ODISHA STATE
CLEAN AIR
ACTION PLAN

2025

STATE POLLUTION CONTROL BOARD, ODISHA

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CONTENTS

Chapter 1

Background

District Map Odisha

Background

Air pollution is a significant risk factor and a major public health challenge throughout India. Urbanisation and associated growth in mobility and industrialisation have resulted in the intensification of air pollution in densely populated areas, causing deterioration in air quality. Many cities in India have now taken several actions to enhance their institutional and technical capabilities to monitor and control air quality and implement preventive measures to reduce the air pollution. The main sources of air pollution in urban cities are due to road dust, vehicular emission, transportation, open waste burning, industry, residential, construction and demolition waste, DG sets, etc. The major air pollutants are particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), ammonia (NH_3), carbon monoxide (CO), and ozone (O_3). Among these pollutants, particulate matter (PM) is one of the major contaminants which can directly affect human health and can induce asthma, lung cancer, kidney damage, cardiovascular disease, premature death, etc. Particulate matter is mainly classified into two types depending on their aerodynamic size, i.e., $PM_{2.5}$ (particle aerodynamic diameter size ≤ 2.5 μm), PM_{10} (particle aerodynamic diameter size ≤ 10 μm). Annual average (60 μg/m^3 for PM_{10} and 40 μg/m^3 for $PM_{2.5}$) and 24 hours average (100 μg/m^3 for PM_{10} and 60 μg/m^3 for $PM_{2.5}$) concentration of PM remain high in many cities in India and usually exceed the Central Pollution Control Board-National Ambient Air Quality Standard (CPCB-NAAQS, 2009).

In response to this alarming situation, the Ministry of Environment, Forests and Climate Change (MoEF&CC), Government of India, launched the National Clean Air Programme (NCAP) in 2019, which provides a roadmap to prevent, control, and reduce air pollution. The NCAP expanded the national air quality monitoring network for air pollution management and strengthened public awareness about the risks of air pollution. The major goal of NCAP is to meet prescribed annual average ambient air quality standards at all cities in the country in a stipulated timeframe with a national target of 20-30% reduction of particulate matter concentration by 2024 as compared to 2019 levels. In 2022, the target was revised to reduce PM levels by 40% by 2026. As of 2024, the CPCB has identified 130 non-attainment cities under NCAP based on the ambient air quality data from 2011-2015. These cities do not meet the National Ambient Air Quality Standards and require focused attention on multiple fronts to deal with the rising air pollution. Out of these 130 cities, Odisha has seven non-attainment cities, namely Angul, Balasore, Bhubaneswar, Cuttack, Kalinga Nagar, Rourkela, and Talcher. The NCAP also provides specific sectoral interventions for mitigation actions for key sectors

known to contribute to air pollution in many cities. These include control of re-suspended road dust, construction and demolition-related dust, power sector emissions, industrial emissions, transport sector emissions, and emissions from unsustainable waste management practices.

In pursuance of the directions of the Hon'ble National Green Tribunal (NGT), Principal Bench, New Delhi, dated 8 October 2018, the Government of Odisha vide Notification dated 15 November 2018, has set up a six-member Air Quality Monitoring Committee (AQMC) with representation from the State Transport Authority of Bhubaneswar, Housing and Urban Development Department, Directorate of Industries, Directorate of Agriculture and Food Production, and State Pollution Control Board. This Committee is to be supervised by the Additional Chief Secretary, Forest, Environment and Climate Change Department, and further supervised by the Chief Secretary for intra-sectoral coordination. Accordingly, a Comprehensive Action Plan (CAP) for seven non-attainment cities have been prepared which was approved by the CPCB and is now under implementation. To enable the framing and implementation of the multi-tiered action plans in the state under NCAP, the Government of Odisha has constituted three committees, i.e., Steering Committee, Air Quality Monitoring Committee, and District Level Environmental Monitoring Committee. In addition to this, city-level air quality management cells have been formed to undertake activities in line with the NCAP guidelines.

In pursuance of the directions of the Hon'ble National Green Tribunal (NGT), for the preparation of State Action Plan (SAP) for clean air, Odisha State Pollution Control Board (OSPCB) has already prepared the State Action Plan and forwarded it to CPCB on 08.06.2023. Further, the Hon'ble National Green Tribunal (NGT), New Delhi, in the matter of OA No. 159 of 2021 (SZ) dated 09.05.2024 gave directions to all states regarding the formulation of the State Action Plan for clean air as per the revised guidelines prepared by CPCB. In accordance with this, SPCB, Odisha has carried out consultation with the concerned departments in different sectors and has incorporated the suggestions, recommendations and data appropriately for assessment of the status of action and the roadmap for the sector. The SAP incorporated several policies, schemes, and programmes as well as the directives, orders and guidelines of state and central governments for the abatement of air pollution in the region. The SAP aims to meet the national ambient air quality standards state-wide through a multisector approach. The multi-sector strategy of the SAP has included industrial emission, vehicular emission, construction & demolition waste and road dust management, municipal solid waste/biomass burning, emissions due to burning of agro residues, and emissions from household and commercial establishments.

Chapter 2

State Review

Topography, Geography and Meteorology

Air pollution is not restricted to geopolitical boundaries; pollutants can travel long distances. Air pollution depends upon meteorology, topography and land use patterns. Dispersion of air pollution occurs in both the vertical and horizontal directions. It is primarily driven by wind speed and direction, but can be influenced by topography as well. In regions with flat topography, air can move freely, dispersing pollutants and reducing the concentration of pollutants. However, in areas with complex topography, such as valleys and mountains, air movement can be restricted. Unfavourable meteorological conditions may also result in the accumulation of pollutants in certain areas.

Odisha is located on the east coast of India and surrounded by Jharkhand in the north, Andhra Pradesh to the south and Chattisgarh to the west. West Bengal lies north-east of Odisha. It is bound on the east by the 480 km coastline of the Bay of Bengal. Odisha is situated between the geographical coordinates of 81.27'E and 87.29' East longitude and 17.49'N and 22.34'North latitude. It occupies a total area of 1,55,707 sq. km accounting for about 4.87 percent of the total area of India. The state is divided into 30 districts which are further subdivided into 314 blocks and 317 tahasils. Odisha's topography consists of fertile coastal plains to the east bounded by the Bay of Bengal. Mountainous highlands and plateau regions occupy the center of the state. Western and northwestern portions of the state consist of rolling uplands. The state also has some major floodplains encompassing the river systems. The climate of Odisha is primarily tropical monsoon. The summers are extremely hot, and the winters are cool and pleasant. Odisha experiences three seasons, namely summer (March-April-May-June), monsoon (July-August-September-October) and winter (November-December-January-February). The state is enriched with large reserves of bauxite, chromite, coal, iron ore, graphite, gemstones, manganese ore, etc.

Demographic Profile of Odisha

Population and Urbanisation in Odisha

The population trend in Odisha and India as per the census of India from 1951 to 2011 is shown in Table 2.1. During the period 1951-2011, the population in rural Odisha increased by 2.5 times from 140.5 lakh to 349.7 lakh. The rural population in Odisha is expected to be 384.7 lakh by 2031. On the other hand, the population in urban Odisha has increased about 12 times from 5.9 lakh in 1951 to 69.8 lakh in 2011 and is expected to become 98.5 lakh by 2031. During the same period (1951-2011), the population of rural India has grown by 2.8 times and

the urban population of India has grown by 6 times. The trend of urbanisation in Odisha during this period has been 2 times faster than in India as shown in Figure 2.1.

Table 2.1: Population trend in Odisha and India

Year	Odisha			India		
	Population (in Lakh)			Population (in Lakh)		
	Rural	Urban	Total	Rural	Urban	Total
1951	140.5	5.9	146.5	2986.4	624.4	3610.8
1961	164.4	11.1	175.5	3603	789.4	4392.4
1971	201	18.5	219.5	4390.5	1091.1	5481.6
1981	232.6	31.1	263.7	5238.7	1594.6	6833.3
1991	274.6	42.4	316.6	6288.6	2175.7	8464.2
2001	312.9	54.2	367.1	7426.2	2861.2	10287.4
2011	349.7	69.8	419.5	8334.6	3767.3	12101.9
2021*	373.1	84.9	457.9	8950.4	4721.4	13671.73
2031*	384.7	98.5	483.1	9239.1	5577.5	14816.57

*Source: Census of India from 1951 to 2011, *Projected Population, MoHFW, GoI*

Figure 2.1: Trend of urban population in Odisha and India
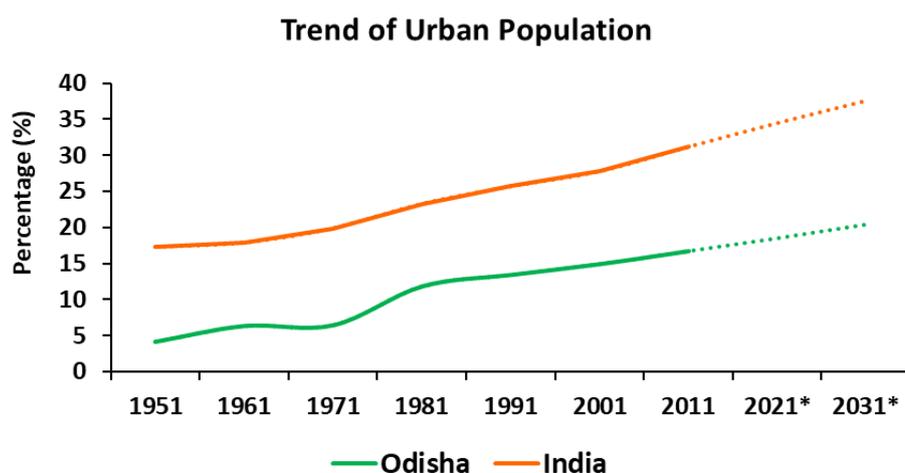
*Source: Census of India from 1951 to 2011; Planning and Convergence Department, Directorate of Economics and Statistics. (2023) Odisha Economic Survey 2022-23. *Projected Population, MoHFW, GoI.*

Demographic profile of Odisha in 2021 is illustrated in Figure 2.2. As per the projections of the Ministry of Health and Family Welfare (MoHFW), Government of India, Odisha had a population close to 4.57 crore in 2021 with 50.3 percent of the male population and 49.7 percent of the female population. The projected population in 2021 shows children (age between 0 -14), youth (age between 15 -29), middle age (age between 30 -59), and old age (age 60+) belong to 23.6, 26.1, 38.8, and 11.5 percent respectively of the total population. Close to 65 percent of the State's population belongs to the working age group (between 15-59).

Figure 2.2: Demographic profile of Odisha in 2021

Figure 2.3 shows the percentage of urban population as per the Census 2011 and projected population in 2021. The percentage of urban population for the year 2021 is a provisional estimate by the Directorate of Economics and Statistics (DES), Government of Odisha.

Figure 2.3: District map of Odisha showing the percentage of urban population in 2011 and 2021
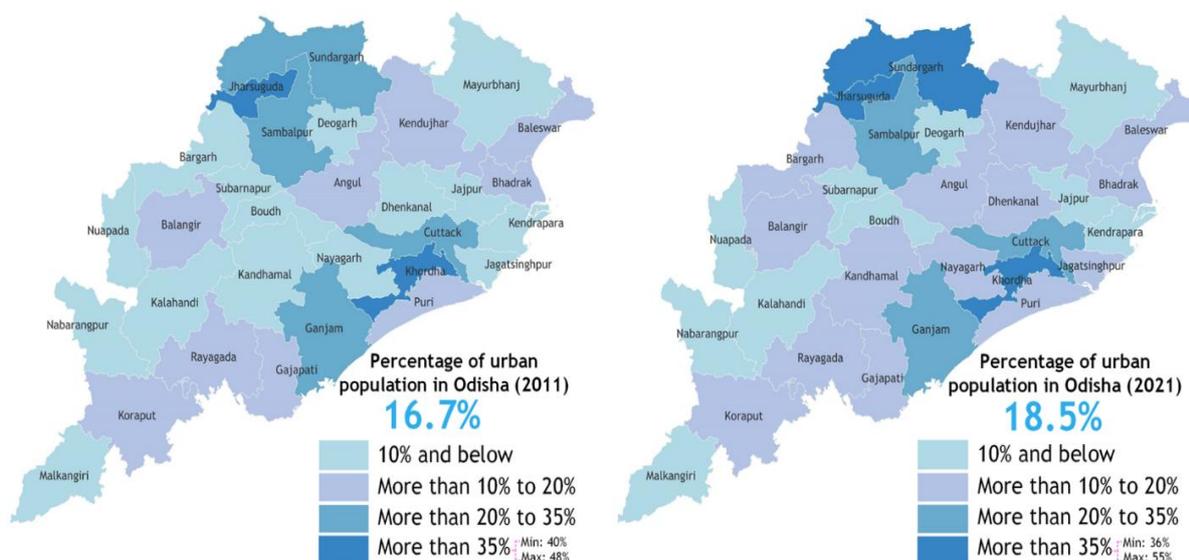
The population in urban Odisha was 16.7 percent in 2011 and is expected to become 18.5 percent by 2021. In both 2011 and 2021, districts like Khordha, Jharsuguda, Sundargarh, Ganjam, Sambalpur and Cuttack have a very high share of urban population. Khordha is the only district which has more than 50 percent of its population living in urban areas largely due to the capital city of Bhubaneswar. Five districts have an urbanization rate ranging between 30 to 40 percent. Comparing both maps, it is evident that in ten years, more districts, namely,

Bargarh, Jagatsinghpur, Kandhamal, Nayagarh, and Dhenkanal, the urban population have increased, and these districts are categorised within the 10 percent to 20 percent group.

Forest Cover

As per the latest forest survey of India, forest cover in Odisha stood at 52,156 sq. km in 2021 which was 33.5 percent of total geographical area in the state shown in Figure 2.4. Forest cover includes all lands more than one hectare in area with tree cover density of more than 10 percent. Odisha is one of the 17 states which has more than 33 percent of forest area as per the requirement of the National Forest Policy. As compared to the previous estimates of 2019, forest cover in Odisha has increased by 537 square km which is third-highest increase in the country. Odisha has 5004 sq. km. of tree cover outside forest area as of 2021. Total forest area and tree cover in Odisha stood at 57,160 sq. km. which is 36.7 percent of total geographical area in the state. Out of 36.7 percent of total forest in 2021, dense forest constitutes 4.6 percent, while moderately dense forest and open forest constitute 13.5 percent and 15.4 percent of total forest respectively. The remaining 3.2 percent is tree cover outside the forest area.

Figure 2.4: Forest coverage by type of forests (Sq. Km) in Odisha
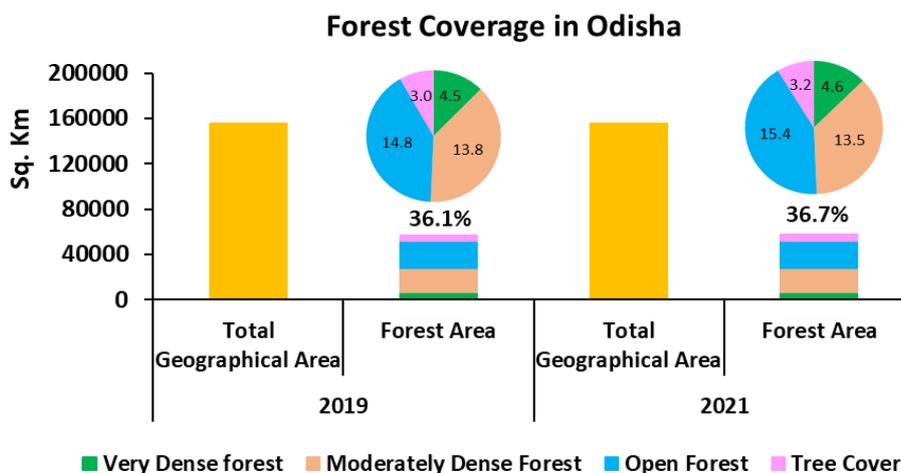
Source: Planning and Convergence Department, Directorate of Economics and Statistics. (2024). Odisha Economic Survey 2023-24.

Economic and Industrial Development

The primary role of the industry sector is to extend the base of the economy of the state, creating value-added products and generating additional employment. The industry sector has been the major driver of economic growth in Odisha. This sector holds a prominent position in Odisha's economy, accounting for 43.3 percent of Gross State Value Added (GSVA) in 2023-24. This sector employs around 26 percent of the total workforce in the State as per Periodic Labor Force Survey (PLFS) 2022-23. The State has industry-friendly policies, enabling

infrastructure, and agile administration to enrich the experience for the investors. Figure 2.5 revealed tremendous progress in industrial growth in Odisha over the last decades despite COVID-19 which played a big disruptor in 2019-20 and 2020-21. Industry sector in Odisha is growing at 8.7 percent in 2023-24 over 2022-23, as compared to an All-India average of 9.5 percent.

Figure 2.5: Annual growth of industry sector in Odisha
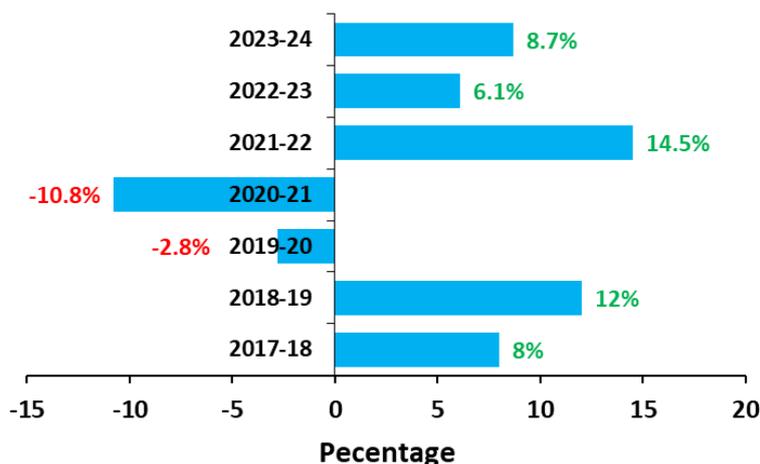
Source: Directorate of Economics & Statistics (DES), Government of Odisha.

Growth in industries in the state is led by manufacturing (9.5 percent) and mining and quarrying sub-sectors (9.0 percent) in 2023-24. This is followed by the other two sub-sectors, viz. electricity, gas, water supply and other utility services (8 percent) and construction (6.2 percent) as shown in Figure 2.6.

Figure 2.6: Growth of sub-sectors in Industry in Odisha during FY 2023-24
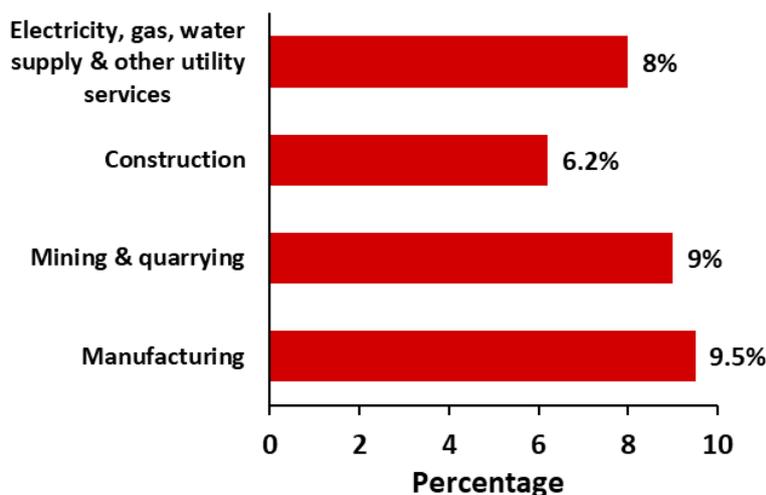
Source: Directorate of Economics & Statistics (DES), Government of Odisha.

Figure 2.7 shows that within the industry sector, manufacturing contributes the highest share of 54 percent to the industry GSVA, followed by mining and quarrying at 22 percent, construction at 16 percent and electricity and other utilities at 8 percent in 2023-24.

Figure 2.7: Contribution of sub-sectors in Industry in Odisha during FY 2023-24
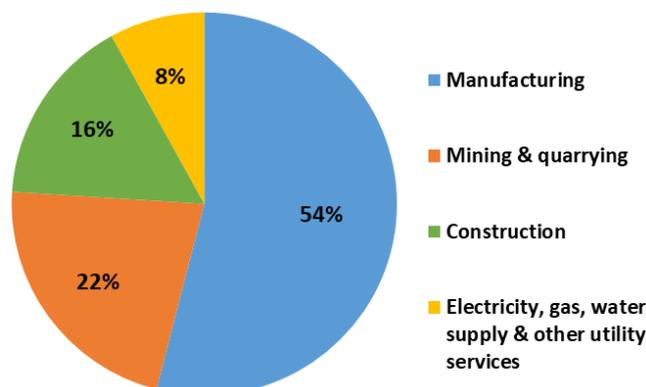
Source: Directorate of Economics & Statistics (DES), Government of Odisha.

As noted above, the manufacturing sub-sector shares more in the industry sector in Odisha. Important constituent in the manufacturing sector and their share to the gross value added in the state in 2021-22 is represented in Figure 2.8. The Figure shows that 85.5 percent of Odisha's total manufacturing output is generated by two products namely Basic metals (78.1 percent), and Coke and refined petroleum products (7.4 percent). Chemicals and allied is the third largest industry of manufacturing in Odisha which contributes 4.1 percent of the gross value added by the manufacturing. Similarly, food products and other non-metallic minerals contribute 2 and 1.9 percent respectively in the state GVA.

Figure 2.8: Share of various sectors in Odisha's total manufacturing output, 2021-22
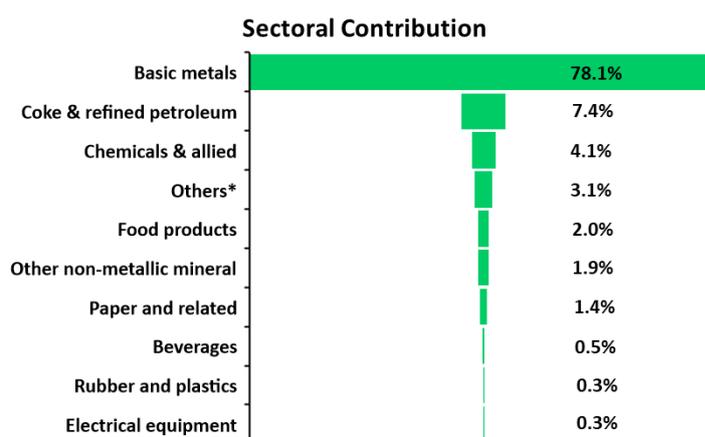
Others* include Cotton, Salt production, tobacco, wearing apparel, leather, wood, printing, computer, electronic & electrical equipment, other transport equipment, furniture, repair and installation of machinery, Waste collection, treatment and disposal activities.

Source: Annual Survey of Industries 2021-22, Ministry of Statistics and Programme Implementation, Government of India.

Minerals are essential raw materials for infrastructure, capital goods, and the basic ingredients for core industries. Odisha is a mineral-rich state occupying a special position in the mineral map of India and is endowed with large varieties of metallic and non-metallic minerals, which include chromite, bauxite, iron ore, coal, and manganese. The mining and quarrying sub-sector is a major driver in the state economy after manufacturing with a share of 22 percent in 2023-24. Odisha also contributes a remarkable share of mineral production to national output. In the supply of major minerals for meeting national needs, Odisha was a leading state during 2022-23. Figure 2.9 shows the share of production of a few major minerals of Odisha at the National level. In the production of minerals, Odisha ranked -1 concerning Chromite, Bauxite, Iron Ore & Coal in 2022-23 while it ranked third in Manganese production. This precipitates the importance of Odisha's contribution to major mineral production at the national level.

Figure 2.9: Share of Odisha's major mineral production in India, 2022-23

Major Mineral

Mineral	Share
Chromite	100%
Bauxite	73%
Iron ore	55%
Coal	25%
Manganese	25%
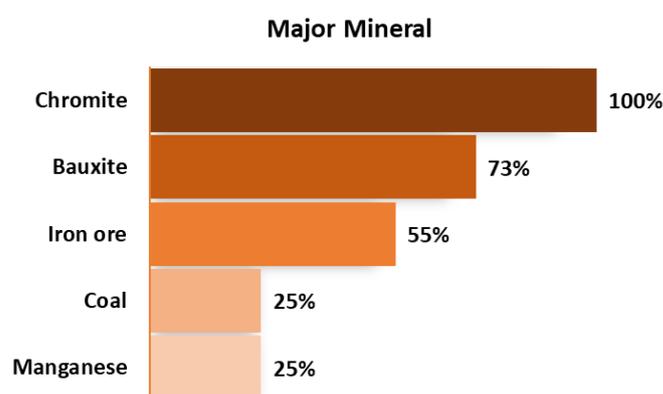
Source: Directorate of Mines, Government of Odisha

Energy and Transport

The energy sector is the most critical component of infrastructure for economic growth and social welfare. Different power sources contributing to the total capacity of Odisha include hydropower, thermal power, independent power producers (IPP) and renewable energy sources, as well as a share from Central Government Schemes. Thermal power is a major component of Odisha's energy sources. In terms of power generation, non-captive power capacity in Odisha stands at 8117 MW in 2022-23, marking a slight increase from 8107 MW in the previous year 2021-22 as represented in Figure 1.10. In 2022-23, state hydropower plants constitute the highest share at 26 percent, followed by thermal power plants with a 17 percent share. New renewable sources, which include solar and wind constitute 18 percent of the total capacity. Besides, the State has a captive power contracted capacity of 11354 MW in 2022-23. Several large and medium industrial units of the state are producing power from captive power plants

(CPP) and their total capacity exceeds that available to GRIDCO. These captive units often can generate more power than they need for their own use. The electricity generated from CPP from various industries is shown in Figure 2.10.

Figure 2.10: Installed capacity of power plants in Odisha (In MW)
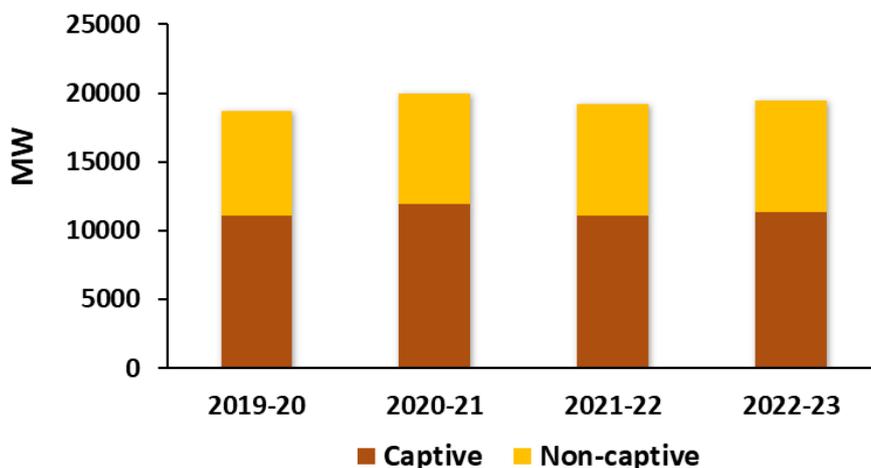
Source: Grid Corporation of Odisha (GRIDCO), Energy Department, Government of Odisha.

Figure 2.11 shows that, in 2022-23 total electricity consumed by Odisha is 19,468 million units (MU). The industry sector accounts for 44.1 percent of total electricity consumption, followed by domestic consumers at 28.8 percent, other utilities and bulk supply at 24.2 percent and agriculture sector accounts for 2.9 percent of electricity consumption in 2022-23.

Figure 2.11: Total power consumption in Odisha (In MU)
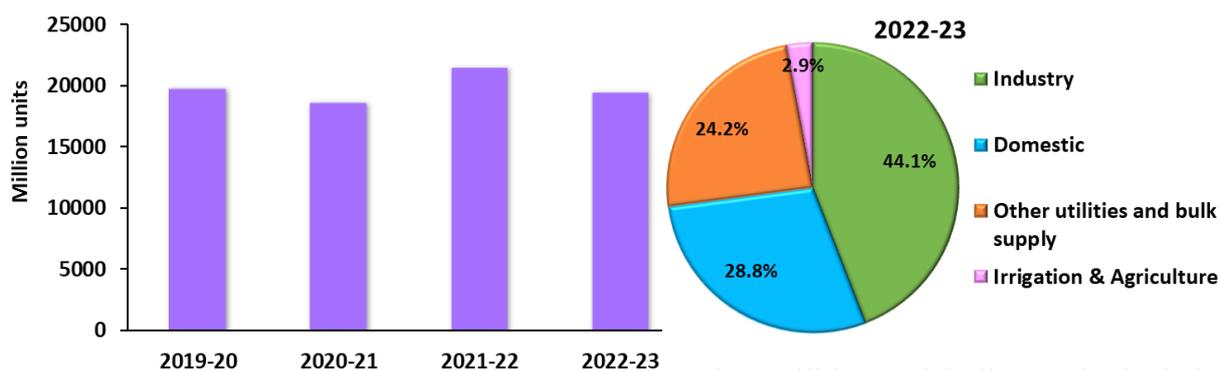
Other utilities and bulk supply includes commercial, railway, public lighting, public works and other consumption.

Source: Grid Corporation of Odisha (GRIDCO), Energy Department, Government of Odisha.

Rapidly changing demographic trends, urbanisation, industrialisation etc. have led to an increase in demand for mobility for both passenger and freight traffic in the State. With the expansion of social and economic activities, the requirement for diversified mobility across the major modes of transport like roads, railways, airways, and waterways remains very high in

Odisha. Among the constituents of transport services, the contribution of road transport is the highest in Odisha, i.e., 56 percent followed by railways, which contribute 25 percent as of 2022-23. The percentage share of Transportation in Odisha in 2022-23 is given in Figure 2.12.

Figure 2.12: Percentage share of Transportation in Odisha in 2022-23
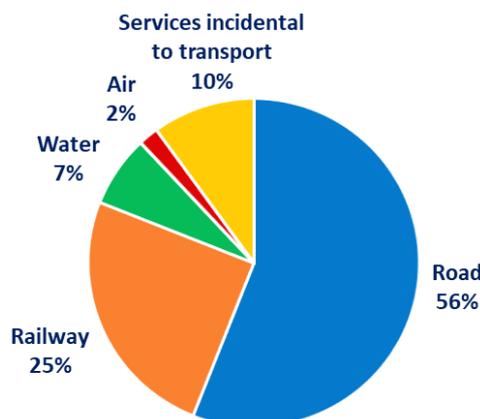
Source: Directorate of Economics & Statistics (DES), Government of Odisha.

As of 2022-23, the State had a total road length of 1.3 lakh km. The state had 5,753 km of national highways and 4,124 km of state highways as of 2023. The State had 2,992 km of railway route, out of which 2940 (98.3 percent) have been electrified as of 2022-23. Odisha has formulated a civil aviation policy in 2022 with the objective to improve air connectivity in the State and with different cities in India and abroad. The State has one international airport in Bhubaneswar and four domestic airports in Jharsuguda, Koraput, Kalahandi, and Rourkela. Further, the State is developing another international airport in Puri. Odisha has one major seaport in Paradeep and two operational non-major seaports in Gopalpur and Dhamra, while two non-major ports are under construction in Astaranga and Subarnarekha.

1.3 Lakh Km   2,992 Km   01 International Airport
04 Domestic Airport   01 Major Seaport
02 Non-major Seaport

Level of Urban Services

The service sector comprises a range of segments such as trading, hotels and restaurants, transportation services, real estate services, professional services such as legal, consultancy, accounting etc., public administration (central, state and local government administrative activities), health, education, arts, entertainment, personal services, and financial services. The service sector in Odisha contributed 36.3 percent to State GSVA in 2023-24, comparatively

lower than India average, of 55 percent. The contribution of sub-sector in service sector is shown in Figure 2.13. Trade, repair, hotels and restaurant services contribute 23.3 percent to service sector. Value addition in health, education, arts and entertainment sectors are the second biggest contributor to service sector, i.e., 21.9 percent.

Figure 2.13: Contribution of sub-sectors in services in 2023-24
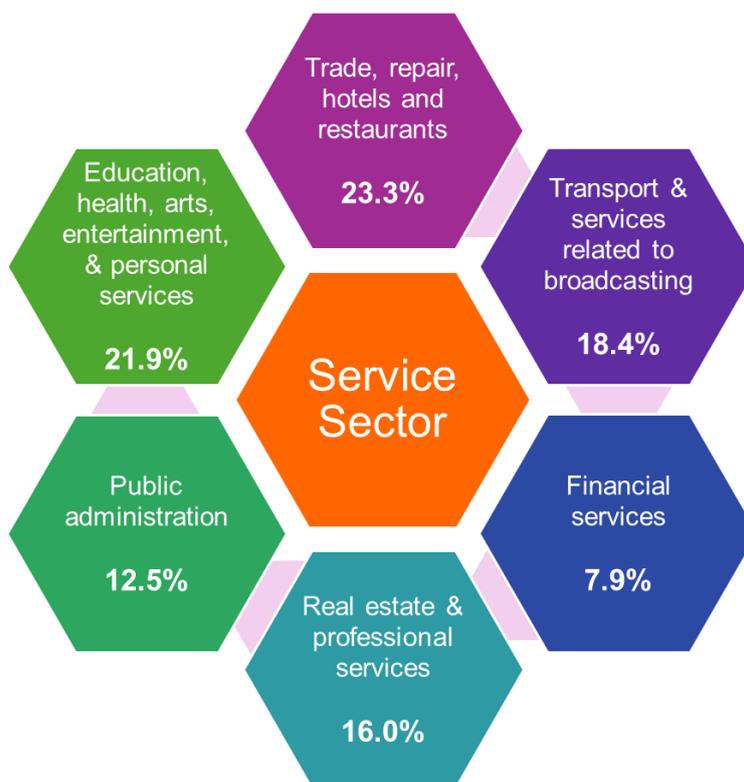
Source: Directorate of Economics & Statistics (DES), Government of Odisha.

The growth rate of service sector and sub-sector in 2022-23 and 2023-24 is shown in Figure 2.14. The service sector is growing at 9.2 percent, in 2023-24 as against 7.5 percent in 2022-23. Within the sub-sectors, trade, repair, hotels, and restaurants registered the highest growth of 17.1 percent in 2023-24, followed by public administration (12.5 percent), transport and related services (9.4 percent), education, health, arts, entertainment, and personal services (5.4 percent), real estate and professional services (3.9 percent) and financial services (2.3 percent). In terms of hotels, restaurants, public administration, real estate and professional services, Odisha is gaining momentum in 2023-24 in comparison to 2022-23. Real estate services are linked to the level of urbanization rate. As urbanization rate improves, demand for various real estate services such as rent, brokerage, and legal services could grow as well.

Figure 2.14: Growth rate of services sector & sub-sectors
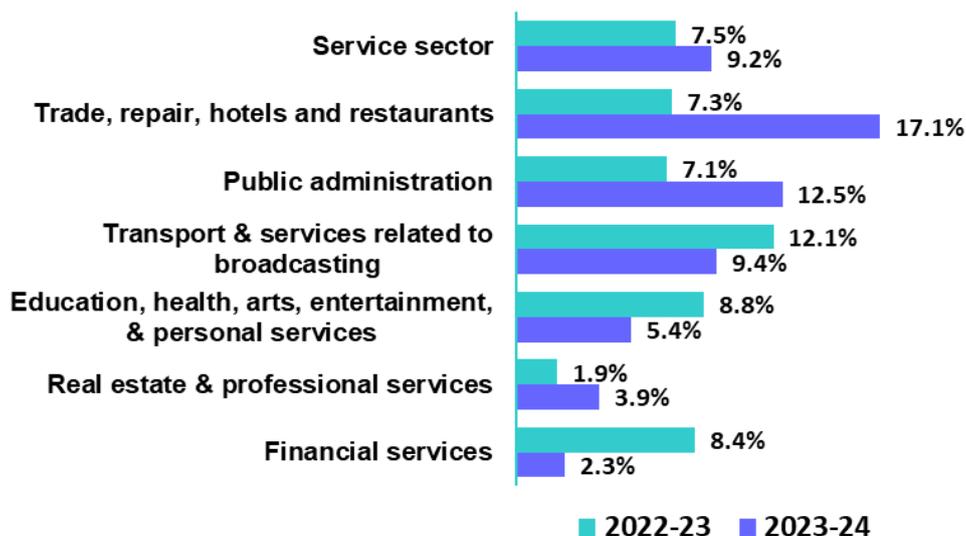
Source: Directorate of Economics & Statistics (DES), Government of Odisha.

