the first country to include LiFE in its Nationally Determined Contributions (NDCs).

Need for this assignment

With the energy efficiency agenda gaining traction and momentum in India, there is a need to continuously evaluate institutional capacity, policies, programs, and markets at the state level to identify best practices and promote cross learning. Developing State Specific Energy Efficiency Action Plan through identification of **focus sector**, **undertaking gap analysis**, **adopting best practices** followed in peer group with **implementation plan strategy**; that can act as platform for developing State's Energy Policy and Programs. This assignment aims to develop State Specific Energy Efficiency Action Plans for the state of Odisha

India is a diverse country with diverse energy consumption patterns in different states/UTs. Broadly, the energy consumption is divided in five major sectors i.e., **Industries, Buildings, Transportation, Agriculture, Municipalities and DISCOMs.**

Though energy efficiency is a multi-dimensional subject, defining key focus areas to bridge gaps is the need of the hour. For instance, there may be states with lesser urbanized areas and therefore lesser number of high

energy consumption buildings. Such a state may need more focus on energy efficiency in sectors such as Transportation, Agriculture, or others.

As a part of the assignment, there has identification of stakeholders from various sectors, identification of focus sector in the state of Odisha, identification of gaps in the sector, providing best practices and identification of designated agency to carry out efficiency activity in the sector in consultation with state for preparation of a short-term plan till the year 2025 and a medium-term plan till the year 2030. The plan also highlights the benefits derived from these initiatives to the state.

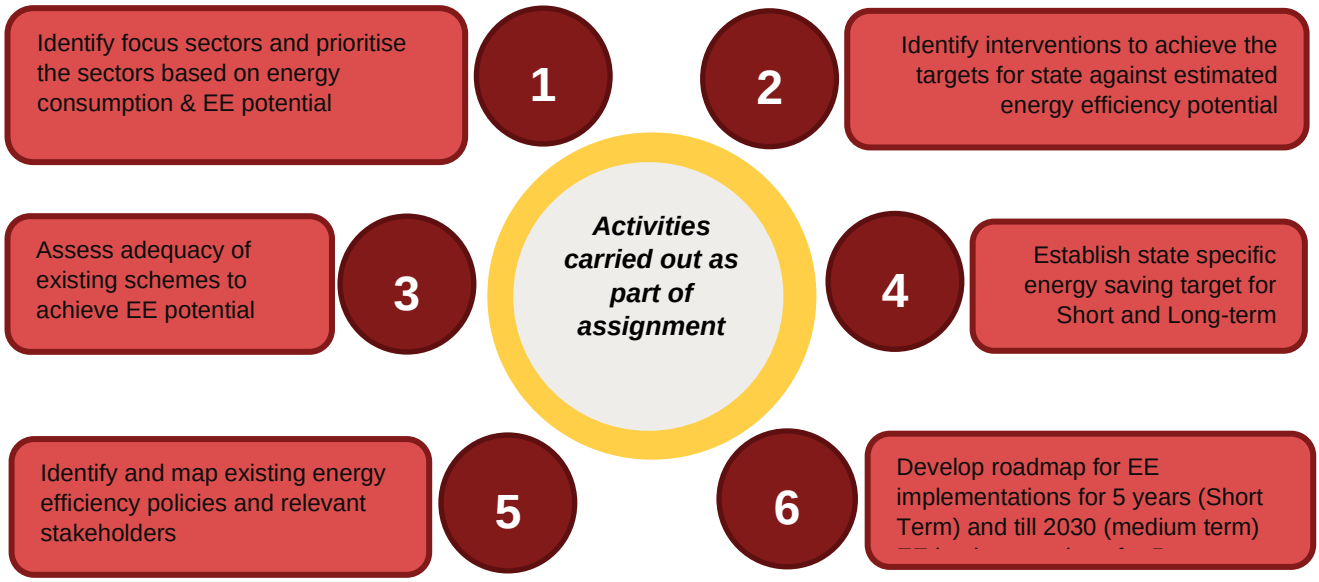

Figure 9: Key activities of the project

State profile

Odisha is the 8th largest state by area located on the eastern side of India. Odisha is one of the fastest growing Indian states with GSDP growing at a CAGR of 6.3% from 2016-17 to 2020-21. (From 2011-12 prices) Odisha contributes approximately 2.7% to the national GDP[3].

Odisha is well-equipped with physical and social infrastructure with well-connected road and rail networks, airports, power, ports etc. Odisha has about 30 districts with 114 urban local bodies. Rourkela and Angul are the major Industrial towns in Odisha. Odisha is also amongst the top 10 states in India with highest number of MSMEs. Odisha is a power surplus state with 4 distribution companies serving their industrial, commercial, and residential consumers.

Figure 10: State of Odisha

The economy of Odisha majorly depends on key sectors like agriculture, industries, and services. Odisha's manufacturing industries contribute about 48.4% to GVA (Gross value added) to its economy and mining/quarrying sector contributes about 25% while electricity, water, gas and building contributes 18.4% and 8.6% respectively. In Odisha, iron Ore, aluminum, steel products shared majority of overall exports from the state.

Odisha is well connected with its neighbouring states like West Bengal, Chhattisgarh Andhra Pradesh by road and rail networks. Odisha has road network of about 2,69,779 kms with road density of about 164 km per 100sqm of area. Odisha's Paradeep Port is one of the largest ports in India who handled about 114.54 MT of Cargo in 2020-21.

[3] IBEF Report Odisha

Figure 11 : Some Key Economic areas in Odisha

The primary, secondary, and tertiary sectors represent various business types and the goods they procure and sell in an economic setup. Each sector is interdependent on the other so that the economy as a whole functions properly and efficiently. The primary sector refers to agricultural and allied sector services, the secondary sector is the manufacturing sector, and the tertiary sector is known as the service sector. Odisha's main economic driver is the tertiary sector (like services, trade, transport etc.) which accounted for 39.88% of GDP in 2021-22. Also, even though primary sector of the economy (like agriculture, forestry, mining etc.) has a considerable contribution (28.9%) to the GSDP, the sector has been historically observed to be non-energy intensive. Table 1 lists out some key profile indicators of the state of Odisha [4]

Table 14: Key profile of Odisha[5]

Parameter	Unit	Value	Mtoe
Total population (FY 2020)	Lakhs	438	-
Gross domestic product (FY 2022) (GSDP)	INR lakh crore	4.20	-
Total power plant installed capacity (FY 2022)	GW	7.6	-
Total renewable energy installed capacity	GW	2.77	-
Total coal consumption[6]	'000 Tonnes	39,066	17.58
Total consumption of petrol	'000 Tonnes	864	0.97
Total consumption of diesel	'000 Tonnes	2,653	3.13
Total consumption of other petroleum products (LPG, kerosene, furnace oil)	'000 Tonnes	1773	1.91
Total consumption	**Mtoe**		**23.59**

4 Odisha Economic Survey 2021-22

5 Odisha Economic Survey 2021-22

6 The coal consumption include coal used in CGP and IPPs of Odisha

Energy supply and consumption scenario

Energy supply

From an energy supply standpoint – oil in the form of LPG, Petrol, Kerosene, HSD, LDO & FO is the most prominent source of energy followed by coal (coal for thermal power plant and non-power activities). Following flowchart illustrates energy supply and consumption scenario in Odisha: -

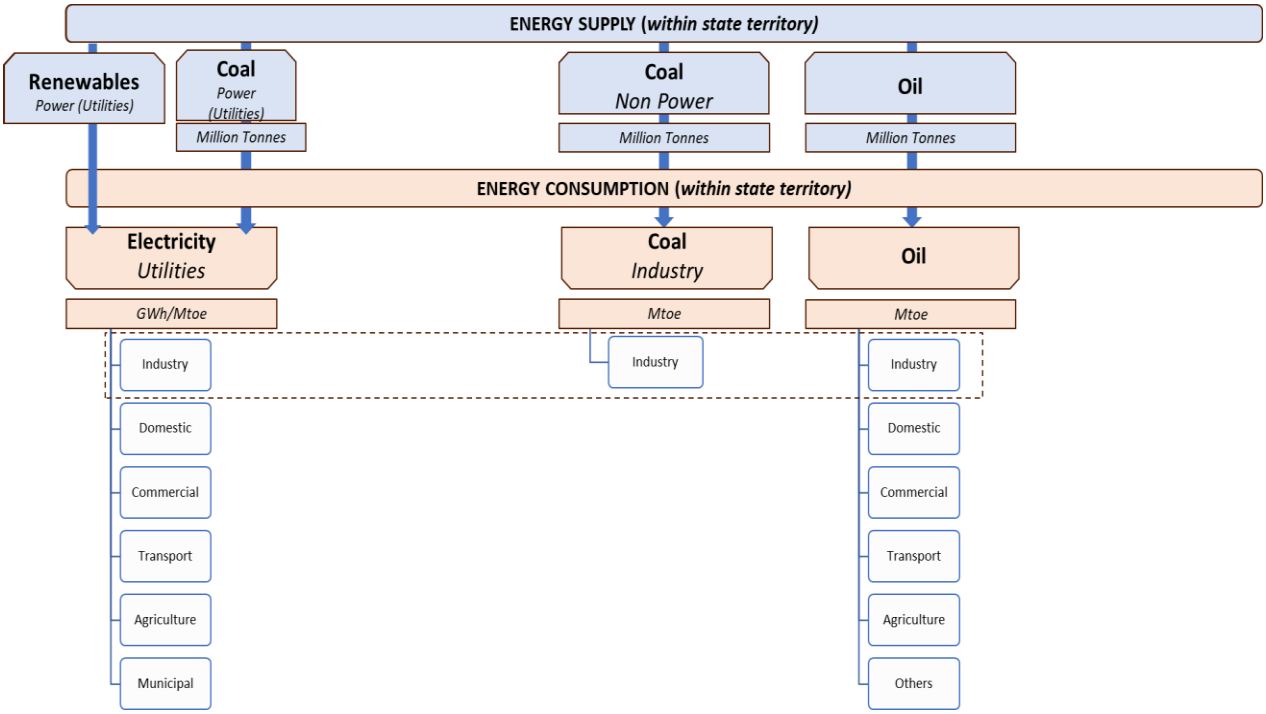

Figure 12: Odisha's energy supply and consumption characteristics

As illustrated in the above figure – along with oil, electricity (generated from the thermal power plants and renewable sources) is utilized across critical sectors such as Industries, Domestic, Commercial, Transport, Agriculture and Municipal (public lighting, water treatment plants, municipal water pumps etc.). While the non-power coal is only used in the industrial sector.

Energy Consumption

From a consumption standpoint - the total energy consumption of Odisha for the year has been estimated to be approximately 23.59 Mtoe for the year 2022. It is pertinent to mention here that coal consumption (captive) is the major contributor to this estimate followed by coal (used in industries) and oil consumption. Following figure illustrates the same: -

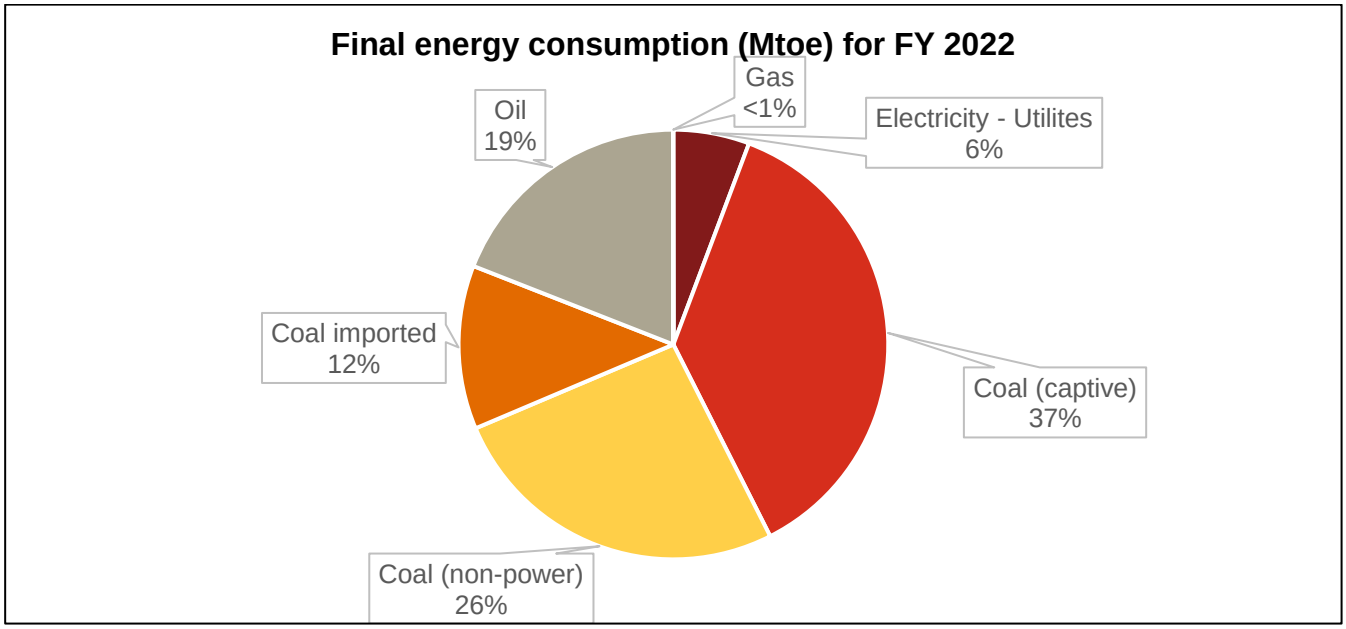

Figure 13: Odisha's final energy consumption (fuel wise)

As specified above, the energy consumption in the state is composed of primary energy and electricity. Electricity Scenario

Installed capacity

Power sector in Odisha is highly coal dependent with 77% of installed capacity and 72% power generation from coal. Hydro power installation capacity has also significant presence in Odisha's energy mix with 17% of total installed capacity and power generation of 24%. Large coal reserves and power plants proximity to coal pits provide a cost advantage and this has been the reason for coal dominance in the state.