Service sector accounted for 26.1 percent of Odisha's total workforce in 2022-23, being the second largest employer after agriculture (48.1 percent). In absolute terms, service sector employed 53.2 lakh workforce in 2022-23 in various sub-sectors as represented in Figure 2.15. Trade, repair, hotels, and restaurants sectors contribute a higher share of employment (46.2 percent) followed by education and health sector (22.9 percent).

Figure 2.15: Employment in different service sectors in 2022-23
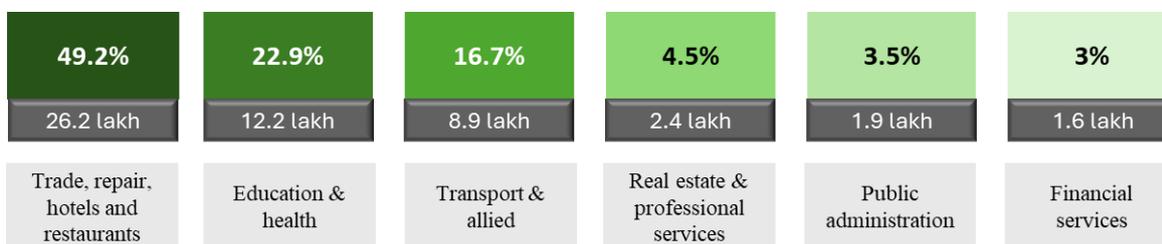
Source: Periodic Labour Force Survey (2022-23), MoSPI, Government of India

Chapter 3

Ambient Air Quality Monitoring and Management

Ambient Air Quality Monitoring

In order to prevent, control and abate air pollution, the Air (Prevention and Control of Pollution) Act was enacted in 1981. According to Section 2(b) of Air (Prevention and control of pollution) Act, 1981 *"Air pollution"* has been defined as 'the presence in the atmosphere of any air pollutant.' As per Section 2(a) of Air (Prevention and control of pollution) Act, 1981 *"Air Pollutant"* has been defined as any solid, liquid or gaseous substance present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment. Therefore, ambient air quality standard is developed as a policy guideline that regulates the effect of human activity upon the environment so that pollutant emissions into the air can be regulated. Standards may specify a desired state or limit alterations.

National Ambient Air Quality Monitoring Programme (NAMP)

Every policy or program needs to be supported by robust air quality monitoring. The air quality monitors generate air quality data on a routine basis, which helps to assess risks and leads towards implementing the control measures. Central Pollution Control Board is executing a nationwide programme known as the National Ambient Air Quality Monitoring Programme (NAMP). NAMP was started in 1984 with 7 stations in Agra and Anpara. As of 2024, 965 ambient air quality monitoring stations are operating in India covering 28 states and 7 Union Territories. Under NAMP three criteria pollutants viz. PM_{10} (Particulate Matter having an aerodynamic diameter less than or equal to 10 µm), sulphur dioxide (SO_2) and nitrogen dioxide (NO_2) were identified for regular monitoring at all locations. Other notified parameters like carbon monoxide (CO), ammonia (NH_3), ozone (O_3), $PM_{2.5}$ (Particulate Matter having an aerodynamic diameter less than or equal to 2.5 µm), Benzo(a)pyrene {B(a)P}, lead (Pb) and nickel (Ni) are being monitored at selected locations. The monitoring of pollutants is carried out for 24 hours (4-hourly sampling for gaseous pollutants and 8-hourly sampling for particulate matter) twice a week, to have 104 observations in a year. The objectives of NAMP are given as follows.

- To determine the status and trends of ambient air quality
- To ascertain whether the prescribed ambient air quality standards are violated
- To identify non-attainment cities with respect to national standards
- To obtain the knowledge and understanding necessary for developing preventive and corrective measures.

Air quality monitoring network under NAMP is also expanding in the state of Odisha. There are 59 nos. of manual monitoring stations operating in Odisha covering 21 cities shown in Table 3.1.

Table 3.1: Manual monitoring stations under NAMP in Odisha

Sl. no.	City/Town name	No. of manual monitoring station
1	Angul	03
2	Balasore	03
3	Bhadrak	02
4	Berhampur	03
5	Bhubaneswar	06
6	Bolangir	03
7	Bonaigarh	02
8	Cuttack	03
9	Jharsuguda	03
10	Kalinga Nagar	03
11	Kendrapara	03
12	Kandhamal	02
13	Keonjhar	01
14	Konark	03
15	Paradeep	03
16	Puri	03
17	Rayagada	02
18	Rajgangpur	01
19	Rourkela	04
20	Sambalpur	03
21	Talcher	03
	Total	**59**

Source: NAMP Database, SPCB, Odisha.

Continuous Ambient Air Quality Monitoring System (CAAQMS)

Continuous ambient air quality monitoring system (CAAQMS) operates in a temperature-controlled room and is equipped for monitoring ambient air pollutants using different analyzers. The real-time data generated through this system is transferred to the central server of CPCB and also displayed on an electronic board at a traffic junction for public purposes. The data generated from CAAQMS are being used for evaluating the daily national air quality index (AQI) of the cities. The network of continuous ambient air quality monitoring stations is expanding in the country and as of 2024, 545 CAAQMS exist across the country. Under CAAQMS the particulate matter (PM_{10} & $PM_{2.5}$), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), nitrogen oxide (NO), ammonia (NH_3), carbon monoxide (CO), ozone (O_3), toluene ($C_6H_5CH_3$), benzene (C_6H_6), and E-benzene (C_8H_{10}) are being monitored at all

locations. The CAAQMS are also equipped with sensors to measure meteorological parameters such as wind speed (WS), wind direction (WD), ambient temperature (AT), relative humidity (RH), solar radiation (SR), and rainfall (R). CAAQMS network is also expanding in the state of Odisha. A total of 18 nos. of CAAQMS operating in Odisha, covering 17 cities by the Board as shown in Table 3.2. All the CAAQMS are linked to the CCR server of CPCB.

Table 3.2: Continuous ambient air quality monitoring stations (CAAQMS) in Odisha

Sl. no.	City/Town name	No. of CAAQMS
1	Angul	01
2	Balasore	01
3	Barbil	01
4	Baripada	01
5	Bhubaneswar	02
6	Bileipada	01
7	Brajrajnagar	01
8	Cuttack	01
9	Kalinga Nagar	01
10	Keonjhar	01
11	Nayagarh	01
12	Rairangpur	01
13	Rourkela	01
14	Suakati	01
15	Talcher	01
16	Tensa	01
17	Paradeep	01
	Total	**18**

Source: Real-time air quality monitoring network, SPCB, Odisha.

National Ambient Air Quality Standards (NAAQS)

Ambient air quality refers to the condition or quality of the outdoor air. NAAQS are the standards for ambient air quality with reference to various identified pollutants notified by the CPCB under the Air (Prevention and Control of Pollution) Act, 1981. The major objectives of NAAQS are given below:

- To indicate necessary air quality levels and appropriate margins required to ensure the protection of vegetation, health, and property.
- To provide a uniform yardstick for the assessment of air quality at the national level
- To indicate the extent and need of the monitoring programme.

Annual standards are basically the annual arithmetic mean of a minimum of 104 measurements in a year, at a particular site taken twice a week, at a uniform 24-hourly interval. The NAAQS notified as on 18th November 2009 has been given in Table 3.3.

Table 3.3: National ambient air quality standards

Sl. no.	Pollutants	Time weighted average	Concentration in ambient air	
			Industrial, Residential, Rural and Other Area	Ecologically sensitive area (Notified by Central Government)
1	Particulate Matter (size less than 10µm) or PM_{10}, µg/m^3	Annual* 24 hours**	60 100	60 100
2	Particulate Matter (size less than 2.5µm) or $PM_{2.5}$, µg/m^3	Annual* 24 hours**	40 60	40 60
3	Sulphur Dioxide (SO_2), µg/m^3	Annual* 24 hours**	50 80	20 80
4	Nitrogen Dioxide (NO_2), µg/m^3	Annual* 24 hours**	40 80	30 80
5	Ammonia (NH_3), µg/m^3	Annual* 24 hours**	100 400	100 400
6	Ozone (O_3), µg/m^3	8 Hours* 1 hour**	100 180	100 180
7	Carbon Monoxide (CO), mg/m^3	8 Hours* 1 hour**	02 04	02 04
8	Benzene (C_6H_6), µg/m^3	Annual*	05	05
9	Benzo(a)Pyrene (BaP) Particulate phase only, ng/m^3	Annual*	01	01
10	Lead (Pb), µg/m^3	Annual* 24 hours**	0.50 1.0	0.50 1.0
11	Arsenic (As), ng/m^3	Annual*	06	06
12	Nickel (Ni), ng/m^3	Annual*	20	20

Source: National Ambient Air Quality Standards (NAAQS), 2009, Central Pollution Control Board, New Delhi, Government of India.

*   Annual arithmetic means of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

**   24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Quality Assurance/Quality Control

Quality assurance and quality control (QA/QC) are the backbone of any air quality monitoring programme. Therefore, the establishment and implementation of QA/QC programmes and the adoption of QA/QC plans are essential to ensure that air quality monitoring data are reliable and provide a sound basis for policymaking. Many published articles on QA/QC (e.g. WHO) in air pollution are available which could be used to set up QA/QC plans and obtain data of known quality.

Air Quality Trend in Odisha

Trend in PM_{10} and $PM_{2.5}$ Levels

The NGT order has directed that the action plans should ensure compliance with the National Ambient Air Quality Standards (NAAQS). In the longer term, emissions must be permanently reduced so that the National Ambient Air Quality standards are maintained at least for 98 percent of the days in a year (as per the Air Act, 1981) and peak pollution episodes are prevented. This requires a more comprehensive action plan with short- and long-term measures along with targeted reduction over time to attain the national ambient air quality standards. Cities with consistently high levels of particulate matter (PM_{10} and $PM_{2.5}$) above the national ambient air quality standards are known as non-attainment cities. Odisha has seven non-attainment cities, i.e., Angul, Balasore, Bhubaneswar, Cuttack, Kalinga Nagar, Rourkela, and Talcher where PM_{10} and $PM_{2.5}$ are the major concerns. While a predominant pollutant is taken as a reason for non-attainment, the air in urban areas is laced with numerous pollutants of which 12 are regulated under NAAQS as shown in Table 2.3. As cities are setting up more monitoring stations new areas of high exposure or high air pollution can be identified.

To meet the NAAQS, it may help to assess the target reduction required. As per the international best practices, such as the method used by the US Environmental Protection Agency (USEPA), an annual average of the immediate past three years is taken to define the base pollution level and, accordingly, the target reduction is set. This helps to assess the level of reduction that is needed to meet the clean air standards. Accordingly, targets for pollution reductions are estimated to guide action and prepare action plans. Long-term trend analysis helps to understand the impact of action on ambient pollutant concentration, as well as to assess the current baseline and the target reduction needed to meet the national ambient air quality standards.

Therefore, OSPCB analysed the five years annual average PM_{10} and $PM_{2.5}$ concentration of 17 cities of Odisha based on NAMP data and the indicative reduction targets

for each city are worked out. The baseline year for the reduction target is considered to be 2019 –23 as depicted in Figure 3.1 and Figure 3.2. These reduction targets are expected to define the level of detail and stringency needed in action to achieve clean air. Figure 3.1 shows that the five-year annual average concentration of PM_{10} surpassed the annual NAAQS at all the 17 monitored cities. The highest PM_{10} reduction is required for Rajgangpur and Rourkela city which is 50 percent to meet the NAAQS followed by Paradeep, i.e., 47 percent. Cities like Bonaigarh, Cuttack, Jharsuguda, Kalinga Nagar, and Talcher will have to reduce the annual average level of PM_{10} by more than 40 percent to meet the NAAQS. Figure 3.2 shows that the five-year annual average concentration of $PM_{2.5}$ surpassed the annual NAAQS in 8 cities out of the 17 monitored cities. The highest $PM_{2.5}$ reduction is required in Kalinga Nagar city which is 32 percent to meet the NAAQS standard followed by Paradeep, i.e., 26 percent. Cities like Jharsuguda, Rourkela, and Balasore will have to reduce the annual average level of $PM_{2.5}$ by 23, 15, and 14 percent respectively to meet the NAAQS. However, in cities such as Berhampur, Bhubaneswar, Konark, Puri and Rayagada the five-year annual average $PM_{2.5}$ concentration is within the NAAQS permissible limit. But, in Angul, Cuttack, Keonjhar, and Talcher cities the five-year annual average is just meeting the standard, which implies that in future if the emissions are not controlled, the levels of fine particles will increase in these cities. It is important to emphasize that more effective air quality profile will emerge once real-time monitoring is established in all cities.

Figure 3.1: Short-term trend and reduction target of PM_{10} concentration in cities of Odisha from 2019 - 2023
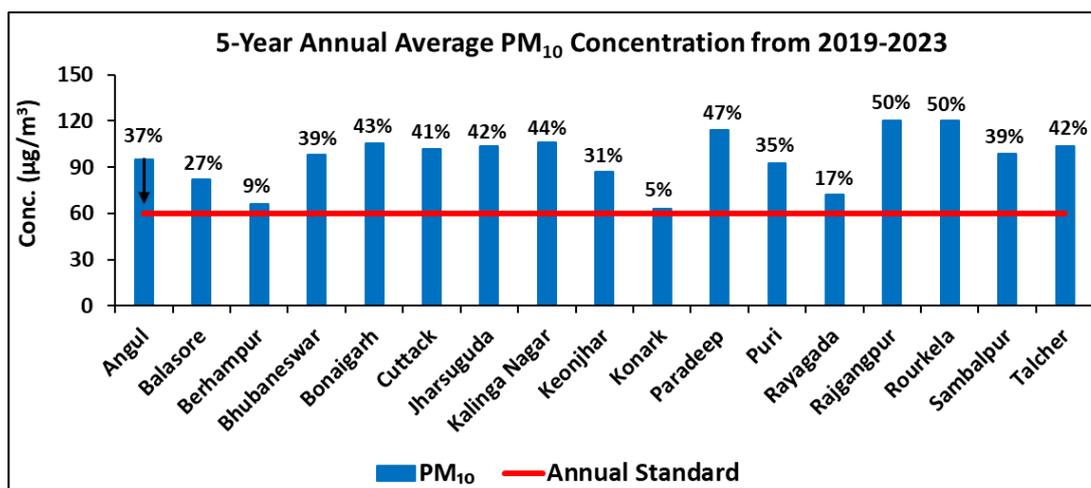
Figure 3.2: Short-term trend and reduction target of PM$_{2.5}$ concentration in cities of Odisha from 2019 - 2023

Trend in NO$_2$ and SO$_2$ Levels

The annual concentration of both pollutants, i.e., NO$_2$ and SO$_2$ in all 17 cities have remained well below the annual standard limit (NO$_2$ = 40 µg/m^3 and SO$_2$ = 50 µg/m^3) throughout the period as represented in Figure 3.3 and Figure 3.4 respectively. However, a small increase in NO$_2$ levels has been observed in some cities such as Angul, Berhampur, Cuttack, Kalinga Nagar, Sambalpur, and Talcher where the nitrogen dioxide levels will require special attention as these are strongly correlated with motorization and industrialization. NO$_2$ also contributes towards ozone formation which is another harmful gas. Similarly, some cities such as Angul, Berhampur, Bonaigarh, Paradeep, and Talcher show high annual SO$_2$ levels were high. This may be due to the high usage of coal in these cities. The main sources of SO$_2$ in the air are the industrial activities that process materials that contain sulphur, for example, the generation of electricity from coal. Some mineral ores also contain sulphur, and sulphur dioxide is released when they are processed. In addition, industrial activities that burn fossil fuels can be an important source of SO$_2$. It is also released because of fuel combustion in vehicles. SO$_2$ may also contribute to the formation of secondary aerosols and increase the particulate concentration in the atmosphere.

Figure 3.3: Short-term trend and reduction target of NO₂ concentration in cities of Odisha from 2019 - 2023
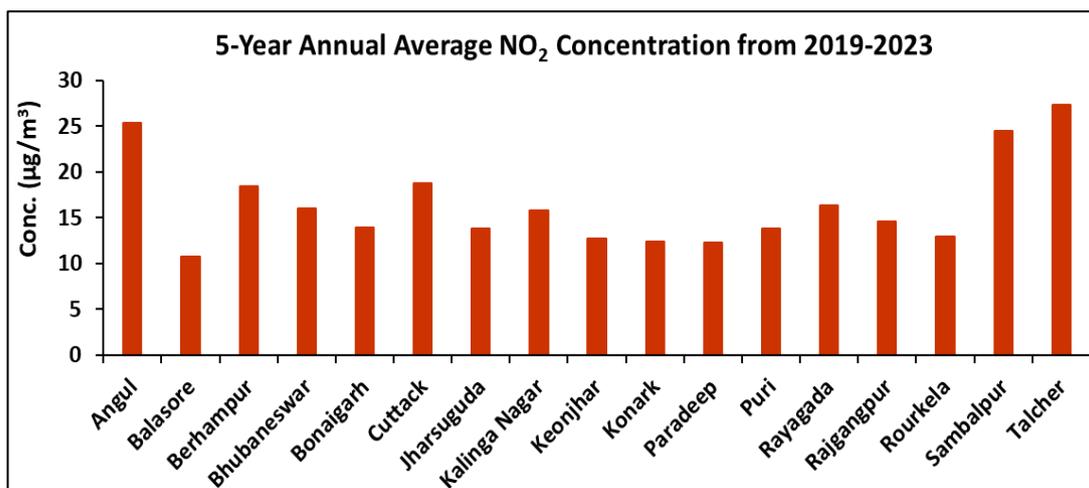
Figure 3.4: Short-term trend and reduction target of SO₂ concentration in cities of Odisha from 2019 - 2023
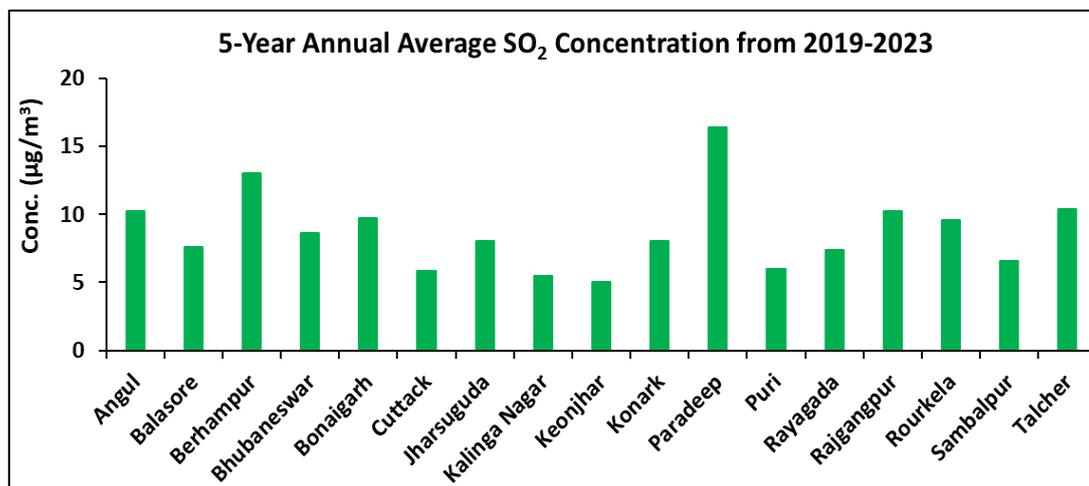
Source: Annual average data monitored through NAMP by SPCB, Odisha.

Exceedance Factor

The annual average PM_{10} and $PM_{2.5}$ concentration for 17 different monitoring stations in Odisha was measured from the year 2019 to 2023. Based on the annual standards, the concentration range of PM_{10} and $PM_{2.5}$ was evaluated using an exceedance factor (EF) given by the Central Pollution Control Board (CPCB), India, as given below in equation (3.1).

$$Exceedance\ factor = \frac{Measured\ annual\ average\ concentration\ of\ pollutant}{Annual\ standard\ concentration\ of\ pollutant} \quad (3.1)$$

Source: CPCB, India, annual report, 2015-16

The air pollution level for the years 2019 to 2023 was calculated using the above equation (1). The air pollution levels are classified into four different categories, based on exceedance factor value i.e.,

- Low Pollution (LP): EF is less than 0.5

23

- Moderate Pollution (MP): EF between 0.5 - 1.0

- High Pollution (HP): EF is between 1.0 - 1.5

- Critical Pollution (CP): EF is more than 1.5

The calculated values of exceedance factors for 17 different monitoring stations are shown in Figure 3.5 and Figure 3.6 respectively. The exceedance factor of PM_{10} and $PM_{2.5}$ in all the monitored cities remains higher than the permissible limits. The exceedance factor of PM_{10} is above the high pollution category in all monitoring stations, however, in some cities, EF values surpassed the critical pollution level. Similarly, the exceedance factor of $PM_{2.5}$ is between moderate pollution to high pollution category in all monitoring stations, however, in some cities EF values exceeded the high pollution (CP) level.

Figure 3.5: Exceedance factor of PM_{10} in cities of Odisha from 2019 - 2023
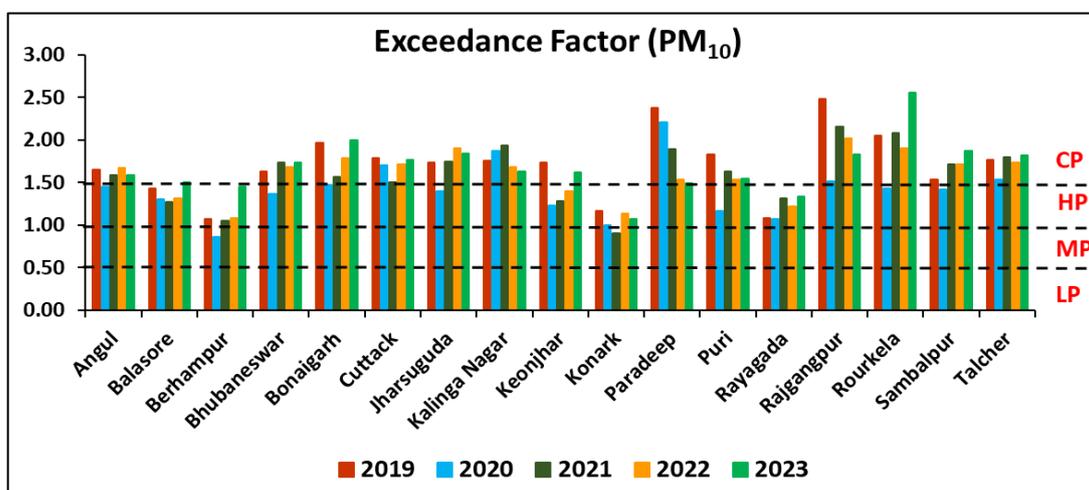
Figure 3.6: Exceedance factor of $PM_{2.5}$ in cities of Odisha from 2019 - 2023
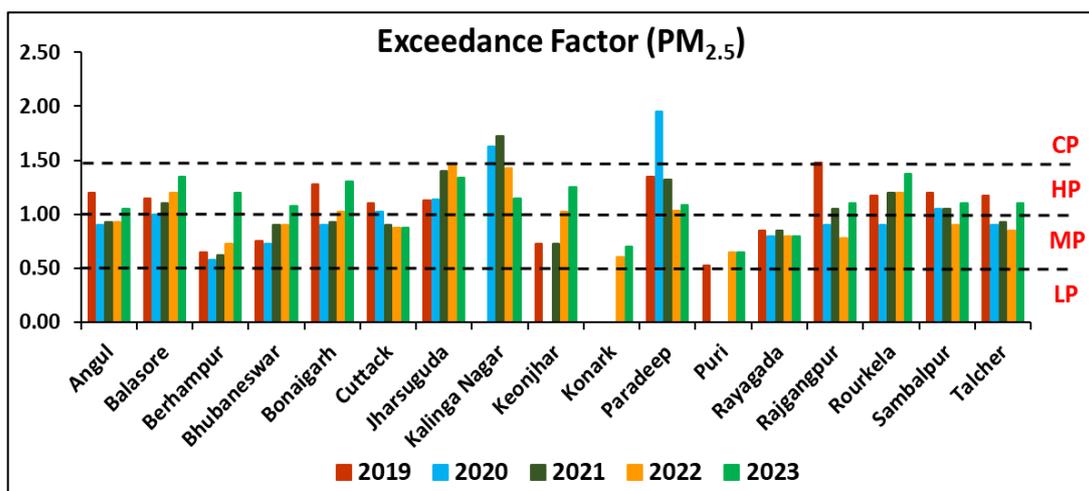
Trend in Daily Air Pollution Levels

State Pollution Control Board, Odisha has analysed daily air pollutants data from the 18 CAAQMS stations and evaluated AQI to determine the proportion of days in a year that have exceeded the national ambient air quality standards during 2023 and 2024. Figure 3.7 depicts the percentage of days within good, satisfactory, moderate, poor, very poor, and severe in monitored cities during the study period. The data shows that in cities like Baripada, Bhubaneswar, Cuttack, Kalinga Nagar, Keonjhar, Rairangpur, Rourkela, Suakati, and Talcher between 50 to 60% of days are observed within the good to satisfactory category, while, in Brajrajnagar and Tensa these percentage has increased and between 70 to 80% of days are observed within good to satisfactory category. However, industrial cities such as Angul, Barbil, and Bileipada have the maximum violations of the 24-hourly PM_{10} and $PM_{2.5}$ concentration. In these cities above 60% of days are observed within moderate to very poor category. Except for Angul and Balasore, all the cities were observed less than 10% of days within the very poor category and not a single city was observed in the severe category during the study period. However, there is a variation in the daily trend of air quality over time.

Figure 3.7: Percentage of days w.r.t AQI during 2023 and 2024
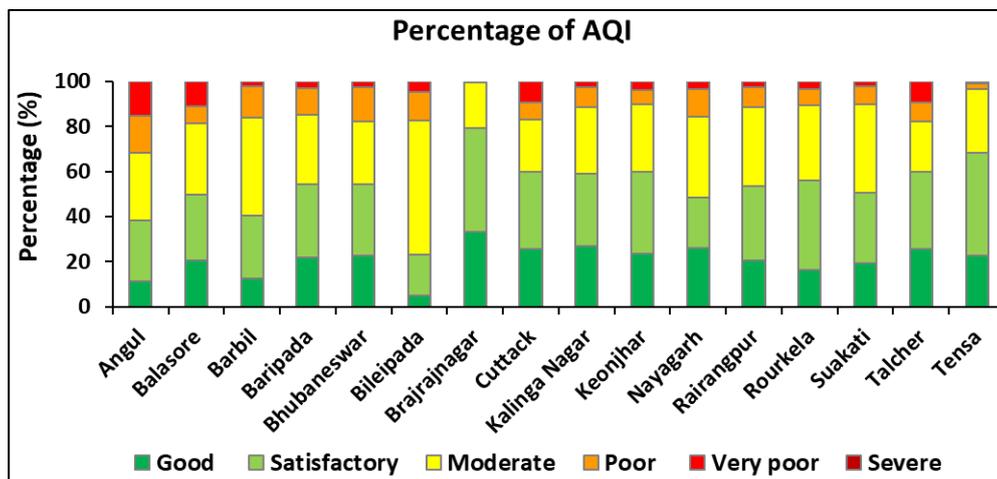
High violation of daily or 24-hour average standard indicates that this requires daily emergency responses or graded response action plan (GRAP), especially if the levels are very high. GRAP is designed for short-term emergency response to control daily pollution peaks and reduce exposure and associated health risks. Smog episodes largely occur under adverse weather condition with a calm atmosphere, cold temperature, and lower mixing height of air that traps air and pollution very close to the ground. This increases exposure drastically. The short-term policy action can control further loading of emissions and needed to reduce exposure and protect public health. GRAP implementation requires automatic real-time air quality monitoring and an online reporting system to enable decision-making on a day-to-day basis.

Whichever pollutant is shown to be leading by the index will determine the nature of interventions as predefined in the GRAP. Thus, GRAP needs to be supported by real-time air quality monitoring and continuous reporting of daily air quality data to assess the rolling daily average to help decision-making.

National Air Quality Index of India

The Hon'ble Prime Minister of India launched National Air Quality Index (AQI) on 6th April 2015 to monitor air quality in major urban cities across the country on a real-time basis and to enhance public awareness. Air Quality Index (AQI) is one such tool for effective dissemination of air quality information to people. This index will help people know about the level of pollution in the ambient air on a daily basis. Under the current measurement of air quality, 8 parameters are used for calculating AQI. The proposed AQI will consider eight pollutants (PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO, O_3, NH_3, and Pb) in which one of the PM_{10} or $PM_{2.5}$ parameters is mandatory. Based on this index, daily pollutant concentrations are classified and graded as good, satisfactory, moderate, poor, very poor and severe and colour-coded so that the public can understand the seriousness of the problem. A health advisory has also been framed to indicate the expected health outcomes at varying severity of daily air pollution. The AQI values and corresponding ambient concentrations (health breakpoints) as well as associated likely health impacts for the identified eight pollutants are presented in Table 3.4 and Table 3.5 respectively.

Table 3.4: AQI category, pollutants concentration and health breakpoints

AQI category (range)	PM_{10} 24-hr ($\mu g/m^3$)	$PM_{2.5}$ 24-hr ($\mu g/m^3$)	NO_2 24-hr ($\mu g/m^3$)	O_3 8-hr ($\mu g/m^3$)	CO 8-hr (mg/m^3)	SO_2 24-hr ($\mu g/m^3$)	NH_3 24-hr ($\mu g/m^3$)	Pb 24-hr ($\mu g/m^3$)
Good (0-50)	0-50	0-30	0-40	0-50	0-1.0	0-40	0-200	0-0.5
Satisfactory (51-100)	51-100	31-60	51-80	51-100	1.1-2.0	41-80	201-400	0.5-1.0
Moderate (101-200)	101-250	61-90	81-180	101-168	2.1-10	81-380	401-800	1.1-2.0
Poor (201-300)	251-350	91-120	181-280	169-208	10-17	381-800	801-1200	2.1-3.0
Very poor (301-400)	351-430	121-250	281-400	209-748	17-34	801-1600	1200-1800	3.1-3.5
Severe (401-500)	430+	250+	400+	748+	34+	1600+	1800+	3.5+

Source: Ministry of Environment, Forest and Climate Change, Government of India

Table 3.5: Air quality index (AQI) category and associated health impacts

AQI category (range)	Associated health impacts
Good (0-50)	Minimal Impact
Satisfactory (51-100)	May cause minor breathing discomfort to sensitive people.
Moderate (101-200)	May cause breathing discomfort to people with lung disease such as asthma, and discomfort to people with heart disease, children and older adults.
Poor (201-300)	May cause breathing discomfort to people on prolonged exposure, and discomfort to people with heart disease
Very poor (301-400)	May cause respiratory illness to the people on prolonged exposure. Effect may be more pronounced in people with lung and heart diseases.
Severe (401-500)	May cause respiratory effects even on healthy people and serious health impacts on people with lung/heart diseases. The health impacts may be experienced even during light physical activity

Source: Ministry of Environment, Forest and Climate Change, Government of India

Air Quality Management (AQM)

AQM aims to maintain the quality of the air to protect human health and welfare and provides protection for animals, plants (crops, forests, natural vegetation), and ecosystems. AQM is a tool which enables governmental authorities to set objectives to achieve and maintain clean air and reduce the impacts on human health and the environment. Governmental authorities in collaboration with other stakeholders can determine the individual steps for implementation of this process. Communities, regulators, analysts, and technological experts all act as key stakeholders when it comes to improving air quality and public health outcomes. Air quality management emphasizes the need for these stakeholders to collaborate and coordinate action for the improvement of air.

Communities

The importance of communities in air quality management cannot be exaggerated as assessing the effects of air pollution on a city requires extensive awareness and community engagement is necessary to successfully address problems and affect change. Based on the trade-offs and their impact on the community, public participation helps determine which regulatory activities lead to improvements in air quality and which do not.

Regulators

Regulators are an important player in air quality management efforts since they face the legal and professional burden of managing air quality. The foundation for the expansion, enforcement, and integration of clean air initiatives into longer-term policy frameworks is provided by air quality regulations. Crucially, the public and other stakeholders from all sectors must support the expansion of efforts to enforce air quality standards and the development of plans to meet these targets.

Analysts

In order to address air pollution challenges, regulatory agencies must have the data analysis capabilities required to influence policy changes and significantly improve air quality. Sharing high-quality, calibrated air quality data across stakeholder groups helps to drive greater analyses and collaboration that are needed to tackle an air pollution issue.

Technologies

Modern regulatory-grade monitoring systems should be used in addition to air quality monitoring technologies, such as the deployment of low-cost sensor networks. To provide high-quality data and support policies and programs aimed at reducing emissions, low-cost sensor networks need to be properly designed and deployed, including the execution of strict quality assurance/quality control (QA/QC) methods.

Key Components of Air Quality Management

To achieve and further maintain clean air, AQM needs to enable governmental authorities to gather the support of numerous stakeholders from governmental institutions, research institutes, non-governmental organisations (NGOs), private organisations, the public, and the media. AQM also needs to consider the local circumstances such as the sources of air pollution, background air pollutant concentrations, technological feasibility, cultural and social conditions, and available financial and human resources. AQM is a dynamic and iterative process which involves the following key components:

- Defining ambient air quality objectives/standards to protect human health and the environment.

- providing information on the status of air quality. It helps to evaluate existing policies and their effective implementation. A key component of an AQM programme is the planning, design and establishment of a monitoring network based on the air quality objectives.

- Identifying and quantifying the impact of different sources of air pollutants at receptor sites through source apportionment studies. This provides input on categories of sources that may contribute to ambient air pollution followed by their quantification.

- Compiling an accurate emission inventory as it is an integral part of AQM. A comprehensive emission inventory is compiled to develop an emission control strategy for selected pollutants.

- Undertaking air quality modelling is undertaken to formulate air pollution control and management strategies by providing guidelines for efficient air quality planning. The main objective is to predict ambient air pollutant concentrations and their correlation with independent variables such as emission and meteorological parameters.

- Undertaking air pollution exposure and health assessments to ensure the impact of air pollution on human health is minimal. These can involve studies to assess the effects of short-term and long-term exposure to air pollution.

- Implementing air pollution prevention and control strategies to maintain acceptable ambient air quality in key urban areas. For example, improved fuel quality, conducting inspection, and awareness programmes banning waste burning inside the city.

Contribution of Pollution Sources to Regional Air Quality

Emission inventory and source apportionment (EI&SA) are fundamental components of air quality management plans to measure progress/changes over time to achieve cleaner air and to determine compliance with environmental regulations. Emission inventories and air quality modelling are two significant components of air quality management in urban areas. The air pollution problem becomes complex due to the multiplicity and complexity of air-polluting sources (e.g., industries, automobiles, generator sets, domestic fuel burning, road dust, construction activities, etc.). A cost-effective approach for improving air quality in polluted areas involves five components as given below.

i. Identification of emission sources.
ii. Assessment of extent of contribution of these sources on ambient environment.
iii. Prioritizing the sources that need to be tackled.

iv. Evaluating various options for controlling the sources with regard to feasibility and economic viability.

v. Formulation and implementation of most appropriate action plans.

A state-level inventory may also be considered to support state-level action plan and enable target-oriented strategies and actions. In this regard, OSPCB and the Automotive Research Association of India (ARAI), Pune have initiated a plan to carry out an emission inventory and source apportionment in seven non-attainment cities (NACs) of Odisha, i.e., Angul, Balasore, Bhubaneswar, Cuttack, Kalinga Nagar, Rourkela, and Talcher. The main aim of this study is to identify and characterize various emission sources at regional level and help the regulatory agencies in prioritizing the actions for improving the air quality. The objectives of the study are

i. To carry out the particulate matter (PM_{10} and $PM_{2.5}$) source apportionment using a receptor modelling approach.

ii. To develop an emission inventory of air pollutants and conduct dispersion modelling analysis.

Regional Emission Inventory

Various sectors are taken into consideration in the emission inventory study is presented in Table 3.6 and the sectoral contribution to particulate matter pollutants is represented in Figure 3.8 and Figure 3.9 respectively. The annual PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO, and NMVOC emission load in non-attainment cities of Odisha is shown in Figure 3.10. Currently, source apportionment and emission inventory studies have been completed for all non-attainment cities of Odisha and the major findings of the emission inventory are summarised below.

Table 3.6: Air pollution source covered in the current emissions inventory

Sl. no.	Type of source	Sectors
1	Line source	Transportation
		Road dust resuspension from transportation
2	Area source	Construction
		Fugitive emissions
		Open waste burning
		Coal mines
		Crematoria
		Residential emissions
		Aviation
		Hotels, restaurants, bakeries and open eateries
		Diesel generators
3	Point source	Industries
		Thermal power plants
		Brink kilns

Angul

The total PM_{10} emission load in the Angul region was estimated to be 24,124 tonnes per year. The top three contributors to PM_{10} emissions are industries & thermal power plants (43%), followed by fugitive emissions (40%), and resuspended road dust (13%). $PM_{2.5}$ emission load in the Angul region was estimated to be 7,241 tonnes per year. Other PM_{10} contributors include transport (1%), and residential (1%). The top three contributors to $PM_{2.5}$ emissions are industries & thermal power plants (66%), fugitive emissions (12%), and re-suspended road dust (10%). Other $PM_{2.5}$ contributors include transport (5%), and residential (3%). The annual SO_2, NO_x, CO, and NMVOC emission load in the Angul region was estimated to be 125996, 62900, 14764, and 8060 tonnes per year respectively. These emission loads are based on annual emissions whereas daily and seasonal emissions could be highly variable.

Balasore

The total PM_{10} emission load in the Balasore region was estimated to be 5,443 tonnes per year. The top four contributors to PM_{10} emissions are resuspended road dust (66%), followed by open waste burning (8%), residential (7%), and industries (7%). Other PM_{10} contributors include transport (5%), and fugitive emission (1%). $PM_{2.5}$ emission load in the Balasore region was estimated to be 2,251 tonnes per year. The top four contributors to $PM_{2.5}$ emissions are resuspended road dust (38%), followed by open waste burning (18%), residential (11%), and industries (11%). Other $PM_{2.5}$ contributors include transport (10%), hotels, restaurants and bakeries (6%) and diesel generators (4%). The annual SO_2, NO_x, CO, and NMVOC emission load in the Balasore region was estimated to be 1523, 5361, 15183, and 9386 tonnes per year respectively. These emission loads are based on annual emissions whereas daily and seasonal emissions could be highly variable.

Bhubaneswar

The total PM_{10} emission load in the Bhubaneswar region was estimated to be 7,711 tonnes per year. The top five contributors to PM_{10} emissions are resuspended road dust (39%), followed by transport (21%), open waste burning (11%), residential (10%), and hotels, restaurants and bakeries (10%). Other PM_{10} contributors include construction (4%), and diesel generators (4%). $PM_{2.5}$ emission load in the Bhubaneswar region was estimated to be 4,356 tonnes per year. The top five contributors to $PM_{2.5}$ emissions are transport (33%), open waste burning (18%), resuspended road dust (17%), residential (11%), and hotels, restaurants and bakeries (11%). Other $PM_{2.5}$ contributors include diesel generators (7%) and construction (2%). The annual SO_2, NO_x, CO, and NMVOC emission load in the Bhubaneswar region was

estimated to be 1104, 16882, 54162, and 33397 tonnes per year respectively. These emission loads are based on annual emissions whereas daily and seasonal emissions could be highly variable.

Cuttack

The total PM_{10} emission load in the Cuttack region was estimated to be 6,404 tonnes per year. The top four contributors to PM_{10} emissions are resuspended road dust (36%), followed by industries (13%), residential emissions (12%), and transport (11%). Other PM_{10} contributors include hotels, restaurants and bakeries (8%), open waste burning (8%), and diesel generators (4%). $PM_{2.5}$ emission load in the Cuttack region was estimated to be 3,163 tonnes per year. The top four contributors to $PM_{2.5}$ emissions are transport (20%), resuspended road dust (19%), residential (15%), and open waste burning (15%). Other $PM_{2.5}$ contributors include industries (10%), diesel generators (7%), hotels, restaurants and bakeries (10%). The annual SO_2, NO_x, CO, and NMVOC emission load in the Cuttack region was estimated to be 1791, 14898, 29758, and 18155 tonnes per year respectively. These emission loads are based on annual emissions whereas daily and seasonal emissions could be highly variable.

Kalinga Nagar

The total PM_{10} emission load in the Kalinga Nagar region was estimated to be 16,895 tonnes per year. The top four contributors to PM_{10} emissions are resuspended road dust (58%), followed by industries and thermal power plants (18%), fugitive emissions (18%), and transport (2%). Other PM_{10} contributors include hotels, restaurants and bakeries (1%) and open waste burning (8%). $PM_{2.5}$ emission load in the Kalinga Nagar region was estimated to be 5,539 tonnes per year. The top four contributors to $PM_{2.5}$ emissions are re-suspended road dust (43%), industries and thermal power plants (36%), fugitive emissions (8%), and transport (6%). Other $PM_{2.5}$ contributors include open waste burning (2%), hotels, restaurants and bakeries (2%) and residential (1%). The annual SO_2, NO_x, CO, and NMVOC emission load in the Kalinga Nagar region was estimated to be 17818, 15543, 105980, and 9339 tonnes per year respectively. These emission loads are based on annual emissions whereas daily and seasonal emissions could be highly variable.

Rourkela

The total PM_{10} emission load in the Rourkela region was estimated to be 16,986 tonnes per year. The top four contributors to PM_{10} emissions are industry (56%), followed by resuspended road dust (22%), fugitive (12%) and transport (3%). Other PM_{10} contributors include residential (3%) and construction (2%). $PM_{2.5}$ emission load in the Rourkela region was

estimated to be 6,666 tonnes per year. The top four contributors to $PM_{2.5}$ emissions are industry (66%), resuspended road dust (14%), transport (8%), and residential (4%). Other $PM_{2.5}$ contributors include fugitive emissions (3%), open waste burning (2%), and construction (1%). The annual SO_2, NO_x, CO, and NMVOC emission load in the Rourkela region was estimated to be 35936, 33217, 111622, and 9110 tonnes per year respectively. These emission loads are based on annual emissions whereas daily and seasonal emissions could be highly variable.

Talcher

The total PM_{10} emission load in the Talcher region was estimated to be 25,144 tonnes per year. The top four contributors to PM_{10} emissions are thermal power plants (40%), followed by mining operations (37%), resuspended road dust (9%), and fugitive emissions (9%). Other PM_{10} contributors include residential (2%) and transport (1%). $PM_{2.5}$ emission load in the Talcher region was estimated to be 7,041 tonnes per year. The top four contributors to $PM_{2.5}$ emissions are thermal power plants (50%), mining operations (27%), re-suspended road dust (7%), and transport (4%). Other $PM_{2.5}$ contributors include residential (4%), fugitive emissions (3%), open waste burning (2%), and brick kilns (2%). The annual SO_2, NO_x, CO, and NMVOC emission load in the Talcher region was estimated to be 106431, 50337, 13885, and 4336 tonnes per year respectively. These emission loads are based on annual emissions whereas daily and seasonal emissions could be highly variable.

Figure 3.8: Sector-wise contribution to annual PM_{10} emissions in seven NACs
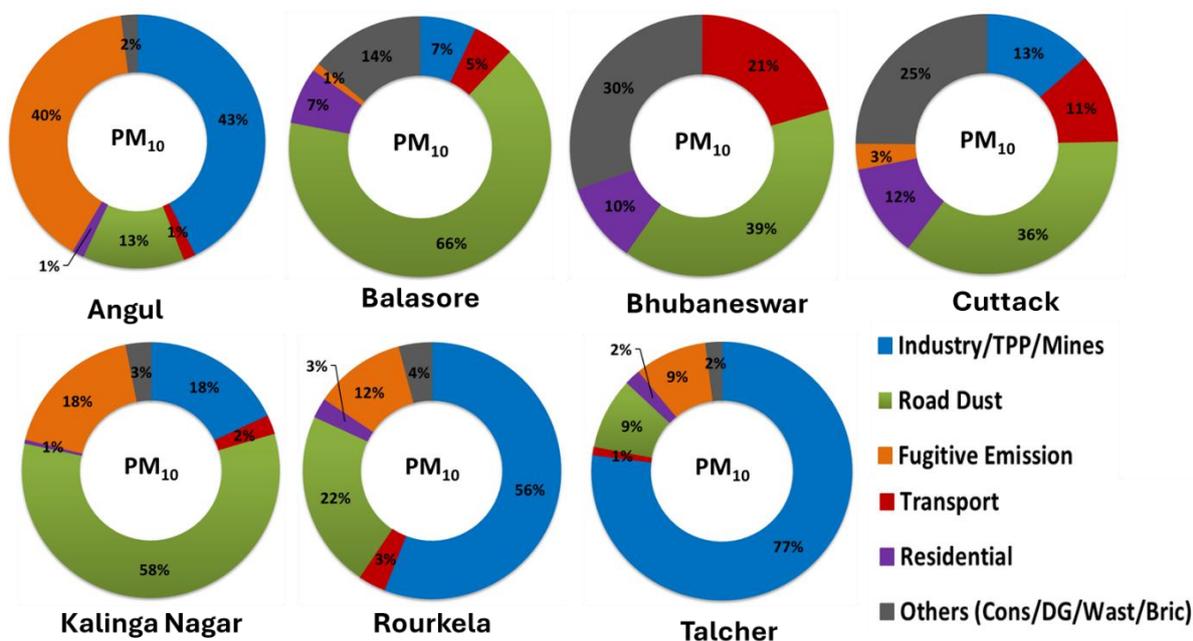
Source: "Emission Inventory and Source Apportionment Study of seven non-attainment cities in Odisha" conducted by ARAI, Pune, final report, 2024.

Figure 3.9: Sector-wise contribution to annual PM2.5 emissions in seven NACs
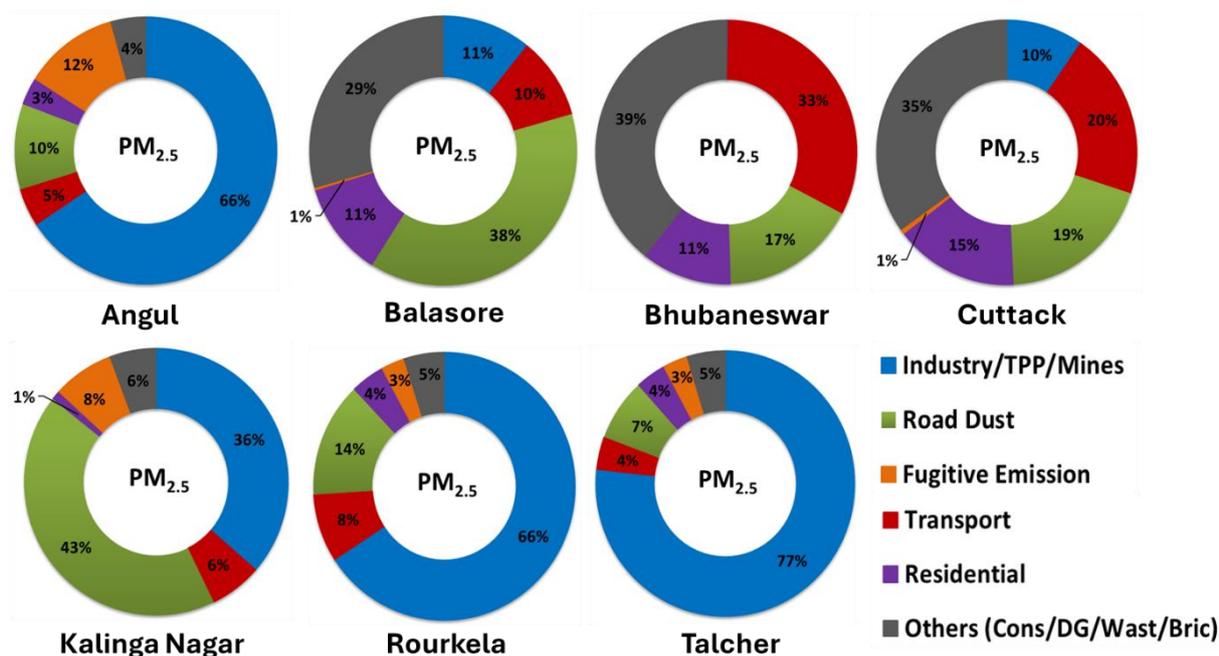
Source: "Emission Inventory and Source Apportionment Study of seven non-attainment cities in Odisha" conducted by ARAI, Pune, final report, 2024.

Figure 3.10: Annual emission load of pollutants (tonnes per year) in NACs of Odisha
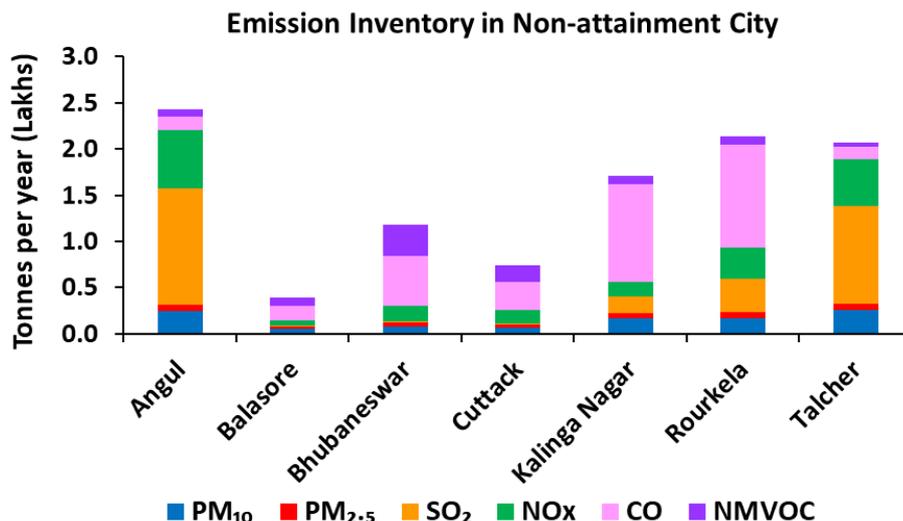
Hotspot Identification Concerning PM2.5

The mandate of the National Clean Air Programme (NCAP) is to reduce the PM_{10} and $PM_{2.5}$ concentrations up to 20-30% by 2024 and 40% by 2026. To achieve this goal, it is crucial to know the sources of air pollution at both city and regional scales with sufficient spatio-temporal resolution. However, current ground-based measurement methodologies cannot provide such information even with high spatial coverage. Therefore, the pollution hotspots are identified concerning $PM_{2.5}$ from satellite-derived aerosol optical depth (AOD) over the seven

NACs of Odisha. The mapping uses high-resolution satellite datasets (1x1 km spatial resolution) with daily temporal coverage over the study region. The study was initiated on 1st April 2020 to support NCAP objectives. OSPCB with the support of the Indian Institute of Technology (IIT), Bhubaneswar has commenced a plan to generate $PM_{2.5}$ high-resolution spatial maps from satellite-derived aerosol optical depth (AOD) and identify the pollution hotspots concerning $PM_{2.5}$ over the 7 NACs of Odisha. A total number of 22 hotspot locations were identified in seven NACs of Odisha are represented in Table 3.7. Hotspots and their respective $PM_{2.5}$ concentrations over the non-attainment cities of Odisha are represented in Figure 3.11. In addition, the OSPCB has already completed its in-situ observations in these 22 locations and identified the main sources of $PM_{2.5}$. As per the NCAP mandate, the OSPCB has also prepared a location-wise hotspot action plan in collaboration with stakeholder departments to control the emission of $PM_{2.5}$.

Figure 3.11: Hotspots and their respective $PM_{2.5}$ concentrations over the non-attainment cities of Odisha
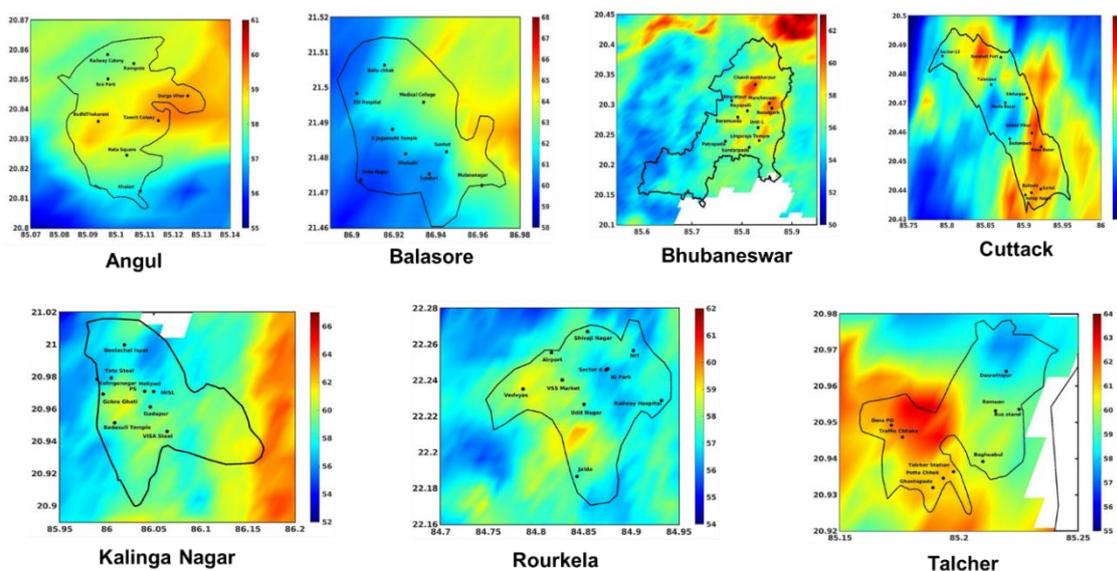
Source: "High-resolution Satellite mapping of particulate pollution ($PM_{2.5}$) hotspots over Bhubaneswar and other non-attainment cities over Odisha" conducted by IIT Bhubaneswar, final report, 2023.

Table 3.7: List of hotspot locations in seven non-attainment cities of Odisha

City	Number of hotspot locations	Name of the hotspot locations
Angul	3	1. Area surrounding railway colony and Ranigoda 2. Tamrit colony and adjoining industrial estate 3. Area surrounding Hari-Mohari chhaka
Balasore	2	1. 2 to 2.5 km area surrounding medical college and hospital 2. Area including Mulannagar, Sunhat and old Balasore
Bhubaneswar	5	1. Chandrasekharpur area 2. Mancheswar industrial area

		3. Lingaraj temple area
		4. Baramunda area
		5. Sundarpada area
Cuttack	3	1. Barabati stadium area
		2. Sikharpur area
		3. Area including Anand Vihar and Naya Bazar
Kalinga Nagar	2	1. Southern part of Kalinga Nagar industrial area
		2. Area surrounding F.C colony
Rourkela	4	1. Chhend Colony, Vedvyas and Udit Nagar area
		2. Rourkela steel plant area
		3. Jalda and Deoga area
		4. Kuarmunda area
Talcher	3	1. Dera chhaka and surrounding area
		2. Bypass chhaka including Talcher railway station and Ghantapada
		3. Baghuabul area

Mission LiFE (Lifestyle for Environment)

LiFE (Lifestyle for Environment) was introduced by the Hon'ble Prime Minister of India, Shri Narendra Modi, at COP26 in Glasgow on 1st November 2021, as a mass movement promoting "mindful and deliberate utilization, instead of mindless and destructive consumption" to protect and preserve the environment. It aims to nudge individuals and communities to practice a lifestyle that is synchronous with nature and does not harm it. Those who practice such a lifestyle are recognized as "*Pro Planet People*." To achieve the objective of LiFE, a comprehensive and non-exhaustive list of 75 individual LiFE actions across 7 categories is identified by Niti Ayog as mentioned below.

1. Save Water

2. Save Energy

3. Reduce Waste

4. Reduce E-waste

5. Adopt Healthy Lifestyles

6. Adopt Sustainable Food Systems

7. Say No to Single Use Plastic

Source: Ministry of Environment, Forest and Climate Change, Government of India

Mission LiFE follows three strategies shown as given below:

Change in Demand — Nudging individuals across the world to practice simple yet effective environment-friendly actions in their daily lives

Change in Supply — Changes in large-scale individual demand are expected to gradually nudge industries and markets to respond and tailor supply and procurement as per the revised demands

Change in Policy — By influencing the demand and supply dynamics of India and the world, the long-term vision of Mission LiFE is to trigger shifts in large-scale industrial and government policies that can support both sustainable consumption and production

Source: Ministry of Environment, Forest and Climate Change, Government of India

MoEFCC issued an Office Memorandum on 23 January 2023, that directed all State Pollution Control Boards (SPCBs), Pollution Control Committees (PCCs) and Urban Local Bodies (ULBs) of the NCAP cities to incorporate relevant actions of Mission LiFE in state action plan (SAP) and city action plan (CAP) to improve air quality with monitorable targets. As per this Office Memorandum, "Implementation of Mission LiFE is mandatory as part of the state and city action plans and fund provision under NCAP and 15th Finance Commission performance grant including convergence of resources from other Union and state government schemes. These may be utilised for implementation of these activities. Sanction of funds under NCAP for next financial year are linked to achievement targets provided under the Mission LiFE component. CPCB will enable a provision on the PRANA portal for inclusion of Mission LiFE components in respective action plans for reporting and monitoring of progress. Based on this, CPCB has provided a reporting format for relevant actions under Mission LiFE to be included in clean air action plans.

CPCB has identified 14 action points from Mission LiFE which can improve air quality. These actions are given as follows:

1. Awareness generation on LiFE activities for all 75 points
2. Signages for LiFE actions at important locations for all 75 points
3. Posting of infographics/ audio visuals in social media platforms
4. **Action no 2:** Use of public transport wherever possible
5. **Action no 5:** Use bicycles for local or short commute

6. **Action no 7:** Prefer CNG/EVs over petrol and diesel

7. **Action no 39:** Prefer non-plastic eco-friendly cutlery during gatherings and events

8. **Action no 42:** Use recycled plastic over virgin plastic, wherever possible

9. **Action no 47:** Compost food waste at home

10. **Action no 52:** Contribute cattle waste, food waste and agricultural waste to biogas plants (provided under GOBARDHAN)

11. **Action no 53:** Practice segregation of dry and wet waste at homes

12. **Action no 61:** Do not discard waste in water bodies and in public spaces

13. **Action no 68:** Plant trees to reduce impact of pollution

14. **Action no 73:** Discard gadgets in nearest e-recycling units

The State Pollution Control Board, Odisha has organised 191 awareness campaigns comprising the 7 themes of Mission LIFE during the period 16.05.2023 to 05.12.2024 in educational institutions, industries, public places, and other locations covering 18 different districts throughout Odisha and a total of 22,366 people have participated in these events. As per the mission LiFE mandate, all the participants have taken the mission LiFE pledge, and all the events are successfully uploaded on the *"Meri LiFE"* portal developed by MoEFCC, Government of India. The district-wise events and participants are shown in Table 3.8.

Table 3.8: Awareness campaign conducted by SPCB, Odisha under Mission LiFE

Sl. no.	District	No. of events	Number of participants
1	Angul	21	1660
2	Balangir	10	645
3	Balasore	10	690
4	Bhadrak	2	400
5	Cuttack	14	1370
6	Dhenkanal	4	230
7	Ganjam	11	3220
8	Jagatsinghpur	8	1160
9	Jajpur	15	1365
10	Jharsuguda	3	290
11	Kendrapara	4	280
12	Keonjhar	2	800
13	Khordha	41	5660
14	Koraput	8	581
15	Puri	1	100
16	Rayagada	5	690
17	Sambalpur	16	1315
18	Sundergarh	19	2090
	Total	**195**	**22,566**

Several key initiatives undertaken by SPCB, Odisha under the Mission LiFE are described below.

- SPCB, Odisha in collaboration with urban local bodies organised various awareness programmes in different cities in Odisha on the 7 themes of Mission LIFE with special reference to the theme "say no to single-use plastic" and distributed cotton bags to the public as an alternative to SUP and cleanliness drive.

- A mass awareness campaign was launched by SPCB, Odisha for the ban of SUP in tourist/picnic locations and covered 176 nos. of picnic spots in Odisha under this event.

- SPCB, Odisha in collaboration with IIT, Bhubaneswar conducted an ideation hackathon on "Idea to Save Water: To Make Our Future Better" on 12th May 2023. Students/ student teams from different universities and research institutes participated and presented ideas on tech products, policy analysis, market models, new designs, and product developments concerning water conservation and maintaining water quality. The top 3 teams were awarded as winners and a total cash prize cash of Rs. 1.00 lakh was distributed to winners on the eve of World Environment Day.

- Vending machines have been provided at 6 locations in the state to provide cloth bags to reduce the use of plastic carry bags.

- SPCB, Odisha and municipalities have conducted drawing and quiz competition programmes to create awareness in many schools in different cities. Prizes and certificates have been distributed to the winners.

- SPCB, Odisha has conducted awareness/sensitise/training programmes in various industries and stakeholder departments on 7 themes under the Mission LiFE.

- SPCB, Odisha have also prepared short awareness videos on the Mission LiFE theme and displayed them in 37 cinema halls across Odisha for environmental awareness of people and commuters.

- The seven non-attainment cities of Odisha identified under NCAP, i.e., Angul, Balasore, Bhubaneswar, Cuttack, Kalinga Nagar, Rourkela, and Talcher observed the "World Environment Day" on 5th June 2024 and "International Day of Clean Air for Blue Skies" on 7th September 2024.

- SPCB, Odisha has organised a mega bi-cycle rally while ULBs of Bhubaneswar, Berhampur, and Rourkela have organised mass public rallies on "International Day of Clean Air for Blue Skies" (7th September 2024) on the theme **"Invest in #CleanAirNow"**.

- SPCB, Odisha has also observed "National Pollution Prevention Day" on 2nd December 2024 in many schools, and industries.

- In order to improve air quality, SPCB, Odisha and superhit 93.5 Red FM collaborated to conduct an extensive public awareness programme at 10 different apartments in Bhubaneswar and Cuttack and Board officers intended for interacting and sensitising everyone in the community to adopt an environmentally friendly lifestyle.

- OSPCB's Regional Office such as Balasore, Bhubaneswar, Cuttack, and Kalinga Nagar organised street plays in different locations, i.e., bus stands, railway stations, major junctions in the city for awareness of environmental pollution in connection with the mass movement program under the Mission LiFE.

- Sunapur sea beach cleaning program along with local DFO was conducted by OSPCB under the Mission LiFE initiatives in Berhampur, Odisha.

- SPCB, Odisha organised a plastic clean-up drive at Prema Pahada in Rayagada town in association with Rayagada Municipality. Awareness and plantation program organised by Regional Office, OSPCB, Rayagada in association with IMFA Limited on the occasion of the "World Environment Day-2024".

- Awareness program and plant distribution under the Mission LiFE organised by OSPCB in association with CCRAS-Central Ayurveda Research Institute, Bhubaneswar. Mission LiFE pledge was taken during the event.

- SPCB, Odisha, Organised the Environ Cup-2024 cricket match with corporate sectors during which slogans and banners were displayed for environmental awareness in Bhubaneswar. All participants took the Mission Life Pledge during the event.

- 14 actionable points of Mission LiFE have been included in the state and city action plans under the National Clean Air Programme.

Institutional Arrangement for Implementation of SAP

Effective implementation and enforcement are key for reducing air pollutant emissions and achieving air quality objectives. A successful and implementable clean air action plan needs a clear institutional framework and defined responsibilities, stakeholder coordination and communication, technical support, and fund allocation. The Government of Odisha has put in place the following institutional framework/committees for monitoring the implementation of clean air action plans.

Committee	Chairman
Steering Committee	Chief Secretary, Odisha
Air Quality Monitoring Committee (AQMC)	Addl. Chief Secretary, FE&CC Department
District Level Monitoring Committee (DLMC)	District Collector / Municipal Commissioner

A steering committee has been formed to monitor the progress and implementation of activities under the NCAP. The committee comprised high-level city officials from relevant departments/stakeholders under the chairmanship of the Chief Secretary, Odisha. The committee meets quarterly to review the implementation of measures and assess overall changes in air pollution scenarios. While monitoring the progress, the committee reviews the effectiveness of the control measures available and determines whether changes are needed to achieve greater reductions, address excessive costs, or amend measures appropriately. Similarly, the AQMC functions under the overall supervision and coordination of the Addl. Chief Secretary, Forest, Environment and Climate Change Department. This is further supervised by the Chief Secretary by ensuring intra sectoral coordination.

In addition to the state-level and district committees, city-level air quality management cells have also been formed to undertake activities in line with the NCAP guidelines. This framework aims to facilitate more aligned and harmonized action with strong accountability and transparent monitoring for compliance across all concerned departments for the implementation of this multi-sector plan.

The State Action Plan (SAP) intends to improve air quality and public health by identifying cost-effective measures to reduce emissions from sectors such as transport, industries, road dust, waste deposits and residential burning, among others. The process of SAP development is to be led by the State government involving all stakeholders under the chair of ACS/PS, Environment (like AQMC constituted under NCAP) involving other Departments like Transport, H&UD, Industry, Energy & Power, Mines & Geology, Agriculture and Food Production, Rural Development, Finance, SPCB, etc. SAP will be approved by the Steering Committee under the chair of the Chief Secretary. For each sector, specific schemes and programmes will have to be identified or devised to enable the implementation of the priority strategies and indicators included in the state plan. This will Strengthen the regulatory and technical capacity of the departments to enable the planning and implementation of clean air programmes.

Chapter 4

Sector Specific Sources and Controlling Measures of Air Pollution

Sector Specific Sources of Air Pollution

4.1 Industrial Emissions

4.2 Vehicular Emissions

4.3 Construction & Demolition Waste and Road Dust Management

4.4 Municipal Solid Waste Management

4.5 Agro or Crop Residue Burning and Forest Fires

4.6 Household Emissions and Commercial Establishments

4.1 Industrial Emissions

Industrial pollution is another area of concern that contributes significantly to air pollution in India. Industries are growing at common centers/estates/parks where resources, manpower, transportation and marketing are feasible. Generally, medium- and small-scale industries develop in such areas and form industrial clusters. These industrial clusters are major hubs of pollution, indicating the lack of awareness and enforcement issues, particularly in India. Odisha has witnessed substantial industrial growth and an increase in mineral production. Its industrial structure is dominated by mining industries, iron and steel, aluminium, ferroalloys, chemical fertilizers and thermal power plants. There is also a special challenge of small- and medium-scale industries with respect to the adoption of emissions control systems and clean fuels. Industrial setups are also vulnerable to fugitive emissions from facilities such as stone crushers or mineral grinding units, material handling and loading/unloading processess; open burning of industrial waste; heavy reliance on diesel generator sets; and dust pollution caused by the movement of heavy-duty trucks and goods vehicles, particularly on unpaved roads in industrial areas, etc. Clean air action would need to address each of these aspects.

As of November 2024, the Industry profile of Odisha as shown in Figure 4.1.1, indicates that Odisha has a total of 12,486 industries. Out of which, 3,682 are in the Red category, 5,735 are in Orange category and 3,069 are in Green category. These industries are monitored periodically by the OSPCB, and action is initiated against non-complying industries. The district-wise industry profile details of are placed in the Graph.

Figure 4.1.1: Industry profile of Odisha
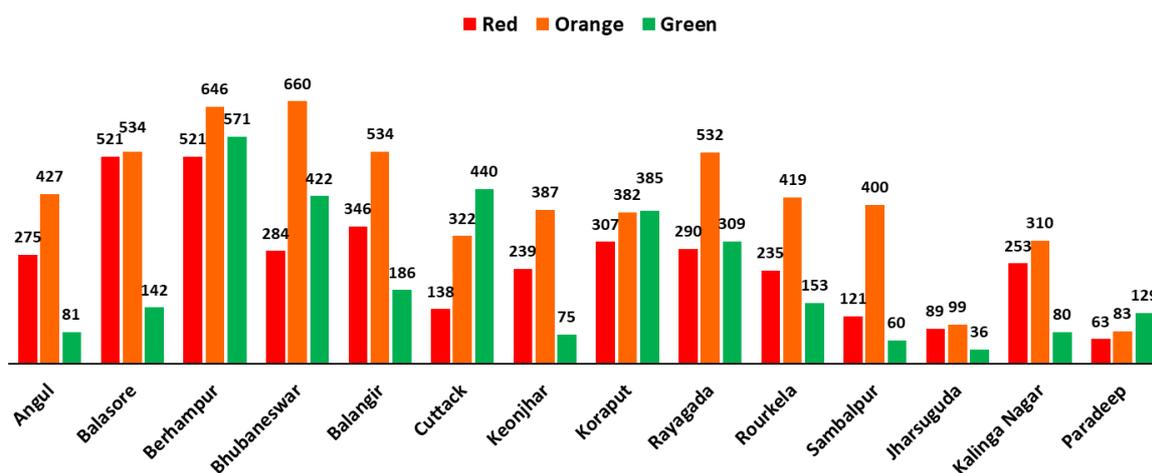
Source: State Pollution Control Board, Odisha.

Region-Wise Industry Categories (Other than the 17 Polluting Industries)

There is a distinct variation in the type and distribution of industrial units across the key regions of Odisha. Information is available for Angul, Balasore, Berhampur, Bhubaneswar, Cuttack, Keonjhar, Koraput, Rayagada, Rourkela, Sambalpur, Jharsuguda, Kalinganagar, Paradeep brings out this diversity. The key air-polluting industries that are outside the list of 17 most polluting categories include stone crushers, stone-metal quarries, brick kilns, hot mix plants, cement products, coal stack yards, coal processing, and minor mineral mining, among others.

Figure 4.1.2: Region-wise industry categories (other than the 17 polluting industries)

Koraput other industries

Rayagada other industries

Jharsuguda other industries

Kalinga Nagar other industries
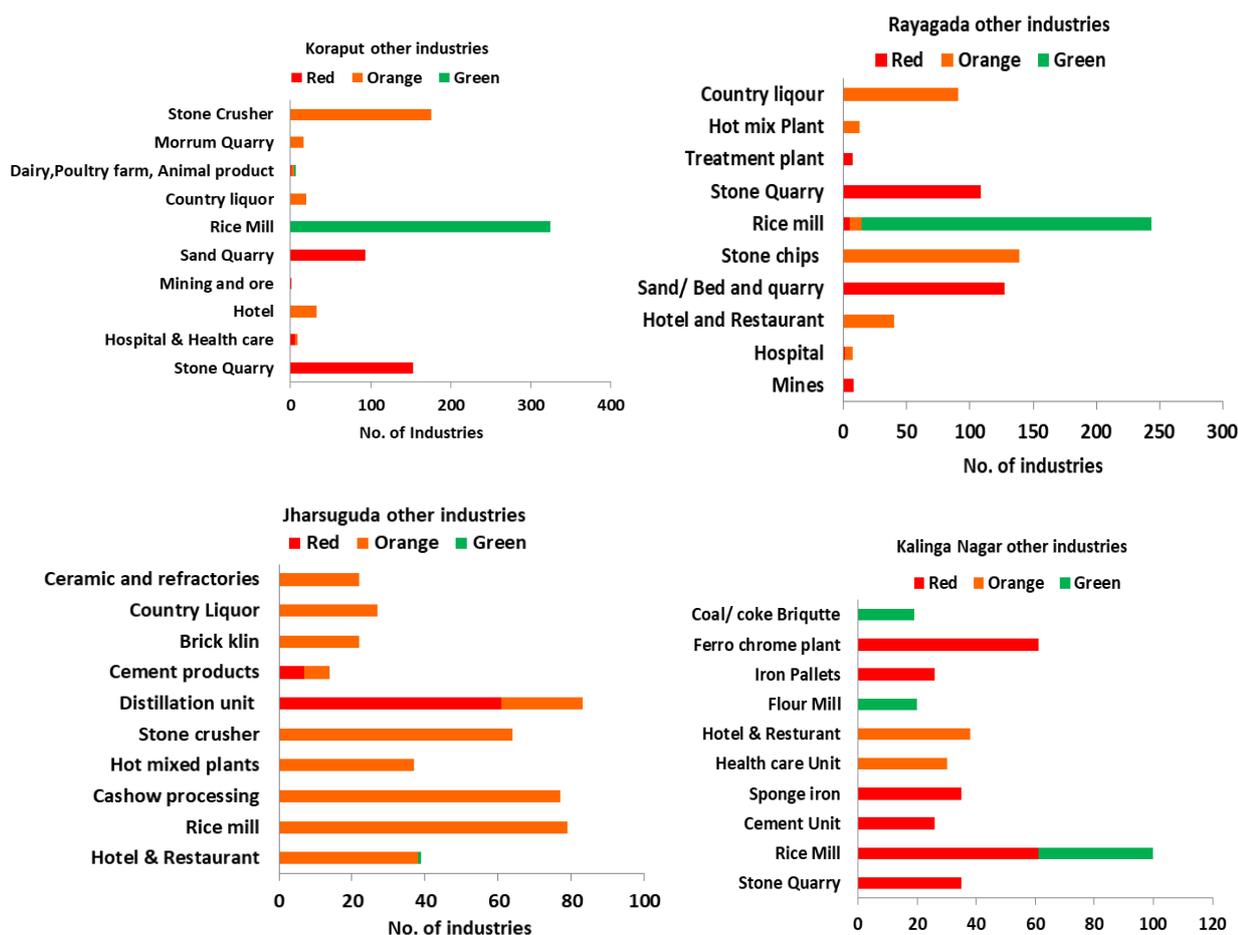
Source: State Pollution Control Board, Odisha.