In terms of electricity access, Odisha has achieved 100% rural electrification with power for all households.[7] Odisha is a power surplus state and continues to progress towards net exporter of electricity from 2020

Odisha's total installed capacity at the end of 2022 FY was 7.6 GW. It is pertinent to mention here that Odisha's total installed power generation capacity had increased from 6.8 GW in 2022 to 7.6 MW.[8]

Sector	Electricity consumption (GWh)	Share (%)
Domestic	9829.46	35.8%
Industry	10426	36.3%
Commercial	3746.8	11.1%
Transport	0	0.0%
Agriculture	781.42	2.8%
Municipalities	660	2.7%

Table 15: Electricity consumption by sector in 2021-22 (Utilities only)[9]

Electricity peak demand in the state

The peak demand of the State was 5048 MW and peak availability was 5712.11 Mw for FY 2020-21 as shown in Table 8. In the last two years, the State has experienced falling demand possibly due to pandemic-induced slump. The most likely reason is reduced demand from industrial units, which have captive power plants with installed capacities exceeding their immediate requirements.[10]

[7] Department of Energy, Government of Odisha

[8] Odisha energy Action Plan

[9] CEA General review 2021

[10] Odisha Energy Action Plan

Year	Peak demand (MW)	Peak availability (MW)	Shortage (MW)
2012-13	2674	2776	-102
2020-21	5048	5712.11	-664.11

Table 16:Peak Power Demand and Availability for Odisha

Renewable energy scenario

As on 31 March 2020, the total estimated potential of renewable power in the state of Odisha is around 32,780 MW. This can be broken down as:

Source	Estimated Potential (in MW)
Solar	29428
Wind	3093
Small hydro	246
Biomass Power	22
Total	**32,780**

Table 17:Total estimated renewable energy potential in Odisha[11]

Further, the monthly renewable energy generation in the state between April 2022 to June 2023 (in MU) can be broken down as:

(In MU)	Wind	Solar	Biomass	Bagasse	Small Hydel	Others	Total
Apr-22	-	61.61	7.18	-	15.84	-	**84.63**
May-22	-	67.39	6.7	-	16.16	-	**90.27**
Jun-22	-	51.50	3.35	-	8.86	-	**63.71**
Jul-22	-	45.69	0.03	-	59.19	-	**104.91**
Aug-22	-	47.45	0.03	-	69.22	-	**116.69**
Sep-22	-	54.08	0.39	-	73.26	-	**127.73**
Oct-22	-	59.25	7.93	-	67.89	-	**135.07**
Nov-22	-	61.95	7.21	-	32.26	-	**101.42**
Dec-22		60.28	9.30		19.32		**88.9**
Jan-23	-	62.42	7.74	-	21.52	-	**91.68**
Feb-23	-	69.38	7.65	-	21.46	-	**98.49**
Mar-23	-	65.24	3.42	-	19.97	-	**88.63**

Table 18:Renewable energy generation in Odisha in 2019-20

Overview of Institutional framework and stakeholder mapping

Figure 9 shows the overview of institutional framework of energy in the state of Odisha

Department of Energy, Odisha

[11] CEA-General Review

Department of Energy in Odisha is the apex body responsible for providing energy to various sectors of the economy. Department of Energy has 7 Public sector Undertakings

Principle Chief electrical Inspector- Engineer in Chief-SDA Odisha

EIC(E) cum PCEI(O) SDA Odisha is a nodal agency for Odisha's co-ordination, regulation, and enforcement of efficient use of energy and its conservation.

GRIDCO

GRIDCO -Grid corporation of Odisha is responsible for transmission, trading and bulk supply of electricity and other related activities under an exclusive license issued by Odisha Electricity Regulatory Commission.

OPGC

OPGC looks after Thermal Power generation operations and R&M Activities across the state.

OHPC

OHPC looks after Hydro power generation across the state.

OPTCL

OPTCL looks after transmission of electricity above 132 kV or above.

GEDCOL

GEDCOL is overlooking faster adoption of Green Energy installation across the state.

OCPL

OCPL is a wholly owned subsidiary of OPGC who looks after mining and supply operations of coal across the state.

The entire energy sector is being regulated by **OERC (Odisha Electricity regulatory commission**) in the state.

OREDA

OREDA is a state nodal agency for the implementation of renewable energy projects by means of financial incentives made available by the Ministry of New and Renewable Energy (MNRE), Govt. of India and Government of Odisha

DISCOMs

There are mainly 4 distribution companies to cater to 4 different circles across the state. TPNODL, TPSODL, TPWODL and TPCODL. Tata Power has recently acquired stake in all these 4 distribution companies and now they are in operational under PPP model.

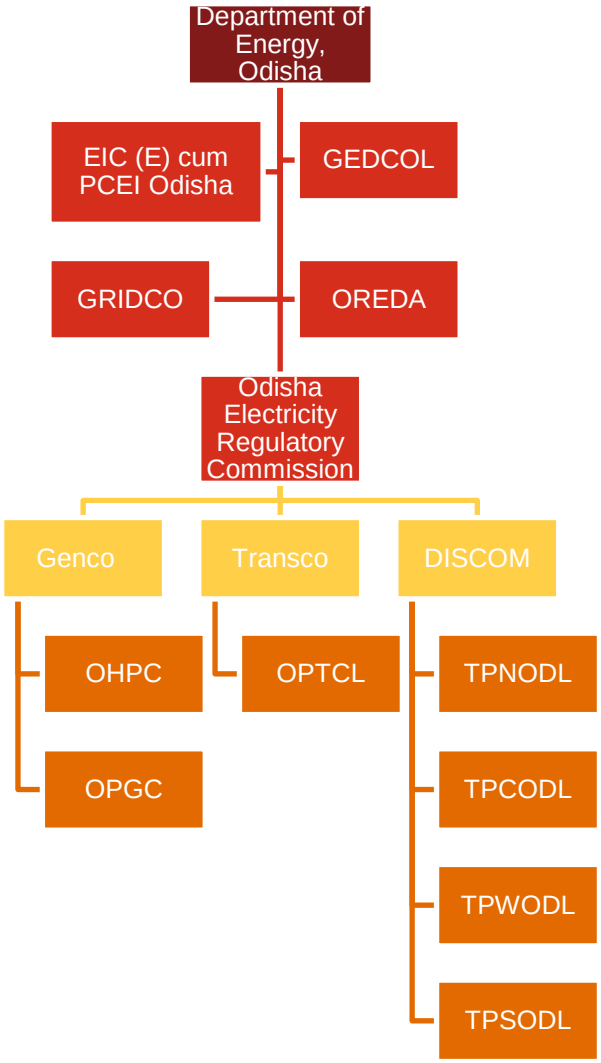

Figure 14 : Overview of institutional framework of energy in Odisha

Moreover, from an end consumer perspective – a number of other departments were also consulted as part of this study. Following figure illustrates the various departments were involved as a part of the study: -

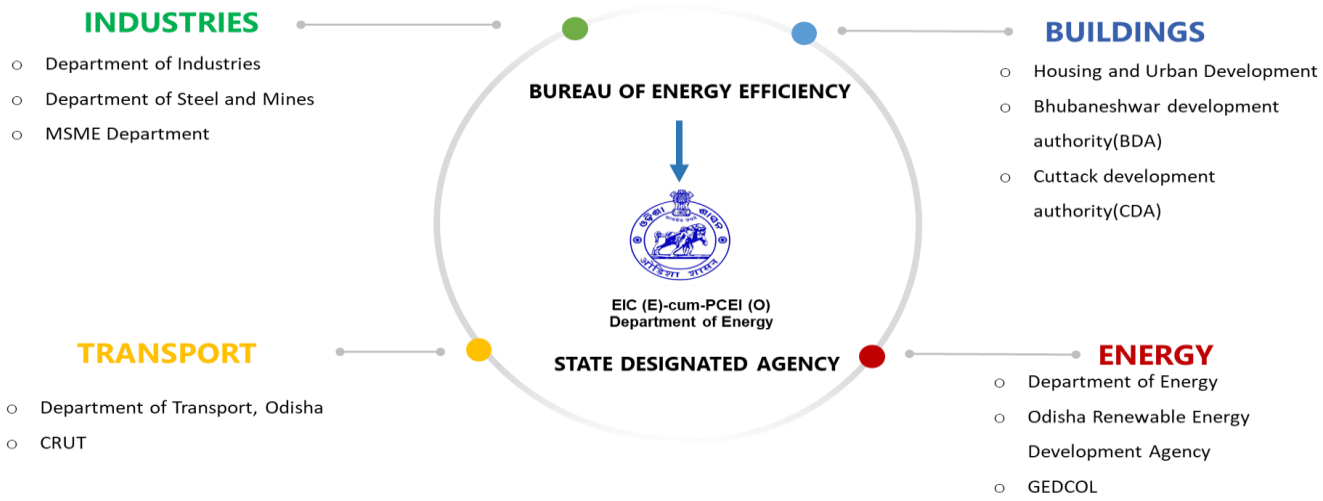

Figure 15: Departments representing Industries, buildings and transport

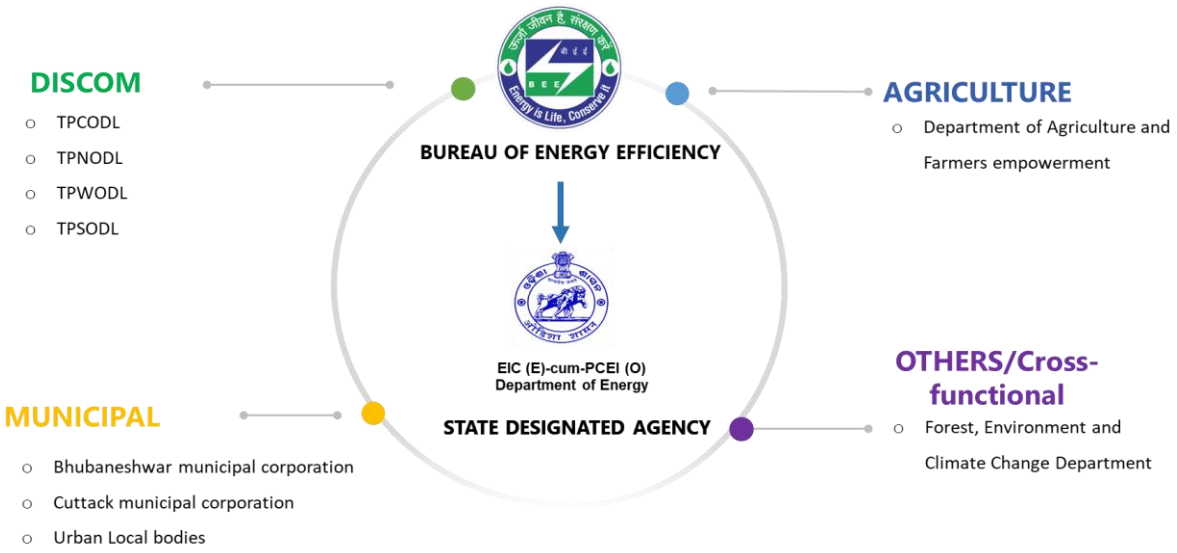

Figure 16: Departments representing DISCOMs, agriculture, municipal and others.

Identification of focus sectors

India has remained progressive and one of the front runners to achieve its Energy Efficiency (EE) potential, through innovative programs such as the PAT scheme, Standards & Labelling, UJALA scheme, Energy Conservation Building Code, Electric Vehicle mission and Smart metering etc. However, at the country level, there is still an immense potential to be realized from large-scale implementation of EE interventions at state level in various demand sectors- industries, MSMEs, agriculture, transport, municipal, domestic & commercial buildings.

These states are also at different stages of progressiveness towards adoption of EE interventions in various demand sectors, which necessitates the need to identify focus sectors, evaluate existing policies and institutional capacities. This section identifies the key energy consuming sectors in Odisha

Methodology of focus sector identification

For identifying the major energy guzzling sectors in the state, energy consumption data of a number of sectors was researched and analyzed. This data was gathered via primary consultations with the various stakeholders and through secondary domain research. In this regard, following sectors were analyzed: -

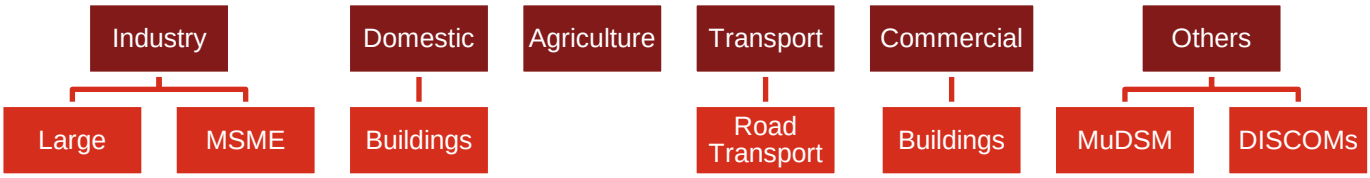

Figure 17: Areas assessed as part of focus sector identification

Identified focus sectors

Based on electricity and primary energy consumption, three focus sectors have been identified as seen below.

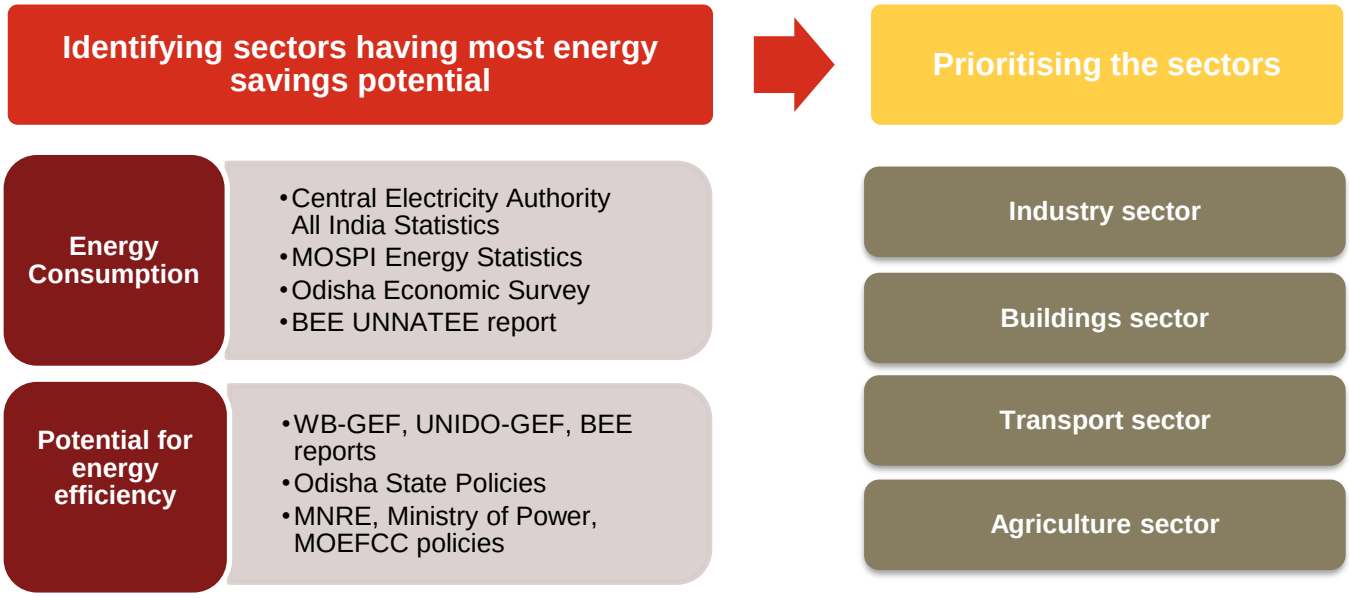

Figure 18 : Identifying focus sectors

Projections and forecasting

It has long been axiomatic that economic growth and energy demand are linked. As an economy grows – its energy demand increases; if energy is constrained, GDP growth pulls back in turn.

In view of the above, this section explores the past trends related to Odisha's **energy consumption** and its GDP and at the same time projects future trajectory of the aforementioned critical elements and explores their correlation i.e., energy intensity.

Forecasting of Odisha's GDP

Following figure captures Odisha's GDP over the years (between 2014/15 to 2019/20). Odisha's GDP varies from **INR 2.92 Lakh Cr** in 2015 to **3.96 Lakh Cr** in 2020 at a CAGR OF 6.3%. (From 2011-12 prices) This figure also projects the increase in GDP from 2020 to 2030. This has been projected till 2030 using 80% weightage to historic trend of 6.3% and 20% weightage to the forecast of 6.9% as per the latest Odisha Economic Survey.