According to Figure 4.1.2, the region-wise industry categories (excluding the 17 identified polluting industries) in Angul city show that road metal and sand quarries are the dominant sources of pollution. In Balasore, stone crushers are the prominent sources of pollution, while in Berhampur city, rice mills are dominate. In Bhubaneswar, hotels and restaurants are the main sources of pollution. Brick kilns are a well-known source of pollution in Cuttack city. In Keonjhar, mines are the prominent polluting category. Distillation units are more numerous in Jharsuguda city, contributing significantly to pollution. In the Kalinga Nagar industrial area, ferrochrome plants and rice mills are major sources of pollution

Policy for permitting new industries in Critically Polluted Areas

Environmental pollution in industrial clusters has been a national issue, particularly in a period of rapid industrial growth. The environmental problem in a cluster is a complex multi-dimensional problem which is often difficult to measure and manage. In order to address such complex problem Central Pollution Control Board (CPCB) developed a Comprehensive Environmental Pollution Index (CEPI). This index is a rational number to characterize the environmental quality of an industrial cluster following an algorithm of source-receptor pathway framework. Increasing value of CEPI indicates an adverse impact on the environment.

The objective of CEPI is to identify the planning needs for abatement strategies for polluted clusters and eventually bring down the level of impact to an acceptable level. Industrial clusters having aggregated CEPI score of 70 and above is considered as Critically Polluted Area (CPA) and clusters having a score between 60 to 70 is considered as Severely Polluted Area (SPA) and those below 60 are designated as other polluted Areas (OPA). In the year 2018, CPCB undertook a project on "Monitoring, sampling and analysis of ambient air quality, surface water quality and ground water quality in around 100 Polluted Industrial Areas (PIAs)". Based on the 2018 monitoring by CPCB, two areas were classified as Severely Polluted Areas (SPAs): Ib-valley (66.35) and Paradeep (60.61), while three areas were classified as Other Polluted Areas (OPAs). Table 4.1.1 showing the CEPI scores of PIAs in Odisha from 2009 to 2024.
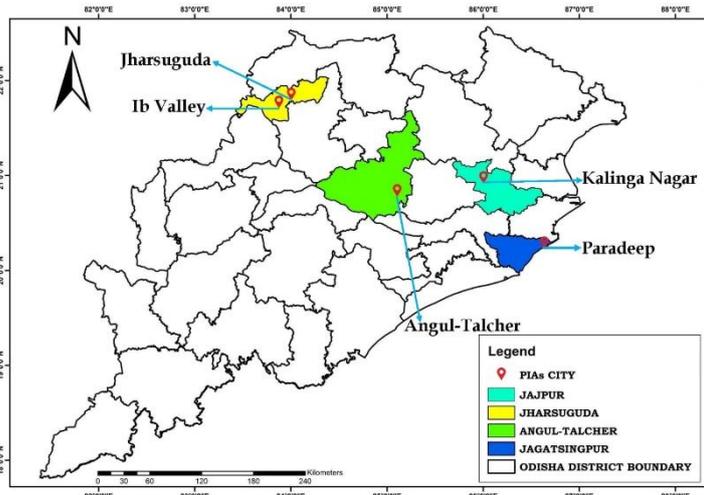
Table 4.1.1: CEPI score of PIAs in Odisha

Sl. No.	PIAs	2009	2011	2013	2018	2020	2022	2024
1	Angul-Talcher	82.09	89.74	72.73	46.43	-	-	-
2	Ib-valley	74.00	65.68	59.73	66.35	52.40	-	58.85
3	Jharsuguda	73.34	67.48	73.31	37.20	-	-	-
4	Paradeep	69.26	-	-	60.61	-	53.23	44.32
5	Kalinga Nagar	-	-	-	49.62	-	-	-

Source: State Pollution Control Board, Odisha.

Guidelines for Laying City Gas Distribution Network for Industries

Natural Gas a new-age fuel is the cleanest, most efficient, non-polluting, environmentally friendly and relatively economical fossil fuel in the modern-day industrial society. Laying a city gas distribution (CGD) network reduces the carbon footprint by providing cleaner natural gas, which emits fewer pollutants and greenhouse gases compared to traditional fossil fuels. This shift helps lower air pollution, supports sustainable development efforts, and contributes to achieving net-zero emissions by facilitating the transition to renewable energy sources. Over the years, GAIL as a major gas pipeline operator has contributed to the growth and development of natural gas pipeline infrastructure and the natural gas market. It has an existing 16271 Km. of gas pipeline network with a capacity of 208 MMSCMD. This pipeline, part of the Pradhan

Mantri Urja Ganga project, aims to supply natural gas to eastern states, including Odisha. The project is expected to be completed by March 2025. The district-wise project run under GAIL is shown in Table 4.1.2

Table 4.1.2: Various pipeline work under GAIL

No.	Projects	Total length (in Km)	Total investment (in Rs Cr.)	Commissioned as on Mar 24	Under construction as on Mar 24
1	Jagdishpur Haldia and Bokaro Dhamra Pipeline (JHBDPL)	2,563	13,414	2,269	Uttar Pradesh, Bihar, Odisha, Jharkhand and West Bengal
2	Srikakulam Angul Pipeline (SAPL)	744	2,658	0	Odisha and Andhra Pradesh
3	Mumbai Nagpur Jharsuguda Pipeline (MNJPL)	1,755	7,844	0	Maharashtra, Madhya Pradesh, Chhattisgarh and Odisha
4	Dhamra Haldia Pipeline (DHPL)	253	1,031	150	Odisha and West Bengal

Source: GAIL (India) Limited.

Policy for Replacement of Heavy Oil (e.g. furnace oil, diesel etc.) Based Industries with Alternate Energy Sources (CNG/ PNG/ Electricity)

The policy aims to support industries in adopting these alternative energy sources by providing incentives, facilitating regulatory approvals, and ensuring a reliable supply of cleaner energy, thereby harnessing the renewable energy (RE) potential of Odisha and accelerating investment in the RE sector to ensure energy security, promote socio-economic growth, and protect the environment.

The Policy aims to achieve the following objectives:

- To accelerate the adoption of clean energy alternatives and decarbonize the energy sector which includes both grid-based electricity consumption and captive consumption of industrial consumers in the State.

- To harness the clean energy potential of the State and make the best use of the available resources by facilitating the development of green energy projects in the State.

- To attract investment in the clean energy sector, create job opportunities and develop the State economy.

- To facilitate R&D and promote new initiatives and emerging RE technologies in the State

The Odisha Gazette Notification No.870, dated: 19.04.2023 following the amendment states the following.

- Use of Furnace oil, in industries, shall be substituted completely in critically / severely polluted areas and non-attainment cities within a period of two years starting from the 1st year of infrastructure development by the oil marketing companies.

- Use of Furnace oil, in industries in all other areas of the state shall be substituted completely within a period of three years.

- No new industries shall be allowed to use Furnace oil in critically/ severely polluted areas and non-attainment cities.

Source: State Pollution Control Board, Odisha.

Policy for Restriction on the Usage of Pet Coke for Industrial Use

Notification No. FE-ENV3-ENV-0014-2017, 7271 dated 12, April 2023 from OSPCB, Bhubaneswar makes the following amendments in the said notification,

- Raw pet Coke having Sulphur content less than 3.5% shall be allowed for use in CPC unit with the condition of more than 90% recovery of SO_2 emission through fuel gas desulphurization system shall be replaced as follows:

- The Sulphur content in the feedstock of the CPC unit shall not be more than 3.5%. The Sulphur content in the feedstock to CPC unit may be maintained at 3.5% and less by blending pet coke/ Raw Pet Coke of different Sulphur content in appropriate proportion with the condition of more than 90% recovery of SO_2 emission with appropriate pollution control measures.

- Furance oil shall be substituted with Low Sulphur Heavy Stock (LSHS) or any other cleaner fuel with a low level of sulphur in a gradual manner. Oil marketing companies shall develop infrastructure in one year for the LSHS distribution system for critically and severely polluted areas and non-attainment cities.

Source: State Pollution Control Board, Odisha.

Rules and Regulations on Uninterrupted Power Supply in State

As on 1st April 2021, Tata Power and the DISCOMs were rechristened as Tata Power Central Odisha Distribution Limited (TPCODL), Tata Power Western Odisha Distribution Limited (TPWODL), Tata Power Northern Odisha Distribution Limited (TPNODL) and Tata Power Southern Odisha Distribution Limited (TPSODL) respectively. Under the Odisha Electricity Reform (OER) Act, 1995 the OERC is mandated to safeguard the interests of the state consumers and ensure that all consumers are provided with reliable, safe, and uninterrupted power supply at reasonable rates. According to the Swachh Vayu Sarvekshan

2024 self-assessment report, the Tata Power company supplies an average of 23.98 hours of electricity per day to all the seven non-attainment cities of Odisha.

Policy for Use of DG Sets

On November 14, 2023, Letter No. 17927, the Odisha State Pollution Control Board (OSPCB) issued a notification regarding the retrofitting of operational diesel generator (DG) sets to control emissions.

DG sets with a Capacity of 50 KVA and above:

- Engines manufactured or installed before July 1, 2004, or engines that do not comply with emission limits must be scrapped.
- Engines that comply with emission limits must install a Retrofit Emission Control Device (RECD) to reduce particulate matter emissions by at least 70%.

DG sets with a Capacity of up to 800 KW or 1000 KVA

- Operators must either retrofit the existing DG sets for partial gas usage or shift to gas-based generators in both attainment and non-attainment cities.

The RECD is designed to improve air quality by capturing particulate matter carbon from the air. It uses electrostatic precipitation fundamentals and filter-less technology. The RECD system must be tested by an approved test agency and the operator must be informed if the system is not functioning properly.

Policy Regarding CAAQMS Based on the Emission Potential or Capacity of Air Polluting Industries

Ambient Air Quality monitoring is an important part of air quality management and is essential for the implementation of air quality legislation, particularly, in compliance with emissions and ambient air quality standards. The major objectives of the air quality monitoring are:

- To determine present Air Quality status and trends
- To assess the health hazard
- To provide background air quality data as needed for industrial siting and town planning
- To control and regulate pollution from industries and other sources to meet the air quality standards.

CPCB guidelines for Continuous Ambient Air Quality Monitoring Systems (CAAQMS) for industries:

Installation and Commissioning: Industries must ensure the correct installation and commissioning of CAAQMS according to CPCB guidelines.

Data Communication: Data from CAAQMS should be transmitted to the CPCB server in real time. Industries need to maintain a stable data communication network.

Periodic Calibration: Regular calibration of the monitoring instruments should be conducted to maintain data accuracy.

Quality Assurance: Industries are responsible for ensuring the quality and reliability of the data generated from CAAQMS.

Data Reporting: Industries must report any discrepancies or issues in data transmission to CPCB promptly.

According to CPCB guidelines, 346 industries and mines in Odisha have installed Continuous Ambient Air Quality Monitoring Stations (CAAQMS). Among these, 31 industries and mines are proposed to be connected to the CCR Portal within one month, as per a letter issued by the State Pollution Control Board (SPCB) to the Central Pollution Control Board (CPCB).

Mechanism to be devised for the expansion of OCEMS to air-polluting industries is not covered currently (Such as emission from utility stacks in 17 categories, etc.).

Odisha has 173 industries operating under this category, the details of various categories of industries connected with OCEMS are provided in Table 4.1.3.

Table 4.1.3: 17-Category Industries in Odisha with connection with OCEMS

Sl. no.	17-Category industries	Total no. industries	Connected with OCEMS
1	Thermal Power	19	19
2	Aluminum Smelter Unit	4	4
3	Iron and Steel	108	108
4	Cement unit	19	19
5	Distillery unit	8	8
6	Pesticides	1	1
7	Pharmaceuticals	2	2
8	Pulp & Paper	6	6
9	Sugar unit	2	2
10	Fertilizer	2	2
11	Refinery	1	1
12	Chlor- Alkali unit	1	1
	17- Category Industries Total	**173**	**173**

Mechanisms to Control Fugitive Emission Sources

There are several industrial enterprises that are responsible for huge amounts of fugitive emissions and dust generation. These include mining and different phases of crushing and storage. Stone crushers, mineral grinding and brick kilns are among the most prominent sources. The responsible units need to adopt dust suppressant measures and establish crusher zones meeting the siting guidelines for proper monitoring. Further, industries under the 17 high-polluting categories in the state either have some fugitive emission control technology or procedure in place. Depending upon the type of industry, emissions and availability, the following technologies are currently deployed in the state for dust extraction and dust suppression:

- Dust extraction systems viz, ESPs, bag houses, and multi cyclones and wet scrubbers.
- Dust suppression systems viz., a) Dry Fog Dust Suppression Systems b) Wet Fog Dust Suppression Systems c) Water sprinkling systems d) Fog cannon e) Rain gun f) Pneumatic dust handling system.

As mentioned before, mining is one of the primary activities in the industry sector of the state. Stone crushers operating with poor implementation of environmental guidelines cause high fugitive emissions. But the degree

of their impact on ambient air and nearby inhabitants goes unaccounted. Since this industry does not have stack emissions, no air monitoring is required to be done by unit operators. The following action points can be implemented to control the fugitive emissions:

- Shift from wet suppression to dry extraction system for dust control
- Develop proper infrastructure to arrest fugitive dust
- Declaration of crusher zones and relocating all units to these zones
- Installation of ambient air monitoring stations near crusher zones and conduct continuous compliance monitoring of the establishments
- Strengthening of state guidelines
- Display of consent information on the gate

Regulations for Conversion of Brick Kilns to Clean Technologies

These require detailed inventory to identify the location and status of kiln technology, emissions control systems and fuel used. In Odisha most of the brick kilns are seasonal. A Geospatial Artificial Intelligence (GeoAI) platform has been developed for brick kilns. This is a platform to improve the environmental compliance of brick manufacturing units. Table 4.1.4 shows the total no. of Brick kilns in Odisha.

Table 4.1.4: Total no. of Brick kilns in Odisha

District name	No. of kilns as per GeoAI	District name	No. of Kilns as per GeoAI	District name	No. of kilns as per GeoAI
Northern Division (HQ Sambalpur)		Central Division (HQ Cuttack)		Southern Divison (HQ Berhampur)	
Angul	7	Balasore	47	Boudh	1
Balangir	1	Bhadrak	3	Gajapati	0
Bargarh	33	Cuttack	56	Ganjam	60
Deogarh	0	Jagatsinghpur	9	Kalahandi	0
Dhenkanal	6	Jajpur	9	Kandhamal	0
Jharsuguda	13	Kendrapada	5	Koraput	3
Kendujhar	1	Khordha	33	Malkangiri	0
Sambalpur	10	Mayurbhanj	34	Nabarangpur	1
Subarnapur	1	Nayagarh	1	Nuapada	3
Sundargarh	71	Puri	7	Rayagada	1
Total	**143**	**Total**	**204**	**Total**	**69**
Sum Total = 416					

Brick kilns need to make a rapid transition from traditional draft kiln technology to improved zig zag technology. The MoEF&CC issued a gazette notification on 22 February 2022 on emissions standards and kiln technology. This provides for stricter particulate emissions standards and specification of stack height by capacity of brick kilns. All new brick kilns will be allowed only with zigzag technologies or vertical shafts or on piped natural gas. The existing ones will also have to follow the same provisions within one year if they are within a 10 km radius of non-attainment cities, and within two years for other areas. They need to follow process emissions/fugitive dust emissions control guidelines. The ash needs to be fully re-utilized in brickmaking. Approach roads will have to be paved, and transport vehicles must be covered. Further, minimum siting criteria have been established.

Industrial Waste Burning

Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs) including Hazardous Waste Incinerators are indeed essential for the treatment and disposal of hazardous waste in an environmentally sound manner, Although both the earlier Hazardous Waste (Management & Handling) Rules, 1989 and newly notified Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 stipulate necessary provision for proper collection, reception, transport, treatment, storage and disposal of hazardous wastes.

The industrial areas and clusters also require well defined industrial waste collection system for proper disposal. Normally, such systems are devised for hazardous industrial wastes. But non-hazardous waste also requires collection and disposal systems; otherwise, these will

be burnt in the open. Any such instance of industrial waste burning in the state can be reduced by planning and streamlining the collection and disposal of all industrial waste to prevent burning. Along with this, making industries and industry associations liable for safe collection and disposal of both hazardous and non-hazardous waste is also equally important. The Central Pollution Control Board (CPCB) guidelines for industrial waste burning include detailed processes and protocols to ensure safe and environmentally friendly disposal of industrial waste. Here are some key points.

Pre-Processing and Co-Processing: Industrial waste must undergo pre-processing before it can be burned, to reduce hazardous emissions.

Incineration Standards: Specific guidelines are in place for the incineration of hazardous waste to minimize air pollution and ensure safe handling.

Monitoring and Reporting: Continuous monitoring of emissions is necessary, and industries must report any violations or irregularities to the CPCB promptly.

Safety Measures: Adequate safety measures must be in place to protect workers and the surrounding environment from harmful emissions during the burning process.

Environmental Impact Assessments: Regular environmental impact assessments should be conducted to monitor the long-term effects of waste burning on the environment.

Thermal Power Plants (TTPs)

Odisha has seven power plants located across four districts that require meeting the emissions standards of 2015 with in the timeframe of 2025-26. According to the MoEFCC classification, TPPs whose stacks are within an aerial distance of a 10-km radius of NCR or cities with a million-plus population fall in Category A. However, the units in Odisha fall either under the 'B' or 'C' category. The deadline for compliance for these categories of power plants is either 2025 or 2026. A quicker roadmap is needed to phase in the new standards. The Central Electricity Authority provides the status of implementation of emissions standards in each power plant (see Table 6: Thermal power plants in Odisha state: status of compliance with 2015 emissions standards). A transition plan for each plant needs to be drawn up to enable that process and ensure compliance. This will allow tighter regulations of particulate matter emissions, nitrogen oxides, sulphur dioxide and mercury. The standards are designed to ensure that high pollution and carbon are not locked in the new infrastructure for many more years especially when industrialization is growing in the state. Some units are more than 20 years old. These meet the older emissions standards. A phase-out plan will be needed to progressively

close the older and more polluting thermal power plants and to move to cleaner fuels like natural gas. This will require more stringent stack monitoring with the help of continuous emissions monitoring systems (CEMS). Fly ash utilization will have to be further scaled up. The thermal power plants in Odisha that comply with 2015 emissions are shown in Table 4.1.5.

Table 4.1.5: Thermal power plants in Odisha state: Status of compliance with 2015 emissions

Sl. no.	Districts	Developer	Sector	Plants	Unit No.	Year of comm	Capacity (MW)	Catagori zation	Deadline for compliance with emission norms	FGD status February, 2023
1	Sundargarh	NTPC	Central	Darlipali STPS	1	2019	800	C	2026	Bid awarded
2	Sundargarh	NTPC	Central	Darlipali STPS	2	2012	800	C	2026	Bid awarded
3	Angul	NTPC	Central	Talcher STPS	1	1995	500	C	2026	Bid awarded
4	Angul	NTPC	Central	Talcher STPS	2	1996	500	C	2026	Bid awarded
5	Angul	NTPC	Central	Talcher STPS	3	2003	500	C	2026	Bid awarded
6	Angul	NTPC	Central	Talcher STPS	4	2003	500	C	2026	Bid awarded
7	Angul	NTPC	Central	Talcher STPS	5	2004	500	C	2026	Bid awarded
8	Angul	NTPC	Central	Talcher STPS	6	2005	500	C	2026	Bid awarded
9	Dhenkanal	GMR	Private	Kamalanga TPS	1	2013	350	B	2025	Bid opened
10	Dhenkanal	GMR	Private	Kamalanga TPS	2	2013	350	B	2025	Bid opened
11	Dhenkanal	GMR	Private	Kamalanga TPS	3	2014	350	B	2025	Bid opened
12	Jharsuguda	IBPIL	Private	Utkal TPP (Ind Barath)	1	2016	350	C	2025	Feasibility study started
13	Angul	JITPL	Private	Derang TPP	1	2014	600	C	2026	Bid opened
14	Angul	JITPL	Private	Derang TPP	2	2015	600	C	2026	Bid opened
15	Jharsuguda	SEL	Private	Sterlite TPP	1	2010	600	C	2026	Feasibility study started
16	Jharsuguda	SEL	Private	Sterlite TPP	2	2010	600	C	2026	Feasibility study started
17	Jharsuguda	OPGC	State	IB valley TPS	1	1994	210	C	2026	Feasibility study completed
18	Jharsuguda	OPGC	State	IB valley TPS	2	1995	210	C	2026	Feasibility study completed
19	Jharsuguda	OPGC	State	IB valley TPS	3	2019	660	C	2026	Bid awarded
20	Jharsuguda	OPGC	State	IB valley TPS	4	2019	660	C	2026	Bid awarded

CEMS Monitoring in Industries

It is necessary to strengthen smart monitoring in industries with the help of continuous emission monitoring systems (CEMS) for efficient and transparent compliance monitoring. This requires a strategy for ensuring correct CEMS installation, quality control of data, proper calibration, technology selection, operation and maintenance, adequate skills, and periodic checks of CEMS performance. Quality control of data is needed for the adoption of market-based mechanisms like the emission trading system and star labelling system. Continuous Emission Monitoring Systems (CEMS) are critical for ensuring industries comply with environmental regulations. Here are some key points from the guidelines issued by the Central Pollution Control Board (CPCB) for CEMS in industries:

Installation and Maintenance: Industrial units must ensure the correct installation and regular maintenance of CEMS to guarantee accurate monitoring

Real-Time Data Transmission: CEMS should provide continuous, real-time monitoring and data transmission of pollutant levels to the CPCB server

Critical Pollutants: The system must monitor critical pollutants such as particulate matter (PM), sulphur dioxide (SO_2), nitrogen oxides (NO_x), and carbon monoxide (CO)

Calibration and Accuracy: Regular calibration and performance evaluations are necessary to maintain the accuracy and reliability of the monitoring data

Site Preparation: Proper site preparation is essential for mounting the CEMS equipment

Data Handling System: A robust data acquisition and handling system is needed to collect, store, and report the emission data accurately.

Mining in Odisha

The state has a very active mining sector due to its rich mineral deposits. Numbers of major mineral mines include coal, iron and manganese, chromite, bauxite, limestone and dolomite, under consent administration of Odisha State Pollution Control Board is shown in Table 4.1.6.

Table 4.1.6: Major mines under consent administration of OSPCB

Sl. no.	Mineral ore	No. of mines	Mines having valid consent as on 26.11.2024
1	Coal	37	32
2	Iron & Manganese	165	74
3	Chromite	21	11
4	Bauxite	07	05
5	Limestone and Dolomite	27	06
	Total	**257**	**128**

The mines in the state are regulated as per the provisions of the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981. The State Pollution Control Board regulates the mines under consent administration as specified in section 25/26 of the Water (Prevention and Control of Pollution) Act, 1974 and section 21 of the Air (Prevention and Control of Pollution) Act, 1981. Consent to operate is granted to the mines under the above provisions stipulating conditions related to prevention and control of environmental pollution. Status compliance of the stipulated conditions is periodically verified by the Board officials and appropriate action is taken based on the status compliance of the stipulation.

Regulations for Emission Trading Scheme (ETS)

OSPCB is working with Data, Policy, and Innovation Centre (DPIC) the University of Chicago on implementation of emission trading scheme. There are several areas where data-driven policy analysis might add significant value to existing policy ideas in Odisha. These include School attendance and Learning outcomes (Education); Improving crop yields and Water availability for farmers (Agriculture); Renewable energy and Reducing distribution losses (Energy), Smart city initiatives (Bhubaneswar Smart City Project), and Climate change and Pollution (Environment).
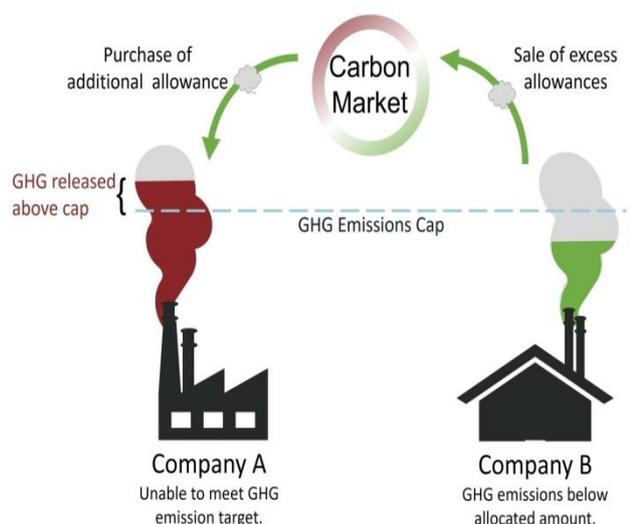
Policy to Set up E-Waste Recycling Units in Industrial Areas in Compliance With E-Waste Management Rules

According to the Guidelines for Determination of Processing Capacity of E-Waste Recycling facilities by SPCBs/ PCCs as mentioned by CPCB.

The processing capacity of an e-waste recycling facility should be determined based on the capacity of the installed plants and machinery per hour (maximum number of hours allowed 20 hours per day) and should have adequate space for the following: a recycling operation comprising of dismantling (manual or mechanical), shredding, ball milling, separation system (magnetic separator, eddy current/electrostatic separators, gravity separators), smelting operation, pyro / hydro / electrometallurgy operations/ electrowinning and any other operations employed for producing end products. The list of minimum machineries in e-waste recycling facility is shown in Table 4.1.7.

Table 4.1.7: List of minimum plants and machinery in an E-waste recycling facility

Sl. no.	Machinery
1	Dismantling Tables (with Suction Hoods connected with cyclone and stack of height 3 meters above roof/shed)
2	Shredder
3	Magnetic Separator
4	Density Separator
5	Eddy Current Separator
6	Conveyor (for Passage of WEEE to Shredder), Sorting Conveyor
7	Compressor Cutting Machine
8	Refrigerant Gas Recovery with control mechanism
9	Compressor Oil Recovery with control mechanism
10	CRT Cutting Machine with control mechanism
11	Component Removing Machine (CRM)
12	Bailing Machine/Compactor/Hydraulic Press
13	Degaussing Machine/Data Wiping Machine/Hard Disk Drive Breakers
14	Furnace and/or Smelting Furnace
15	Precious Metal Recovery System, along with all other requisite facilities/processes as per the Guidelines for environmentally sound recycling of E-Waste: Implementation Guidelines for Recyclers & Refurbishes under E-Waste (Management) Rules, 2016 available onCPCB's web site. *(Note: Pyro metallurgical operations or Hydro metallurgical operations/Chemical Leaching or Electro-metallurgical operations) should have pollution control measures in place for example cyclone, scrubber, off gas treatment, and venting arrangement).*
16	Wire Stripper and/or Wire Cutter and/or wire peeling machine
17	Tube light/CFL Recycling
18	Air Pollution Control Devices
19	ETP of adequate capacity, Sludge Drying Bed and Evaporator etc
20	Weighing Bridge
21	Weighing Machines/Equipment

a) raw material storage (E-Waste – Waste Electrical and Electronic Equipment)

b) storage for products of recycling

c) storage for non-recyclables

d) storage for hazardous waste

e) pollution control equipment/devices (cyclone, bag house, alkaline scrubber, off-gas treatment facility, stack, etc, and ETP)

f) operation control area

i. SPCBs/PCCs should verify the plants & machinery processing capacity and other supporting facilities as above and then only grant CTO specifying capacity (Tonnes per Annum) based on such verification.

ii. End products of recycling are as below:

    a) Gold in the form of nuggets

    b) Copper in the form of shreds or powder or ingots/bars

    c) Aluminium in the form of shreds or powder or ingots

    d) Iron in the form of bales or shreds

iii. SPCBs/PCCs should specify annual processing capacity in terms of the weight of waste electrical and electronic equipment (WEEE) which the recycler can process.

iv. SPCBs/PCCs while issuing common CTO for recycling and refurbishing operations, should specify the Recycling capacity and Refurbishing capacity separately.

v. Standalone dismantling facilities (other than at the E-Waste Recycling unit) are allowed only if recyclers apply for the same. Further, such recycler shall take responsibility for the flow of material i.e. quantity of raw electronic waste received, and the quantity of dismantled electronic waste supplied to the recyclers from the said dismantling facility. The same shall also be reported in the annual return of the recycler. Further, the name, address and other details of such dismantler shall be the part of CTO issued to the recycler instead of individual CTO to such dismantlers. The concerned SPCBs/PCCs, therefore, should also verify the standalone dismantling facility before entering its details in the CTO of the recycler.

vi. Recyclers should maintain material flow records at each stage of processing in terms of input and output weight. Recyclers should also maintain records of the following products / non-recyclable / Hazardous Waste materials besides the end products, as derived from E-waste, for ensuring material balance as per the requirement of the EPR Portal:

Any other Policy/ Rules/ Standard Guidelines Pertaining to Industrial Emissions

Star Rating program utilizes continuously monitored emissions data from major industrial plants in Odisha, to categorize industries from 1-star (most polluting) to 5-star (least polluting).

Action plan: Controlling Industrial Pollution

Sl. no.	Indicative actions	Status of activity (completed/ ongoing/to be started)	Timeline for completion	Target (coverage/ percentage)	Financial implications (Yes/ No)	Funds allocated (Rs Crore)	Funds utilized as on date (Rs Crore)
1	Policy for permitting new industries in Critically Polluted Areas (CPAs)	The State follows the policy prepared by MOEFCC with respect to Critically Polluted Areas from time to time. No CPAs in the state since 2018. According to the 2018 CPCB report, there were two SPAs and three OPAs in the state: 1.Paradeep - 60.61 2.Ib Valley - 66.35 3.Angul-Talcher - 46.43 4.Jharsuguda - 37.20 5.Kalinga Nagar - 49.62 As per the present report of Pre-monsoon 2024, there are no SPAs in the state; all 5 cities are now classified as OPAs: 1.Paradeep - 44.32 2.Ib Valley - 58.85	Not applicable because currently there are no CPAs in the state.	Not applicable because currently there are no CPAs in the state.	NA	NA	NA
2	Guidelines for laying city gas distribution network.	Ongoing	This pipeline, part of the Pradhan Mantri Urja Ganga project, aims to supply natural gas	March 2025	Rs.24,947 Cr.	NA	NA

			to eastern states, including Odisha. The project is expected to be completed by March 2025.				
3	Policy for replacement of heavy oil (eg., furnace oil, diesel, etc.) based industries to alternate energy sources (CNG / PNG / electricity)	The Odisha Gazette Notification No.870, dated: 19.04.2023 following the amendment of, • Use of Furnace oil, in industries, shall be substituted completely in critical / severely polluted areas and non-attainment cities within a period of two years starting from the 1st year of development of infrastructure by the oil marking companies. • Use of Furnace oil, in industries in all other areas of the state shall be substituted completely within a period of three years. • No new industries shall be allowed to use Furnace oil in critically/ severely polluted areas and non-	19.04.2023	All the industries are shifted to Low Sulphur Heavy Stock (LSHS)/ Light Diesel Oil (LDO)/ Gas.	NA	NA	NA

		attainment cities					
4	Policy for restriction on usage of pet coke for industrial use.	The State Fuel Policy has been issued by the State Government vide No. FE-ENV3-ENV-0014-2017, 7271 dated 12, April 2023 from OSPCB, Bhubaneswar makes the following amendment in the said notification: Furance oil shall be substituted with Low Sulphur Heavy Stock (LSHS) or any other cleaner fuel with the low level of sulpher in gradual manner. Oil marketing companies shall develop infrastructure in one year for LSHS distribution system for critically and severely polluted areas and non-attainment cities**.	Ongoing	Domestic Raw petcoke: 93,502 TPM Imported Raw petcoke: 13,023 TPM Domestic Calcined petcoke: 43,394 TPM Imported Calcined petcoke: 47,040 TPM	NA	NA	NA
5	Rules and Regulations on uninterrupted power supply in State/UT	Under the Odisha Electricity Reform (OER) Act, 1995 the OERC is mandated to safeguard the interests of the state consumers and ensures that all consumers are provided with reliable, safe,	Completed	The policy is applicable all over the State	NA	NA	NA

		and uninterrupted power supply at reasonable rates. According to the Swachh Vayu Sarvekshan 2024 self-assessment report, the Tata Power company supplies an average of 23.98 hours of electricity per day to seven non-attainment cities.					
6	Policy for use of DG sets	On November 14, 2023, latter no: 17927, the Odisha State Pollution Control Board (OSPCB) issued a notification regarding the retrofitting of operational diesel generator (DG) sets for emission control • No policy in place to ban/ phase out DG sets. • All major industries (17 categories) have DG sets. • Operators must either retrofit the existing DG sets for partial gas usage or shift to gas-based generators both in attainment and non-attainment cites	Completed	The policy is applicable all over the State	NA	NA	NA

7	Policy regarding installation of CAAQMS based on the emission Potential or capacity of air polluting industries	The SPCB follows the following policy for installation of CAAQMS • All 17 cat. polluting industry. • All opencast coal mining areas. • Iron and manganese mines of 5 MTPA capacities. • Major industries having high pollution potential.	Completed	The policy is applicable all over the State	NA	NA	NA
8	Mechanism to be devised for expansion of OCEMS to air polluting industries, they are not covered currently (such as emission from utility Stacks in 17 categories, etc.)	All the major polluting industries have installed OCEMS	Completed	The policy is applicable all over the State	NA	NA	NA
9	Mechanisms to control fugitive emissions	• All 17 polluting category industries have fugitive emission control mechanisms in place. • Types of mechanisms deployed depend on the types of emissions.	Completed	All the 17 polluting category Industries have fugitive emission Control.	NA	NA	NA
10	Regulations for conversion of brick kilns to clean technologies	These require detailed inventory to identify location and status of kiln technology, emissions control systems and fuel used.	Ongoing	All the government constructions done with fly ash bricks	NA	NA	NA

		In Odisha most of the brick kilns are seasonal. A Geospatial Artificial Intelligence (GeoAI) has been developed for brick kilns. This is a platform to improve environmental compliance of brick manufacturing units. In odisha there are 416 nos of Brick kilns are monitored through GeoAI app by SPCB.					
11	Regulations for Emission Trading Scheme (ETS)	OSPCB is working with Data, Policy, and Innovation Centre (DPIC) the University of Chicago has taking of emission trading scheme.	Ongoing	There are several areas where data-driven policy analysis might add significant value to existing policy ideas in Odisha.	NA	NA	NA
12	Policy to set up e-waste recycling unit in industrial areas in compliance with e-waste management rules	According to Guidelines of Determination of Processing Capacity of E-Waste Recycling facility by SPCBs/ PCCs. by CPCB mentioned: Discussed above.	NA	The policy is applicable all over the State.	NA	NA	NA
13	Any other Policy / Rules/ Standards/ Guidelines pertaining to industrial emissions	Star rating system Star Rating program utilizes continuously monitored emissions data from major industrial plants in Odisha, to categorize industries from	NA	NA	NA	NA	NA

		1-star (most polluting) to 5-star (least polluting).					
14	Number of industries in the state complying with emission standards	17 polluting categories Total industries – 173(as of June 2024) Other than 17 polluting categories Total industries – 11357(as of June 2024) Complying (as of June 2024) - 10955	Ongoing	The policy is applicable all over the State	NA	NA	NA
15	Inventory of fuel consumed in the industries (type and quantity)	• Coal: Major industries, especially steel and power plants, consume a significant amount of coal. • Natural Gas: Utilized by refineries, fertilizer plants, and chemical industries. • Diesel and Petrol: Widely used across transportation, mining, and manufacturing. • Furnace Oil: Common in various industrial processes. • LPG (Liquefied Petroleum Gas): Used in certain industries for heating purposes. • Ethanol Blended Petrol (EBP): Rising in use due to the	NA	NA	NA	NA	NA

		EBP Programme					
16	Shifting of industries/ commercial units to gaseous fuels (CNG/ PNG/CBG)	• Use of Furnace oil, in industries, shall be substituted completely in critical / severely polluted areas and non-attainment cities within a period of two years starting from the 1st year of development of infrastructure by the oil marking companies. • Use of Furnace oil, in industries in all other areas of the state shall be substituted completely within a period of three years • No new industries shall be allowed to use Furnace oil in critically/ severely polluted areas and non-attainment cities.	Ongoing	NA	NA	NA	NA
17	Number of households shifted to PNG/LPG	As on 01.04.2024 total no of 9960000 households shifted to PNG/LPG	Ongoing	NA	NA	NA	NA
18	Any other activity/ project pertaining to industrial emissions	SembCorp Industries has signed MOUs with the Odisha Government to set up a green hydrogen	NA	NA	NA	NA	NA

		production facility and develop an industrial park. The facility is anticipated to produce 720,000 tonnes of green hydrogen annually and generate over 2,000 employment opportunities. This aligns with Odisha's efforts to transition to a low-carbon future.					

4.2 Vehicular Emissions

Odisha is located in the eastern region of India and has a coastline of 485 km along the Bay of Bengal. The state shares its borders with West Bengal, Jharkhand, Andhra Pradesh, Chhattisgarh and the Bay of Bengal. Bhubaneswar, Mayurbhanj, Baleshwar, Khordha, Sundargarh, Ganjam, and Cuttack are some of the large cities in terms of population. Transportation in Odisha is well connected with road, rail, airports and seaports. In the coastal State of Odisha, the length of National Highways has reached 6,968 k.m. in 2018. Over 2,500 km of State Highways have been identified for upgradation to National Highways. This will further increase the length of National Highways in Odisha to 9,493 km. The public transportation connects inter and intra-state cities using bus and rail. The State has one international airport in Bhubaneswar and four domestic airports in Jharsuguda, Koraput, Kalahandi, and Rourkela. Capital Regional Urban Transport (CRUT) provides city bus services along with private operators and Odisha State Road Transport Corporation (OSRTC) provides regional bus services. Vehicular pollution has become one of the leading contributors to environmental degradation and public health concerns in urban and suburban areas. As the number of vehicles on the road continues to grow, the emissions from internal combustion engines are causing increased levels of harmful pollutants, including particulate matter (PM), nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), and volatile organic compounds (VOCs). This report provides an overview of the current situation of vehicular pollution, its environmental and health impacts, and presents potential strategies to mitigate its effects.

Vehicular pollution is a major environmental issue, especially in densely populated cities, where the proliferation of vehicles, coupled with inadequate infrastructure and poor emission standards, leads to alarming levels of air pollution. The increase in the number of private cars, trucks, and buses, many of which are still running on outdated technologies and fuels, exacerbates this problem. A State Action Plan for controlling vehicular pollution is a comprehensive strategy designed to reduce the environmental impact of transportation systems. It includes regulatory measures, technological advancements, public awareness campaigns, and infrastructure development to combat air pollution caused by vehicles. Below is an outline of a typical state action plan for vehicular pollution.

Understanding Vehicular Population and Mode Share

Odisha State is well connected by road, rail, and air. Several national and state highways pass through the state, resulting in large volumes of traffic entering the state. The state's transportation system is predominantly road-based. Owing to the absence of an adequate public transport system in the state, dependence on individual modes and intermediate public transport

is high. Although roads in the city are generally wide, network design and development are incomplete.

Sources and Types of Vehicular Pollution

The primary source of vehicular pollution comes from the combustion of fossil fuels in internal combustion engines. These engines emit a variety of pollutants, which include:

- Particulate Matter ($PM_{2.5}$ & PM_{10}): Fine particles released during the burning of fuel, especially from diesel engines, contribute significantly to air pollution.
- Nitrogen Oxides (NO_x): These are produced during high-temperature combustion and contribute to the formation of ground-level ozone, which is a major component of smog.
- Carbon Monoxide (CO): A colourless, odourless gas produced by incomplete combustion of fuel, which can interfere with oxygen transport in the body.
- Sulphur Dioxide (SO_2): Emitted from vehicles using high-sulphur fuel, it contributes to acid rain and respiratory problems.
- Volatile Organic Compounds (VOCs): Released from gasoline, these compounds contribute to smog formation and have detrimental effects on human health.

The type of vehicle, fuel quality, maintenance, and driving patterns significantly influence the levels of pollution emitted.

Vehicle registration from 2014 to 2024 reflects significant growth, driven by urbanization, economic development, and rising consumer demand. Over this decade, the government has introduced stricter environmental regulations, encouraging the registration of electric and hybrid vehicles to reduce carbon emissions. The digitalization of registration processes has also improved efficiency, making vehicle registration more accessible through online platforms. Additionally, some regions have implemented policies promoting vehicle scrappage to phase out older, polluting models. This period witnessed a shift in consumer preferences, with an increasing focus on eco-friendly and technologically advanced vehicles, reshaping the automotive landscape globally. Table 4.2.1 shows the details of vehicles registered in Odisha during 2014-24.

Table 4.2.1: Details of vehicles registered in Odisha during 2014-24

Sl. no.	Vehicle category	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1	Two Wheeler	476781	487604	39791	643738	719399	685837	494597	425745	505547	585229	605560
2	Three wheeler	17205	18335	18939	18197	206913	23316	11541	7364	10883	19091	21421

3	Car	6145	37255	39720	47918	54287	50974	44715	54527	65342	69975	66994
4	Bus	3296	3205	3004	3439	2288	1997	862	598	1545	2834	3753
5	Goods Carrier	16643	18200	19958	22978	30693	30002	19163	20512	23720	29635	26811
6	Others than mentioned above	64973	22413	24246	27787	56939	27919	26772	24323	20727	25883	29066

Source: VAHAN database, MoRTH, GoI

Based on the Ministry of Road Transport and Highways (MoRTH) data, Figure 4.2.1 shows the exponential growth in the number of vehicles registered in the state annually since 2014.

Figure 4.2.1: Year-wise total number of vehicles registered in Odisha
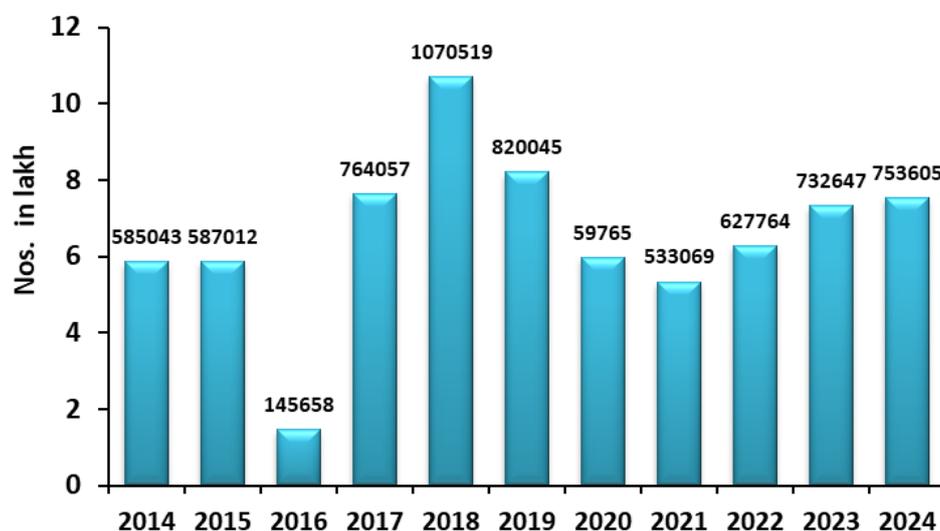
Source: VAHAN database, MoRTH, GoI.

On-Road Emission Inspection and Monitoring

On-road emissions inspection and monitoring are critical for ensuring that vehicles comply with air quality standards and reducing pollution from transportation. This approach involves measuring the emissions produced by vehicles while they are being operated on public roads, as opposed to relying solely on periodic inspections at fixed testing stations.

PUC stands for Pollution under Control certificate, which is a legal document issued to vehicles after they pass an emissions test. It certifies that the vehicle meets the emission standards set by the regulatory authorities in a specific country. PUC certification is mandatory in many regions to reduce air pollution and ensure vehicles operate within safe emission limits. The number of PUC centres in various cities in Odisha is depicted in Figure 4.2.2. The petrol vehicles are tested for carbon monoxide, hydrocarbons and lambda test whereas diesel vehicles

are only tested for smoke opacity, oil temperature, RPM, etc. PUC norms are linked to the different mass emission standards for vehicles. There is also an advisory from the Ministry of Road Transport and Highways for checking of the malfunctioning light of onboard diagnostic systems at the time of inspection and to return the vehicle for repair if the light is found to be 'on', indicating a technical problem.

Figure 4.2.2: Number of PUC centres in the different cities of Odisha
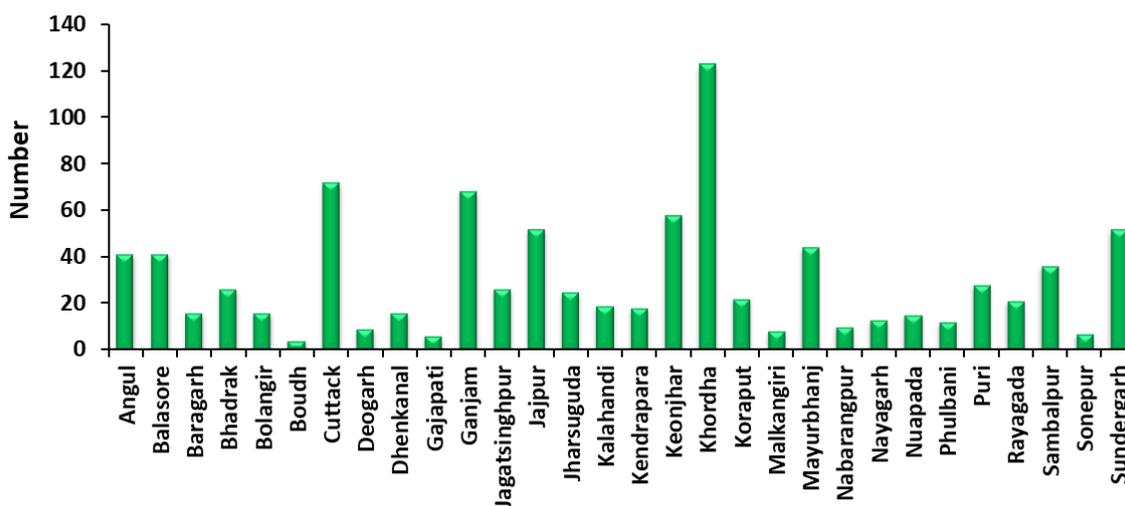
Source: VAHAN database, MoRTH, GoI.

Advancement of On-Road Emissions Monitoring

Advancements in on-road emissions monitoring have significantly improved the ability to measure, analyse, and regulate vehicle emissions in real-time. These innovations leverage modern technologies to ensure compliance with emissions standards, enhance air quality management, and reduce environmental impacts. Here are the key advancements:

- Remote Sensing Technology
- Portable Emissions Measurement Systems (PEMS)
- Artificial Intelligence (AI) and Machine Learning
- Internet of Things (IoT) Integration
- Enhanced Measurement Capabilities
- Use of Satellite Data
- Integration with Autonomous Vehicles
- Big Data and Analytics
- Renewable Energy-Powered Monitoring Stations
- Mobile Emissions Monitoring Units

Importance

- Environmental Impact: Transportation is a significant source of pollutants such as carbon monoxide (CO), nitrogen oxides (NO_x), hydrocarbons (HC), and particulate matter (PM), which contribute to air pollution and climate change.

- Health Concerns: Emissions from vehicles are linked to respiratory and cardiovascular diseases.

- Compliance: Ensures vehicles adhere to emission standards set by governments and regulatory bodies.

Phase-Out of Old Vehicles and Scrappage of End-of-Life Vehicles

The phase-out of old vehicles and the scrappage of end-of-life vehicles (ELVs) are key strategies adopted by governments and organizations worldwide to reduce pollution, improve road safety, and promotes sustainability. These initiatives involve retiring older, heavily polluting, and less efficient vehicles and replacing them with newer, cleaner, and more efficient ones. In the current global scenario, environmental pollution is considered to be the most alarming issue causing climate change, threatening the lives of important species. The rising number of vehicles, especially old vehicles, plying on the roads, is a major contributor to air pollution levels. Unlike developed countries, the current set-up for vehicle recycling in India is extremely unorganized and the majority of the vehicles are being scrapped through the informal sector which does not follow any Legal/ Environmental or Ethical norms. The non-scientific manner of recycling causes low material recovery, environmental damage by way of water/air/soil pollution, and unsafe working conditions for workers. The current unorganized system also lacks visibility and transparency in the process for owners and the government. On this backdrop, the Ministry of Road Transport and Highways (MoRTH) has notified the Motor Vehicles (Registration and Functions of Vehicle Scrapping Facility) Rules, 2021 vide Notification No. G.S.R. 653(E), Dated. 23rd September 2021 and Motor Vehicles (Registration and Functions of Vehicle Scrapping Facility) Amendment Rules, 2022 vide Notification No. G.S.R. 695(E), Dated. 13th September 2022, which lays down the procedure for the establishment of a "Registered Vehicle Scrapping Facility" (RVSF) for carrying out dismantling and scrapping operations of "End of Life" vehicles. This applies to all vehicles and their last registered owners, Automobile collection centers, Automotive Dismantling, Scrapping and Recycling Facilities and re-cyclers of all types of automotive waste products. The government of India has also requested all State Governments/ UTs to formulate a Policy to carry out the provisions of the Motor Vehicles (Registration and Functions of Vehicle Scrapping Facility) Rules, 2021.

India Bharat Stage VI Emission Standard

On February 19, 2016, the Indian Ministry of Road Transport and Highways (MoRTH) issued a draft notification of Bharat Stage (BS) VI emission standards for all major on-road vehicle categories in India. The standards apply to light- and heavy-duty vehicles, as well as two- and three-wheeled vehicles. As proposed, the BS VI standards will go into effect for all vehicles in these categories manufactured on or after April 1, 2020. The draft BS-VI proposal specifies mass emission standards, type approval requirements, and on-board diagnostic (OBD) system and durability levels for each vehicle category and sub-classes therein. In addition, reference and commercial fuel specifications are included in the BS-VI proposal. The adoption of the proposed BS-VI emission standards will essentially bring Indian motor vehicle regulations into alignment with European Union regulations for light-duty passenger cars and commercial vehicles, heavy-duty trucks and buses, and two-wheeled vehicles. While not yet reaching European levels, more stringent emission standards are also set for three-wheeled vehicles.

Table 4.4.2 displays the dates when BS III, BS IV, and BS VI were implemented. On January 6, 2016, the Indian Ministry of Road Transport and Highways (MoRTH) announced its decision to leapfrog from BS IV to BS VI emission standards in an accelerated fashion, with full implementation of BS VI level emission standards beginning in 2020. This announcement was supported by corresponding actions taken by the Ministry of Petroleum and Natural Gas (MoPNG) to ensure a nationwide supply of BS-VI fuel along with the proposed BS-VI emission standard implementation date of April 1, 2020.

Table 4.4.2: BS-III, BS-IV and BS-VI implementation dates

BS III implementation date	BS IV implementation date	BS VI implementation date
2010	2017	2020

- The BS emission standards are based on the European emission standards (Euro). For example, BS III is based on Euro 3, BS IV is based on Euro 4, and BS VI is based on Euro 6.
- The BS VI standard also includes a limit for ammonia emissions.
- The BS VI standard made it mandatory for manufacturing companies to change their production lines to produce BS-VI fuel-friendly engines. This made BS-VI vehicles more expensive than BS-IV vehicles.

Electric Vehicles

Climate change has become a global concern over the last few decades and rapid global temperature increase has created the need for a reduction in the use of fossil fuels to reduce pollution caused by emissions. Due to rapid urbanization, the number of automobiles has gone up manifold leading to increased pollution. Electric vehicles can improve the above scenario by reducing local concentrations of pollutants in the world. Many countries have included EVs as an element of their transportation policy. Their responses vary according to their stage of economic development, energy resources, technological capabilities and above all political prioritization of their response to climate change. India is also operating in the same global context as other countries that have adopted an EV policy. But India has a unique mobility pattern and the rapid growth rate of vehicles as well as the ownership is a key difference between India and developed countries. Further, the large variety of motorized transport on roads and its auto segments are quite different from most of the developed countries. The government of India has therefore adopted a National Electric Mobility Plan and has committed to cutting its emission intensity by 35% below 2005 levels by 2030 and requested all the States and Union Territories to frame their own EV policy.

Whereas climate change has become a global concern over the last few decades and the road transport sector pollution plays a major role in the rapid increase in the global temperature therefore, there is a need for reduction in the use of fossil fuels to reduce pollution due to emission. Whereas, Government of Odisha have framed a draft "Odisha Electric Vehicle Policy, 2021" vide Notification No.1360 dated the 11th February 2021 which was notified in the Extraordinary Gazette No. 268 dated the 12th February 2021 inviting suggestions for any inclusion or omission in the final policy. The registered e-vehicles in Odisha from the last 10 years (2014-2024) are shown in Table 4.4.3 and Figure 4.4.3.

And now, therefore after considering the suggestions received within the stipulated time, the Government have been pleased to announce the following Policy, namely, Odisha Electric Vehicle Policy, 2021 to build Odisha into a model State in promotion of EVs through adoption, adaptation, research & development apart from facilitating growth in employment.

Table 4.4.3: Registered Vehicles from 2014-2024 in Odisha

Year	Electric/BOV	Total vehicle registration	%
2014	51	585043	0.01
2015	47	587012	0.01
2016	25	145658	0.02

2017	212	764057	0.03
2018	1358	1070519	0.13
2019	1160	820045	0.14
2020	903	597650	0.15
2021	5626	533069	1.06
2022	28445	627764	4.53
2023	44543	732647	6.08
2024	65341	753605	8.67

Source: VAHAN database, MoRTH, GoI.

Figure 4.4.3: Electric vehicles sales annually in Odisha since 2014
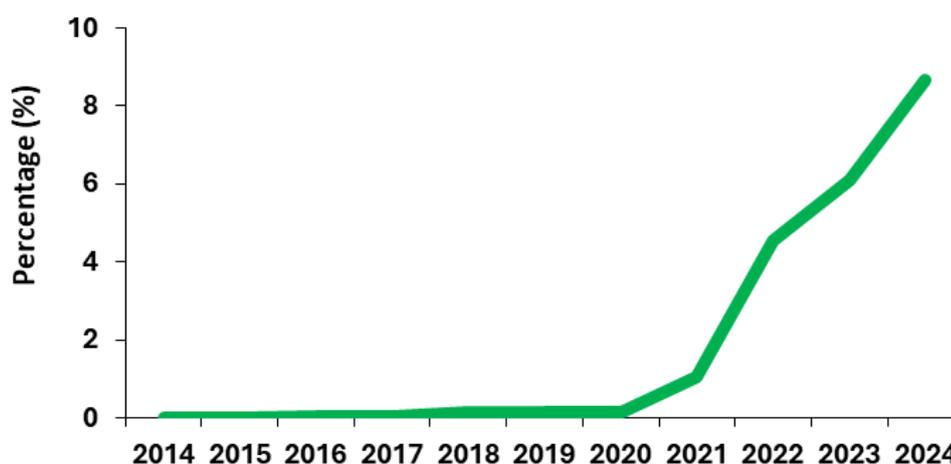
Source: VAHAN database, MoRTH, GoI.

Basing on the techno-economic development in the EV sector, there is need to formulate a policy for promotion of Electric vehicles in Odisha to keep pace with other states of India. The Government of Odisha envisages to build Odisha a model State in promotion of EVs through adoption, adaptation, research & development apart from facilitating growth in employment.

CNG-operated vehicles

CNG (Compressed Natural Gas) vehicles are a popular alternative to petrol or diesel vehicles due to their environmental and economic benefits. CNG is a clean and sustainable fuel derived from natural gas, primarily composed of methane (CH_4). It is widely used as an alternative to traditional fuels like petrol and diesel due to its environmental and economic benefits. Below is an overview of its background:

Advantages

- Eco-Friendly: CNG produces fewer harmful emissions like CO_2, CO, and NO_x compared to petrol and diesel, contributing to cleaner air.

- Cost-Effective: CNG is generally cheaper than petrol or diesel, resulting in significant fuel cost savings over time.

- Engine Longevity: CNG combustion generates less carbon residue, leading to less engine wear and tear.

- High Octane Rating: CNG has a higher-octane number, which improves engine efficiency and reduces knocking.

- Safety: CNG tanks are robust and built to withstand high pressure, making them safer than traditional fuel tanks.

Non-motorized Transport (NMT)

With the National Urban Transport Policy (NUTP) notified in 2006 and the National Mission on Sustainable Habitat (NMSH) formed in 2009 among other initiatives, we now have National level policy support for NMT. The objective of NUTP 2006 is stated as "to ensure safe, affordable, quick, comfortable, reliable and sustainable access for the growing number of city residents to jobs, education, recreation and such other needs within our cities." Cities that received funds through NUTP were encouraged to prioritize non-motorized transportation. In particular the following NMT priorities are highlighted in the NUTP:

- The safety concerns of cyclists and pedestrians must be addressed by encouraging the construction of segregated lanes for bicycles and pedestrians. Segregation of vehicles moving at different speeds would improve traffic flow.

- Segregated non-motorised vehicle (NMV) paths are required not only along arterials but also on access roads to public transport terminals. This will increase the use of the public transport system particularly when combined with the construction of NMV parking.

- Specific area plans for exclusive non-motorized modes will be supported and cycling use must be encouraged through public bicycle programs and cycling infrastructure.

Non-Motorized Transport (NMT) refers to modes of transportation that do not rely on engines or motors. NMT is an important part of urban mobility, but it is often overlooked in transport system planning. NMT, also known as human-powered transport or active transport, includes walking, cycling, skating, wheelchair travel, and handcarts. NMT is a vital component of sustainable urban mobility and has significant environmental, social, and health benefits. Odisha has been actively working to enhance Non-Motorized Transport (NMT) as part of its broader urban mobility and environmental strategies. It has many benefits for society and individuals, including.

- Improved physical health
- Improved air quality
- Improved accessibility
- Improved road safety
- Improved public transit access
- Empowerment of vulnerable groups
- Low carbon footprint
- Minimal energy consumption
- Zero local emissions

Non-motorized transport (NMT) in Odisha, like in many other states, plays a crucial role in promoting sustainable mobility, reducing congestion, improving air quality, and supporting the environment. NMT generally includes walking, cycling, and the use of non-motorized vehicles such as cycle rickshaws and carts. Here's an overview of NMT in Odisha:

Current Scenario

Walking: Walking is the primary mode of transportation for short distances, especially in urban areas like Bhubaneswar, Cuttack, and smaller towns. However, inadequate pedestrian infrastructure such as footpaths and pedestrian crossings poses challenges.

Cycling: Cycling is a popular mode of transport, especially in rural areas and among economically disadvantaged groups. However, urban areas lack dedicated cycling infrastructure, such as bike lanes or parking facilities.

Challenges

Lack of Infrastructure: Limited or poorly maintained sidewalks, absence of cycling lanes, and lack of dedicated NMT zones are major issues.

Safety Concerns: High traffic volumes and lack of proper crossings make walking and cycling risky.

Urban Planning Gaps: Urban development projects often prioritize motorized transport, sidelining NMT-friendly infrastructure.

Public Awareness: Limited awareness about the environmental and health benefits of NMT hinders its widespread adoption.

Government Initiatives

The Odisha government has taken steps to improve NMT as part of sustainable urban development:

Smart City Initiatives: Under the Smart Cities Mission, cities like Bhubaneswar are developing pedestrian-friendly streets, and dedicated cycle tracks.

Comprehensive Mobility Plans (CMP): Urban mobility plans include provisions for NMT infrastructure.

Awareness Campaigns: Promotion of cycling and walking through events like car-free days.

Proposed Solutions and Recommendations

Infrastructure Development: Develop continuous sidewalks, cycling tracks, and greenways. Ensure proper street lighting and shade for pedestrians and cyclists.

Integration with Public Transport: Create seamless connectivity between NMT and public transport like buses and rail.

Safety Measures: Implement traffic-calming measures, zebra crossings, and dedicated NMT signals to enhance safety.

Policy and Planning: Enforce policies mandating NMT considerations in urban planning and infrastructure projects.

Promoting non-motorized transport in Odisha can significantly contribute to achieving sustainable urban mobility, reducing greenhouse gas emissions, and enhancing public health and livability.

Most cities and towns of Odisha are compact and that reduces the average daily travel trips. Well-organized intermediate transport, along with good walking and cycling infrastructure can meet most of the travel demand and convert a sizable share of urban commuting trips to zero emissions.

Improvement of Traffic Management

Road traffic accidents are a major cause of death and injury in Odisha and are preventable. The Safe System Approach (SSA) is a framework that many countries in India use to reduce road traffic deaths and injuries. The SSA prioritizes human life and health over other objectives of the road traffic system. In such areas, insufficient parking, lack of pedestrian facilities, and inadequate enforcement have compounded traffic problems. Enhancement in the number and capacity of the traffic police and related equipment is critical.

- **Congestion control**: Implement policies that reduce traffic congestion, such as carpool lanes, improved public transport systems, and intelligent traffic management systems.

- **Better public transportation**: Invest in modernizing and expanding the public transportation network to encourage citizens to use buses, metro systems, and shared vehicles, reducing the number of personal vehicles on the road.

Odisha has implemented several initiatives to improve traffic management, including:

- **Intelligent Enforcement Management System (IEMS):** This project uses ANPR cameras to monitor traffic and enforce policies for speeding, triple riding, and other violations.

- **Adaptive Traffic Signal Control System:** This system adjusts signal timings based on traffic volumes and predicts emergencies. The goal is to reduce congestion and improve travel time reliability.

- **Advanced Traffic Management System:** This system uses cameras, sensors, and GPS devices to collect traffic data. It also includes features such as adjustable signal control, incident identification, and smart parking solutions.

- **Smart Traffic Management System:** This system uses low-cost sensors to detect vehicles and collect traffic data. It also uses IoT devices to send traffic data to big data analytics centers.

Infrastructure for Cleaner Fuels and Technologies

- **Fuel quality improvement:** Ensure the availability of cleaner fuels like CNG and LPG across the state by building more refueling stations and making cleaner fuel more affordable.

- **Charging infrastructure for electric vehicles:** Establish EV charging stations across the state, especially in urban centers, highways, and key transit hubs.

- **Development of green zones:** Designate specific zones where only electric or low-emission vehicles are allowed, such as in congested commercial areas or near schools.

Renewable Energy Sources

These can include geothermal, wind, and solar photovoltaic (PV) technologies. Odisha is among the leading industrialised states in the country and a continuous increase in energy demand from all sectors is expected in the years to come. There is a clear demand for RE from the DISCOMs and the industries due to RPO and Net Zero commitments. It is desirable that these obligated entities meet most of their RE requirement from projects developed inside the State. Hence, the Government has formulated a new RE Policy to facilitate the development of commercially viable projects across multiple RE technologies within the State both for captive and open access consumption. As Industries and Governments embark upon the journey of energy transition, it is essential to ensure that the transition is 'just'. Proper training will be required for the youth and working population to take up jobs in RE sector. The Policy aims to create skilled and semi-skilled manpower for the RE sector. With this primary objective to create an enabling environment for harnessing the maximum potential of Renewable Energy in the State through Government, private sector and individual efforts, the Odisha Renewable Energy Policy 2022 has been developed.

Emission Inventory in Vehicle Sector

Odisha has identified seven non-attainment cities—Angul, Balasore, Bhubaneswar, Cuttack, Kalinga Nagar, Rourkela and Talcher, —where air quality does not meet the National Ambient Air Quality Standards (NAAQS). To address this, the State Pollution Control Board (SPCB) of Odisha has initiated Emission Inventory (EI) and Source Apportionment (SA) studies to identify and quantify pollution sources in these cities. In response to directives from the National Green Tribunal (NGT), the SPCB issued an Expression of Interest (EoI) in June 2019 to engage educational and research institutions for conducting EI and SA studies in non-attainment cities. The objective is to identify pollution sources across sectors such as vehicular emissions, industrial activities, construction dust, and residential pollution. PM_{10} emissions contribute in Angul (1.5%), Balasore (20.4%), Bhubaneswar (20.4%), Cuttack (11.2%), Kalinga Nagar (2.3%), Rourkela (3.4%) and Talcher (4.6%) followed by transport whereas $PM_{2.5}$ emissions contribute in Angul (4.6%), Balasore (32.5%), Bhubaneswar (32.5%), Cuttack (20.4%), Kalinga Nagar (6.4%), Rourkela (8.2%) and Talcher (8.7%).

Public Awareness and Education

- Awareness campaigns: Launch state-wide campaigns to inform the public about the harmful effects of vehicular pollution and the benefits of using cleaner fuels and vehicles. This can include advertisements, workshops, and school programs. Government and NGOs can organize events, distribute pamphlets, and use social media to spread information.

  (Examples: Car-free days, workshops on eco-friendly practices.)

- Promotion of eco-driving practices: Educate drivers on fuel-efficient driving practices that reduce pollution, such as avoiding idling, smooth acceleration, and regular vehicle maintenance.

- Media Engagement: Use TV, radio, and online platforms to share pollution statistics and preventive measures. Highlight success stories of reduced emissions.

- Community Initiatives: Promote carpooling, use of public transportation, and cycling. Encourage tree planting and green infrastructure.

- Technological Solutions: Advocate for the use of electric vehicles (EVs) and cleaner fuels. Educate about the importance of maintaining vehicles to reduce emissions.

Incentives and Penalties

Incentives for adopting cleaner technologies: Offer financial incentives for individuals and businesses that switch to cleaner technologies, such as tax credits for electric vehicle

purchases or conversions. Penalties for polluting vehicles: Introduce a fine system for vehicles that exceed permissible emission limits, especially for those failing regular emission checks.

Recommendations

- Stricter Enforcement of emission standards and regular vehicle inspections.
- Expansion of EV Infrastructure and incentives to encourage the adoption of electric and hybrid vehicles.
- Upgrading Public Transport systems to reduce the number of private vehicles on the road.
- Incentives for Scrapping Old Vehicles to remove high-polluting vehicles from circulation.
- Increased Public Awareness campaigns on the health risks of vehicular pollution and the importance of eco-driving practices.

Action plan: Controlling Vehicular Pollution

Sl. no.	Indicative actions	Status of activity (completed/ ongoing/to be started)	Timeline for completion	Target (coverage/ percentage)	Financial implications (Yes/ No)	Funds allocated (Rs Crore)	Funds utilized as on date (Rs Crore)
1	Notification for phasing out old vehicles (Commercial: 10 years; Private: 15 years)	Government of Odisha has notified Vehicle Scrapping Policy to scrap 15 years old vehicles by Notification no.3345 dated 30/11/2022. In the Policy it states "Mandate of Vehicle Scrappage Policy" • For effective Implementation of this scrappage policy to reduce vehicular pollution & phase out unfit and polluting vehicles, thereby promoting the recycling of vehicle scrap in an eco-friendly manner, the following steps shall be adopted. • All Govt. Vehicles under different Govt. Departments, Organisations, PSUs, Autonomous Councils, ULBs etc. above 15 years of age as on 1st April 2022 are to be mandatorily scrapped through a Registered Vehicle Scrapping Facility (RVSF) by 31st December 2022 at the scrap value as per the existing market rates.	Policy has already been notified in 2022.	During FY 2023-24, 2668 number of 15 years old Govt vehicles have been scrapped at RVSF centres. From April 2024 to November 2024, 1042 numbers of 15 years old Govt vehicles have been scrapped at designated RVSF centres. Further, Transport Department , Govt of Odisha has submitted a plan for scrapping of 5024 numbers of 15 years old vehicles at RVSF centre in the FY 2024-25.	NA	NA	NA
2	Policy for scrapping old vehicles	Government of Odisha has notified Vehicle Scrapping Policy to scrap 15 years old vehicle by Notification no. 3345 dated 30/11/2022. The Govt of Odisha has notified the implementation of Motor Vehicle(MV) Tax concession on Vahan for new vehicle	Policy has already been notified in 2022.	As per the notified policy Odisha has two vehicle scrapping facility. One RVSF center at Khordha. 1. Second RVSF center at Jajpur will be operational soon. 2. Collection center at Keonjhar.	Scheme for special assistance to State for Capital Investment.	NA	NA

		registration against Certificate of Deposit i.e. • 25% in case of non-transport vehicles and 15% in case of transport vehicles. • This concession shall be available up to 8 years in the case of transport vehicles and up to 15 years in the case of non-transport vehicles. • Further, one time waiver of pending liabilities such as pending tax, penalities etc. for 2 years on vehicles scrapped at RVSF centre have also been notified in the State. • Further scrap value for old vehicles shall be given by the Scrapping center approx. 6% of the ex-showroom price prevailing at the time of scrapping. Notification No. 517/TRN-LC-MISC-0021-2021 Dated 13/01/23. Notification No. PT3-TRN-LC-MISC-0021-2021/10895 Dated 14/10/24.		Since inspection in 2023, 7882 vehicles were auctioned out of which 3710 were scrapped till December 2024.			
3	Policy/Plan for Li-battery waste management from scrapped vehicles	Government of Odisha has notified vehicle scrapping policy to scrap 15 years old vehicle by notification no. 3345 dated 30/11/2022. • In the policy it is mentioned that "In case scrapping yards do not have adequate capability or provisions for responsible recycling of hazardous waste (like e-waste, lead acid batteries, lithium-ion components, or for recovery of rare earth metals etc.), or for recycling of scrap material, which is	Policy has already been notified in 2022.	At all designated RVSF centres established in Odisha.	NA	NA	NA

		outside its scope, then such materials shall be sold to duly authorized re-cyclers or agencies who have adequate capability and license."						
4	Policy/Scheme for Eco-Friendly Mass Rapid Transport Systems	Capital Region Urban Transport (CRUT) is buying e-vehicles for seamless public transport. 50 E-buses procured under FAME II.	Completed	100%	NA	NA	NA	NA
		200 E-buses procured under the Bhubaneswar City Bus Modernization Plan (BCBMP)	Mar-25	30%	NA	NA	NA	NA
		400 E-buses approved under the PM e-buses Sewa Scheme.	To be decided	NA	NA	NA	NA	NA
5	Policy for augment e-vehicles	• The Odisha EV Policy was notified by the C&T Dept. on 02nd Sept. 2021. • Grant for subsidy was notified in 2022. • Govt. of Odisha amended the subsidy amount in Apr- 2023. _See subsidy table below_ • Provision for 100% interest free loans (up to 15 lakhs) to	20% electric vehicles in Odisha by 2025.	• 211% growth seen in FY 2022-23 as compared to FY 2021-22 in EV registration. • A dedicated portal has been developed for grant of subsidy & it has been launched by HCM in 2022. • After the amendment of subsidy amount in 2023, an 58% growth was seen in FY 2023-24 as compared to FY 2022-23. • The calendar year wise registration. _See EV registration table below_	NA	NA	NA

Subsidy table (Row 5):

Category of vehicle	Age of cost of vehicle as subsidy	Maximum amount of subsidy
2 W	Rs. 5000/- per kWh	Rs. 20,000/-
3 W	-	Rs 30,000/- per vehicle (flat)
4 W	Rs. 10,000/- per kWh	Rs. 1,50,000/-

EV registration table (Row 5):

Calendar year	EV registered
2021	5626
2022	28445
2023	44543
2024	65341

		State Government employees for purchase of electric vehicle.					
6	Notification and enforcement of PUC norms	The Odisha Motor Vehicle Rule 129-A provide the procedure for issuance of pollution under control certificate to all category of vehicles which has already been implemented in the State of Odisha and enforcement for non-compliance of PUC norms are done on a regular basis by the RTOs & Police. Penalties under the provision of 190 :(II) of MV act.	Completed	Entire Odisha	NA	NA	NA
7	Online monitoring of PUC implementation	As per the Ministry of Road Transport & Highways, Govt. of India, notification GSR No. 527 (E) dated 06.06.2018; the emission results obtained during pollution testing shall be electronically uploaded through online process in VAHAN from 01st April 2019. The manual certificates issued by Pollution Testing Centres have been stopped. Circular NO. 3 of 2019 dated: 07/06/2019 has been issued for monitoring of PUC. NIC is developing the PUC version 2.0 application for PUC monitoring and after implementation of the version 2.0, PUC is available in Central Database which can be accessed nationwide.	Will be completed within the next 06 months.	Entire Odisha	NA	NA	NA
8	Mechanism for centralized record maintenance of PUC check by the concerned transport authorities to be incorporated	PUC is issued in a centralized application in a Pan India Level. Implementation of online PUC already started in 2019. Data pertaining to the PUC is available in Central Database which can be accessed nationwide.	Completed	Entire Odisha	Fees are collected from the authorized application that operates the PUC centre in Odisha.	NA	NA
9	Construction of bypass/ ring roads	Not related to Transport Dept.	NA	NA	NA	NA	NA

10	Re-filling Stations retrofitted with Vapor Recovery System	Not related to Transport Dept.	NA	NA	NA	NA	NA
11	Incentive of setting up R&D facilities related to EVs	In the EV Policy it is mentioned that, A Centre of Excellence shall be set up at once of the State Universities within Odisha and hall be funded by Government. The centre shall focus on research and development regarding design and use of EVs, improving the usage and efficiencies of EVs and charging equipment.	No time limit	NA	NA	NA	NA
12	Any others Policy/Rules/Standards/Guidelines pertaining to vehicular emissions	Governed under CMV Rule 1989, MV Act 1988 & OMV Rule 1993	NA	NA	NA	NA	NA

4.3 Construction & Demolition Waste and Road Dust Management

As Odisha is urbanizing, construction of buildings and infrastructure is pacing up. While construction and demolition (C&D) contributes to dust pollution, its waste also causes considerable environmental damage. While the C&D sites need stringent dust control management, the waste can also be recycled and reused to substitute naturally sourced material. The Bureau of Indian Standards (BIS) has already amended rules to allow the use of concrete made from recycled material and processed C&D waste as an alternative to natural aggregates. While CPCB has issued dust control guidelines from construction sites, the C&D Rules and Regulations 2016 define the full ambit of C&D waste management. The urban local bodies are expected to amend the municipal byelaws accordingly. Additionally, Swachh Sarvekshan 2021 of MoHUA has accorded more weightage to waste management infrastructure and waste processing efficiency. This requires a waste collection system, notified charges for C&D services, segregation of waste and collection, processing and reuse of waste. This makes the programme more performance oriented.