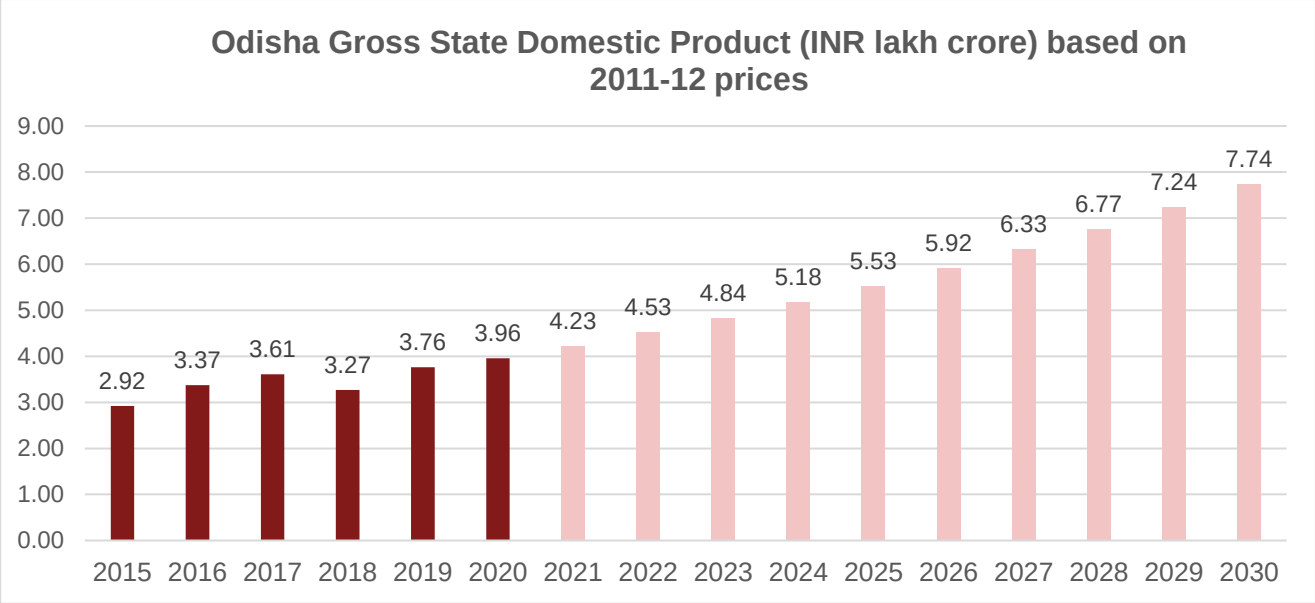

Figure 19: Odisha's GDP projections

Forecasting of final energy Consumption

The final energy consumption in Odisha varies from 24.97 Mtoe in 2014-15 to 31.09 Mtoe in 2020. The baseline energy consumption intensity for FY2020 was calculated (8.43) and multiplied with forecasted GSDP to obtain final energy consumption trend till 2030. Following figure illustrates this information:

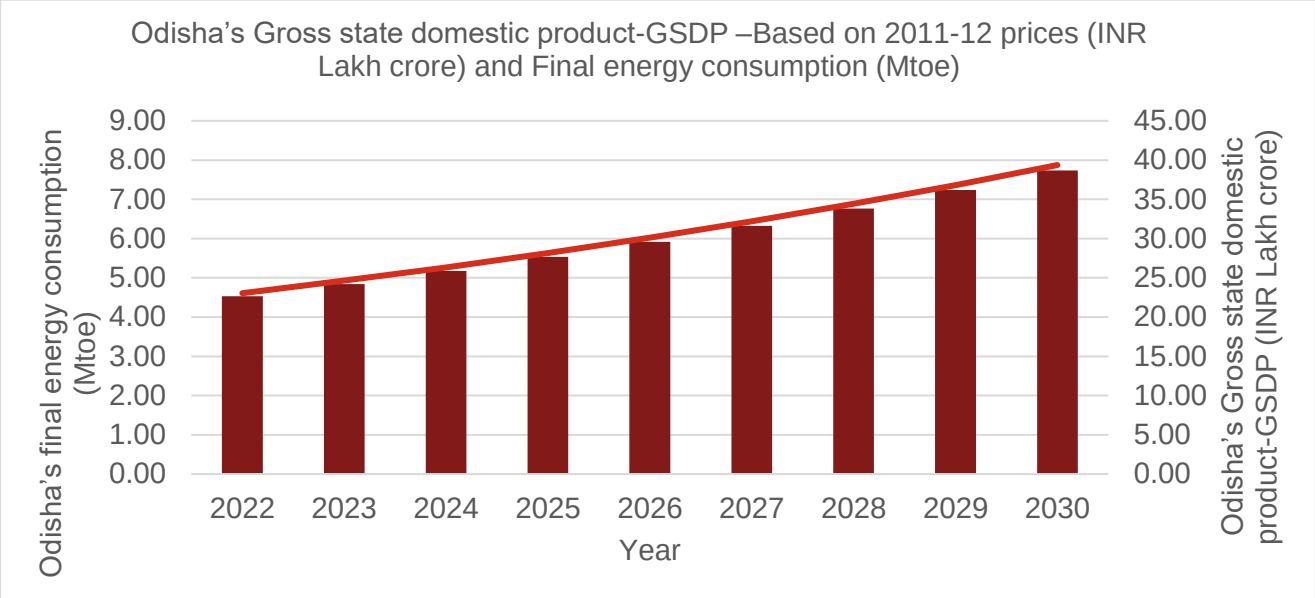

Figure 20: Year-wise projection of final energy consumption and GDP for Odisha

Focus sector 1 – Industry

This section assesses the present scenario of this sector, energy efficiency potential, EE strategies in the sector (existing and proposed) along with setting of energy savings targets and its monitoring mechanism.

Current scenario

Brief description of the sector

Odisha is one of the leading states in India in terms of its industrial sector. The state has a wide range of industries, including steel, power, aluminum, chemicals, textiles, and food processing. Odisha has a strategic location on the east coast of India, which provides easy access to markets in Southeast Asia and the Middle East.

Large Industries

The state has many mineral resources, which are key to its industrial growth. Odisha is the largest producer of steel in India, and has several steel plants, including the Rourkela Steel Plant, the Bhushan Steel Plant, and the Jindal Steel Plant. The state is also a major producer of aluminum, with the Nalco (National Aluminium Company Limited) being one of the largest aluminum plants in India.

Odisha has also made significant progress in the renewable energy sector, with several solar power projects being developed in the state.

The industrial sector in Odisha is identified as a priority sector based on energy consumption and high potential for energy efficiency. PAT sectors in Odisha are Aluminum, Cement, Chlor-Alkali, Fertilizer, Iron & Steel, Pulp & Paper, Thermal Power Plants, DISCOM, Petro Chemicals, Railways and Petroleum Refinery. 12 . Odisha is the largest Stainless-Steel producer in the country with about 20% of steel manufacturing capacity of India. Odisha has major Steel manufacturers including Tata Steel, Jindal Stainless Steel, Jindal Steel and Power Limited with integrated steel plants[13]

Overall, Odisha's industrial sector has been growing steadily over the years, and the state government has been taking several initiatives to attract more investments and promote industrial development.

Key highlights	
Total Share	34.62%
Major sectors in Odisha	Aluminum, chlor-alkali, Iron and steel, Cement[14]
Major mineral reserves	iron ore, nickel, Bauxite, nickel, coal
Major companies operating in Odisha	NALCO, Vedanta Aluminum, Jindal Steel and Power, JK Paper, Arcelor Mittal Nippon Steel (Green field development)
Designated Consumers for PAT scheme (2021)	67 Designated Consumers
Main industrial areas	Talchur-Angul Industrial Area, Balasore Industrial Area, Rajgangpur Industrial Area, Joda-Barbil Area etc
Other key highlights	50% Aluminium of Smelting capacity and 20% of Steel Production capacity of India
Stakeholders	Department of Industries, Odisha Department of Energy

12 Department of Industries, Odisha

13 Annual Report 2020-21, Ministry of Steel

14 Department of Energy-Odisha

	Department of steel and Mines MSME Department Odisha

Table 19 : Key highlights of industrial sector in Odisha

MSMEs

Micro, Small & Medium Enterprises-Development Institute (MSME-DI), Cuttack under the Development Commissioner (MSME), Ministry of Micro, Small and Medium Enterprises plays a key role in developing MSMEs in the state of Odisha. MSME sector in Odisha consists of micro, small and medium enterprises in the state which are spread across various regions and clusters. Table shows the key highlights for MSME sector in Odisha.[15] [16] [17]

Key highlights	
List of major MSME clusters	Angul Engineering Cluster, Odisha Sponge iron cluster, Balasore rice mills Bargarh rice mills, Berhampur rice mills, Ganjam rice mills, Balakati brass industries, Bhubaneshwar seafood processing industries
Number of MSME units-Operational (2018-19)	4,49,352
Stakeholders	MSME Development Institute Cuttack Department of Industries MSME Department

Table 20 : Key highlights of MSME sector in Odisha

It is pertinent to mention here that the industrial sector in Odisha has traditionally been suffering from low investment, low capital and low return on investment. However, over the last few years with the right intervention from the government, there has been a lot of significant improvement. The state has a large base of cost-effective industrial labor, making it an ideal destination for a wide range of industries.

Iron and steel sector:

Odisha is one of the leading states in India in terms of iron and steel manufacturing output. The state has a rich mineral base and is the largest producer of iron ore in the country. The iron and steel industry in Odisha has been growing steadily over the years, and the state contributes significantly to India's overall steel production.

As per the data from the Ministry of Steel, the state of Odisha produced around 32 million tonnes of crude steel in the financial year 2020-21, which is about 24% of India's total crude steel production. The production of finished steel in the state was around 29 million tonnes in the same period, which is about 27% of India's total finished steel production

Rourkela Steel Plant, which is located in Odisha, is one of the largest steel plants in India and has an annual production capacity of 4.5 million tonnes. The plant produces a wide range of products, including hot-rolled coils, cold-rolled coils, and wire rods. Other major steel plants in the state, such as Jindal Steel and Power, Tata Steel, and Bhushan Power and Steel, also contribute significantly to the overall steel production in the state.

The iron and steel industry in Odisha provides direct and indirect employment to a large number of people and contributes significantly to the state's economy. The state government has been taking various measures to promote the growth of the sector, including providing infrastructure support, simplifying regulatory frameworks, and attracting investments.

Coal mining sector:

15 Annual Report, Ministry of Micro, Small and Medium Enterprises

16 Department of Industries

17 MSME Development Institute-Cuttack

Odisha is one of the leading coal producing states in India and has significant coal reserves. The state's coal mining sector is an important contributor to the state's economy, and the coal produced in the state is used for power generation, steel manufacturing, and other industries.

As per the data from the Ministry of Coal, the state of Odisha produced around 137 million tonnes of coal in the financial year 2020-21, which is about 24% of India's total coal production. The state has several coalfields, including Talcher, Ib Valley, and Jharsuguda, which are major coal producing regions in the state.

The state has several coal mining companies, including Mahanadi Coalfields Limited (MCL), which is a subsidiary of Coal India Limited, and is the largest coal mining company in the state. MCL produces coal from several mines located in the Talcher coalfields. Another major coal mining company in the state is Neyveli Lignite Corporation (NLC), which operates several coal mines in the Talcher coalfields.

Apart from these major coal mining companies, the state has several small and medium-sized coal mining companies that contribute to the state's overall coal production. The state government has been taking various measures to promote the growth of the coal mining sector, including providing infrastructure support, simplifying regulatory frameworks, and attracting investment.

Energy efficiency potential in the sector

The estimated energy efficiency potential projected for the year 2030 in the industrial sector in Odisha is as follows: -

Energy efficiency strategies	Energy Savings in 2030 under moderate scenario (Mtoe)	Energy Savings in 2030 under ambitious scenario (Mtoe)
Deepening and widening PAT scheme	0.5	1.24
Energy efficiency in SME (Non-PAT sector)	0.16	0.28

Table 21: Energy savings potential in industrial sector of odisha

The energy savings potential has been estimated based on the following two scenarios: -

- Moderate scenario
- Ambitious scenario

The afore-mentioned two scenarios have been devised across the various type of industries. This will be discussed in detail in the next section.

Energy Efficiency Strategies in the Industrial sector

To realize the energy efficiency potential in the industrial sector in Odisha, as set out in the previous section, a number of strategies and polices have to fall in place. Moreover, apart from the estimated EE potential in the state, the Unlocking National Energy Efficiency Potential (UNNATEE) report published by the Bureau of Energy Efficiency has laid out the energy saving target of Odisha by segregating the total energy saving potential for each sector. The energy saving target for industrial sector is 1.466 Mtoe by 2031.[18]

Keeping the above in hindsight, this section explores the present policies/strategies pertaining to energy efficiency in Odisha as well as recommend various energy efficiency strategies (policy as well as technological) in order to realize the state's energy savings potential.

Present schemes/policies in place pertaining to energy efficiency

From an industries sector perspective – Odisha has two main national level schemes which are being administered through the Bureau of Energy Efficiency. This is detailed as below:

- **Perform Achieve and Trade (PAT) scheme:** Under this scheme, acceleration of energy efficiency is targeted in energy intensive industries through the issuance of tradable instruments which are known as "Energy Saving Certificates" or "ESCerts". As part of this scheme, the notified energy intensive industrial units (which are also known as designated consumers) are required to reduce their energy consumption by undertaking energy efficiency measures. The PAT scheme is presently looking after the energy consumption

18 UNNATEE report, Bureau of Energy Efficiency 2019

of 14 sectors. These include Cement, Aluminum, Chlor and alkali, Pulp and paper, Iron & steel, Fertilizer, Thermal power plants, Petroleum refinery, Railways, Petrochemicals, DISCOM, Railways, Textile, Commercial buildings.

Odisha has the following designated consumers (DC):

Designated Consumer	Sector
Vedanta Aluminum Limited, Kalhandi	Aluminum
National Aluminium Company Limited, Koraput	Aluminum
Hindalco Industries Limited, Hirakud	Aluminum
National Aluminium Company, Angul	Aluminum
Vedanta Aluminium Limited, Jharsuguda	Aluminum
Utkal Alumina International Limited	Aluminum
Aditya Aluminium, Sambalpur,	Aluminum
Vedanta Limited, Jharsuguda, Smelter II	Aluminum
Dalmia Cement (Bharat) Limited (Formerly OCL India Ltd.)	Cement
ACC Ltd., (Bargarh Cement Works),	Cement
UltraTech Cement Limited, Jharsuguda Cement Works	Cement
Kapilas Cement Manufatcuring	Cement
Grasim Industries Limited	Chlor & Alkali
JK Paper Mills Rayagada	Pulp and Paper
Ballarpur Industries Ltd., Unit Sewa	Pulp and Paper
Emami Paper Mills Limited ,Balgopalpur	Iron and Steel
Rourkela Steel Plant	Iron and Steel
Tata Sponge Iron Limited/Tata Steel Long Product Ltd	Iron and Steel
Jindal Stainless Ltd, Kalinga Nagar Industrial Complex	Iron and Steel
Indian Metals & Ferro Alloys Ltd.	Iron and Steel
Nava Bharat Ventures Limited,	Iron and Steel
Neelachal Ispat Nigam Limited,	Iron and Steel
VISA Steel Limiled, Kalinga Nagar	Iron and Steel
Action ISPAT & power Pvt.,Jharsuguda,	Iron and Steel
Anjani Steel Ltd	Iron and Steel
SMC Power Generation Ltd., Hirima, Jharsuguda	Iron and Steel
Aarti Steels Ltd, Ghantikhal,	Iron and Steel

M G M Minerals ltd, Village- Nimidiha	Iron and Steel
Tata Steel Limited, Kalinga Nagar Industrial Complex, Duburi	Iron and Steel
Vishal Metallics Private Limited Barhamusa	Iron and Steel
Surendra Mining Industries Private Limited, Barhamusa	Iron and Steel
Yazdani Steel and Power Private Limited, Kalinga Nagar Growth Centre	Iron and Steel
Viraj Steel and Energy Private Limited	Iron and Steel
Jai Balaji Jyoti Steels Limited, Tainser,	Iron and Steel
Reliable Sponge Private Limited, KALUNGA	Iron and Steel
Shree Ganesh Metaliks Ltd Chardrihariharpur	Iron and Steel
Maithan Ispat Limited Dasmania,	Iron and Steel
Ferro Alloy Corporation Limited Charge Chrome Plant	Iron and Steel
Ferro Alloy Plant, Bamnipal, Tata Steel Limited Bamnipal,	Iron and Steel
Concast Steel & Power Ltd Village Kukurjanga, Badmal, Jharsuguda	Iron and Steel
Balasore Alloys Limited, Balgopalpur	Iron and Steel
Jindal Steel & Power Ltd Chhendipada Road	Iron and Steel
Bhusan Power And Steel Limited, Sambalpur	Iron and Steel
TATA Steel (Bhusan Steel) Ltd., Meramandali, Angul	Iron and Steel
Rungta Mines Limited(sponge iron Division),Karakolha,Barbil, Keonjhar	Iron and Steel
Patnaik Steels And Alloy Limitted, Keonjhar Garha,	Iron and Steel
Kamaljeet Singh Ahluwalia Steel & Power Division, Keonjhar,	Iron and Steel
Shyam Metalics & Engery Limited,	Iron and Steel
Indian Farmers Fertiliser Coop. Ltd.	Fertilizer
Paradeep Phosphates Limited	Fertlizer
IB Thermal Power Station, Orissa	Thermal Power
NTPC Limited, Talcher, Kaniha	Thermal Power
NTPC Limited, Talcher Angul	Thermal Power
GMR Kamalanga Energy Limited, Kamalanga	Thermal Power
Jindal India Thermal Power Limited	Thermal Power
Vedanta Limited, Jharsuguda,	Thermal Power
IOCL, Paradip	Petroleum Refinery

East Coast Railway Rail Sadan, Chandrasekharpur	Railway
Tata Power Northern Odisha Limited (TPNODL)	DISCOMs
Tata Power Central Odisha Limited (TPCODL)	DISCOMs
Tata Power Western Odisha Limited (TPWODL)	DISCOMs
Tata Power Southern Odisha Limited (TPSODL)	DISCOMs

Table 22: List of Designated consumers in Odisha

Note: The Designated consumers list of Odisha is prepared from web-research and discussions with PAT cell of EIC (E) cum PCEI- SDA Odisha and it includes designated consumers up to PAT Cycle- VI. Odisha currently has total of 75 no's of DCs in the state and the list will be updated as part of final report.

BEE-SME programme: The BEE SME Programme has been initiated to carry out energy efficiency-specific activities in the SME sector in India including conducting an extensive study for specific sectors as well as generating energy-related data for the SME sector which is believed to be highly unorganised and fragmented. As part of this programme, 25 clusters have been selected from 35 clusters across the country where the adoption of energy efficiency practices will be undertaken through several steps like capacity building, development of financing mechanisms and knowledge sharing.

Odisha is one of the leading states in India in terms of its industrial sector. The state has a wide range of industries, including steel, power, aluminum, chemicals, textiles, and food processing. Odisha has a strategic location on the east coast of India, which provides easy access to markets in Southeast Asia and the Middle East.

Iron and steel sector

Energy efficiency is critical in the iron and steel manufacturing sector in India for several reasons:

Cost Reduction: The iron and steel industry is one of the largest consumers of energy in India, and energy costs account for a significant portion of the industry's operating expenses. Improving energy efficiency can help reduce energy consumption and costs, thereby improving the industry's overall competitiveness.

Environmental Concerns: The iron and steel manufacturing process is energy-intensive and produces a significant amount of greenhouse gases (GHGs), contributing to global climate change. Improving energy efficiency can reduce energy consumption and GHG emissions, thereby mitigating the environmental impact of the industry.

Resource Conservation: India is a resource-constrained country, and the iron and steel industry is a significant consumer of natural resources, including coal, iron ore, and limestone. Improving energy efficiency can help conserve these resources, ensuring their availability for future generations.

Government Regulations: The Indian government has introduced several policies and regulations aimed at promoting energy efficiency and reducing GHG emissions in the industrial sector. Compliance with these regulations is necessary to avoid penalties and maintain the industry's license to operate.

Energy efficiency is a critical issue in the coal mining sector in Odisha, as it is one of the largest energy-consuming industries in the region. Coal mining involves a variety of activities such as excavation, transportation, and processing, all of which require a considerable amount of energy. Therefore, improving energy efficiency in the coal mining sector can have significant environmental and economic benefits.

Coal mining sector:

There are several reasons why energy efficiency is important in Odisha's coal mining sector. Firstly, the mining of coal is an energy-intensive process, and the more energy-efficient the operations are, the lower the amount of energy required to extract and process coal. This can help reduce the overall energy consumption and the associated greenhouse gas emissions, which can help mitigate climate change.

Secondly, energy efficiency can lead to cost savings for coal mining companies. By reducing the amount of energy required to extract and process coal, companies can reduce their energy bills and improve their

profitability. Additionally, energy-efficient technologies can reduce maintenance costs and improve the lifespan of mining equipment, leading to further cost savings.

Thirdly, improving energy efficiency can help Odisha's coal mining sector become more sustainable in the long term. As the world transitions to cleaner energy sources, there is a growing demand for sustainable mining practices that minimize the environmental impact of coal mining. Energy efficiency can play a crucial role in achieving this by reducing the amount of energy required to extract coal and by minimizing the environmental impact of mining activities

However, it is worth noting that the coal mining sector is facing challenges due to concerns over environmental impact and the shift towards renewable energy sources. The state government has been taking steps to address these concerns and promote sustainable mining practices in the state

Recommended schemes/policies to achieve the state's energy efficiency potential

Action plan 1 – Deepening of PAT scheme: It is pertinent to comprehend that some of the existing manufacturing units of the already notified sectors (iron & steel) does not fall under the purview of the PAT scheme. In this regard, it is recommended that the threshold for the PAT criteria may be lowered so that some of the existing iron and steel units like Aryan Ispat and Power, LN Metaliks, Kalinga iron and steel and many others may be added to the PAT scheme. The savings have been calculated using the moderate and ambitious scenario which is defined in this case as follows: -

Moderate scenario

- For moderate scenario - It is assumed that all the existing units will achieve the moderate SEC target in 50% units.

Ambitious scenario

- For the ambitious scenario - it is assumed that all existing units will achieve ambitious SEC target in 70% units.

Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in the year 2030 as per this strategy of deepening the PAT scheme: -

Sector	Baseline SEC (toe/tonne)	Moderate SEC (toe/tonne)	Ambitious SEC (toe/tonne)	Production in 2030 [19](tonnes)	Energy saving in moderate scenario(ktoe)	Energy saving in ambitious scenario (ktoe)
Iron and steel	0.6284	0.447	0.380	529607.227	181.4	347.89
Aluminium	0.33	0.265	0.2	9845000	320	896

Table 23 : Energy savings potential in Iron and steel sector of odisha

(Note: The baseline, moderate and ambitious specific energy consumption has been assumed based on various studies on the secondary domain along with the consultant's previous experience in the industrial sector)

To achieve this potential, it is critical that this strategy is put into play. For this following are some of the recommended action points: -

S. No.	Action Plans for Odisha state to achieve energy efficiency potential
1	Mandatory Standardized Energy Audits in every three years for all units that have energy consumption below PAT threshold, in all notified PAT sectors, excluding MSEs.
2	Creating enabling environment through B2B forums with global technology suppliers
3	State-level energy efficiency roadmap for key sectors to be prepared
4	Encouraging industries to adopt ISO 50001 certifications for their manufacturing units
5	Channelizing green/climate finance and leverage financing instruments including but not limited to risk guarantee programs
6	Encouraging demonstration and pilot projects through technical institutions like IIT

[19] https://ibm.gov.in/IBMPortal/

7	Conduct feasibility study and pilot for installing Green/Grey/Blue hydrogen plant for Industrial cluster

Table 24 :Action points for deepening of PAT scheme

Action plan 1.1 – Widening of PAT scheme

It is pertinent to comprehend that some of the energy intensive coal-mining sectors are not under the purview of PAT scheme. In this regard, it is recommended that baseline energy consumption exercise can be carried out in some of the existing coal mines in IV Valley, Sundergarh district Odisha and other regions. These units can be added to the PAT scheme as coal mining is an energy intensive process The savings have been calculated using the moderate and ambitious scenario which is defined in this case as follows:

Moderate scenario

- For moderate scenario - It is assumed that 50% of total coal mining units will be inducted into PAT sector and will achieve 50% of global SEC

Ambitious scenario

- For ambitious scenario - It is assumed that 70% of total coal mining units will be inducted into PAT sector and they will achieve 70% of global SEC

Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in the year 2030 as per this strategy of widening the PAT scheme: -

Sector	Baseline SEC (toe/tonne)	Moderate SEC (tonne/MT)	Ambitious SEC (tonne/MT)	Production in 2030 [20](tonnes)	Energy saving in moderate scenario (toe)	Energy saving in ambitious scenario (toe)
Coal Mining	14.71 tonne/MT	13.24 tonne/MT	11.77 tonne/MT	221.33	73.3	205.24

Table 25: Energy efficiency potential in coal mining sectors of Odisha[21]

Action plan 2: Energy efficiency in the non-PAT sector:

Manufacturing MSME industries form the backbone of the Indian economy – so it is only justified that this sector may be looked at more carefully from the lens of energy efficiency. From secondary research – it was discovered that there are a number of MSME industry clusters that are energy intensive.

Odisha, like many other states in India, has a large number of Micro, Small, and Medium Enterprises (MSMEs) that play a crucial role in the state's economic growth and development. The MSME sector in Odisha contributes significantly to employment generation, industrialization, and exports.

As of 2021, there are approximately 2,20,000 registered MSMEs in Odisha, which provide employment to more than 1 million people. The state government has taken several initiatives to support and promote the growth of MSMEs:

Odisha has several MSME clusters, which are geographic concentrations of interconnected companies, suppliers, and supporting institutions in a particular sector or industry. These clusters promote the growth of MSMEs by providing a range of benefits, including access to specialized infrastructure, shared services, and skilled labor.

Some of the prominent MSME clusters in Odisha are:

Odisha's sponge iron cluster: According to statistics from 2004–2005, Odisha produces roughly 46 million tonnes of iron ore annually. Odisha is home to over 107 large- and small-scale sponge iron manufacturing facilities as a result of the state's abundant and ready access to resources. These units are mainly found in the

[20] https://ibm.gov.in/IBMPortal/

[21] Coal controller's organization (CCO's) data

districts of Sundergarh and Keonjhar. Most of the sponge iron production facilities employ horizontal rotary kilns with capacities ranging from 25 to 350 tonnes per day (tpd).[22]

Odisha's rice mill clusters: Odisha contributes heavily to India's overall rice production with few of the largest clusters like Balasore rice mills, Bargarh rice mills, Berhampur rice mills, Ganjam rice mills produce approx. 923544 tonnes of rice yearly[23]. There are more than 1000 small units related to rice processing in Odisha which are more than 10-15 years old who uses old technologies which makes energy saving potential in rice mills of Odisha significant.

Odisha's sea-food processing cluster: With roughly 16 active seafood processing facilities, Bhubaneswar is one of the major hubs for the industry in the nation. The cluster is well known for exporting prawns to numerous nations across five continents, including Japan, the United States, the European Union, and nations in Southeast Asia including Thailand and Vietnam. Approximately 110 tonnes per day are produced on a yearly average at the cluster level. Over 90% of the cluster's produce is prawns. These facilities' capacity utilization varies seasonally based on fish harvest and culture. The 'off-season' period, which runs from early January to early April, is characterized by output levels as low as 25% of the yearly average. The 'season' runs from May to December, with peak production taking place from July to September (or around 160% of average annual production).[24]

Cuttack Brass and Bell Metal Cluster: This cluster is located in Cuttack district and is known for its brass and bell metal handicrafts. The cluster has more than 500 MSMEs engaged in the production of a wide range of products like lamps, utensils, and decorative items.

Rourkela Steel and Engineering Cluster: This cluster is located in Rourkela and is known for its steel and engineering products. The cluster has more than 150 MSMEs engaged in the production of steel pipes, tubes, and other engineering products.

Khurda Food Processing Cluster: This cluster is located in Khurda district and is known for its food processing industry. The cluster has more than 100 MSMEs engaged in the production of a variety of food products like snacks, sweets, and packaged foods.

Jajpur Plastic Cluster: This cluster is located in Jajpur district and is known for its plastic products. The cluster has more than 200 MSMEs engaged in the production of plastic bags, pipes, and other plastic products.

Sambalpur Handloom Cluster: This cluster is located in Sambalpur and is known for its handloom products. The cluster has more than 300 MSMEs engaged in the production of a wide range of handloom products like sarees, bed sheets, and dress materials.

These MSME clusters in Odisha have been provided with infrastructure support, common facilities centers, and technical assistance to promote their growth and competitiveness. The state government has also initiated several schemes and programs to support the development of these clusters and promote the growth of MSMEs in the state.

Odisha has a significant sponge iron cluster, which contributes to the state's economy and the country's steel production. Sponge iron is a key raw material used in the production of steel, and Odisha is one of the major producers of sponge iron in India.

The sponge iron cluster in Odisha is primarily located in the districts of Sundargada, Keonjhar, and Jharsuguda. The cluster consists of several small and medium-sized units engaged in the production of sponge iron using the Direct Reduced Iron (DRI) process.

As per the data from the Ministry of Steel, Government of India, Odisha produced around 11.3 million tonnes of sponge iron in the 2020-21 fiscal year, which is about 29% of India's total sponge iron production. The sponge iron cluster in the state is a major contributor to this production.

The cluster uses modern technology and equipment to produce high-quality sponge iron, which is used by the steel industry to produce different types of steel products. Many of the units in the cluster have obtained certifications such as ISO to ensure quality standards and compliance with environmental regulations. The state government has been taking various measures to promote the growth of the sponge iron cluster in the

[22] BEE-SME Program-Sameeksha

[23] BEE-SME Program- Rice mills cluster

[24] BEE- SME Program- Odisha's sea-food processing cluster

state. The government has been providing infrastructure support, such as electricity, roads, and water supply, to the cluster, and has also simplified regulatory frameworks to facilitate the establishment of new units.

Rice mils are major industries in rural parts of India. These mills are critical to economic development of rural India as they are generally located near to paddy growing area. The rice produced in these mills are of medium and high quality and is marketed through dealer network in different places of the state.

The major rice mill clusters in Odisha are Ganjam,Balasore and Berhampur with more than 350 MSMEs for rice production having annual production capacity of 92354 tonnes in 2016 [25]

Odisha with its coastline of 480 kms and conducive environment for fish breeding, is one of the important states w.r.t to the development in **India's fishery sector**. The state fisheries department is working on improving production plant capacities in Odisha.