This requires comprehensive assessment and quantification of C&D waste generation from active construction sites and site-wise management plan indicating disposal and utilization in order to plan adequate infrastructure and system for management. Accordingly, cities and towns need to implement dust control methods, network of collection points and GPS-enabled transportation systems, recycling facilities, and strategies for uptake of the recycled products. There are already established systems of recording all the approved construction projects of 500 sqm or more on the Odisha Real Estate Regulatory Authority (ORERA) or EIA portals. Potential generation of waste can be estimated by using thumb rules such as those developed by TIFAC (2001) under the Department of Science and Technology. All EIA and ORERA projects should be asked to adopt forecasting systems for waste generation and waste management strategies during the pre-construction stage. While the recycling capacity is being augmented in the state, it is necessary to encourage the sharing of these facilities by a cluster of towns and cities to maximize asset utilization and to make investments more efficient. The construction industry needs to be incentivized to manage their own waste and do onsite reuse and recycling. It is also necessary to integrate the informal sector to improve collection efficiency and make the process more cost-effective.

District-wise C & D Waste Generation in Odisha

Presently, Odisha has 172 urban local bodies (ULBs) including 5 nos. of Municipal Corporations, 54 Municipalities and 113 Notified area councils (NAC). Based on Form-IV submitted by OSPCB to CPCB, Odisha has 115 ULBs in 30 districts as of FY 2023-24. The details of ULB-wise population, C&D waste generation (TPD) and area of solid waste disposal

site in (acre) for the year 2023-24 are given in Annexure - I. The C&D waste generation in each district of Odisha is represented as Figure 4.3.1

Figure 4.3.1: District-wise C&D waste generation in Odisha for FY 2023-24
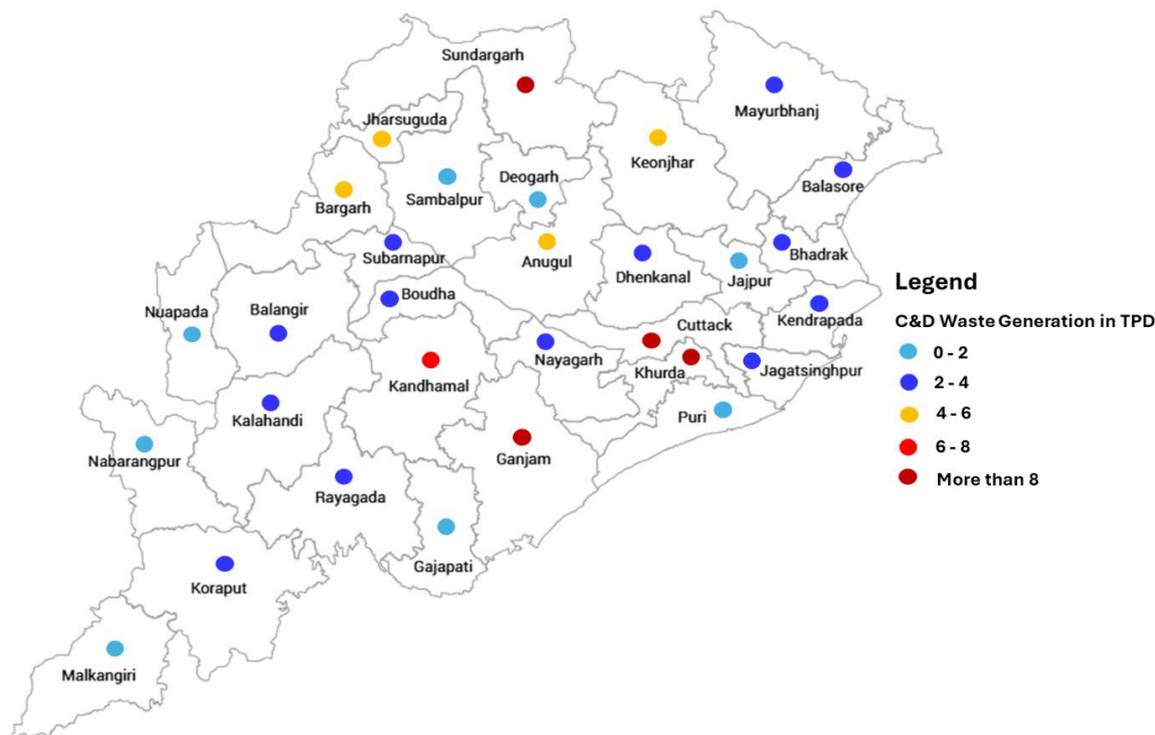
Source: State Pollution Control Board, Odisha, 2023-24.

Figure 4.3.1 depicts that, the total C&D waste generated across 115 ULBs in Odisha for the year 2023-24 was 260.14 TPD. Bhubaneswar Municipal Corporation generating 120 TPD topped the list, followed by Cuttack (35 TPD), Digapahandi NAC (6 TPD), Baliguda NAC (6 TPD) and Rourkela Municipal Corporation (5 TPD). 47 ULBs were produced C&D waste between 1 TPD and 5 TPD, while 67 ULBs reported generating less than 1 TPD. The C&D waste produced by Gopalpur NAC was not reported.

Angul district generated 4.5 TPD of C&D waste for the year 2023-24 across 3 ULBs. Talcher Municipality generated 3 TPD of C& D waste followed by Angul Municipality (1 TPD) and Athmalic NAC (0.5 TPD). The city has three monitoring locations to ensure that the transportation of construction materials is conducted in covered vehicles. The ULBs have set aside a separate area for the disposal of C&D waste generated within its boundary. There is no C&D processing plant in Angul district, and the collected C&D waste is used for filling roadside areas or low-lying areas. The Angul municipality employs two tractor-trailers for the transportation of C&D waste. Total C&D waste generation in Balasore district was estimated 2.51 TPD from its 5 ULBs. Balasore municipality has generated 0.5 TPD of C&D waste. One landfill site at Phulladi, Lumia Jodi Polo (ward no. 31) is used for landfilling of this waste. All

31 wards are covered for the collection of C&D waste. About ten tractor-trailers are employed for the transportation of C&D waste. Bolangiri district includes 5 ULBs and total C&D waste generation was 3.6 TPD. The district has a separate area of 6.3 acres for the disposal of C&D waste. Total C&D waste generation in Baragarh district was estimated to be 5.5 TPD across 5 ULBs. Bargarh Municipality produced 2 TPD of C&D waste and has a separate area of 3 acres for the disposal of C&D waste generated within its boundary.

Bhadrak district produced 2.75 TPD of C&D waste across 4 ULBs. Dhamnagar NAC generated 1.5 TPD of C&D waste followed by Bhadrak Municipality (0.8 TPD) and the rest of ULBs produced less than 0.25 TPD of waste. Boudh and Deogarh districts each have only one ULB i.e., Boudh NAC and Deogarh Municipality and each generated 3 TPD and 1 TPD of C&D waste respectively. Cuttack district has 4 ULBs and total C&D waste generation was 39.1 TPD. Cuttack Municipal Corporation topped the list with 35 TPD of waste generation and has a 10-acre area for disposal of C&D waste. About 128 vehicles of various types are available for C&D waste transportation in Cuttack. CMC has also proposed setting up a C&D waste processing facility with a processing target of 10 TPD. Dhenkanal district generated 2.27 TPD of C&D waste across 4 ULBs and Gajapati district generated 0.98 TPD of C&D waste across 2 ULBs. Ganjam district which consists of the highest numbers of ULBs (18) generated 18.32 TPD of C&D waste. Jagatsingpur, Jajpur, Kendrapada, Malkanagiri and Nabarangpur districts each have 2 ULBs each generating 3.7 TPD, 1 TPD, 2.25 TPD, 1.5 TPD and 0.45 TPD of C&D waste, respectively for the year 2023-24. Vyasanagar Municipality has proposed setting up a C&D waste processing facility with a processing target of 10 TPD. Jharsuguda district which consists of Belpahar Municipality, Brajarajnagar Municipality and Jharsuguda Municipality generated 5.5 TPD of C&D waste. Kalahandi district generated 2.46 TPD of C&D waste across 4 ULBs. Bhawanipatna Municipality and Junagarh NAC each produced 1 TPD of waste and the rest ULBs produced less than 0.5 TPD of C&D waste. Kandhamal and Keonjhar district produced 6.53 TPD and 5.7 TPD of C&D waste across 3 ULBs and 5 ULBs, respectively.

Khordha district generated 121.59 TPD of C&D waste for the FY 2023-24. Bhubaneswar Municipal Corporation alone generated 120 TPD of C&D waste and topped the list followed by Banpur NAC (0.78 TPD), Khordha Municipality (0.5 TPD), Balugaon NAC (0.23 TPD) and Jatni Municipality (0.08 TPD), respectively. C&D waste generation in Koraput and Mayurbhanj districts was 2.23 TPD and 2.22 TPD, respectively across 4 ULBs each. Nuapada, Rayagarh and Subarnapur districts generated 1.45 TPD, 2.6 TPD and 2.5 TPD of C&D waste, respectively across 3 ULBs for the year 2023-24. Nayagarh, Puri and Sambalpur district generated 2.72 TPD, 0.225 TPD and 1.75 TPD of C&D waste across 5 ULBs, 4 ULBs
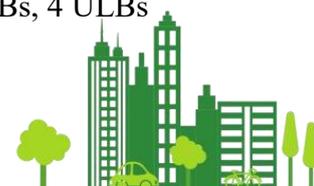
and 3 ULBs, respectively. Sundergarh district generated 10.23 TPD of C&D waste across 4 ULBs. Rourkela Municipal Corporation generated 5 MT of C&D waste and has a disposal area of 5 acres within its jurisdiction. Sundergarh Municipality, Rajagangpur Municipality and Biramitrapur Municipality generated 4.5 TPD, 0.7 TPD and 0.03 TPD of C&D waste respectively. Rourkela Municipal Corporation has also proposed a C&D waste processing facility with a processing target of 10 TPD. Currently, there is no C&D processing plant in 115 ULBs of Odisha and the collected C&D waste is used for filling roadside areas or low-lying areas.

Rules and Regulations of CDWM in India
General Aspects of the CDWM Rules, 2016

The Ministry of Environment, Forest and Climate Change (MoEF&CC) notified Construction & Demolition Waste Management (CDWM) Rules on 29th March 2016 to address the growing problem of CDW by establishing a uniform approach to standardise the random and separate actions being taken by each state vid Gazette notification G.S.R. 317(E) Part-II, Section-3, Sub-section (ii). The guiding principle of the rules is to recover, recycle and reuse (3R's) the waste generated through construction and demolition. Segregating CDW and depositing it to the collection centres for processing is the responsibility of every waste generator.

Based on the size of the city, the rules specify the timeline for implementation of the three main stages in CDWM:

1. Policy formulation
2. Site identification
3. Commission of facility based on the size of the city

Monitoring shall be made by State Pollution Control Boards (SPCBs) three times a year i.e. once in four months for cities having population of more than one million. Cities with populations of 0.5-1 million and less than 0.5 million shall be monitored by SPCBs two times a year i.e. once in six months (Rule - 13). Permission for construction will be given only when the complete construction and demolition waste management plan is presented. Large generators of waste will have to pay relevant charges for collection, transportation, processing and disposal, as notified by the concerned authorities. The CDW Rules' Appendix includes a collection of form templates including an application template for authorisation of CDW processing facility and an annual report template. These templates are provided to support the responsible stakeholders and to simplify implementation processes. The rules also incorporate

compliance criteria for setting up and operating a CDW processing facility (see CDWM rules, Schedules I and II) including environmental protection aspects:

- Minimum life of processing facility to be 20-25 years.
- Buffer for five tons per day on facility grounds.
- Facility to be away from habitation, forest areas, national parks, water bodies etc.
- Facility to be fenced including a vegetation boundary around the premises.
- Gate to monitor vehicles, weigh bridge and fire protection are mandatory.
- De-watering, sewage treatment and noise reduction of machines.
- Measuring of air and noise quality.

In addition to the legal framework, the 2016 CDWM Rules of India also provide material to guide the responsible stakeholders in implementing CDWM plans and strategies.

CDWM Rules Important Duties for Involved Parties

This section highlights the tasks and duties of stakeholders involved in the process of CDWM. According to the rules, the most important stakeholders are waste generators, service providers and contractors and the different administrative units from state to local governments. The duties of different stakeholders are described below.

Duties of waste generators (Rule – 4)

- Every waste generator shall segregate CDW and deposit it at a collection centre or transfer it to the authorized processing facilities.
- Shall ensure that there is no littering or deposition to prevent obstruction to the traffic or the public drains.
- Large generators (who generate more than 20 tons or more in one day or 300 tons per project in a month) shall submit a waste management plan with appropriate approvals from the local authority before starting construction or demolition or remodelling work.
- Large generators shall have an environment management plan to address potential environmental issues from construction, demolition, storage, transportation process and disposal/reuse of CDW.
- Large generators shall segregate the waste into streams such as concrete, soil, steel, wood and plastics, bricks and mortar.
- Large generators shall pay relevant charges for collection, transportation, processing and disposal as notified by the concerned authorities.

Duties of Service Providers and Contractors (Rule –5)

- The service providers shall prepare a comprehensive waste management plan for waste generated within their jurisdiction, within six months from the date of notification of these rules.
- Shall remove all CDW in consultation with the concerned local authority or through any agency.

Duties of Local Authorities and State Government (Rule –6 & 9)

- Local Authority (LA) shall place appropriate containers for collection of waste, removal at regular intervals, and transportation to appropriate sites for processing and disposal.
- LA shall seek a detailed plan or undertaking from large generators of CDW and sanction the waste management plan.
- Seek assistance from concerned authorities for the safe disposal of CDW contaminated with industrial hazardous or toxic material or nuclear waste if any.
- LA shall give appropriate incentives to generators for salvaging, processing and or recycling preferably in situ.
- The Secretary of Urban Development Department in the state government shall prepare state's policy with respect to the management of CDW.
- The concerned department in the state government dealing with land shall provide suitable sites to establish facilities to store, process, and recycle CDW.
- The town planning department shall incorporate the site in the approved land use plan so that there is no disturbance to the processing facility on a long-term basis.
- Shall procure and utilize 10-20% of materials made from CDW in municipal and government contracts.

Duties of SPCB or Pollution Control Committee, Central Pollution Control Board, (Rule –8 & 10)

- SPCB shall grant authorization to CDW processing facility.
- The Central Pollution Control Board shall prepare operational guidelines related to the environmental management of CDW.
- Monitor the implementation of these rules by the concerned local bodies, and submit annual report to Central Pollution Control Board and the State Government

Standards for Products of Construction and Demolition Waste (Rule –11)

- The Bureau of Indian Standards shall prepare a code of practices and standards for products of CDW.

- Indian Roads Congress (IRC) shall prepare standards and practices pertaining to products of CDW in road construction.

Duties of Central Ministries (Rule –12)

- The Ministry of Urban Development, Ministry of Rural Development, and Ministry of Panchayati Raj shall facilitate local bodies in the compliance of these rules.

- The Ministry of Environment, Forest and Climate Change shall review the implementation of these rules as required.

Duties of Processing / Recycling Facility (Rule –7)

- The operator of the facility shall obtain authorization from State Pollution Control Board or Pollution Control Committee.

- The processing/recycling site shall be away from habitation clusters, forest areas, water bodies, monuments, national parks, wetlands and places of important cultural, historical or religious interest.

- The processing/recycling facility exceeding five tonnes per day capacity, shall maintain a buffer zone of no development around the facility.

- The operator of the facility shall submit the annual report to the State Pollution Control Board.

Dust Control in Construction Sites

The CPCB issued guidelines for dust management and control in 2018. This will require stringent surveillance to ensure proper and effective implementation and adoption of appropriate technologies and strategies for dust control. Dust mitigation measures can be further strengthened. Standards/guidelines related to C&D waste and road dust management have been adopted by the municipalities. As is practised in other states, a web portal may be launched for C&D sites of 500 sqm and above plot areas for uploading self-audits of dust pollution control. This may include registration, uploading of self-declaration, generation of data for physical audit and the physical audit for compliance reporting. Stringent enforcement of dust control measures, adoption of appropriate technical methods, monitoring and compliance are necessary in all municipalities.

Moreover, construction agencies need to renew their fleet of construction machinery to meet the current BS IV emissions standards notified by MoRTH in 2021. The BS VI standards are due for implementation in 2024.

Key Strategies for Action

- Comprehensive quantification of C&D waste generation ward-wise for planning of infrastructure.

- In-situ management of C&D waste for on-site reuse.

- Infrastructure for segregation and collection of C&D waste streams and GPS-enabled transportation system.

- Recycling and processing plants for clusters of towns and ULBs as needed.

- Mandate bulk waste generators for the collection and transport of waste.

- Mandate the use of recycled material and aggregates in new construction.

- Enforce implementation of effective dust control measures in construction sites.

- Amend municipal byelaws as per the C&D waste rules and regulations 2018.

Integrated Approach of Construction and Demolition Waste Management

A characterisation study of construction and demolition waste in India by the Technology, Information, Forecasting & Assessment Council (TIFAC, 2001) shows that most fractions including bulky material (concrete, bricks) and fines (sand, excavation soil) are amenable to recycling with proper processing equipment and techniques. Figure 4.3.2 shows the typical composition of C&D waste in India.

Figure 4.3.2: Typical composition percentage of C&D waste in India
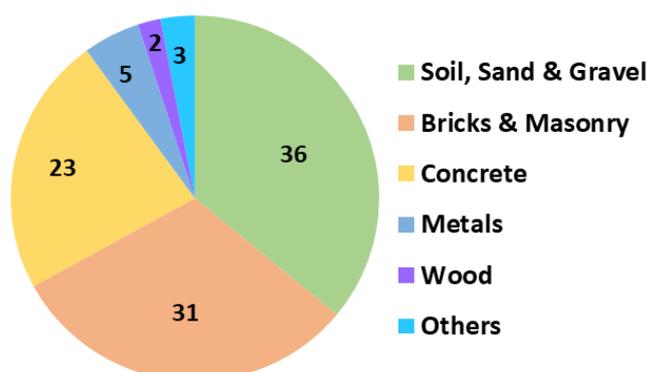
Source: Technology, Information, Forecasting & Assessment Council (TIFAC), 2001.

Recycling of C&D waste starts with the segregation of unwanted residual material such as plastic, wood, metal fragments, etc (constituting 10% of the total waste as per the TIFAC composition). The remaining bulky waste is fed into crushers and reduced to smaller and smaller sizes, with size fractions separated depending on end use. Fines are typically best recovered with a "wet process". A simplified diagram depicting C&D waste processing is shown in Figure 4.3.3. These coarse and fine aggregates of various sizes can be used directly as recycled aggregates in construction or used to manufacture a range of pre-cast products.

Figure 4.3.3: C&D waste processing steps and outputs
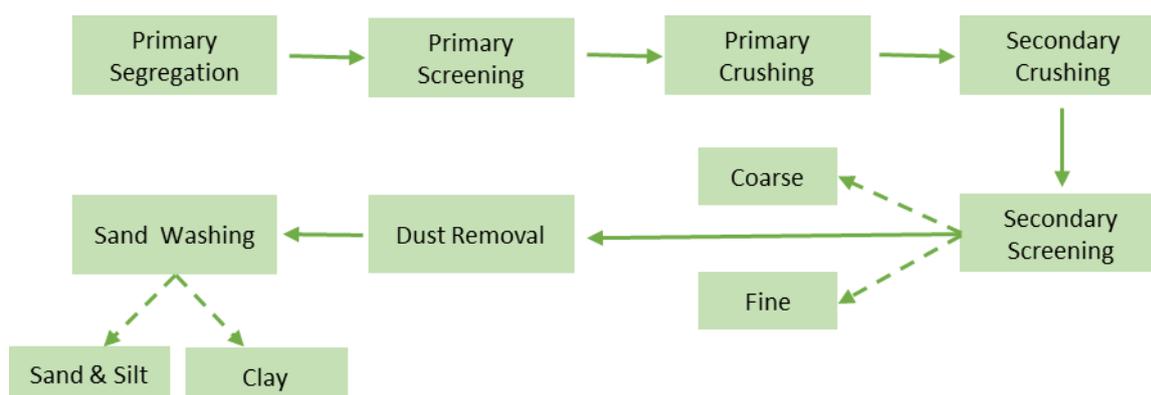
Source: Strategy on resource efficiency in construction and demolition sector, MoHUA, 2019.

Road Dust Management

Road dust is a significant contributor to coarse particles causing air pollution. This is also influenced by the local geo-climatic conditions, loose crustal soil and high wind effect. Re-suspension of road dust due to vehicular traffic is of special concern. Dust is a carrier of toxins from combustion sources and therefore can be harmful. In addition to road cleaning, sweeping and water sprinkling that most municipalities do, it is necessary to address mismanaged urban construction of roads, lack of paving and urban greening together. This requires implementation of street design guidelines for footpaths with adequate vegetative buffers and paving of roads; blacktopping and pavement of road shoulders, maintenance of pothole-free roads; implementation of truck loading guidelines; use of appropriate enclosures for haul trucks; gravel paving for all freight routes; increase in green cover on the roadsides; and enforcement of air pollution control in concrete batching (use of water spray and wind breakers, bag filters at silos and enclosures, hoods, curtains, etc).

Road dust and windblown dust can accumulate and carry toxic substances that come from other combustion sources and can be a health hazard. Most cities especially Balasore and Kalinga Nagar are heavily polluted due to the unpaved roads present in the city area. With the expansion of infrastructure both institutional, transport and basic services- road digging has become a common cause of road dust and wind-blown dust. Also, in several cities' roads and pavements are not well-paved and are devoid of vegetative cover. Emission contributors towards PM_{10} due to resuspended road dust is highest in Balasore (66%), followed by Kalinga Nagar (58%), Bhubaneswar (39%), Cuttack (36%), Rourkela (22%), Angul (13%), and Talcher (9%). Emission contributors towards $PM_{2.5}$ due to resuspended road dust is highest in Kalinga Nagar (43%), followed by Balasore (38%), Cuttack (19%), Bhubaneswar (17%), Rourkela (14%), Angul (10%), and Talcher (7%).

Currently, the urban local bodies in Odisha are more focused on the maintenance of roads, mechanical and manual sweeping, and water sprinkling. In Angul, a total length of 45 km and 40 km of road is cleaned using mechanical sweepers and water sprinklers. Manual street sweeping is done every day in the city. Currently, one mechanical sweeper and one water sprinkler are operational to suppress road dust. Angul municipality has installed one water fountain at a major traffic intersection. In Balasore, a total length of 80 km and 20 km of road is cleaned using mechanical sweepers and water sprinklers. Manual street sweeping is done every day in the city. Currently, two mechanical sweepers and one water sprinkler are operational in the city. Balasore municipality has installed three water fountains at major traffic intersections and has also proposed an additional water fountain at a major traffic junction. In Bhubaneswar, a total length of 110 km and 40 km of road is cleaned using mechanical sweepers and water sprinklers. Manual street sweeping is done every day in the city. Currently, three mechanical sweepers and four water sprinklers are operational and a proposal for two additional water sprinklers has been submitted. Bhubaneswar Municipal Corporation has installed three water fountains at major traffic intersections. In Cuttack, a total length of 172 km and 86 km of road is cleaned using mechanical sweepers and water sprinklers. Manual street sweeping is done every day in the city. Currently, six mechanical sweepers and two water sprinklers are operational. Cuttack Municipal Corporation has proposed two water fountains at major traffic intersections. CMC has planted 31,240 trees for increasing green cover. In Kalinga Nagar, a total length of 40 km of road is cleaned using mechanical sweepers. Manual street sweeping is done every day in the city. Currently, one mechanical sweeper is operational and a proposal for one water sprinkler has been submitted. Vyasnagar Municipality has installed four water fountains at major traffic intersections. The municipality has planted trees for increasing green cover in seven locations in a 1.5-acre area. In Rourkela, a total length of 180 km and 160 km of road is cleaned using mechanical sweepers and water sprinklers. Manual street sweeping is done every day in the city. Currently, four mechanical sweepers and four water sprinklers are operational. Rourkela Municipal Corporation has proposed two water fountains at major traffic intersections. The municipality is taking action to upgrade infrastructure and reduce congestion. RMC has planted 3100 trees to increase green cover. In Talcher, a total length of 22 km and 20 km of road is cleaned using mechanical sweepers and water sprinklers. Manual street sweeping is done every day in the city. Currently, two mechanical sweepers and one water sprinkler are operational. Talcher Municipality has installed four water fountains at major traffic intersections.

Interventions to Reduce Road Dust

- End-to-end paving of roads along with black-topping and maintenance of roads.

- Regular cleaning of street surfaces and spraying of water using water sprinkler.

- Removing road dust regularly by using mechanical road sweepers.

- Introducing water fountain at major traffic intersection.

- Identifying road stretches with high dust generation.

- Creating proper pedestrian infrastructure and widening of roads.

- Brick-lining all the canals/nullah's side roads.

- Greening of traffic corridors and open areas.

Action plan: Managing Construction & Demolition Waste and Road Dust

Sl. no.	Indicative actions	Status of activity (completed/ ongoing/to be started)	Timeline for completion	Target (coverage/ percentage)	Financial implications (Yes/ No)	Funds allocated (Rs Crore)	Funds utilized as on date (Rs Crore)
1	Policy for development of projects/ plants for C&D waste management.	• H&UD Department has issued state policy & strategy on Construction & Demolition Waste Management vide Addendums to Odisha Urban Sanitation Policy, 2017 and Odisha Urban Sanitation Strategy, 2017 on 21.06.2021, which is in accordance with the provisions of Construction & Demolition Waste Management Rules, 2016. • 126 sites in 115 ULBs have been designated for C&D waste disposal.	NA	NA	NA	NA	NA
2	Policy for use of C&D waste in laying and construction of State highways.	The state is at the preliminary stage of implementation.	NA	NA	NA	NA	NA
3	Demand creation for C& D waste and alternative use of C& D waste materials.	Sites for storage of C&D wastes have been notified and webhosted. Processing is the next higher step after collection and storage. The ULB collect C&D wastes from the wards, and it is being transferred to a dedicated storage	NA	NA	NA	NA	NA

		point from where the engaged agencies/ contractors are instructed to use the stored C&D waste for construction purposes. Further, the C&D waste is used for construction of road subgrade, temporary pathways, raising the low-lying areas, etc. thereby offsetting the use of soil for all these purposes.					
4	Schemes for development of green belt/ open spaces and street sides greening on State highways.	Suitable instruction has been issued to ULBs for needful action. A massive plantation drive is being started by some ULBs under Ek Ped Maa Ke Naam.	NA	NA	NA	NA	NA
5	Penalty provisions for non-compliance of C&D waste management rules at construction sites.	All ULBs have taken steps for levying fines for putting building materials over roads or empty lands in SWM bye-laws.	NA	NA	NA	NA	NA
6	Maintenance, repair and paving of State highways.	All ULBs have taken several steps to reduce road dust. An action plan has been submitted to the CPCB for the implementation of dust mitigation measures in the seven non-attainment cities under the National Clean Air Programme (NCAP).	NA	NA	NA	NA	NA
7	Monitoring of road dust especially in and around hotspot areas	22 numbers of Hotspots locations have been identified in the seven non-attainment cities	NA	NA	NA	NA	NA

	and in the vicinity of State highways.	under the National Clean Air Programme (NCAP). Suitable instruction has been issued to respective ULBs for needful action.					
8	Mechanism for development and maintenance of road infrastructures for industrial states and clusters.	Project of Bhubaneswar Municipal Corporation on PPP mode for production of paver blocks through blending of C&D waste and low value plastic is under process.	NA	NA	NA	NA	NA
9	Any other Policy / Rules/ Standards/ Guidelines pertaining to C&D waste and Road dust management.	Suitable instruction has been issued to ULBs for needful action. Mechanical sweeping is being adopted by some ULBs for dust mitigation. An action plan has been submitted to the CPCB for the implementation of dust mitigation measures in the seven non-attainment cities under the National Clean Air Programme (NCAP).	NA	NA	NA	NA	NA
10	C&D waste processing plants.	The state is at the preliminary stage of implementation. Sites for storage of C&D wastes have been notified and webhosted. Processing is the next higher step after collection and storage. The ULB collect C&D wastes from the wards, and it is being transferred to a dedicated storage point from where the engaged	NA	NA	NA	NA	NA

		agencies/ contractors are instructed to use the stored C&D waste for construction purposes. 126 C&D waste disposal sites across all ULBs of Odisha have been notified for wider circulation amongst public. Further, the C&D waste is used for construction of road subgrade, temporary pathways, raising the low-lying areas, etc. thereby offsetting the use of soil for all these purposes.					
11	Any other activity/ project pertaining to C&D waste and Road dust management.	(i) Suitable instructions to all ULBs have been issued by H&UD Dept. vide Letter no. 13019 dtd. 4.8.2020 for collecting the C&D wastes from all wards. (ii) Suitable instruction has been issued to ULBs for needful action. Mechanical sweeping is being adopted by some ULBs to curb the resuspension of road dust.	NA	NA	NA	NA	NA

4.4 Municipal Solid Waste Management

Municipal Solid Waste Management

The open burning of waste and recurring fires in landfills are major contributors to air pollution, releasing harmful toxins that pose significant risks to local communities. Addressing this challenge requires a robust and integrated waste management strategy. Such a strategy should focus on accurately quantifying waste generation, establishing an efficient infrastructure to enable 100% segregated waste collection, facilitating material recovery through recycling. preventing the dumping of fresh waste into landfills, and implementing comprehensive remediation of legacy waste. These initiatives align with the objectives of the LiFE Mission, which emphasizes sustainable and eco-friendly practices. The Environment (Protection) Act, 1986, provides a legal framework for the disposal and management of waste. Guidelines for the preparation of a comprehensive plan for the prevention, control or abatement of pollution by using scientific waste management methods have been issued by the Government of India from time to time. The Ministry of Environment, Forests and Climate Change (MoEF&CC) notified the Municipal Solid Waste (Management and Handling) Rules, on September 2000. The Solid Waste Management Rules, 2016 superseded MSW Rules, 2000. Section 221 of the Odisha Municipal Act 1950 and Section 339 to 345 of the Odisha Municipal Corporation Act, 2003 mandate scientific management of solid waste as an obligatory function of the ULBs. Municipal Solid Waste (MSW) Rules 2000 envisages that every municipal authority shall be responsible for the collection, segregation, storage, transportation, processing and disposal of solid waste. The basic principle to be adopted for managing waste is the hierarchy of 3R i.e., Reduce, Reuse and Recycle.

Hierarchy of waste management

Process of Waste Management

Schedule II of the MSW Rules 2000 provides for the segregation, storage, collection, transportation, processing and disposal of municipal solid waste for proper management of solid waste. The waste that is generated should be segregated and collected at the source. Thereafter, it should be transported and processed in accordance with the principles of 3Rs. The inert material remaining after processing has to be safely disposed. The entire process from segregation to disposal of waste management is the responsibility of the ULBs.

The process of waste management is depicted in Figure 4.4.1.

Figure 4.4.1: Process of waste management system

Current Status of Solid Waste Management in Odisha

Odisha's 115 Urban Local Bodies (ULBs) collectively generate 3,623 tonnes of municipal solid waste (MSW) per day, as detailed in Form IV submitted to the Odisha State Pollution Control Board (OSPCB) for the fiscal year 2023-24 is shown in Figure 4.4.2. Out of this, 3,480 TPD, accounting for 96%, is collected, and 2,809 TPD (81%) undergoes treatment. However, 281 TPD of waste is still openly disposed of in landfills.

Figure 4.4.2: Current status of municipal solid waste management in Odisha
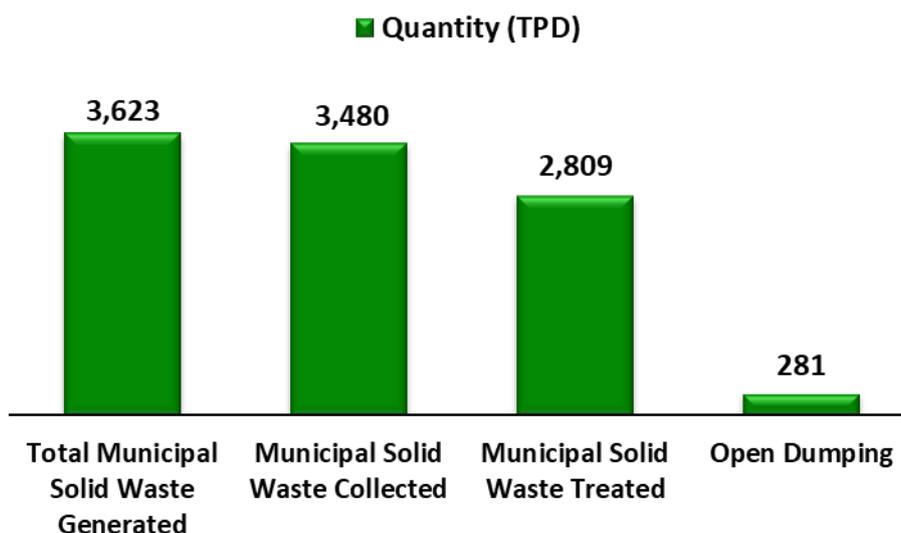
Source: State Pollution Control Board, Odisha, 2023-24.