Presently, major species processed in Odisha includes Tiger Prawn, Brown Shrimp, and some fishes. A species called "L. vannamei" primarily found in Latin America is being cultured in brackish water in Odisha and is expected to increase production in coming years. Bhubaneswar has about 39 storages (cold and chilled) and is one of the important seafood processing hubs in the country

It is recommended that sponge iron cluster, rice mills and sea-food processing cluster may be incentivized or prompted to adopt energy efficient technologies. In view of this, following scenarios are proposed:-

Moderate scenario

- For moderate scenario - 50% penetration of energy efficient motors in sponge iron units,50% penetration of energy efficient motors in rice mills, 50% energy efficient refrigeration systems in seafood processing industries and 50%penetration of VFD in extrusion motors

Ambitious scenario

- For the ambitious scenario -70% penetration of energy efficient motors in sponge iron units, 70% penetration of energy efficient motors in rice mills and 70% energy efficient refrigeration systems in seafood processing industries and 70%penetration of VFD in extrusion motors **(107 sponge iron units/kilns in sponge iron clusters, 21 sea-food processing plants, 250 rice mills in Ganjam cluster**

Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in 2030 as per this strategy of penetration of energy efficienct technologies in major MSME clusters of Odisha

Sector	Baseline SEC (toe/tonne)	Moderate SEC (toe/tonne)	Ambitious SEC (toe/tonne)	Production in 2030 [26](tonnes)	Energy saving in moderate scenario (toe)	Energy saving in ambitious scenario (toe)
Sponge Iron	0.7624	0.7	0.68	4968658	151528	265175
Rice Mills	0.09	0.087	0.082	1416051	6850.2	14385
Sea-food processing industries	0.15	0.11	0.10	132555	2549	4997
Plastic	0.456	0.041	0.036	141533	323.3	905.3

Table 26 : Energy efficiency savings potential in MSME clusters of Odisha

(Note: The baseline, moderate and ambitious specific energy consumption has been assumed based on various studies on the secondary domain along with the consultant's previous experience in the industrial sector)

To achieve this potential, it is critical that this strategy is put into play. For this following are some of the recommended action points: -

S. No.	Action Plans

[25] SAMEEKSHA-Rice mills cluster report

[26] https://ibm.gov.in/IBMPortal/

1	Awareness on Energy conservations in Sponge Iron, Rice Mills, Seafood processing industries clusters of the state
2	Periodic standardized energy audits for MSMEs on load basis and reimbursement of energy audit cost with a maximum cap
3	Sector-specific policy development for financial assistance on implementation of ECMs suggested in energy audit.
4	Demonstration projects on latest Energy Efficiency Technologies in SME clusters
5	Encouraging industries to adopt ISO 50001 certifications for their manufacturing units
6	Technical and financial assistance for transition from **inefficient induction motors to efficient motors in rice mills**, **transition to energy efficient refrigeration systems in seafood processing industries** and Installing **Preheating Rotary kiln for Raw material heating using Waste heat gases for Sponge iron energy efficient furnaces, VFD in plastic extrusion motors**
7	Encouragement of waste heat recovery of flue gases in brass manufacturing processes (mainly furnaces)

Table 27 :Action points to promotion of EE in non-PAT sector

Energy savings targets and monitoring mechanism

Energy savings targets

Taking into account the savings estimated based on strategy 1 & 2 recommended for the industrial sector, following table illustrates the overall energy savings targets envisaged for the industries in Odisha in the year 2030: -

Action Plan	Energy Savings in 2030 under moderate scenario (Mtoe)	Energy Savings in 2030 under ambitious scenario (Mtoe)
Deepening and Widening of PAT scheme	0.5	1.24
Energy efficiency in non-PAT	0.16	0.28

Table 28 : Overall energy savings potential in industrial sector in Odisha

Monitoring mechanism

An energy efficiency policy monitoring mechanism is a system put in place to track and evaluate the progress of energy efficiency policies and programs over time. It is designed to provide feedback on the effectiveness of these policies and identify areas where improvements can be made.

Here are some key elements that should be included in an energy efficiency policy monitoring mechanism:

Clear objectives: The mechanism should be designed to achieve specific goals such as reducing energy consumption, increasing energy efficiency, and reducing greenhouse gas emissions

Data collection: The mechanism should collect accurate and reliable data on energy consumption, energy efficiency, and other relevant variables, which can be used to evaluate the effectiveness of energy efficiency policies.

Performance indicators: The mechanism should establish key performance indicators that can be used to assess the effectiveness of energy efficiency policies, such as energy savings, cost savings, and reduction in greenhouse gas emissions.

Analysis and reporting: The mechanism should analyze the data collected and generate reports on the progress of energy efficiency policies and programs.

Feedback loop: The mechanism should provide feedback to policymakers and program managers on the effectiveness of their policies and programs and identify areas for improvement.

Transparency and accountability: The mechanism should be transparent, with the results of the analysis and evaluation made available to the public. It should also be accountable, with policymakers and program managers being held responsible for the effectiveness of their policies and programs.

Following monitoring framework is recommended to effectively assess the status of energy efficiency action plan for industry sector.

Indicator Framework for the Energy efficiency policies and programs				
Indicator types	**Purpose**	**Frequency**	**Aspects**	**Responsible agency**
Energy efficiency action plan for industry sectors and mainstreaming	Tracking the progress of implementation of regulatory actions and fund mobilization	Annual	Programme administrative structure (responsibilities of key stakeholders, resource allocation plan and programme monitoring and review mechanism) established	EIC (E) cum PCEI, SDA Odisha, Department of energy Department of Industries MSME Department, Department of steel and mines
			Selection of appropriate international energy management standards to serve as a reference for a programme	
			Energy consumption threshold levels for selecting participating industrial units determined	
			Consultations conducted between Nodal Agency and selected industries	
			Data reporting mechanism enabled	
			Preparation and appraisal of draft legal documents completed	
			MRV systems for industrial energy efficiency technologies of high energy saving potential	
Institutional Readiness and capacity building	Tracking the progress of improving capacities of concerned agencies related to energy efficiency implementation	Annual	Capacity building of concerned staff of industry on reporting of energy performance	EIC (E) cum PCEI, SDA Odisha.
			Training programme implementation with certification for energy auditors	
Outcome	Assessing results of energy efficiency interventions - projects, market mechanisms, etc.	Annual	Assessing results of energy efficiency policies/programs at industrial unit level	PAT Cell, EIC (E) cum PCEI, SDA Odisha. MSME Department,
Impacts	Assessing the progress towards achieving a more competitive, resilient, and sustainable economy	Annual		PAT Cell, EIC (E) cum PCEI, SDA Odisha. MSME Department,

Project financing	Project evaluation and feasibility studies for energy efficiency projects and their financing through banks/financial institutions	Annual	Budget allocated for project implementation/secured through innovative financing instruments	Department of finance, PAT Cell, EIC (E) cum PCEI, SDA Odisha.

Table 29:Monitoring mechanism for Industry sector energy efficiency action plans

Focus sector 2 – Buildings

This section assesses the present scenario of this sector, energy efficiency potential, EE strategies in the sector (existing and proposed) along with setting of energy savings targets and its monitoring mechanism.

Current scenario

Brief description of the sector

The buildings sector in Odisha consists of domestic, commercial, and public buildings in the state. Buildings are a significant consumer of energy and have high potential for energy efficiency. Table 9 shows key highlights for buildings sector in Odisha. [27] [28]

Key highlights	
Total Share	32.37%
Number of Buildings under Building Energy Efficiency Program (BEEP)	427
Rooftop solar (MW)	21.66[29]
Stakeholders	• All ULBs/Municipal Corporations coming under H&UD, • All Construction authorities in Odisha • SDA [EIC(Elec.)-cum-PCEI(O)]

Table 30:Key highlights of buildings sector in Odisha

The buildings sector in Odisha is identified as a priority sector based on high energy consumption and high potential for energy efficiency.

The Odisha Energy Conservation Building Code 2022(OECBC-2022) of Odisha was notified in Oct-2022. This will cover schools, hospitals, hotels, shopping complexes, offices, multiplex/theatres, airports, railways stations and bus stations.[30]Odisha has also initiated equipping all public hospitals including health centres with rooftop solar plants. GEDCOL is exploring new opportunities of installing Roof-top Solar over commercial buildings for this purpose itself. MNRE has approved Solar rooftop project of 4 MW on non-residential buildings in twin city of Cuttack-Bhubaneshwar. Total of 199 buildings have been identified under this project. GEDCOL is also considering installing similar type of Rooftop project in other cities of Odisha such as Puri, Hirakud, Rourkela etc with total capacity of 10 MW. Operationalization of the Energy Conservation and sustainability Building Code (ECSBC) is being supported under the NLTA initiative of the World Bank[31]

Energy efficiency potential in the sector

The estimated energy efficiency potential projected for the year 2030 in the buildings sector in Odisha is as follows: -

EE Strategy	Energy Savings in 2030 under moderate scenario (Mtoe)	Energy Savings in 2030 under ambitious scenario (Mtoe)
Strategy 1	0.113	0.19
Strategy 2	0.0003	0.0004

27 Unlocking National Energy Efficiency Potential, Bureau of Energy Efficiency

28 All India Electricity Statistics 2021, Central Electricity Authority

29 Ministry of New and Renewable Energy

30 Ministry of New and Renewable Energy

31 Odisha's Climate Change Action Plan

Strategy 3	0.005	0.011

Table 31 : Energy efficiency potential in buildings sector of odisha

The energy savings potential has been estimated based on the following two scenarios: -

- Moderate scenario
- Ambitious scenario

The afore-mentioned two scenarios have been devised across both domestic and commercial type of buildings based on different type of strategies. This will be discussed in detail in the next section.

Energy Efficiency strategies in the buildings sector

To realize the energy efficiency potential in the buildings sector in Odisha, as set out in the previous section, a number of strategies and polices have to fall in place. Moreover, apart from the estimated EE potential in the state, the Unlocking National Energy Efficiency Potential (UNNATEE) report published by the Bureau of Energy Efficiency has laid out the energy saving target of Odisha by segregating the total energy saving potential for each sector. The energy saving target for buildings sector is 0.33 Mtoe by 2031.[32]

Energy efficiency is critical for the building sector of Odisha for several reasons

Cost savings: Building owners and occupants can save a considerable amount of money by reducing energy consumption. Energy-efficient buildings require less electricity, natural gas, or oil for heating, cooling, and lighting, leading to reduced energy bills

Environmental sustainability: The building sector is a significant contributor to greenhouse gas emissions. By adopting energy-efficient practices, the building sector can reduce its carbon footprint and mitigate climate change.

Energy security: Odisha is an energy-deficient state, and its building sector is a significant consumer of electricity. By promoting energy efficiency in buildings, the state can reduce its dependence on external sources of energy, ensure energy security, and avoid power outages.

Improved indoor air quality and comfort: Energy-efficient buildings are designed to provide improved indoor air quality, thermal comfort, and lighting. Such buildings can enhance the productivity and health of occupants.

Regulatory compliance: Odisha has implemented several policies and regulations that promote energy efficiency in buildings. Compliance with these regulations is essential for builders, architects, and engineers to ensure that their projects are sustainable and meet the state's standards.

The table below lists several energy efficiency activities that can be carried out in the state under the commercial and residential buildings sectors.

S.No.	Area	Activity	Sub Activity
1	Commercial Buildings	Implementation of ECSBC	Develop model regulation for ECSBC implementation in state and ensure incorporation of regulation in municipal byelaws of relevant municipal authorities
2			Develop ECSBC implementation roadmap along with requisite supporting infrastructure
3		Market development to facilitate	Undertake awareness programs on building energy conservation and efficiency as well as building labelling systems

32 UNNATEE report, Bureau of Energy Efficiency 2019

4		implementation of ECSBC-C	Provide support to businesses institutional and regulatory support to businesses providing ECSBC compliant building material and BEMS
5			Undertake the energy conservation buildings awards to incentivize uptake of energy efficiency and energy conservation
6		Increase uptake of energy efficiency and energy conservation measures	Undertake retrofitting of existing equipment with energy efficient variants along with implementation of energy conservation options for building envelope in public buildings
7	Residential Buildings	Increase uptake of energy efficient appliances	Develop and implement loyalty program for building efficiency
8			Develop awareness of retail buyers on the benefits of energy efficiency for buildings and building labelling program
9		Demand response system	Develop implementation roadmap for demand response system
10		Increase penetration of solar water heater	Provide financial incentives to increase uptake of solar water heaters

Table 32 :List of energy saving activities in buildings sector

Keeping the above in hindsight, this section explores the present policies/strategies pertaining to energy efficiency in Odisha as well as recommend various energy efficiency strategies (policy as well as technological) in order to realize the state's energy savings potential.

Recommended schemes/policies to achieve the state's energy efficiency potential

Action plan 1 – Replacement programme for inefficient appliances: Replacement of inefficient appliances with their efficient counterparts can be considered as a low hanging fruit from and energy efficiency implementation standpoint. This strategy can be implemented in both domestic as well as commercial buildings. As part of the strategy, following appliances have been identified that can be in the contention for replacement: -

Table 33 : Appliance under consideration

The savings estimated from the appliance replacement programme have been calculated using the moderate and ambitious scenario which is defined in this case as follows: -

Moderate scenario

- In moderate scenario, it is assumed that 30% of appliances will be replaced with efficient appliances. For LPG cookstove, a 10% switch to electric cookstove in moderate scenario

Ambitious scenario

- In ambitious scenario, it is assumed 50% appliance replacement with efficient appliance. For LPG cookstove, a 20% switch to electric cookstove in ambitious scenario

Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in the year 2030 as per this strategy appliance replacement programme:-

Appliance	Inefficient stock in FY2020	Energy saving in moderate scenario (Mtoe)	Energy saving in ambitious scenario (Mtoe)
Fan	98,66,700	0.03	0.06
Air conditioner	15,34,820	0.012	0.02
Refrigerator	49,33,350	0.04	0.06
Washing Machine	40,56,310	0.004	0.006
Television	57,00,760	0.002	0.003
LPG cookstove	1,01,95590	0.026	0.05

Table 34: Energy savings potential due to appliance energy efficiency

To achieve this potential, it is critical that this strategy is put into play. For this following are some of the recommended action points: -

S. No.	Action Plans for Odisha state to achieve energy efficiency potential
1	Development of state-specific implementation models and identification of relevant agencies for replacing all existing inefficient appliances in government offices and buildings with BEE Star Rated appliances
2	Issue of directive to government offices and buildings in the state to replace all existing inefficient appliances with BEE Star rated appliances
3	Phase-wise plan for replacement of existing inefficient appliances with BEE Star rated appliances in all buildings, through DSM schemes

Table 35 : Action points for promoting appliance replacement EE programme

Action plan 2: Implementing ECSBC: Under this strategy, it is recommended that the new and upcoming commercial and domestic buildings may be mandated as per the energy conservation and sustainability buildings code (ECSBC) in the state. Commercial buildings having connected load of 100 kW or greater or a contract demand of 120 kVA or greater or built-up area of 1000 square meter or above (excluding stilt or basement meant for parking area) come under the purview of OECBC 2022." In view of this, following scenarios are proposed: -

Moderate scenario

- In moderate scenario, it is assumed ECBC will be implemented in new commercial buildings **under the purview of OECBC 2022** and lead to 25% savings.

Ambitious scenario

- In ambitious scenario, ECBC+ is assumed to be implemented in new commercial buildings **under the purview of OECBC 2022** and lead to 35% savings

Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in 2030 as per this strategy of mandating the compliance of ECSBC for new buildings: -

Energy saving in moderate scenario (toe)	Energy saving in ambitious scenario (toe)
255.16	**357.23**

Table 36 : Energy savings potential due to effective implementation of Odisha ECSBC

To achieve this potential, it is critical that this strategy is put into play. For this following are some of the recommended action points: -

S. No.	Action Plans
1	Integrate ECSBC in new building approval process
2	Setting-up of effective enforcement plan with ULBs and SDA as monitoring agencies

3	Development and maintenance of ECSBC compliance portal, directory of energy efficient materials/technologies
4	Empanelment of building experts at the state level
5	Market Outreach for ECSBC compliant Products, Radio Jingles, Social Media Awareness
6	Pilot project investment for Super ECSBC as case studies (initial 20 Buildings)
7	Periodic upgradation of PWD Schedule of Rates (SoR) to incorporate latest energy efficient materials and technologies
8	Inclusion of curriculum on energy efficiency in buildings, in state universities and education boards

Table 37 : Action points for promoting ECSBC for energy efficiency in buildings

Action plan 3: Energy audit for commercial and public buildings: Under this strategy, it is recommended that periodic energy audits may be carried out at public/commercial buildings on load basis. Directives may be issued to government departments to carry out detailed energy audits at heir respective building facilities. In view of this, following scenarios are proposed: -

Moderate scenario

- In moderate scenario, it is assumed 5% buildings will have energy audit and in ambitious scenario, it is assumed 10% of buildings will get energy audit

Ambitious scenario

- It is assumed that energy audit recommendations implementation will lead to 30% savings

Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in 2030 as per this strategy of mandating the compliance of ECSBC for new buildings: -

2030 energy consumption in commercial and public buildings sector (toe)	Energy saving in moderate scenario (toe)	Energy saving in ambitious scenario (toe)
357535	**5363.02**	**10726**

Table 38: Energy savings potential due in mandatory energy audits scenario

To achieve this potential, it is critical that this strategy is put into play. For this following are some of the recommended action points: -

S. No.	Action Plans
1	Issue directives to all government departments to conduct energy audits and target to achieve BEE Star Rating for public buildings more than 100kW connected load
2	Periodic energy audits for commercial buildings on load basis and incentives on achieving star rating for buildings
3	Capacity Building of Architects & Building Professionals and Developers
4	Market Outreach for Star & Shunya Rating by Radio Jingles, Social Media Awareness
5	Transformation of iconic government buildings to Net-Zero (10 nos)
6	Mandatory minimum set point of 24 degree for air conditioners in all government buildings

Table 39:Action points to promote energy audit in buildings

Energy Efficiency targets and Monitoring mechanism

Energy savings targets

Taking into account the savings estimated based on strategy 1 & 2 recommended for the in buildings sector, following table illustrates the overall energy savings targets envisaged for the buildings in Odisha in the year 2030:-

Action Plan	Energy Savings in 2030 under moderate scenario (Mtoe)	Energy Savings in 2030 under ambitious scenario (Mtoe)
Deepening of S&L in domestic buildings	0.113	0.19
Effective implementation of Odisha ECBC 2022	0.0003	0.0004
Energy audit for commercial and public buildings	0.005	0.011

Table 40 : Overall energy savings potential in buildings sector of Odisha

Monitoring mechanism

Following monitoring framework is recommended to effectively assess the status of energy efficiency action plan for buildings sector

Indicator Framework for the Energy efficiency policies and programs				
Indicator types	**Purpose**	**Frequency**	**Aspects**	**Responsible agency**
Energy efficiency action plan for buildings sectors and mainstreaming	Tracking the progress of implementation of regulatory actions and fund mobilization	Annual	Programme administrative structure (responsibilities of key stakeholders, resource allocation plan and programme monitoring and review mechanism) established	ECBC Cell, EIC (E) cum PCEI, SDA Odisha. Housing and Urban development department, Development Authorities, ULBs, Municipalities
			Selection of appropriate international energy management standards to serve as a reference for a programme	
			Energy consumption threshold levels for selecting participating building units determined	
			Consultations conducted between Nodal Agency and selected buildings	
			Data reporting mechanism enabled	
			Preparation and appraisal of draft legal documents completed	
			MRV systems for Building energy efficiency technologies of high energy saving potential	
Institutional Readiness and capacity building	Tracking the progress of improving capacities of concerned agencies related to energy efficiency implementation	Annual	Capacity building of concerned staff of buildings on reporting of energy performance	EIC (E) cum PCEI, SDA Odisha.
			Training programme implementation with certification for energy auditors	

Outcome	Assessing results of energy efficiency interventions - projects, market mechanisms, etc.	Annual	Assessing results of energy efficiency policies/programs at building level	ECBC Cell, EIC (E) cum PCEI, SDA Odisha. Housing and Urban development department
Impacts	Assessing the progress towards achieving a more competitive, resilient, and sustainable economy	Annual	Impact assessment of energy efficiency policies/programs in terms of emission reductions	ECBC Cell, EIC (E) cum PCEI, SDA Odisha. Housing and Urban development department
Project financing	Project evaluation and feasibility studies for energy efficiency projects and their financing through banks/financial institutions	Annual	Budget allocated for project implementation/secured through innovative financing instruments	Department of finance, H&UD Department, EIC (E) cum PCEI, SDA Odisha.

Table 41:Monitoring mechanism for building sector energy efficiency action plans

Focus sector 3 – Transport

Current scenario

Brief description of the sector

The transport sector is a major consumer of energy for Odisha and the emphasis is on electric vehicles to decarbonise this sector. Table 12 shows the key highlights of the transport sector in Odisha.[33] [34]

Two wheelers constitute highest 82% of share in Vehicle segment of Odisha.[35] recently launched Electrical Vehicle policy in August-2021 to increase adoption of EVs specifically in categories of 2W, 3W and Light Motor vehicles. [36]. The state has provided 100% exemption in road tax and registration fees of e-bus for first 4 years. 15% of subsidies are to be provided on purchase of 2,3 and 4-wheeler vehicles. Government of Odisha will also provide capital subsidy of 25% for selected energy operators for charging installations. [37]For customers, there is 100% exemption from vehicle registration fees and road tax.

Odisha Government along with BEE and Engineer in Chief (Electricity) as the state designated agency recently launched 'Go Electric' campaign in Bhubaneshwar to promote adoption of electrical vehicles in state.[38]

Fifty electronic buses will soon play in the capital region for which tendering process has been completed and agency has been selected.[39]

The low carbon transport NAMA study was completed by the Energy Research Institute (TERI) with support from the government of the Netherlands.[40] Table 22 shows the total registered vehicles in Odisha categorized by mode type.[41]

	Goods Vehicles	Bus	Two-wheelers	Auto-rickshaws	Light Motor Vehicles	Others
2019-20	261684	21807	6214995	94497	516099	152649

Table 42 :Mode-wise split for vehicles in Odisha

Key highlights	
Electric Vehicle target	20% of new registration in EV segment by 2025
Stakeholders	Transport and commerce department Odisha

Table 43 : Key highlights of transport sector in Odisha

Energy efficiency potential in the sector

Following table estimates the energy efficiency potential projected for the year 2030 in the transport sector in Odisha:

Strategy	Energy Savings in 2030 under moderate scenario (Mtoe)	Energy Savings in 2030 under ambitious scenario (Mtoe)
Strategy 1	0.4	0.6
Strategy 2	0.21 (As per policy)	

Table 44 : Energy efficiency potential in transport sector of Odisha

33 Unlocking National Energy Efficiency Potential, Bureau of Energy Efficiency
34 Department of Transport, Odisha
35 Odisha Electrical Vehicle policy-2021
36 Odisha Electrical Vehicle Policy-2021
37 Odisha Electrical Vehicle Policy-2021
38 Odisha Transport Department
39 Odisha Economic Survey-2021
40 Odisha Climate Action Plan (2018-23)
41 Odisha Transport Department

The energy savings potential has been estimated based on the following two scenarios: -

- Moderate scenario
- Ambitious scenario

The afore-mentioned two scenarios have been devised keeping in hindsight strategies like transition to electric vehicles and ethanol blending. This will be discussed in detail in the next section.

Strategies in the Transport sector

The rapid growth of vehicles numbers in the State has been accompanied by related problems including congestion and traffic snarls, lack of adequate parking spaces, high accident rates, environmental vehicular pollution rise, and inadequacy of road space for efficient public transportation. In this regard, there is dire need for the state government to decarbonize the sector in order to align with India's NDC and Net Zero commitments.

Energy efficiency in the transport sector refers to the use of energy-efficient technologies and practices to reduce energy consumption, improve fuel economy, and decrease greenhouse gas emissions associated with transportation.

There are several ways to improve energy efficiency in the transport sector, including:

Vehicle efficiency: Vehicles can be designed to be more energy-efficient by reducing weight, improving aerodynamics, and using more efficient engines and transmissions. Hybrid and electric vehicles are also becoming increasingly popular as they use less fuel and emit fewer greenhouse gases than traditional internal combustion engines.

Fuel efficiency: Fuel efficiency can be improved by using more efficient fuels such as biofuels, hydrogen, and natural gas. Driving techniques such as eco-driving can also help reduce fuel consumption.

Modal shift: Modal shift refers to shifting from less energy-efficient modes of transport, such as personal cars, to more energy-efficient modes such as public transport, cycling, or walking.

Infrastructure improvements: Infrastructure improvements such as better traffic management, improved road design, and the development of electric vehicle charging stations can also help improve energy efficiency in the transport sector.

Behavioral change: Changes in behavior such as carpooling, telecommuting, and using public transport can also help reduce energy consumption and greenhouse gas emissions associated with transportation.

For an alternative pathway of development of the transport sector in Odisha, the promotion of electric mobility is focused on since it has immense potential.

Moreover, as per the Unlocking National Energy Efficiency Potential published by the Bureau of Energy Efficiency, the energy saving target for the state has been calculated by segregating the total energy saving potential for each sector. The energy saving target for transport sector in Odisha is 0.445 Mtoe by 2031.[42]

Keeping the above in hindsight, this section explores the present policies/strategies pertaining to energy efficiency in Odisha as well as recommend various energy efficiency strategies (policy as well as technological) in order to realize the state's energy savings potential in the transport sector.

Recommended schemes/policies to achieve the state's energy efficiency potential

Action plan 1 – Transition of existing fleet to electric vehicles: Under this strategy, it is recommended to transition the existing ICE (Internal combustion Engine) fleet (two wheelers, three wheelers, four wheelers, bus and heavy vehicles) to electric vehicles. As of 2019-20, there are approximately 88 Lakh ICE [43]registered vehicles in the state. Out of this, 82 % are two wheelers, 10.29% are 4 wheelers, 3.28% % are buses, , 8.09% are three wheelers and the remaining 9% of heavy-duty vehicles.

As per this strategy – following scenarios have been adopted for the replacement of ICE fleet by electric vehicles:

42 UNNATEE report, Bureau of Energy Efficiency 2019

43 MORTH

Moderate scenario

- As per Odisha's EV policy, Under **moderate scenario,20% EV penetration in vehicle mix by 2031** across all category of vehicles is considered

Ambitious scenario

- As pe Odisha's EV policy,under **ambitious scenario, 30% EV penetration in vehicle mix by 2031** across all category of vehicles is considered

Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in the year 2030 as per this strategy of transition from ICE to electric vehicles :-

Energy saving in moderate scenario (Mtoe)	Energy saving in ambitious scenario (Mtoe)
0.4	**0.6**

Table 45 : Energy saving potential due to EV transition

Note: Overall average utilization and mileage in case of ICE Vehicles as well as electrical vehicle across vehicle categories are considered as below:

	2W	3W	4W	Bus	HDV
Average utilization (km)	6300	7,000	12,600	50,000	75,000
Mileage (kWh/km)	0.033	0.061	0.15	1.15	1.15
Mileage (litre/km)	0.014285714	0.025	0.05	0.166666667	0.333333333

Table 46 : Average utilization and mileage across vehicle categories

Growth rate for increase in vehicle on road is considered to be 2W (10.42%) , 3W (8.09%), 4W (10.29%) , Bus (3.28%) and HDVs (9.00%)[44]

To achieve this potential, it is critical that this strategy is put into play. For this following are some of the recommended action points: -

S. No.	Action Plans for Odisha state to achieve energy efficiency potential
1	Establishment of regulatory mechanism to develop EV charging infrastructure
2	Set up Charging stations based on open access
3	Pilot projects on Battery Swapping stations in 5 model cities
4	Pilot projects on Hydrogen fuel cell vehicles
5	Pilot projects on Green hydrogen vehicles

Table 47 : Action points to promote transition to EVs in Odisha

Action plan 2: Ethanol blending programme: Government of India has been implementing Ethanol Blended Petrol (EBP) Programme throughout the country wherein Oil Marketing Companies (OMCs) sell petrol blended

[44] MoRTH India- Vehicle growth rate in India

with ethanol. Under EBP Programme, Government has fixed the target of 10% and 20% blending of ethanol with petrol by 2022 and 2025 respectively.[45]

Government has been taking several steps to increase production and utilization of ethanol

i. In order to augment ethanol production capacity in the country, the Government has notified Ethanol Interest Subvention Scheme(s) inter-alia extending financial assistance in the form of interest subvention @ 6% per annum or 50% of rate of interest charged by banks/financial institutions whichever is lower for five years including one-year moratorium.
ii. The National Policy on Biofuels-2018, allowed the production of ethanol from a variety of feedstocks like agricultural residues (rice straw, cotton stalk, corn cobs, saw dust, bagasse etc.); starch containing materials such as maize, cassava, rotten potatoes etc.; damaged food grains like wheat, broken rice etc; and foodgrains like rice apart from sugarcane and other sugar containing materials (like sugar beet, sweet sorghum etc).
iii. The Government and OMCs have been fixing remunerative prices of ethanol produced from different feedstocks for supply to OMCs
iv. The Government has amended the industries (Development & Regulation) Act, 1951 vide Notification dated 14.5.2016 to ensure free movement of ethanol in the country.
v. The Government has also reduced Goods & Service Tax (GST) on ethanol meant for Ethanol Blended with Petrol (EBP) Programme from 18% to 5% w.e.f 27.7.2018.

The Odisha State Cooperative Milk Producers' Federation (OMFED) has been tasked with implementing the program. OMFED will set up ethanol plants and supply the ethanol to oil marketing companies for blending with petrol.

The program is expected to provide several benefits, including the creation of new jobs, increased income for farmers, and a reduction in pollution. The use of ethanol as a fuel is also expected to reduce the country's dependence on imported oil.

Odisha currently has total installed capacity of 3.1 Crore litres/annum which is significantly less compared to Odisha's overall requirement of ethanol blending target by 2025 [46]

Under this strategy - it is recommended that, as per the national target, ethanol blending in conventional fuels may be executed. The target already set in this segment is 20%.

Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in 2030 as per this strategy: -

Energy saving as per policy (Mtoe)
0.21

Table 48 : Energy savings potential due to ethanol blending in transport sector

To achieve this potential, it is critical that this strategy is put into play. For this following are some of the recommended action points: -

S. No.	Action Plans
1	Encourage establishing biofuel production plants

Table 49 : Action points to promote ethanol blending

[45] https://pib.gov.in/PressReleasePage.aspx?PRID=1885392#:~:text=Under%20EBP%20Programme%2C%20Government%20has,by%202022%20and%202025%20respectively.

[46] https://pib.gov.in/PressReleasePage.aspx?PRID=1885392#:~:text=Under%20EBP%20Programme%2C%20Government%20has,by%202022%20and%202025%20respectively.