Infrastructure for Waste Processing

Odisha has made progress in setting up infrastructure for waste processing. The state has established 278 vermicomposting micro-composting centres (MCCs) with a combined capacity of 1,296 TPD and 223 material recovery facilities (MRFs) capable of handling 2,290 TPD is shown in Figure 4.4.3. Out of these, 260 MCCs with a capacity of 1,233.5 TPD and 220 MRFs with a capacity of 2,260 TPD are currently operational. Additional infrastructure is under development, including 18 MCCs (62.5 TPD capacity) and 3 MRFs (30 TPD capacity). Despite these efforts, challenges remain in achieving optimal waste processing and reducing reliance on open dumping.

Figure 4.4.3: Waste Processing Infrastructure in Odisha
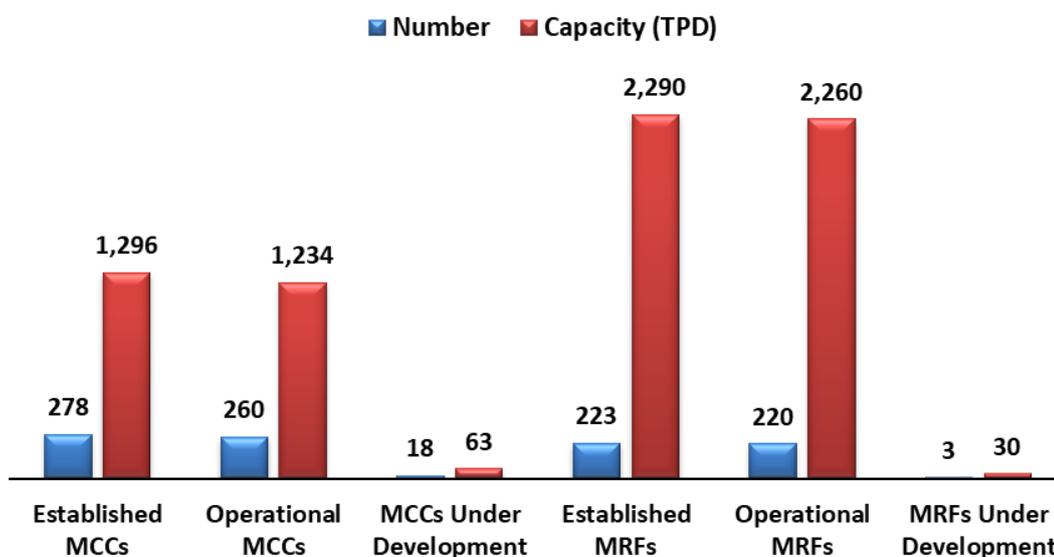
Source: State Pollution Control Board, Odisha, 2023-24.

Waste Generation and Collection Performance

Among the 115 ULBs, the top waste-generating cities are Bhubaneswar (820 TPD), Cuttack (300 TPD), Sambalpur (196 TPD), Berhampur (124 TPD), and Rourkela (120 TPD). Together, these 5 cities account for more than 40% of the total municipal solid waste generated in the state are shown in Figure 4.4.4.

Figure 4.4.4: Top waste-generating ULBs in Odisha (value in percentage)
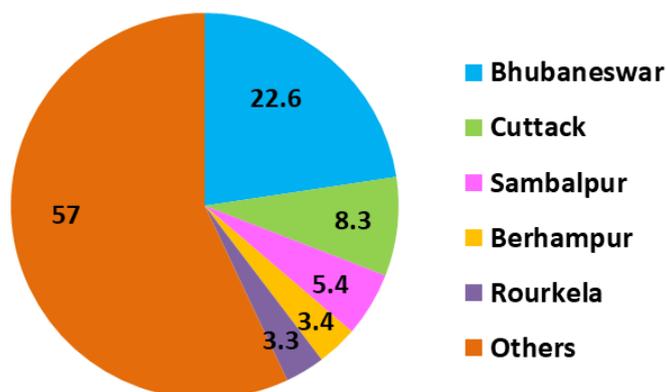
Source: State Pollution Control Board, Odisha, 2023-24.

The transportation infrastructure of the top waste-generating cities is detailed in the table below.

Table 4.4.1: Solid waste transportation infrastructure in Bhubaneswar

Type of vehicles	Numbers	Trips made
Vehicles engaged for animal carcasses	2	2
Tractors	44	88
Tipping truck	15	30
Dumper placers	9	18
Compactors	10	20
JCB	12	24
Light commercial vehicles	275	550
Battery operated vehicle	50	100
Total	**417**	**832**

Table 4.4.2: Solid waste transportation infrastructure in Berhampur

Type of vehicles	Numbers	Trips made
Tractors	22	44
Tipping truck	5	10
Dumper	3	6
Tata Ace	132	264
Excavator	2	4
Minihitachi	2	4
Dresser	1	2

JCB	4	8
Loader	2	4
JCB Mini Robert	1	2
Compactors	8	16
Total	**182**	**364**

Table 4.4.3: Solid waste transportation infrastructure in Cuttack

Type of vehicles	Numbers	Trips made
LCV	146	292
BOV	64	128
Sweeping Machine	5	10
Defogging	2	4
JCB	2	4
Total	**219**	**438**

Table 4.4.4: Solid waste transportation infrastructure in Sambalpur

Type of vehicles	Numbers	Trips made
Tractors	54	108
Dumper Placer	4	8
Compactors	5	10
Total	**63**	**126**

Table 4.4.5: Solid waste transportation infrastructure in Rourkela

Type of vehicles	Numbers	Trips made
Tractors	3	6
Tipping truck	3	6
Compactors	40	80
LCV	132	264
BOV	73	146
JCB	3	6
Total	**254**	**508**

Collection Performance

Out of the 115 ULBs in Odisha, 84 have achieved approximately 100% waste collection, including all Class 1 cities, where door-to-door collection is practised. Among the remaining cities, most have collection rates exceeding 70%. However, some cities report lower rates of collection, with Khariar and Sambalpur achieving 64%, followed by Purusottampur at 60%, Kodala at 56%, Bhuban at 50%, Chandbali at 44%, Koraput at 43%, Umerkote and Junagarh at 30%, and Parlakhemundi at 19%. Figure 4.4.5 highlights the need for improved waste collection mechanisms in the cities with lower performance.

Figure 4.4.5: Waste Collection Rates in Low-Performing Cities in Odisha
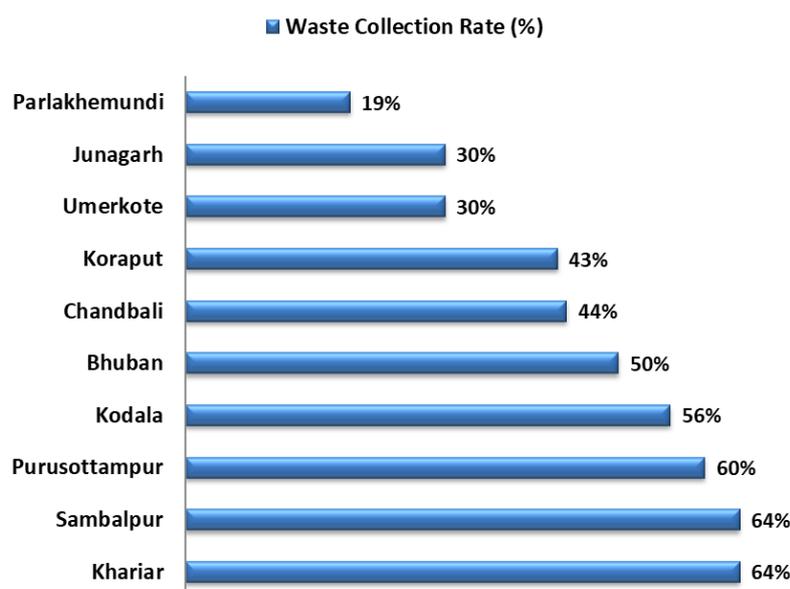
Source: State Pollution Control Board, Odisha, 2023-24.

Waste Segregation Practices

Segregation at the source is a critical component of effective waste management, and most ULBs in Odisha have reported progress in this area. However, seven ULBs like Jatani, Anandapur, Aska, Buguda, Balimela, Athamallick, and Atabira—have yet to implement comprehensive segregation practices. Strengthening awareness campaigns and infrastructure for segregation in these cities will be essential to ensure efficient waste processing and recycling.

Waste Processing and Treatment

Detailed information on MSW generation, collection, processing, and landfill utilisation across 30 districts of Odisha is shown in Table 4.4.6. According to data compiled by OSPCB, Odisha treats 81% of the total waste generated, with 84 ULBs achieving 100% treatment of their waste. These include Class 1 cities such as Berhampur, Rourkela, Balasore, Puri, and Sambalpur, which have demonstrated exemplary waste management practices. However, 7 ULBs treat less than 50% of their waste, indicating a pressing need for additional resources and technical support to enhance processing capabilities in these areas.

Table 4.4.6: Detailed information on Municipal Solid Waste (MSW) generation, collection, processing, and landfill utilisation across 30 districts.

Sl. no.	Name of the district	MSW generated in TPD	MSW collected in TPD	Qty processed per day in TPD	Landfill	Population
1	Angul	20.75	20.41	19.35	0	111093
2	Balasore	44.57	44.57	44.57	4.8	227694

3	Baragarh	51.18	49.78	44.78	12.2	147564
4	Bhadrak	59.5	53	36.5	14	227007
5	Bolangir	57.3	57	44.5	12.5	182977
6	Boudh	6	6	6	0	20435
7	Cuttack	319.84	319.84	153.14	166.2	777523
8	Deogarh	9.5	9.5	5.05	0	22390
9	Dhenkanal	30.8	23.3	21.8	2	139629
10	Gajapati	10.1	3.6	3.9	2.1	57307
11	Ganjam	194.81	187.09	186.59	5.5	715419
12	Jagatsinghpur	21.14	21.14	21.14	0	105579
13	Jajpur	29.4	29.4	29.4	0	86369
14	Jharsuguda	49.02	48.2	38.1	0	217126
15	Kalahandi	33.5	30	21.3	8.2	127759
16	Kandhamal	9.6	8.1	7.1	0.1	74561
17	Kendrapada	29	29	18.96	10.04	83534
18	Keonjhar	75.5	75.5	75.5	0	241731
19	Khordha	847.03	844.03	444.03	0	980059
20	Koraput	37	33.5	33.5	4	167876
21	Malakangiri	15.57	13	11.8	1.07	54296
22	Mayurbhanj	56.2	56.2	41.2	5	171161
23	Nawarangpur	18.92	11.21	7.29	4	59034
24	Nayagarh	20.7	20.2	15.1	0.1	72098
25	Nuapada	10.7	10	10.7	0	50262
26	Puri	75.55	75.55	75.55	0	254255
27	Rayagada	37.5	37.3	29.3	16.5	107009
28	Sambalpur	202.8	131.8	131.8	1.5	471788
29	Sonepur	15.8	15.8	15.8	0	44876
30	Sundergarh	149.45	131.45	131.45	11	439481

Source: State Pollution Control Board, Odisha, 2023-24.

Overview of MSW in Odisha

Khordha, with a significant urban population of 980,059, produces the highest Municipal Solid Waste (MSW) at 847.03 TPD, indicative of the increased consumption and waste generation characteristic of urban areas. Likewise, Sambalpur (202.8 TPD) and Sundergarh (149.45 TPD) also contribute notable amounts of waste, corresponding to their larger populations. On the other hand, Boudh (6 TPD) and Nuapada (10.7 TPD) generate the least waste, owing to their smaller populations of 20,435 and 50,262, as well as their predominantly rural area. Top-performing districts such as Cuttack, Balasore, Puri, Keonjhar, and Jajpur have achieved 100% collection efficiency, reflecting well-organized and efficient waste management systems. In contrast, Gajapati (35.64%) and Nawarangpur (59.26%) demonstrate notable shortcomings, with significant amounts of waste left uncollected. Puri,

Balasore, and Keonjhar stand out as efficient waste processors, successfully handling 100% of their collected waste, highlighting their advanced waste management systems. Similarly, Ganjam processes 186.59 TPD of the 194.81 TPD generated, achieving an impressive processing rate of 95.7%.

However, Khordha underperforms despite its high waste generation, processing only 444.03 TPD out of 847.03 TPD, leaving a substantial portion unprocessed. Similarly, Cuttack processes just 47.88% of its generated waste, with the majority being disposed of in landfills. Cuttack (166.2 TPD) and Rayagada (16.5 TPD) exhibit a high dependency on landfills, highlighting constraints in recycling and waste-to-energy initiatives. In contrast, districts such as Puri, Keonjhar, and Jagatsinghpur report minimal or zero reliance on landfills, demonstrating effective waste diversion systems. Urban districts like Khordha, Cuttack, and Sambalpur need improved waste processing to reduce landfill dependence, while Gajapati and Nawarangpur should prioritize strengthening waste collection. Promoting recycling and waste-to-energy technologies can help high-landfill districts, while rural areas with low collection efficiency would benefit from awareness campaigns on waste segregation and proper disposal.

Plastic Waste Management

The Plastic Waste Management Rules, 2016 (amended in 2018 and 2021) by the Ministry of Environment, Forest and Climate Change (MoEF&CC) focus on managing plastic waste and minimizing environmental harm caused by plastics. Key provisions include:

- **Extended Producer Responsibility (EPR):** Producers, importers, and brand owners (PIBOs) are accountable for collecting and managing plastic waste through recycling or appropriate disposal systems.
- **Ban on Specific Plastics:** Certain single-use plastics, such as carry bags under 75 microns thick and plastic cutlery, are prohibited.
- **Segregation and Collection:** Local authorities are responsible for the segregation, collection, and proper channelization of plastic waste.
- **Role of Waste Generators:** Both individuals and organizations must segregate plastic waste and ensure its proper disposal.
- **Recycling and Processing:** Plastic waste must be processed through recycling, co-processing, or other environmentally safe methods.

Role of ULBs

Urban local bodies are crucial for the enforcement of plastic waste management. They are responsible for:

- **Collection and Segregation**: Ensuring that waste is segregated at the source and that segregated plastic waste is collected door-to-door.

- **Awareness Programs**: Educating citizens about plastic waste segregation and the importance of reducing plastic consumption.

- **Setting up Infrastructure**: Establishing recycling facilities, including collection points, Material Recovery Facilities (MRFs), and co-processing plants.

- **Monitoring and Reporting**: Ensuring compliance with the rules and submitting annual reports to the State Pollution Control Boards (SPCBs) or Pollution Control Committees (PCCs).

According to Form V submitted to the Odisha State Pollution Control Board (OSPCB) for the year 2023-24, the state generated 70,829 TPA of plastic waste, as reported by all 115 Urban Local Bodies (ULBs) as shown in Figure 4.4.6. Out of this, 33,473 TPA was collected, reflecting significant efforts in waste management. Impressively, 2,27,717 TPA of plastic waste was sent for co-processing, and 85,836 TPA was utilized for granule production, highlighting Odisha's focus on sustainable recycling practices. The state has also enforced a complete ban on specific plastic products, including plastic bags (with or without handles, irrespective of size or thickness), single-use disposable items like cups, plates, straws, and spoons, as well as non-woven polythene bags and thermo products. The submission of annual reports by all 115 ULBs underscores the state's commitment to transparency and effective governance in plastic waste management, aiming to reduce environmental impact and promote sustainability.

Figure 4.4.6: Status of plastic waste management in Odisha
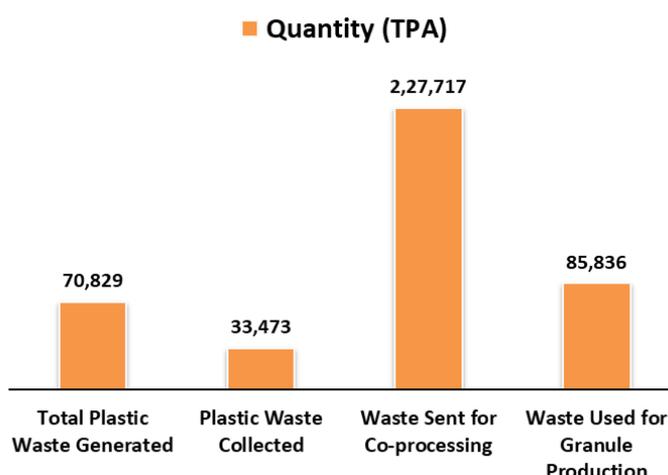
Source: State Pollution Control Board, Odisha, 2023-24.

Plastic Waste Generation

The top 10 Urban Local Bodies (ULBs) in Odisha that reported the highest plastic waste generation are led by Bhubaneswar Municipal Corporation, which generated a substantial

19,665 TPA as shown in Figure 4.4.7. Following closely is Berhampur Municipal Corporation with 9,724 TPA, and Cuttack Municipal Corporation with 7,665 TPA. Other notable ULBs include Bargarh Municipality with 6,000 TPA, Rourkela Municipality with 5,110 TPA, and Paradeep Municipality with 3,124.4 TPA. Additionally, Brajrajnagar Municipality reported 3,080.6 TPA, Rajgangpur Municipality generated 2,520 TPA, Dhenkanal Municipality produced 2,170 TPA, and Kantabanji Municipality reported 1,852 TPA. These ULBs collectively account for a significant portion of the total plastic waste generated in the state, with Bhubaneswar and Cuttack standing out as major urban centers contributing notably to the waste volume.

Figure 4.4.7: Top plastic waste-generating urban local bodies (ULBs) in Odisha

■ **Plastic Waste (TPA)**

ULB	Plastic Waste (TPA)
Kantabanji	1852
Dhenkanal	2170
Rajgangpur	2520
Brajrajnagar	3080.6
Paradeep	3124.4
Rourkela	5110
Bargarh	6000
Cuttack	7665
Berhampur	9724
Bhubaneswar	19665
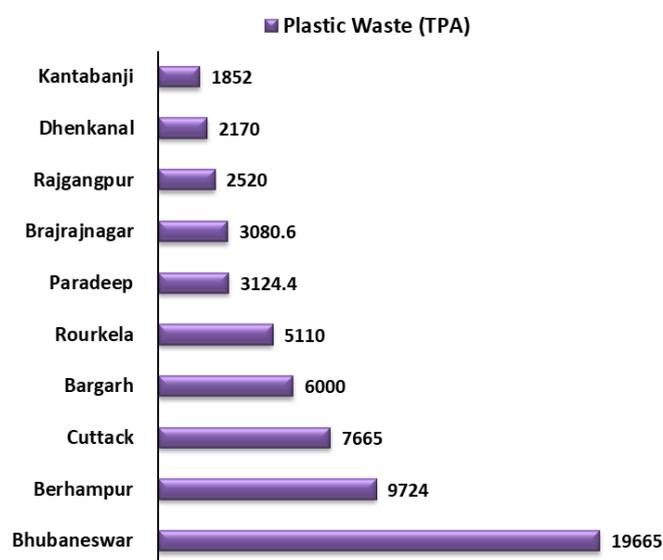
Source: State Pollution Control Board, Odisha, 2023-24.

All other ULBs had relatively lower plastic waste generation, with Paralakhemundi, Rairangpur and Sunabeda having as low as zero TPA. Less than one TPA of plastic waste was reported to have been produced in the ULBs of Bellaguntha (0.75 TPA), Bijepur (0.7 TPA), Hindol (0.7 TPA), Khandapara (0.04 TPA), Kotpad (0.085 TPA), Redhakhol (0.8 TPA).

ULBs with Effective Plastic Waste Channelization

Some Urban Local Bodies (ULBs) have excelled in efficiently channeling their plastic waste for reuse, achieving 100% processing and setting examples of sustainability. Berhampur Municipal Corporation leads the way with 9,724 TPA of plastic waste reused, followed by Cuttack Municipal Corporation with 7,281.75 TPA. Dharamgarh NAC processed 1,108.56 TPA, while Balasore Municipality reused 592 TPA. Keonjhargarh Municipality contributed with 761.95 TPA, and Padampur NAC managed 188 TPA. Polasara NAC reused 40 TPA, and Vyasanagar Municipality processed 20 TPA. These ULBs exemplify how efficient processing

and reuse of plastic waste can contribute to sustainability and mitigate the environmental impact of plastic waste.

ULBs with Zero Channelization of Plastic Waste

Several Urban Local Bodies (ULBs) have reported minimal or zero channelization of their plastic waste, highlighting significant gaps in waste management and plastic recycling infrastructure. ULBs such as Attabira NAC, Bhadrak Municipality, Bhuban NAC, Brajrajnagar Municipality, Gunpur Municipality, Kendrapara Municipality, Khandapada Municipality, Phulbani Municipality, Rayagada Municipality, Sonepur Municipality, and Talcher Municipality have recorded zero plastic waste reuse. This situation indicates the urgent need for improved waste management systems, stronger recycling mechanisms, and better infrastructure to ensure that plastic waste is effectively reused, reducing environmental impact and fostering sustainability. Strengthening waste management frameworks in these areas is critical to addressing the growing challenges of plastic pollution and promoting a circular economy.

Plastic Waste Management Data in Odisha

The data presented in Table 4.4.7 highlights the generation and utilization of plastic waste across various districts, emphasizing the efficiency of waste management systems. Khordha leads in plastic waste generation with 19,740 TPA, driven by its high population density and urbanization, while Gajapati generates the least at just 1 TPA, reflecting its smaller population and lower plastic consumption. Balasore (688 TPA), Baragarh (6,193 TPA), and Ganjam (10,421 TPA) demonstrate efficient systems by utilizing a significant portion of their plastic waste. On the other hand, Deogarh (76 TPA) and Rayagada (8 TPA) show no waste utilization, underscoring deficiencies in their waste processing infrastructure. Khordha, despite generating a large amount of waste, utilizes only 4,102 TPA (20.8%), highlighting inefficiencies in its waste management system. Similarly, Jagatsinghpur and Jharsuguda show low utilization rates despite their moderate to high waste generation. Districts such as Cuttack and Balasore, though moderate in plastic waste generation, manage to utilize a substantial portion of their waste, demonstrating relatively better infrastructure for waste management. Rural and sparsely populated districts like Boudh (20 TPA), Sonepur (6 TPA), and Nawarangpur (13 TPA) produce minimal plastic waste, with their utilization rates being equally low.

Urbanized districts like Khordha and Cuttack must prioritize the development of advanced waste processing facilities to manage the significant amounts of unutilized plastic waste effectively.

Table 4.4.7: Detailed information on plastic waste generation and utilization across 30 districts.

Sl. no.	Name of the district	Plastic waste generation	Quantity of waste for use in TPA
1	Angul	11	7
2	Balasore	697	688
3	Baragarh	6205	6193
4	Bhadrak	40	7
5	Bolangir	1993	4
6	Boudh	20	1
7	Cuttack	7742	7287
8	Deogarh	76	0
9	Dhenkanal	2175	1144
10	Gajapati	1	1
11	Ganjam	11664	10421
12	Jagatsinghpur	3138	10
13	Jajpur	33	30
14	Jharsuguda	3305	62
15	Kalahandi	280	38
16	Kandhamal	5	3
17	Kendrapada	44	5
18	Keonjhar	954	954
19	Khordha	19740	4102
20	Koraput	788	18
21	Malakangiri	92	111
22	Mayurbhanj	57	5
23	Nawarangpur	13	2
24	Nayagarh	117	35
25	Nuapada	659	325
26	Puri	822	577
27	Rayagada	8	0
28	Sambalpur	40	39
29	Sonepur	6	1
30	Sundergarh	5131	65

Simultaneously, districts such as Deogarh and Rayagada, which report zero or minimal waste utilization, require immediate intervention to establish robust waste management systems. Promoting recycling initiatives and conducting awareness campaigns in rural areas can further enhance plastic waste utilization by encouraging communities to adopt sustainable practices and improve their contribution to waste management efforts.

Need Effective Leveraging of Swachh Bharat Mission Urban 2.0 & Key Strategies of SBM 2.0

The Swachh Bharat Mission - Urban (SBM-U), was launched on 2nd October 2014 aimed at making urban India free from open defecation and achieving 100% scientific management of municipal solid waste in 4,041 statutory towns in the country. The second phase of SBM-U was launched on 1st October 2021, for a period of 5 years (till October 2026). The vision for SBM-U 2.0 is to achieve *"Garbage Free"* status for all cities by 2026 and institutionalise 'Swachh' behaviour amongst the citizens. SBM–U 2.0 will be implemented by MoHUA through States/ UTs in all statutory towns (as per Census 2011, and statutory towns added subsequent to that). The Government of India in partnership with States/ UTs and ULBs is committed to making all cities *"Garbage Free"* under SBM-Urban 2.0 to contribute to the achievement of the Sustainable Development Goals (SDG) 2030, which will ultimately improve the quality of life and ease of living of urban populations, thus leading to urban transformation.

Mission: Overall Vision, and Specific Objectives

SBM-U 2.0 will be implemented with a vision of achieving "Garbage Free" status for all cities. This will involve the following:

- All households and premises segregate their waste into "wet waste" (from kitchen and gardens) and "dry waste" (including paper, glass, plastic, and domestic hazardous waste and sanitary waste wrapped separately).
- 100% door-to-door collection of segregated waste from each household/ premise.
- 100% scientific management of all fractions of waste, including safe disposal in scientific landfills.
- All legacy dumpsites were remediated and converted into green zones.

To achieve this vision, the following specific objectives are targeted to be achieved:

Sustainable Solid Waste Management focuses on maintaining cleanliness and hygiene in public spaces, ensuring cities are free from garbage, and achieving 100% scientific processing of Municipal Solid Waste (MSW). This includes reducing air pollution from Solid Waste Management (SWM) activities and gradually cutting down the use of single-use plastics.

Sustainable Sanitation and Treatment of Used Water involves implementing a comprehensive sanitation process that covers everything from waste discharge and containment to safe disposal of toilet effluents. It emphasizes the treatment of used water before it's released into water bodies and encourages the reuse of treated water. Additionally, hazardous substances

in sewers and septic tanks must be eliminated, and manual scavenging is banned through the mechanization of cleaning operations.

Awareness and Citizen Engagement aim to raise awareness and involve citizens in a large-scale movement to promote cleanliness and sustainable behaviour.

Building Institutional Capacity focuses on developing the necessary infrastructure and systems to effectively implement actions that will achieve the mission's goals.

Key Components and Focus Areas

- Sustainable Solid Waste Management
- Sustainable Sanitation
- IEC / BCC
- Capacity Building (CB)

Strategies for Achieving a Garbage-Free Urban India through SBM-U 2.0

To achieve a "Garbage-Free Urban India" the SBM-U 2.0 framework can be enhanced by focusing on awareness, technological innovation, public-private partnerships, and sustainability. City-wide campaigns should promote cleanliness, waste segregation, and hygiene, involving community groups, influencers, and citizens through mobile apps for better engagement. Leveraging artificial intelligence (AI) and machine learning (ML) for waste management, creating real-time digital dashboards, and hosting innovation challenges can drive smarter solutions. Collaborations with corporates for infrastructure and CSR-driven initiatives will further support these efforts, alongside PPP models for waste-to-energy and recycling projects. Regular monitoring, such as participation in the Swachh Survekshan rankings and transparency through audits, will ensure accountability. Additionally, promoting upcycling, composting, plastic waste management, and inclusive sanitation for marginalized communities will contribute to a circular economy. Engaging schools and universities through cleanliness drives, and focusing on slum areas and tourist locations, will ensure widespread participation and progress.

Action plan: Managing Municipal Solid Waste and Plastic Waste

Sl. no.	Indicative actions	Status of activity (completed/ ongoing/to be started)	Timeline for completion	Target (coverage/ percentage)	Financial implications (Yes/ No)	Funds allocated (Rs Crore)	Funds utilized as on date (Rs Crore)
1	Enforcement of municipal solid waste management Rules.	Completed (SWM Byelaws Published by 114 ULBs)	Completed	114 ULBs (99%)	NA	NA	NA
2	Policy for MSW management.	Completed (SWM Byelaws Published by 114 ULBs)	Completed	114 ULBs (99%)	NA	NA	NA
3	Policy for legacy waste management at dumpsites.	Completed SOP Developed for Bio-Remediation of Legacy Waste	Completed	115 ULBs (100%)	NA	NA	NA
4	Policy for development and Construction of Waste to Energy Plants Waste to Energy Plants Waste Collection and Segregation status in the city (%).						
	(a) non-recyclable / combustible dry waste	Completed SOPs Developed for wealth centre management	Completed As per the SOP non-recyclable/ combustible dry waste is sent to cement plants for co-processing.	114 ULBs (99%)	NA	NA	NA
	(b) Bio-methanation / Bio CNG	NA	NA	NA	NA	NA	NA
	(c) Composting plant etc.	Construction completed in 114 ULBs SOPs developed for wealth centre management	Completed	114 ULBs (99%)	NA	NA	NA
5	Material Recovery Facility.	220	NA	NA	NA	NA	NA
6	• Waste to Energy plants. • Waste to Compost plants.	• Nil • 262	NA	NA	NA	NA	NA
7	Control open burning of MSW.	NA	NA	NA	NA	NA	NA
8	Any other activity/ project pertaining to MSW Management.	Out of 115 ULBs, 96 ULBs had Legacy waste dumpsites & remediation completed in respect of 77 ULBs.	NA	NA	NA	December 2025	NA

4.5 Agro or Crop Residue Burning and Forest Fires

Agro or Crop Sector in Odisha

Agriculture is the major source of livelihood for most of the population in Odisha. Therefore, the State Government places utmost emphasis on agricultural development enhancing farmers' income and empowering them. Against the target of 60.50 lakh ha in Kharif, 59.35 lakh ha has been achieved under major crops like paddy, pulses, cotton, millets, oilseeds and vegetables and 28.14 lakh ha in Rabi cropping season for 2023-24. Emphasis was given to low-duty non-paddy crops like millets and pulses and accordingly, more acreage was achieved in millets, maize, cotton and pulses. The crop area of 2023-24 when compared with the year 2018-19, the area expanded from 1.62 lakh ha to 2.64 lakh ha in millets, from 2.51 lakh ha to 3.09 lakh ha in maize, from 19.51 lakh ha to 20.44 lakh ha in pulses and from 1.57 lakh ha to 2.35 lakh ha in cotton. There is a visible impact of the adoption of crop diversification from paddy to non-paddy crops by the farmers. It also indicates that farmers are more fascinated by low-duty and high-value commercial crops.

There is a steady increase in cotton coverage in the state owing to the promise of better price realisation through appropriate procurement support. The acreage under the crop has touched an all-time high of 2.35 lakh hectares and is likely to go up steadily in the coming years. This should further encourage farmers to go for cotton cultivation. The Government is taking cautious supportive steps for promoting cotton farming under various schemes like the Technology Mission, Intensive Agriculture Programme (IAP) and NFSM (Commercial Crops). Moreover, the food grain production in the state is estimated to reach 124.41 lakh MT during 2023-24. The production of Maize, Pulses, and Groundnut crops is significantly more compared to last year. It is envisaged to take advantage of this sufficiency status to diversify a greater proportion of paddy land to more remunerative non-paddy crops like pulses, oilseeds, vegetables and other commercial crops through special emphasis on crop diversification thereby enhancing farmers' income while keeping the self-sufficiency of the state in food grains.

Out of the various crops grown, rice, wheat and sugarcane are prone to crop residue burning and also contribute to local and regional air quality significantly. Crop residues are burnt during the time of harvests and are not a permanent issue. Agro-residue or crop residues are of different sizes, such as straws, stalks, leaves, fibrous materials, etc. Odisha is largely a paddy-growing state, and the waste straw is mostly used as livestock feed. Stubble-burning cases in the state are also very few and rare.

Adverse Effect of Crop Residue Burning

Burning of crop residues leads to release of soot particles and smoke causing human and animal health problems. It also leads to the emission of greenhouse gases namely carbon dioxide, methane and nitrous oxide, causing global warming and loss of plant nutrients like N, P, K and S. The burning of crop residues is a waste of valuable resources which could be a source of carbon, bio-active compounds, feed and energy for rural households and small industries. Heat generated from the burning of crop residues elevates soil temperature causing death of active beneficial microbial population, though the effect is temporary, as the microbes regenerate after a few days. Repeated burnings in a field, however, diminishes the microbial population permanently. The burning of crop residues immediately increases the exchangeable NH_4^+-N and bicarbonate-extractable P content, but there is no build-up of nutrients in the profile. Long-term burning reduces total N and C, and potentially mineralizable N in the upper soil layer. The burning of agricultural residues leads to significant emissions of chemically and radiatively important trace gases such as methane (CH_4), carbon monoxide (CO), nitrous oxide (N_2O), oxides of nitrogen (NO_x) and sulphur (SO_x) and other hydrocarbons to the atmosphere. It is estimated that upon burning, 70% of Carbon (C) present in rice straw is emitted as CO_2, 7% as CO 7% and 0.66% as CH_4 (while 2.09% of Nitrogen (N) in straw is emitted as N_2O. It also emits a large amount of particulates that are composed of a wide variety of organic and inorganic species. One ton of rice straw on burning releases about 3 kg particulate matter, 60 kg CO, 1460 kg CO_2, 199 kg ash and 2 kg SO_2 (IARI, ICAR, 2012). Besides other light hydrocarbons, volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) including polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), SO_x and NO_x are also emitted. These gases are of major concern for global impact and may lead to an increase in the levels of aerosols, acid deposition, increase in tropospheric ozone and depletion of the stratospheric ozone layer. These may subsequently undergo transboundary migration depending upon the wind speed/direction, and reactions with oxidants like OH, leading to physicochemical transformation and eventually wash out by precipitation. Many pollutants found in large quantities in biomass smoke are known or suspected carcinogens and could be a major cause of concern leading to various air-borne/lung diseases.

National Policy for Management of Crop Residue (NPMCR)

The situation demands that an appropriate policy package of technical and policy interventions for crop residue management is formulated for adoption by the states.

Accordingly, National Policy for Management of Crop Residue (NPMCR) has the following major objectives:

- Control of burning of crop residue to prevent environmental degradation and loss of soil nutrients and minerals by promotion of in-situ management (incorporation in soil, mulching, baling/binding for use as domestic/industrial fuel, fodder) of crop residue.

- Diversified use of crop residue for various purposes like charcoal gasification, power generation, as industrial raw material for production of bioethanol, packing material, paper/board/panel industry, composting and mushroom cultivation etc.

- Capacity building and awareness about the ill effects of crop residue burning and its effective utilization and management.

- Formulation and implementation of suitable law and legislative/policy measures to curb the burning of crop residue.

Strategy

The strategy inter-alia comprises.

- Promotion of technologies for optimum utilization and in-situ management of crop residue to prevent loss of invaluable soil nutrients, minerals and improvement of general soil health.

- Promotion of diversified uses of crop residue for various purposes viz. power generation, as industrial raw material for production of bioethanol, packing material for fruits & vegetables and glassware, utilization for paper/ board/panel industry, biogas generation/composting and mushroom cultivation in Public Private Partnership (PPP) mode.

- Capacity building of various stakeholders including farmers and extension functionaries under crop development programmes and organization of field-level demonstrations on management of crop residues in all programmes/schemes.

- Promotion of adaptive research for the management of crop residue and development of machinery for effective utilization of such residues.

- Formulation and implementation of necessary policy measures for control of crop residue burning through suitable laws/ legislation/ executive orders etc.

Interventions to Curb Crop Residue Burning

Various interventions to curb crop residue burning are listed below for adoption.

Technological Interventions

- Incorporation of crop residue into soils through the adoption of conservation agriculture practices to prevent soil erosion from wind & water and to augment the soil moisture.

- Promotion of use of crop residue for preparation of bio-enriched compost/vermin compost and its utilization as farmyard manure.

- Use of crop residue for cultivation of mushrooms particularly Agaricus bisporus (white button mushroom) and Volvriella Volvacea (straw mushroom).

- Incentivize purchase of happy seeder/ turbo seeder/shredder/ baling machines and zero-seed-cum-fertilizer drill to facilitate in-situ management of crop residue and retaining the straw as surface mulching.

- Extending subsidies to the farmers for hiring resource conservation machinery from the Custom Hiring Center (CHC)/Agriculture Service Center (ASC) and promoting establishment of new CHS/ASC to ensure the availability of such machines to the farmers at the time of crop harvesting.

Diversified Uses of Crop Residue

- Crop residues are primarily used as bedding material for animals, livestock feed, soil mulching, bio-gas generation, biochar production, thatching for rural homes, mushroom cultivation, biomass energy production, fuel for domestic and industrial use, etc.

- Promotion of various interventions under ongoing schemes/programmes for diversified use of crop residue as fuel for power plants, production of cellulosic ethanol, etc. in Public Private Partnership (PPP) mode.