Energy savings targets and monitoring mechanism

Energy savings target

Taking into account the savings estimated based on strategy 1 & 2 recommended for the transport sector, following table illustrates the overall energy savings targets envisaged for the buildings in Odisha in the year 2030: -

Action Plan	Energy Savings in 2030 under moderate scenario (Mtoe)	Energy Savings in 2030 under ambitious scenario (Mtoe)
Transition to electric vehicles	0.4	0.6
Ethanol blending	0.21 (As per policy)	

Table 50: Energy savings potential in transport sector of Odisha

Monitoring mechanism

Following monitoring framework is recommended to effectively assess the status of energy efficiency action plan for transport sector

Indicator Framework for the Energy efficiency policies and programs				
Indicator types	**Purpose**	**Frequency**	**Aspects**	**Responsible agency**
Energy efficiency action plan for transport sectors and mainstreaming	Tracking the progress of implementation of regulatory actions and fund mobilization	Annual	Programme administrative structure (responsibilities of key stakeholders, resource allocation plan and programme monitoring and review mechanism) established	EIC (E) cum PCEI, SDA Odisha. Transport department
			Prepare proposals to amend the relevant provisions to encourage the use of EVs	
			Selection of appropriate international energy management standards to serve as a reference for a programme	
			Data reporting mechanism enabled	
			Preparation and appraisal of draft legal documents completed	
			Conduct assessment studies to prepare recommendations for amendments to the regulations on the designation of places and parking lots, and buildings to establish regulations governing the charging infrastructure for EV	
Institutional Readiness and capacity building	Tracking the progress of improving capacities of concerned agencies related to transport sector energy efficiency programs	Annual	Capacity building of concerned staff on reporting of energy performance	EIC (E) cum PCEI, SDA Odisha.

Outcome	Assessing results of energy efficiency interventions - projects, market mechanisms, etc.	Annual	Assessing results of energy efficiency policies/programs	EIC (E) cum PCEI, SDA Odisha. Transport department
Impacts	Assessing the progress towards achieving a more competitive, resilient, and sustainable economy	Annual	Impact assessment of energy efficiency policies/programs in terms of emission reductions	EIC (E) cum PCEI, SDA Odisha. Transport department
Project financing	Project evaluation and feasibility studies for energy efficiency projects and their financing through banks/financial institutions	Annual	Availability of project finance for buildings sectors, fund allocation, subsidy/benefits allocation	Department of finance, EIC (E) cum PCEI, SDA Odisha.

Table 51:Monitoring mechanism for transport sector energy efficiency action plans

Focus sector 4 – Agriculture

Current scenario

Brief description of the sector

The agriculture sector is a significant energy consumer in Odisha, as in many other Indian states. Energy is required for various agricultural activities such as irrigation, land preparation, harvesting, threshing, and transportation of agricultural produce. In Odisha, the agriculture sector consumes a substantial amount of energy in the form of electricity, diesel, and other fuels.

As per the data from the Odisha State Load Dispatch Center (SLDC), the agriculture sector consumed around 11,109 million units (MUs) of electricity in the 2020-21 fiscal year. This accounts for about 25% of the total electricity consumption in the state. Most of the electricity consumption in the agriculture sector is for irrigation purposes.

In addition to electricity, the agriculture sector in Odisha also consumes a significant amount of diesel and other fuels for irrigation and other agricultural activities. As per the data from the Ministry of Petroleum and Natural Gas, the consumption of diesel in Odisha for agricultural purposes was around 4.4 million tonnes in the 2020-21 fiscal year.
To reduce the energy consumption in the agriculture sector, the state government has been promoting the use of renewable energy sources such as solar and wind energy for irrigation purposes. The government has been providing subsidies and incentives to farmers for the installation of solar pumps and other renewable energy-based irrigation systems.

The government has also been promoting the use of energy-efficient technologies and practices in agriculture, such as drip irrigation and mechanized farming, which can reduce the energy consumption and improve the productivity of the sector.

Odisha being an agricultural state provides employment to 62% of the total workforce. Odisha has about 39% of cultivated land of total Land mass of Odisha which is roughly about 61.80 Lakh hectares.[47] The agricultural economy is characterised by low investment, low productivity, mono-cropping, inadequate irrigation facilities and small holdings of land. [48]

The main energy consumption in this sector is by tractors and water pumps. OREDA is promoting uptake of solar water pumps in the state by offering subsidy and loans. There are 176 solar water pumps as of 2020. [49]

Odisha being an agricultural state provides employment to 62% of the total workforce. Odisha has about 39% of cultivated land of total Land mass of Odisha which is roughly about 61.80 Lakh hectares.50 The agricultural economy is characterised by low investment, low productivity, mono-cropping, inadequate irrigation facilities and small holdings of land. [51]

The main energy consumption in this sector is by tractors and water pumps. OREDA is promoting uptake of solar water pumps in the state by offering subsidy and loans. There are 176 solar water pumps as of 2020. [52]

Key highlights	
Total Share	17.18%
Major crops produced	Rice, pulses, oil seeds, jute, coconut and turmeric
Cultivable area	61.9 lakh hectares

[47] IBEF-Odisha Report

[48] Department of Agriculture and Farmers empowerment

[49] OREDA Annual activity report

[50] IBEF-Odisha Report

[51] Department of Agriculture and Farmers empowerment

[52] OREDA Annual activity report

Net sown area	56.04 lakh hectares
Number of solar water pumps	155753
Stakeholders	Department of Agriculture and Farmers empowerment Krishi Vigyan Kendra

Table 52 : Key highlights of agriculture sector in Odisha[54]

Odisha government has launched many schemes to boost agriculture sector and lift irrigation system is one such scheme. To uplift adoption of renewable energy, specifically Solar, GEDCOL along with OREDA is planning install 2378 MW of Solar Power in the state. Odisha government is also promoting 0.5 hp Solar Photovoltaic pumps in scarce electricity supply regions.[55] In Odisha, Energy consumption share of agriculture has increase from 1.14% in 2010-11 to 3.9% in 2019-20. The consumption has increased almost two times from 2016-17 from 281.7 MU to 695.5 MU in 2019-20. Major Power consumptions in Agriculture is due to Pumping of borewells and tube wells for irrigation.[56]

Energy efficiency potential in the sector

Following table estimates the energy efficiency potential projected for the year 2030 in the agriculture sector in Odisha:

Strategy	Energy Savings in 2030 under moderate scenario (Mtoe)	Energy Savings in 2030 under ambitious scenario (Mtoe)
Strategy 1	0.25 (Policy scenario)	0.25 (Policy scenario)
Strategy 2	0.004	0.020

Table 53 : Energy savings scenario in agriculture sector

The energy savings potential has been estimated based on the following two scenarios: -

- Moderate scenario
- Ambitious scenario

The afore-mentioned two scenarios have been devised across the agriculture sector. This will be discussed in detail in the next section.

Proposed energy efficiency strategies in the agriculture sector

As per the Unlocking National Energy Efficiency Potential of Bureau of Energy Efficiency, the energy saving target for a state has been calculated by segregating the total energy saving potential for each sector. The energy saving target for agriculture sector is 0.016 Mtoe by 2031[57]. From an energy consumption standpoint, it is estimated that presently there are more than 4 lakh diesel pumps in Odisha[58] along with 2 Lakh electric pumps

Keeping the above in hindsight, this section explores the present policies/strategies pertaining to energy efficiency in Odisha as well as recommend various energy efficiency strategies (policy as well as technological) in order to realize the state's energy savings potential in the agriculture sector

Recommended schemes/policies to achieve the state's energy efficiency potential

Action plan 1 – Transition of existing diesel pumps to solar based pumps: Under this strategy, it is recommended that the existing stock of diesel-based pumps may be replaced by solar based pumps by 2025.

[53] Activity Report 2020-21
[54] Activity Report 2020-21
55 OREDA Annual activity report
56 Activity Report 2020-21
57 UNNATEE Report, Bureau of Energy Efficiency 2019
[58]https://agcensus.nic.in/document/is2016/air_is_16-17_210121-final_220221.pdf

As per this strategy – following scenarios have been adopted for the replacement of existing stock of diesel pumps with solar based pumps: -

Moderate scenario

- By 2025, moderate scenario assumes 100% replacement of diesel pumps with solar pumps

Ambitious scenario

- By 2025, ambitious scenario assumes 100% replacement with solar pumps

Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in the year 2030 as per this strategy of transition from diesel pumps to solar based pumps:-

Diesel pumps estimated inventory by 2025	Energy saving in moderate scenario (Mtoe)	Energy saving in ambitious scenario (Mtoe)
4,95,500	**0.25 (Policy scenario)**	**0.25 (Policy scenario)**

Table 54 : Energy saving potential- transition to solar based pumps

To achieve this potential, it is critical that this strategy is put into play. For this following are some of the recommended action points: -

S. No.	Action Plans for Odisha state to achieve energy efficiency potential
1	Effective implementation of PM KUSUM Yojana

Table 55: Action points to promote replacement of diesel pumps with solar based pumps

Action plan 2: Replacement of inefficient electric pumps with efficient electric pumps: Under this strategy, it is recommended that the existing stock of inefficient electric pumps may be replaced by solar based pumps by 2025. As per this strategy – following scenarios have been adopted for the replacement of inefficient electric pumps with energy efficient electric pumps: -

Moderate scenario

- Moderate scenario assumes 30% replacement with efficient Star-Rated pumps

Ambitious scenario

- Ambitious scenario assumes 50% replacement with efficient Star-Rated pumps

Following table encapsulates both the aforementioned scenarios and demonstrates the energy efficiency potential in 2030 as per this strategy: -

Inefficient pumps estimated inventory by 2030	Inefficient pumps replaced by Star-Rated pumps in ambitious scenario by 2030	Energy saving in moderate scenario (toe)	Energy saving in ambitious scenario (toe)
552145	**551245**	**4895**	**20726**

Table 56 : Energy savings potential- Replacement of in-efficient agricultural pump sets

To achieve this potential, it is critical that this strategy is put into play. For this following are some of the recommended action points: -

S. No.	Action Plans
1	Phase wise plan to implement DSM scheme for replacement of existing inefficient pumps through ESCOs

Table 57 :Action points to promote replacement of inefficient electric pumps with efficient 5 star pumps

Energy savings targets & Monitoring mechanism

Energy savings targets

Taking into account the savings estimated based on strategy 1 & 2 recommended for the agriculture sector, following table illustrates the overall energy savings targets envisaged for agricultural sector in Odisha in the year 2030: -

Strategy	Energy Savings in 2030 under moderate scenario (Mtoe)	Energy Savings in 2030 under ambitious scenario (Mtoe)
Replacement of diesel pumps with solar based pumps	**0.25**	**0.25**
Replacement of inefficient electric pumps with energy efficient electric pumps	0.004	0.020

Table 58 : Energy savings potential in agriculture sector

Monitoring mechanism

Following monitoring framework is recommended to effectively assess the status of energy efficiency action plan for agricture sector

Indicator Framework for the Energy efficiency policies and programs				
Indicator types	**Purpose**	**Frequency**	**Aspects**	**Responsible agency**
Energy efficiency action plan for agriculture sectors and mainstreaming	Tracking the progress of implementation of regulatory actions and fund mobilization	Annual	Programme administrative structure (responsibilities of key stakeholders, resource allocation plan and programme monitoring and review mechanism) established	EIC (E) cum PCEI, SDA Odisha. Department of Agriculture and Farmer's empowerment, OREDA
			Selection of appropriate international energy management standards to serve as a reference for a programme	
			Data reporting mechanism enabled	
			Preparation and appraisal of draft legal documents completed	
Institutional Readiness and capacity building	Tracking the progress of improving capacities of concerned agencies related to transport sector energy efficiency programs	Annual	Capacity building of concerned staff on reporting of agricultural pump sets O&M practices energy performance.	EIC (E) cum PCEI, SDA Odisha.
Outcome	Assessing results of energy efficiency interventions - projects, market mechanisms, etc.	Annual	Assessing results of energy efficiency policies/programs related to agriculture sector	EIC (E) cum PCEI, SDA Odisha. Department of Agriculture and Farmer's empowerment

Impacts	Assessing the progress towards achieving a more competitive, resilient, and sustainable economy	Annual	Impact assessment of energy efficiency policies/programs in terms of emission reductions	EIC (E) cum PCEI, SDA Odisha. Department of Agriculture and Farmer's empowerment
Project financing	Project evaluation and feasibility studies for energy efficiency projects and their financing through banks/financial institutions	Annual	Availability of project finance for energy efficient pump sets , fund allocation, subsidy/benefits allocation for PM-KUSUM Scheme	Department of finance, Department of Agriculture and Farmer's empowerment EIC (E) cum PCEI, SDA Odisha.

Table 59:Monitoring mechanism for agriculture sector energy efficiency action plans

Investment potential

Taking into hindsight the energy savings potential that has been highlighted for each of the focus sectors – it is also pertinent that this study also takes into account the investment required to realize this potential. This section illustrates the investment required to execute each of the strategies.

Estimated investment potential

Following table depicts the estimated energy & emission savings potential that can be achieved through each of the strategies along with its estimated investment potential: -

Sector	Energy saving in moderate (Mtoe)	Energy saving in ambitious (Mtoe)	Emission Saving (MtCO2)	Emission Saving (MtCO2)	Investment Potential (INR crore)
Industry	0.66	1.53	2.07	4.78	2813.0
Buildings	0.12	0.21	0.37	0.66	385.7
Transport	0.63	0.84	1.96	2.62	1538.5
Agriculture	0.25	0.27	0.80	0.85	497.6
Total	1.66	2.84	5.21	8.90	5234.7

Table 60: Estimated investment potential

(Note: Market Potential calculated using cost of 1 tonne of oil equivalent as INR 18,402 and assuming a payback of 3 years)

Emission Factors			
Fuel	**Emission Factor**	**Unit of Emission Factor**	**Source**
Coal	1.52	kgCO2/kg	BEE
Electricity	0.79	kgCO2/kWh	CEA
Oil	3.13	kgCO2/kg	BEE

Way forward

Following table summarizes the strategies put forward as part of this SEEAP report along with the action points required to enforce the same. Moreover, this table also points out the relevant departments that may take up the execution of the afore-said action points: -

Focus Sector	EE strategies	Action Points	Implementing agencies
Industries	Strategy 1: Deepening and widening of PAT	1. Mandatory Standardized Energy Audits in every three years for all units that have energy consumption below PAT threshold, in all notified PAT sectors 2. Creating enabling environment through B2B forums with global technology suppliers 3. State-level energy efficiency roadmap for key sectors to be prepared. 4. Encouraging industries to adopt ISO 50001 certifications for their manufacturing units 5. Channelizing green/climate finance and leverage financing instruments including but not limited to risk guarantee programs 6. Encouraging demonstration and pilot projects through technical institutions like IIT, IISc	Bureau of Energy Efficiency (BEE); EIC (E) cum PCEI- SDA Odisha
	Strategy 2: EE in non-PAT sectors	1. Awareness on Energy conservations in **Sponge Iron, Rice Mills, Seafood processing industries of the state** 2. Periodic standardized energy audits for MSMEs on load basis and reimbursement of energy audit cost to include key units such as petrol pumps, goods carriers, restaurants, mining activity, brick units 3. Sector-specific policy development for financial assistance on implementation of ECMs suggested in energy audit. 4. Demonstration projects on latest Energy Efficiency Technologies in SME clusters 5. Technical and financial assistance for transition from inefficient induction motors to efficient motors in rice mills, transition to energy efficient refrigeration systems in seafood processing industries and Installing Preheating Rotary kiln for Raw material heating using Waste heat gases for Sponge iron energy efficient furnaces 6. Encouragement of biomass blending in coal-fired brick kilns by strengthening the supply chain.	Bureau of Energy Efficiency (BEE); EIC (E) cum PCEI- SDA Odisha
Buildings	Strategy 1: Appliance replacement programme	1. Development of state-specific implementation models and identification of relevant agencies for replacing all existing inefficient appliances in government offices and buildings with BEE Star Rated appliances 2. Phase-wise plan for replacement of existing inefficient appliances with BEE Star rated appliances in all buildings, through DSM schemes	Bureau of Energy Efficiency (BEE); EIC (E) cum PCEI- SDA Odisha, State utilities
	Strategy 2: Enforcing ECSBC in new and upcoming buildings	1. Integrate ECSBC in new building approval process 2. Setting-up of effective enforcement plan with ULBs and SDA as monitoring agencies 3. Development and maintenance of ECSBC compliance portal, directory of energy efficient materials/technologies 4. Empanelment of building experts at the state level 5. Market Outreach for ECSBC compliant Products, Radio Jingles, Social Media Awareness	Bureau of Energy Efficiency; EIC (E) cum PCEI- SDA Odisha Housing and Urban development, BDA and CDAs

		6. Pilot project investment for Super ECSBC as case studies (initial 20 Buildings) 7. Periodic upgradation of PWD Schedule of Rates (SoR) to incorporate latest energy efficient materials and technologies 8. Inclusion of curriculum on energy efficiency in buildings, in state universities and education boards	
	Strategy 3: Promoting energy audits for commercial and public buildings	1. Issue directives to all government departments to conduct energy audits and target to achieve BEE Star Rating for public buildings more than 100kW connected load 2. Periodic energy audits for commercial buildings on load basis and incentives on achieving star rating for buildings 3. Capacity Building of Architects & Building Professionals and Developers 4. Market Outreach for Star & Shunya Rating by Radio Jingles, Social Media Awareness 5. Transformation of iconic government buildings to Net-Zero (10 nos) 6. Mandatory minimum set point of 24 degree for air conditioners in all government buildings	Bureau of Energy Efficiency; EIC (E) cum PCEI-SDA Odisha Housing and Urban development
Transport	Strategy 1: Transition of existing fleet to electric vehicles	1. Establishment of regulatory mechanism to develop EV charging infrastructure 2. Set up Charging stations based on open access 3. Pilot projects on Battery Swapping stations in 3 model cities 4. Pilot projects on Hydrogen Fuel Cell Vehicles	Department of Transport
	Strategy 2: Ethanol blending programme	1. Encourage establishing biofuel production plants	State Transport Department & Individual Government Departments
Agriculture	Replacement of diesel pumps with solar based pumps	1. Effective implementation of PM KUSUM Yojana	Department of Agriculture and farmers empowerment, EIC (E) cum PCEI- SDA Odisha, OREDA,
	Replacement of inefficient electric pumps with energy efficient electric pumps	1. Phase wise plan to implement DSM scheme for replacement of existing inefficient pumps through ESCOs	Department of Agriculture and farmers empowerment, EIC (E) cum PCEI- SDA Odisha, OREDA

Table 61 : Way forward with focus sector

Following table summarizes the strategies put forward as part of this SEEAP report along with the priority action points required to initiate action plan. Moreover, this table also points out the relevant financial sources which can be obtained to achieve energy saving potential.

Sector	Strategies	Priority action plans for Odisha state to achieve energy efficiency potential	Potential Financing Sources
Industrial Sector	**Deepening and Widening of PAT Scheme**	Mandatory Standardized Energy Audits in every three years for all units that have energy consumption below PAT threshold, in all notified PAT sectors, excluding MSMEs.	State budget
		Implementation of ISO 50001 in large industries.	Private investments accelerated by incentives from IDAs and/or from state budget
		State-level energy efficiency roadmap for key sectors to be prepared	Combination of Private equity and central/state grant
	Energy Efficiency Intervention in Sponge Iron, Rice Mills, Seafood processing industries, Plastic processing clusters of the state	Periodic standardized energy audits for MSMEs on loan basis and reimbursement of energy audit cost with a maximum cap	State budget
		Sector-specific financial instruments on implementation of ECMs suggested in energy audit.	Concessional loans; incentives from state budget
		Implementation of ISO 50001 in units of MSME clusters across Odisha	Private investments accelerated by incentives from IDAs and/or from state budget[59]

Table 62:Priority action points and financing soources for Industral sector

Sector	Strategies	Priority action plans for Odisha state to achieve energy efficiency potential	Potential Financing Sources
Buildings Sector	**Replacement program for inefficient appliances**	Development of state-specific implementation models and identification of relevant agencies for implementing utility-scale replacement program	Green financing supported by grant from IDAs or State Budget, ESCO/ DISCOM led replacement program
		Issue of directive to government offices and buildings in the state to replace all existing inefficient appliances with BEE Star rated appliances	State budget
		Integrate ECBC in new building approval process	-

59

	Effective Implementation of Odisha ECBC 2022	Setting-up of effective enforcement plan with ULBs and SDA as monitoring agencies	-
		Periodic upgradation of PWD Schedule of Rates (SoR) to incorporate latest energy efficient materials and technologies	-
	Energy audit for commercial and public buildings	Issue directives to all government departments to conduct energy audits and target to achieve BEE Star Rating for public buildings more than 100kW connected load	State budget
		Periodic energy audits for commercial buildings on load basis and incentives on achieving star rating for buildings	Combination of Private equity and central/state grant
		Mandatory minimum set point of 24 degree for air conditioners in all government buildings	-
		Pilot on installing Demand responsive appliances for government buildings	Green financing supported by grant from IDAs or State Budget

Table 63 : Priority action points and financing sources for buildings sector

Sector	Strategies	Priority action plans for Odisha state to achieve energy efficiency potential	Potential Financing Sources
Transport Sector	**Increase EVs in vehicle mix of the state across vehicle categories**	Establishment of regulatory mechanism to develop EV charging infrastructure.	-
		Set up Charging stations based on open access	Combination of Private equity and Central/state grant
		Pilot projects on Hydrogen Fuel Cell Vehicles	Green financing supported by grant from IDAs or State Budget
	Ethanol Blending program	Incentives on establishing biofuel production plants	State/Central Grant
Agriculture Sector	**Transition from diesel pumps with solar**	Effective implementation of PM KUSUM Yojana	Combination of Private equity and Central/state grant
	Replacement of inefficient electric pumps with efficient electric pumps	Phase wise plan to implement DSM scheme for replacement of existing inefficient pumps through ESCOs	Combination of Private equity and Central/state grant
Municipal Sector		Replacement of inefficient sewerage and water pumps with BEE 5-star rated pumps under all municipal corporations of the state.	Green financing supported by grant from IDAs or State Budget, ESCO/ DISCOM led replacement program

Table 64 : Priority action points and financing sources for transport, agriculture and municipal sector

References

Energy Data

S.No.	Reference
1	Energy Statistics India 2021, Ministry of Statistics and Programme Implementation (MoSPI)
2	National Accounts Data, Ministry of Statistics and Programme Implementation (MoSPI)
3	Population Projections For India and States 2011-2036, National Commission on Population, Ministry of Health & Family Welfare
4	NITI Aayog: India Energy Dashboards
5	Small and Medium Enterprises: Energy Efficiency Knowledge Sharing A Platform for Promoting Energy Efficiency in SMEs (SAMEEKSHA)
6	Simplified Digital Hands-on Information on Energy Efficiency in MSMEs (SIDHIE), Bureau of Energy Efficiency (BEE), Ministry of Power
7	Impact Assessment of BEE's Standard & Labelling Program in India, Market Xcel Data Matrix Pvt Ltd.

Table 65 : Energy data references

Fuel calorific values

Fuel	Gross Calorific Value (GCV)	Unit of GCV
Coal	4,500	kcal/kg
Natural Gas	10,200	kcal/kg
Diesel	10,350	kcal/kg
Electricity	860	kcal/kWh

Table 66 : Fuel calorific values references

Units of conversion

Units	
1 tonne of oil equivalent (TOE)	1,00,00,000 kcal
	0.000001 MTOE
	11,630 kWh

Table 67 : Units of conversion

Annexures

List of sources

Primary Source	Secondary Source
Department of Agriculture and farmers Empowerment Odisha	Central Electricity Authority
Transport and Commerce department	Odisha Economic Survey
TPNODL, TPCODL, TPWODL, TPSODL	Ministry of Statistics and Programme Implementation
GRIDCO	Transport Department
Department of Industries, Odisha	Bureau of Energy Efficiency
Odisha Renewable Energy Development Agency (OREDA)	Energy Efficiency Services Limited
Department of Steel and Mines Odisha	NITI Aayog (Energy Dashboard)
Urban Local Bodies	Ministry of Micro, Small and Medium Enterprises
Cuttack, Bhubaneshwar and Berhampur Municipal Corporation	Department of Energy
Housing and Urban Development	Ministry of Power
Forest, Environment and Climate Change Department	Ministry of New and Renewable Energy
MSME Department	India Brand Equity Foundation
Bhubaneshwar Development Authority	Krishi Vigyan Kendras districts
Cuttack Development Authority	World Bank/ Asian Development Bank
	Indian Bureau of Mines

Table 68 : Key data sources

Primary list of stakeholders

Sector	Stakeholder	Type
Cross-Functional	EIC (E)-PCEI SDA-Odisha	Government
Cross-Functional	Department of Energy	Government
Industry	Department of Industries	Government
Industry	Department of Steel and Mines	Government
Industry	MSME Department	Government
Agriculture	Department of Agriculture and Farmers empowerment	Government
Transport	Department of Transport, Odisha	Government
Cross-Functional	Odisha Renewable Energy Development Agency	Government
Cross-Functional	Forest, Environment and Climate Change Department	Government
Domestic and Commercial Buildings	Housing and Urban Development	Government
Domestic and Commercial Buildings	Bhubaneshwar development authority	Government
Domestic and Commercial Buildings	Cuttack development authority	Government
Municipalities and DISCOMS	Urban Local Bodies	Government
Municipalities and DISCOMS	Bhubaneshwar Municipal Corporation	Government
Municipalities and DISCOMS	Cuttack municipal Corporation	Government
Municipalities and DISCOMS	TPCODL	Government
Municipalities and DISCOMS	TPNODL	Government

Municipalities and DISCOMS	TPSODL	Government
Municipalities and DISCOMS	TPWODL	Government
Municipalities and DISCOMS	OERC	Government
Municipalities and DISCOMS	GRIDCO	Government
Cross-Functional	GEDCOL	Government

Table 69 : List of key stakeholders

Proceedings from draft SEEAP discussion at EIC (E) cum PCEI-SDA Odisha

Overview of the program

As per the meeting held under Hon'ble Union Minister of Power, New and Renewable Energy Shri R.K. Singh, emphasized the need for collaborative effort between Centre and State Governments to develop a State Energy Efficiency Action Plan (SEEAP) with sector-wise targets in consultation with state governments for deployment of appropriate resources in an effective and efficient manner.

PricewaterhouseCoopers Pvt. Ltd. (PwC India) has been assigned the responsibility to prepare the State Energy Efficiency Action Plan for Odisha (SEEAP) in collaboration (support and guidance) with Bureau of Energy Efficiency and Engineer in Chief (Electricity) cum Principal Chief Electrical Inspector (Odisha). The State Energy Efficiency Action Plan will assess the energy savings potential in various sectors of Odisha. Based on identified focus sectors, SEEAP will suggest the medium-term plan till 2030 and long-term action plan till 2040 for various stakeholders in order to achieve assigned targets arrived in consultation and guidance of the State. The SEEAP will be aligned to Energy Action Plan (EAP) prepared for Odisha and will complement the State Energy Action Plan for Odisha

Objective of the program

The objective of this assignment is to provide technical assistance for the identification of focus sectors for the State Energy Efficiency Action Plan in various states/UTs, to ensure that the allocation of resources is as per the requirement of state/UT and estimate the potential of energy conservation in sectors which are predominant in the region. The State Energy Efficiency Action Plan is sought in two parts, a short term-plan for a tenure of 5 years and a long-term plan targeting high impact energy efficiency by the year 2030

Proceedings

The representative from PwC explained the overview of draft state energy efficiency action plan for Odisha and its objectives. PwC deliberated on the work done thus far on the project and how we have arrived at the list of focus sectors for the state of Odisha

PwC explained about the methodology of arriving total primary energy consumption (TPES) for the state of Odisha for FY 2020 considering difference sources of energy such as coal, oil, gas.

PwC also explained about the methodology adopted for arriving at the sector specific energy efficiency target for state of Odisha. PwC also explained high level action points for achieving sector-specific energy saving targets.

PwC explained strategy adopted for arriving industry sector specific energy saving targets where it was noted that Odisha has many designated consumers/large industries who are not operating anymore so careful considerations need to be made while considering them for PAT deepening strategy.

It has been noted that earlier Odisha was assigned a targeted reduction of 3.96 mtoe in total primary energy consumption by 2030 from Ministry of Power, Government of India.

In the end, PwC team briefed Shri Saurajit Ray (Chief engineer- EIC-(E) cum PCEI- SDA Odisha) regarding the findings of state energy efficiency action plan. Mr. Saurajit ray emphasized on including more practical/affordable solutions as part of Odisha's state energy efficiency action plan. Mr Saurajit also mentioned that an implementable plan with sustainable operational model is paramount as state of Odisha has its own set of challenges compared to other states in India.

The presentation ended with a productive discussion on draft state energy efficiency action plan for Odisha. Some of the key points discussed are included in the section below:

Discussion Points and recommendations

- SDA Team suggested to include railways as one of the focussed demand sectors for Odisha, however PwC informed that railways is one of the priority sectors for government of India, Odisha's overall energy scenario doesn't have significant share of railways sector compared to other key demand sector and the policies/programs for decarbonising railways sector are being driven by central government.
- PwC team collected list of existing large industries in iron and steel segment (where benchmarking exercise is already conducted and there are high chances that these industries may feature in PAT-VIII cycle). It was noted that large aluminium plants considered under PAT deepening are already in the PAT scheme. PwC team will update the analysis accordingly.
- SDA team suggested to include cashew cluster as part of energy efficiency interventions in MSME clusters of Odisha. PwC acknowledged the same and requested SDA team to share any reports published/study carried out for the same cluster.
- Regarding buildings sector, Odisha has already taken a leap in replacement program for inefficient appliances for public buildings in Odisha and all major government buildings have BEE 3-5 star labelled appliances in their office.
- It was noted that ECBC Cell of EIC (E) -PCEI- SDA Odisha do not have data projections on how many new commercial buildings are going to come up in next 5-10 years as there are multiple building approval authorities in India.
- Odisha has limited building professionals (Architects, green building consultant etc). It was discussed to incorporate action points for SDAs/Department of energy in capacity building/skill development of building professionals.
- The SDA team suggested to include practical action points on transitioning from diesel points to solar pumps as in Odisha, agricultural consumers face operations, maintenance and financing challenges

Outcomes:

- Overall, the action plan covers sectors which are relevant to Odisha's energy efficiency ambitions. However, SDA team suggested to include more practical and implementable action points through which Odisha can realize energy savings potential across demand sectors

Next steps:

- Project team from PwC has shared state energy efficiency action plan with EIC (E) cum PCEI-SDA Odisha. SDA team will come up with comments on action plans if any. And post incorporating all the changes, dissemination workshop can be planned.

Annexure A - List of participants

S. No.	Name	Designation	Organization
1	Saurajit Ray	Chief Engineer	EIC(E) cum PCEI- SDA Odisha
2	Smita Behera	SE-cum-DEI	EIC(E) cum PCEI- SDA Odisha
3	Simant Das	Energy Consultant	EIC(E) cum PCEI- SDA Odisha
4	Himansu Misra	Energy Consultant	EIC(E) cum PCEI- SDA Odisha
5	Manoj Pattnaik	Energy Consultant	EIC(E) cum PCEI- SDA Odisha
6	Ardhendu Rout	Member-PAT Cell	EIC(E) cum PCEI- SDA Odisha
7	Ashoka Nanda	Member- ECBC Cell	EIC(E) cum PCEI- SDA Odisha
8	Monak Modi	Senior consultant	PwC India