- Promotion and encouragement of use of crop residue/rice straw in paper/board/panel and packing material.

- Promotion of collection of crop residue for feed, brick making, etc. and extending subsidy for transport of crop residue to fodder deficient areas.

Capacity Building and Awareness Generation

- Organising training of farmers for creating awareness about the effects of crop residue burning, adoption of conservation agriculture practices and resource conservation technology through all ongoing State/Centre Sector Schemes.

- Creation of awareness about various measures to prevent crop residue burning through mass media, print media, etc. just before the harvesting seasons.

- Establishing self-help groups and providing subsidies to unemployed youth for the establishment of custom hiring centres to enhance the availability of resource conservation machinery.

- Self-certification by farmers to not resort to crop residue burning needs to be further certified by Gram Pradhan/ Sarpanchas as an additional condition while availing crop loan/agricultural credit from financial institutions.

- Demonstrations of crop residue management technology on a large scale by the State Department of Agriculture and other Government Institutions by organising on-farm demonstrations to create awareness and dissemination of various technologies and organising field days under ongoing programmes/schemes.

Pilot Studies on Management of Crop Residue

- Development of appropriate and cost-effective farm machinery to facilitate collection, volume reduction, transportation and application of residues.

- Modifying combine harvester to collect finely chopped crop residues by use of twin cutter bar type combine harvester for harvesting of top portion of the crop for grain recovery and a lower cutter bar for straw harvesting at a suitable height and windrowing should be developed for proper management of straw.

- Use of satellite-based remote sensing technologies to monitor crop residue management, with active involvement of the National Remote Sensing Agency (NRSA) and CPCB of MoEF&CC.

Laws and Legislation to Curb Crop Residue Burning

- As per the Seventh Schedule of the Constitution of India, subject of agriculture falls under the purview of the State Governments, therefore, it is for the State Governments to take necessary steps to curb the practice of crop residue burning. Accordingly, States, namely, Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu and Uttar Pradesh should bring suitable law/rules/order for prevention/banning of the practice of crop residue burning as per policy and priority of the State. Accordingly, State Government may identify an agency or authority to implement such an order to abate, prevent and ban the practice of crop residue burning

- Incentivizing establishment of projects aiming at the utilization of crop residues as raw materials by entitling them to all benefits as permissible under the Fiscal Incentives for Industrial Promotion schemes/programmes in the respective State.

- Ministry of Environment, Forests & Climate Change (MoEF&CC) may issue an advisory to various State Governments and Union Territories to curb this nuisance of crop residue burning.

To prevent the problem of crop residue burning, both ex-situ and in-situ measures are needed. As part of the ex-situ measures, it is necessary to map out the end uses of biomass such as cattle feed, biomass fuel for industry, co-firing in power plants and other value-added production from biomass like biogas, bio-CNG, etc. This can not only help to build market value for the waste residues but also ensure more efficient material recovery. This will require efficient collection and transportation systems to build the supply chain of biomass to link with the market. This will require support for balers, storage and transport.

The in-situ measures will require harvesting and seeding machinery that can help to mix the stubble or straw with the soil and mulch it for fertilisation. Also, the use of decomposers can accelerate the decomposition of biomass in the field and reduce the time required for disposal. Given the national trend of growing incidence of crop residue burning, a preventive action plan will be helpful.

Forest Protection and Management

At a regional scale, air quality is also impacted by the forest fires which are seasonal. In Odisha, forest fires are more common in the summer season. The Forest Department of Odisha works to manage forest fires in various forest divisions. The detailed picture of the forest protection units in the State is reflected below.

No. of Units	Forest Divisions	Wildlife Divisions	Total
No. of Division	37	14	51
No. of Ranges	223	77	300
No. of Sections	827	241	1068
No. of Beats	3082	699	3781

Source: Highlights of Odisha Forestry Sector, 2024, Odisha Forest Department.

The different programmes/activities undertaken by Forest Department, Government of Odisha during the last five years for the protection of forests are as follows:

- The forest management units comprise 51 Divisions, 300 Ranges, 1068 Sections and 3781 Beats.

- Each Division, Range, Section and Beat is managed by the Divisional Forest Officer (DFO), Forest Ranger, Forester and Forest Guard respectively.

- In total, 122 intra-state forest check gates are functioning under 27 Forest Divisions for checking of vehicles and prevention of smuggling of forest produce in transit.

- In total, 316 forest protection squads under the Compensatory Afforestation Fund Management and Planning Authority (CAMPA) scheme, having 10 local youths in each squad have been deployed at 37 Territorial Divisions.

- 287 **Fire Protection Squads** have been constituted under Forest Conservation Development & Regeneration under component protection from fire, involving 2870 numbers of local youths in all the Divisions of the State for forest fire prevention and control activities.

- During the year 2023-24, under Special Relief Commissioner (SRC) Scheme for Forest Fire Prevention and Management 19,000 Km of forest fire lines have been created/maintained in the shape of maintenance of compartment lines, forest boundary lines and other fire lines for the prevention of forest fire in different forest divisions of the State.

- During the year 2023-24, under Centrally Sponsored Scheme (CSS); FPM Scheme: Forest Fire Prevention and Management 5727 Km of forest fire lines have been created/maintained in the shape of maintenance of compartment lines, forest boundary lines and other fire lines for prevention of forest fire in different forest divisions of the State.

- During the year 2023-24, under CAMPA Scheme: Forest Fire Prevention and Management 7074 Km of forest fire lines have been created/maintained in the shape of maintenance of compartment lines, Forest Boundary lines and other fire lines for prevention of forest fire in different Forest Divisions of the State.

- 16,160 numbers of Vana Surakshya Samities have been formed in the State, where 20,06,000 numbers of families from 15,303 villages are involved and they have been assigned with 13,93,144 hectares of forest area for its protection and usufruct benefit.

- 590 numbers of Eco-Development Committees have been formed in the proximity of protected areas to protect forest & wildlife with active involvement of the local community.

- 590 numbers of very high frequency (VHF) stations and 880 numbers of walky-Talky are in operation in the state for strengthening the communication network to be used for monitoring protection activities.

Forest Fire Prevention and Management

The number of cases of forest fire that took place in all 51 divisions during the last three years in the state is given in Table 4.5.1, Table 4.5.2 and Table 4.5.3

Table 4.5.1: Forest fire incidences as reported by Forest Survey of India (FSI) from 01.02.2022 to 02.06.2022

Sl. no.	Name of the division	No. of fire incidences in forest area	No. of fire incidences in non-forest area	Total
1	Angul	1114	111	1225
2	Athamallik	368	69	437
3	Athagarh	38	4	42
4	Balasore WL	14	4	18
5	Balliguda	2027	206	2233
6	Bamra WL	278	149	427
7	Baragarh	554	147	701
8	Baripada	411	127	538
9	Berhampur	84	10	94
10	Bhadrak WL	0	9	9
11	Bolangir	1017	172	1189
12	Bonai	428	11	439
13	Boudh	913	89	1002
14	Chandaka WL	35	2	37
15	Chillika WL	0	9	9
16	Cuttack	83	36	119
17	City Forest (Bhubaneswar)	0	10	10
18	Deogarh	577	166	743
19	Dhenkanal	257	292	549
20	Ghumsur North	104	3	107
21	Ghumsur South	294	17	311
22	Hirakud WL	84	0	84
23	Jeypore	373	164	537
24	Jharsuguda	195	295	490
25	Kalahandi North	1311	128	1439
26	Kalahandi South	1087	570	1657
27	Karanjia	113	7	120
28	Keonjhar	650	279	929
29	Keonjhar WL	246	7	253
30	Khariar	713	23	736
31	Khordha	45	4	49
32	Koraput	606	438	1044
33	Mahanadi WL	28	6	34

34	Malkangiri	735	1301	2036
35	Nawarangpur	595	126	721
36	Nayaragh	186	2	188
37	Paralakhemundi	1055	270	1325
38	Phulbani	511	47	558
39	Puri WL	1	5	6
40	Rairakhol	458	29	487
41	Rairangpur	56	19	75
42	Rajnagar WL	0	29	29
43	Rayagada	2327	635	2962
44	Rourkela	129	87	216
45	Sambalpur	317	281	598
46	Subarnapur	281	62	343
47	Satkosia WL	26	3	29
48	Similipal South	42	77	119
49	Similipal North	101	22	123
50	Sunabeda WL	448	2	450
51	Sundargarh	704	269	973
	Total	**22,019**	**6,830**	**28,849**

Source: Forest Survey of India (FSI), MoEF&CC, Government of India.

Table 4.5.2: Forest fire incidences as reported by Odisha Forest Management System (OFMS) from 01.01.2023 to 11.06.2023

Sl. no.	Name of the division	No. of fire incidences in forest area	No. of fire incidences in non-forest area	Total	Total area affected (in Ha)
1	Angul	635	158	793	160.73
2	Athamallik	325	64	389	177.24
3	Athagarh	215	20	235	110.67
4	Balasore WL	106	28	134	76.53
5	Balliguda	2038	127	2165	62.3
6	Bamra WL	600	364	964	37.95
7	Bargarh	479	221	700	301.47
8	Baripada	725	252	977	91.69
9	Berhampur	316	20	336	36.08
10	Bhadrak WL	0	42	42	7.13
11	Bolangir	434	57	491	522.93
12	Bonai	1410	74	1484	151.52
13	Boudh	607	45	652	162.71
14	Chandaka WL	64	0	64	20.81
15	Chillika WL	1	1	2	0.55
16	Cuttack	112	24	136	37.05

17	City Forest (Bhubaneswar)	0	4	4	5.01
18	Deogarh	1227	381	1608	106.25
19	Dhenkanal	456	275	731	65.29
20	Ghumsur North	421	4	425	115.1
21	Ghumsur South	743	76	819	153.15
22	Hirakud WL	119	0	119	24.65
23	Jeypore	314	150	464	199.8
24	Jharsuguda	244	332	576	71.24
25	Kalahandi North	722	63	785	296.07
26	Kalahandi South	829	473	1302	118.34
27	Karanjia	349	30	379	81.39
28	Keonjhar	1285	479	1764	547.13
29	Keonjhar WL	558	64	622	256.49
30	Khariar	885	59	944	347.1
31	Khordha	310	21	331	492.87
32	Koraput	792	411	1203	365.23
33	Mahanadi WL	150	7	157	6.36
34	Malkangiri	447	787	1234	303.75
35	Nabarangpur	1230	143	1373	604.45
36	Nayaragh	700	15	715	560.71
37	Paralakhemundi	1412	298	1710	54.9
38	Phulbani	1166	60	1226	393.23
39	Puri WL	4	17	21	66.6
40	Rairakhol	612	59	671	82.29
41	Rairangpur	453	114	567	432.7
42	Rajnagar WL	1	19	20	23.31
43	Rayagada	2400	584	2984	646.54
44	Rourkela	397	142	539	52.15
45	Sambalpur	451	308	759	135.99
46	Subarnapur	266	45	311	44.14
47	Satkosia WL	33	7	40	37.62
48	Similipal South	98	242	340	91.98
49	Similipal North	471	245	716	235.25
50	Sunabeda WL	449	6	455	146.44
51	Sundargarh	1100	224	1324	623.19
	Total	**29,161**	**7,641**	**36,802**	**9,471.06**

Source: OFMS, Odisha Forest Department.

Table 4.5.3: Forest fire incidences as reported by Odisha Forest Management System (OFMS) from 01.01.2024 to 14.06.2024

Sl. no.	Name of the division	No. of fire incidences in forest area	No. of fire incidences in non-forest area	Total	Total area affected (in Ha)
1	Angul	369	95	464	28.3
2	Athamallik	148	14	162	56.43
3	Athagarh	146	9	155	53.66
4	Balasore WL	3	9	12	89.93
5	Balliguda	2390	138	2528	48.69
6	Bamra WL	151	40	191	4.43
7	Bargarh	230	76	306	176.41
8	Baripada	150	60	210	20.57
9	Berhampur	154	14	168	3.5
10	Bhadrak WL	0	6	6	3.41
11	Bolangir	221	74	295	114.62
12	Bonai	512	34	546	53.13
13	Boudh	163	21	184	33.79
14	Chandaka WL	42	0	42	14.09
15	Chillika WL	0	0	0	0
16	Cuttack	126	34	160	95.97
17	City Forest (Bhubaneswar)	0	2	2	NA
18	Deogarh	392	118	510	26.63
19	Dhenkanal	171	50	221	21.34
20	Ghumsur North	188	1	189	33.09
21	Ghumsur South	271	9	280	37.21
22	Hirakud WL	17	0	17	12.96
23	Jeypore	596	271	867	339.96
24	Jharsuguda	78	94	172	18.26
25	Kalahandi North	715	78	793	125.73
26	Kalahandi South	752	362	1114	46.4
27	Karanjia	39	6	45	11.37
28	Keonjhar	552	217	769	163.85
29	Keonjhar WL	240	9	249	26.24
30	Khariar	217	17	234	86.28
31	Khordha	64	5	69	211.75
32	Koraput	770	462	1232	145.53
33	Mahanadi WL	50	6	56	2.34
34	Malkangiri	947	1915	2862	332.47
35	Nabarangpur	596	122	718	319.52
36	Nayaragh	459	23	482	215.81

37	Paralakhemundi	797	123	920	28.13
38	Phulbani	371	29	400	69.03
39	Puri WL	4	25	29	4.72
40	Rairakhol	235	12	247	16.3
41	Rairangpur	94	23	117	52.9
42	Rajnagar WL	2	13	15	16.82
43	Rayagada	2268	659	2927	461.94
44	Rourkela	173	74	247	6.12
45	Sambalpur	181	118	299	48
46	Subarnapur	94	17	111	18.25
47	Satkosia WL	27	0	27	41.9
48	Similipal South	115	118	233	106.72
49	Similipal North	146	96	242	74.49
50	Sunabeda WL	103	2	105	30.04
51	Sundargarh	469	142	611	74.8
	Total	**16,998**	**5,842**	**22,840**	**4,023.74**

Source: OFMS, Odisha Forest Department.

The number of forest fires detected by Forest Survey of India using Suomi National Polar-orbiting Partnership-Visible Infrared Imaging Radiometer Suite (SNPP-VIIRS) sensors over the past five forest fire seasons (this includes large, continuous and repeated forest fires) in Odisha is given Fig. 4.5.1

Figure 4.5.1: Number of forest fires detected by FSI using SNPP-VIIRS sensors
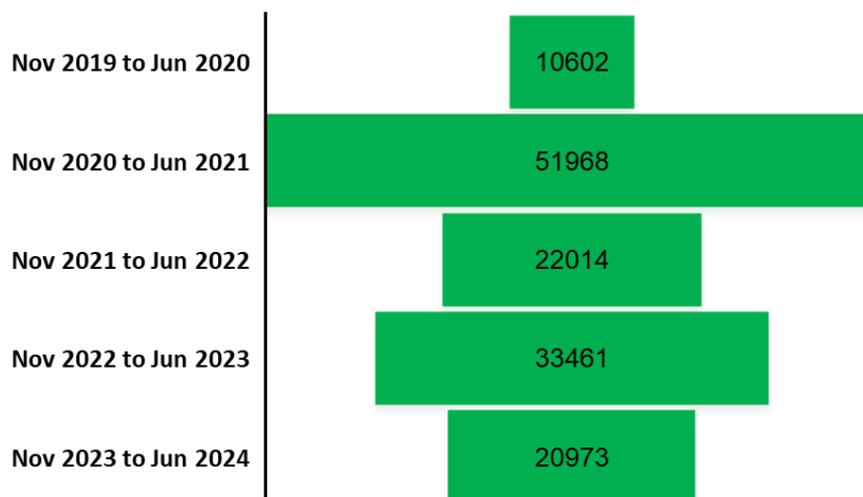
Source: Forest Survey of India (FSI), MoEF&CC, Government of India.

The Forest, Environment & Climate Change Department, Government of Odisha have taken the following remedial and preventive measures to control forest fire and to save forest resources including wild animals.

- Information technology intervention using Odisha Forest Management System (OFMS)

i. Receiving of fire alerts from Forest Survey of India (FSI).

ii. Processing of Data in OFMS and alerts sent directly to mobile up to the level of beat forest guards for immediate response in their jurisdiction.

iii. Offline navigation to fire alert points, data collection with geo-tagged pictures and action taken are uploaded using OFMS mobile application.

iv. Centralized data sync from mobile to OFMS server for proper reporting of fire alerts status throughout the state.

- District Level Committee – In each district of the State a District level Committee has been formed under the chairmanship of concerned District Collector to facilitate interdepartmental cooperation for effective prevention and management of forest fires.

- Annual District Action Plan is put in place well in advance in order to mitigate the deficiency of funds under emergency situations from other schemes/sources of the District Administration to combat forest fire.

- The standard operating procedure (SOP) for prevention and control of forest fire in the State has been prepared and circulated to field officials for taking up effective measures for prevention & control of forest fire.

- Creation and maintenance of fire lines on annual basis.

- Deployment of firefighting squads in all identified fire-vulnerable sites of the State.

- Incentives are given to the Vana Surakhya Samities for their active participation in combating the forest fire in coordination with the forest department personnel.

- Supply of modern equipment like leaf litter blowers and other firefighting gadgets to firefighting squads for effective prevention and control of forest fire.

- Registering Mobile numbers of all field staff starting from Forest Guards to the Divisional Forest Officers to receive fire alerts directly from the Forest Survey of India. Control Rooms have been made functional at both the State Forest Headquarters and Divisional Headquarters for monitoring forest fire incidences. The control room at forest headquarters is dedicated with Toll Free Number 1800-3457-158 for use by public on 24x7 basis.

- Training and capacity building programmes are being regularly organized at different levels for field staff directly involved in combating the forest fire.

- Awareness campaign through distribution of leaflet, brochure, folk dance, roadside play etc. and also through SHG groups are being organized to sensitize the forest edge villagers on prevention of forest fire.

The Odisha Forest Act 1972 Section 27(3) and the Odisha Forest (Fire Protection) Rules, 1979 are in force to take appropriate corrective measures against the culprits involved in causing forest fires.

The State Government have received financial assistance from Government of India through Centrally Sponsored Scheme (CSS) under Forest Fire Prevention & Management (FPM) programme on a 60:40 basis (i.e. 60% Central Share & 40% State Share) and through State Disaster Management Fund (SDMF). The details are given below:

Sl. no.	Year	Name of the scheme	Funds allotted (Rs. in Lakh)
1	2017-18	FPM under CSS (60:40) basis	280.00
2	2018-19	FPM under CSS (60:40) basis	467.39
3	2018-19	TSP Component of FPM under CSS (60:40) basis	83.99
4	2018-19	SCSP Component of FPM under CSS (60:40) basis	124.61
5	2019-20	FPM under CSS (60:40) basis	661.36
6	2020-21	FPM under CSS (60:40) basis	866.59
7	2021-22	FPM under CSS (60:40) basis	754.81
8	2022-23	FPM under CSS (60:40) basis	769.15
9	2023-24	FPM under CSS (60:40) basis	245.30
10	2023-24	SDMF	762.26
		Total	**5015.46**

Source: Highlights of Odisha Forestry Sector, 2024, Odisha Forest Department.

The Agriculture & Farmers Empowerment Department and Forest Department of Odisha works to manage the stubble burning and forest fires in the state. Both departments will need to strengthen the strategies and implement them to control agro or crop residue burning and forest fires as per the defined methods and techniques.

Action Plan: Controlling Emissions Due to Burning of Agro Residues and Forest Fires

Sl. no.	Indicative actions	Status of activity (completed/ ongoing/to be started)	Timeline for completion	Target (coverage/ percentage)	Financial implications (Yes/ No)	Funds allocated (Rs Crore)	Funds utilized as on date (Rs Crore)
1	In-situ treatment of biomass residues for management of stubble burning						
a	Schemes for procurement of agriculture machinery	SMAM (CSS) & popularization of agricultural implements, equipment & pump sets.	Ongoing	Estimate the requirement of crop residue management machines in each district based on quantum of burning expected and number of farmers to be covered to set time-bound targets and assess subsidy requirements. Implementation plan: 50% of the targeted machines in 1st year 100% in 3rd year			
b	Assistance for establishment of farm machinery banks/custom hiring centres	The operational modalities are approved and communicated to field functionaries for implementation.	Ongoing	Target number of custom hiring centres per targeted district. Implementation target: 50% of the planned centres in 1st year 100% in 2nd year			
c	Use of decomposer for in-situ crop residue management.			Targeted hectares of land (in number) to be brought under decomposer district-wise			
2	Ex-situ treatment of biomass residues for management of stubble burning						
a	Schemes for balers/pellet/ briquette machines, etc.	Schemes for subsidies are notified as per Agriculture Policy 2013. The equipment suppliers are also notified in SLTC	Ongoing	Notify the scheme for subsidised balers, pellet / briquette machine, etc. and estimated number to be supported per year. Implementation: 50% in 1st year 75% in 3rd year 100% in 5th year			
3	Biomass projects with respect to the	The proposed site for projects is in Bargarh &	Not finalized	Implementation of biomass-based projects and			

	hotspots of crop residue burning	Sambalpur Districts.		substitution of coal in targeted industry within a year			
4	Use of biomass / crop residue-based pellets mass blending with coal and its co-firing in thermal power plants with blending ratio which needs no modification in boilers						
5	Policy for supply chain mechanism for in-situ and ex-situ management of stubble			Policy to be notified in the first year for district-wise implementation (as applicable) Set up biomass trading system with adequate storage and transportation system to connect farmers, end-users			
6	Supply chain for crop residues to cow shelters.			Implementation with immediate effect			
7	Development of effective protocol for monitoring of fire incidents including crop area consideration and crop fire area data.			Immediate - within a year			
8	Collaboration with ISRO and preparation of Satellite based maps for monitoring of fire incidence.			Immediate - within a year			

4.6 Household Emissions

and Commercial

Establishments

Odisha is the 11th largest state in terms of population as per the 2011 Census of India consisting total population of 4,19,74,218 with no. of households 96,37,820 with 4.3 average household size (number of persons in a household). As per the Odisha Economic Survey Report, 2023-24, the projected population was 4.64 crores by the end of FY 2023-24. The average population growth of Odisha in the last five years from FY 2019-20 to FY 2023-24 is approx 1.16% as depicted in Figure 4.6.1.

Figure 4.6.1: Population Trend of Odisha.
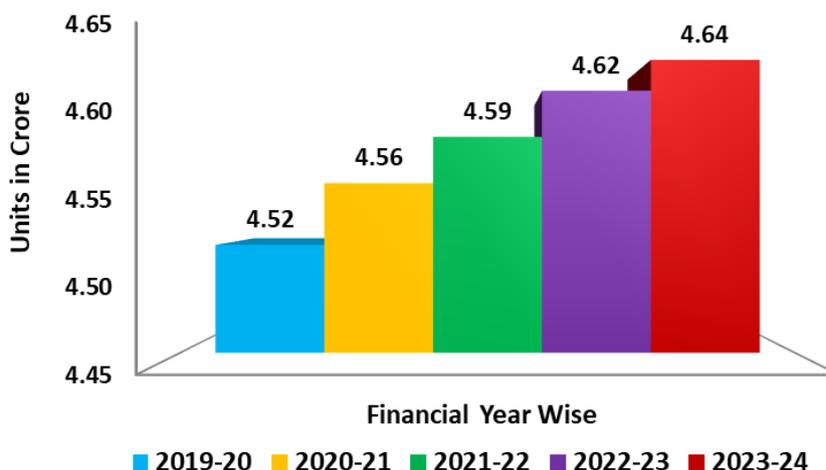
Source: Planning and Convergence Department, Directorate of Economics and Statistics. (2024). Odisha Economic Survey 2023-24.

The use of solid fuels for domestic cooking has a significant impact not only on indoor air quality but also on outdoor air quality with serious public health consequences. In Odisha, majority of the people use conventional fuels (kerosene, coal, and wood) and LPG (Liquid Petroleum Gas) for cooking their foods, with massive consumption of 13.69 tonnes/day of coal, 13.69 tonnes/day of wood, 6.84 tonnes/day of cow dung, 57.0 tonnes/day of LPG, 47.14 kl/day of Kerosene (State of Air Quality, Odisha, Oct 2021 to March 2023, Switch on Foundation). Outdoor air pollution contributes a significant share to indoor air quality due to the massive quantity of vehicular emission; road dust and open waste burning in the urban areas but in rural areas, household emissions impact outdoor air pollution in the morning and evening time because of massive use of conventional fuels. Kerosene consumption is a major indicator of the utilisation of traditional fuel. The data for Odisha from the Ministry of Petroleum and Natural Gas indicates that the percentage of kerosene allocation under the public distribution system (PDS) as illustrated in Table 4.6.1 and upliftment was 98.9% in FY 2019-20 which is further reducing to 24.56% in FY 2022-23, showing a decreasing trend in Figure 4.6.2.

Table 4.6.1: Detail of Kerosene allocation and Upliftment of Odisha under PDS.

Financial Year	2019-20	2020-21	2021-22	2022-23
Kerosene Allocated under PDS (Kilolitre)	210568	194304	155424	116544
Kerosene Quantity Uplifted under PDS (Kilolitre)	208283	190291	150313	28658

Figure 4.6.2: Graph showing decreasing trend in utilisation of kerosene.
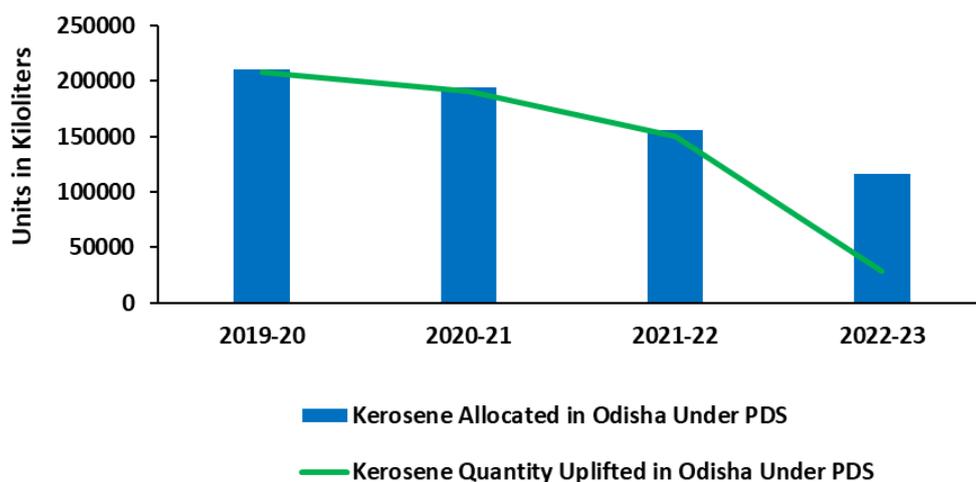
Source: IPNG Statistics Report, 2022-23, MoPNG, GoI.

Low-income groups often do not have adequate access to a reliable supply of affordable clean fuels. Expansion of LPG, piped natural gas (PNG), and electric cooking can help to improve access. This requires a rapid energy transition to replace solid fuels in both urban and rural households with cleaner fuels. Even though there has been a substantial expansion of LPG connection and PNG network in the region, the problem remains same. Central government schemes including Pradhan Mantri Ujjwala Yojana (PMUY) and direct benefit transfer to LPG consumers (PAHAL) combined with state government initiatives have widened the coverage.

Schemes for Use of LPG/PNG for Cooking Fuels

Pradhan Mantri Ujjwala Yojana (PMUY) was launched on 1 May 2016 to distribute 5 crore LPG connections to families which fall below the poverty line. As on 01.04.2024, the PMUY scheme (Ujjwala 1.0, 2.0 and 2.0-Extended) has covered around 10.33 crore beneficiaries since its launch. A total number of 55.5 lakhs domestic LPG connections in Odisha under PMUY as of 01.04.2024 and total active connection in the state is 99.6 lakhs. Status of the last six years active connection in the state is shown in Figure 4.6.3.

Figure 4.6.3: Active domestic LPG connection in Odisha.
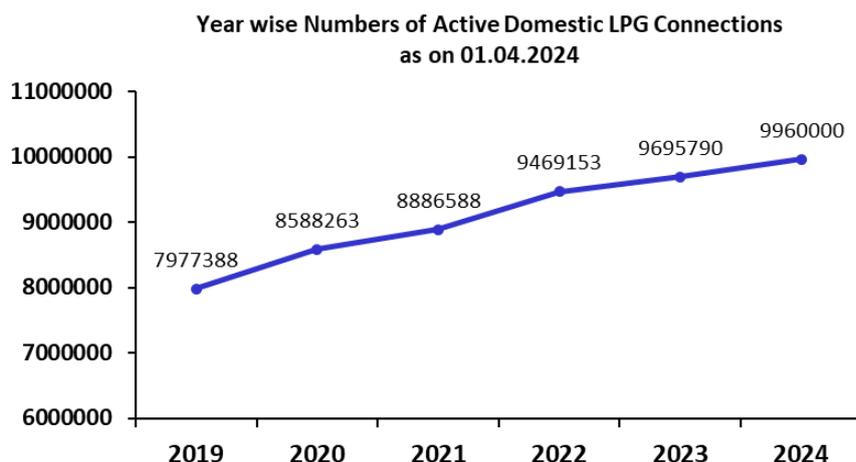
Source: LPG Profile Report, 2023-24, PPAC, MoPNG. GoI.

The highest percentage of PMUY connections since the launch of the scheme on 01.05.2016 has been released in Eastern region (32.4%), followed by Northern region (29.7%), Western region (21.5%), Southern region (10.5%) and North-East region (6.0%). Cabinet approved expansion of Ujjwala Yojana (PMUY 2.0-Extended) in Sep' 2023 for 75 lakhs additional LPG connections to be released in 3 years (2023-24, 2024-25 and 2025-26). It will take total number of PMUY beneficiaries to 10.35 crore. Details of PMUY connections provided in Odisha from FY 2019-20 to 2023-24 are given below in Table 4.6.2.

Table 4.6.2: Details of total domestic active LPG customers in Odisha.

Sl. No.	Year	Total Number of Active Domestic LPG Consumers in Odisha (Cumulative Status as on 01.04.2024)	PMUY (Cumulative Status as on 01.04.2024)	Other Schemes (Cumulative Status as on 01.04.2024)
1	2019	7977388	4226289	3751099
2	2020	8588263	4740385	3847878
3	2021	8886588	4736666	4149922
4	2022	9469153	5188279	4280874
5	2023	9695790	5319685	4376105
6	2024	9960000	5547343	4412657

Source: IPNG Statistics Report, 2022-23, LPG Profile Report, 2023-24, PPAC, MoPNG, GOI.

All India LPG coverage jumped from 56.2% in April 2015 to 61.9% in April 2016, 72.8% in April 2017, 80.9% in April 2018, 94.3% in April 2019 and 97.5% in April 2020 and further to 99.8% in April 2021. This reflects the mission mode of the Government towards increasing LPG penetration.

Implementation of Policies Aiming for Conversion of Conventional Fuel to Cleaner Fuels in Commercial Establishments

The total non-domestic customer population as on 01.04.2023 in Odisha is 0.55 lakhs (LPG Profile Report, 2023-24, MoPNG). It is also necessary to address the use of solid fuels in open eateries and restaurants. This can be further aided by the adoption of indoor air quality standards/guidelines. OSPCB has already issued the notice to restrict the use of raw coal in roadside dhabas, including owner or operator of roadside dhabas in the districts of Dhenkanal, Angul, Sambalpur, Jharsuguda, and Sundargarh (OSPCB, Notice No. 17967/Ind-I-Con-Misc-1290, Dated 22.12.2016). This step was taken due to severe air pollution, which caused respiratory discomfort for people passing by. The commercial licenses for setting up these eateries need to be linked with a mandate for using clean fuel (LPG/PNG). The list of active licensed/Registered Food Business Operators (FBOs) in the state is mentioned in the Table 4.6.3.

Table 4.6.3: Year-wise active number of food business operators in Odisha.

Financial Year	2019-20	2020-21	2021-22	2022-23	2023-24
Total number of active licensed/registered food business operators (FBOs) in Odisha	NA	NA	2688	5631	NA

Source: FSSAI Annual Report 2021-22 & 2022-23 (FoSCoRIS, FSSAI).

Total license/registration issued till the end of FY 2023-24 is 18590 in Odisha as per the Food Safety Compliance System (FoSCoS, FSSAI).

* FoSCoRIS is meant for conducting inspection of food units by Food Safety Officers (FSO) and Designated Officers (DO).
* foscos.fssai.gov.in is a portal for new registration/renewal/modification of licenses for FBOs.

Key Strategies to Curb Emissions From Households and Commercial Establishments

- Aim for 100 percent coverage of households in all districts for clean cooking fuels.
- Enforce ban on use of coal and other dirty fuels in open eateries.
- Link up decentralized renewable energy generation with clean energy access.
- Adopt indoor air quality standards/guidelines.
- Approved fuel list to mandate the use of only clean fuels in open eateries, restaurants and hotels and include this in permit condition, as applicable.

Action Plan: Controlling Emissions Due to Households and Commercial Establishments

Sl. no.	Indicative actions	Status of activity (completed/ ongoing/to be started)	Timeline for completion	Target (coverage/ percentage)	Financial implications (Yes/ No)	Funds allocated (Rs Crore)	Funds utilized as on date (Rs Crore)
1.	Schemes for use of LPG/ PNG for cooking fuels	Total Active LPG domestic consumers in Odisha (As on 01.04.2024) =99.6 Lakhs. Under Pradhan Mantri Ujjwala Yojana (PMYU) total connections issued in Odisha (As on 01.04.2024) = 55.5 Lakhs. A total 103.3% household is using LPG in Odisha and PMUY covers 57.55% households (as per 2011 Census of India). *Percentage of household connections may vary after next Census of India.	Ongoing	1-2 years: Average 100% coverage of households in all districts of state (with reliable refills).	No implications for the state government	NA	NA
2.	Amendments to the building by-laws for "Indoor air quality management"	The Energy Conservation Building Code 2011 of Odisha has necessary provisions for managing indoor air pollution	Completed	Housing & Urban Development Department, NotificationNo.1043 dated 10th August, 2020	No	NA	NA
3.	Implementation of policies aiming for conversion of conventional fuel to cleaner fuels in commercial establishments	The state government has prohibited use of coal in Dhabas and eateries in certain districts (OSPCB, Notice No. 17967/Ind-I-Con-Misc-1290, Dated 22.12.2016).	Ongoing	Approved fuel list to mandate the use of only clean fuels in open eateries, restaurants and hotels and include this in permit condition, as applicable.	No	NA	NA

4.	Incentive measures to switch over to cleaner fuels	Pratyaksh Hanstantrit Labh Scheme (PAHAL)	Ongoing	Till FY 2025-26 align with the PMUY	No implications for the state government	NA	NA
5.	Any other policies/ rules/ standards/ guidelines pertaining to household emissions.	The state government has prohibited use of coal in Dhabas and eateries in certain districts. Comprehensive Action Plan (CAP): Short-medium- and long-term measures for Household Emissions and Commercial establishments have also been prepared by OSPCB.	Ongoing	i.Approved fuel list to mandate use of only clean fuels in open eateries, restaurants and hotels and include this in permit condition, as applicable. ii.Adopt indoor air quality standards/ guidelines. iii.Link up decentralized renewable energy generation with clean energy access.	No	NA	NA

Comprehensive Action Plan (CAP): Short-medium and long-term measures for Household Emissions and Commercial establishments by OSPCB.

Sl. no.	Action points	Agency responsible	Timeline
1	A targeted programme to be implemented for 100 percent coverage of households by distribution of LPG/PNG in all non-compliant cities. Leverage programs like Ujjwala and other state government programs	Department of Energy	1-2 years
2	In low-income neighbourhoods, as well as roadside eateries/dhabas/ restaurants etc. promote and give access to LPG and electricity. Mandate and link commercial license to clean fuels.	Dept. of Energy, Power and Natural Gas, Urban Local Bodies	1-2 years
3	Prohibit use of coal in hotels and restaurants. Phase out and eliminate use of kerosene for cooking in the city and incentivize move to LPG. Also check feasibility of natural gas pipeline for residential and commercial use	Department of Energy, Civil Supplies Department	1-2 years

Source: Comprehensive Action Plan for Clean Air for Non-Attainment Cities of Odisha, 2018, OSPCB.

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Annexure I

ULB-wise C & D waste generated in Odisha for FY 2023-24

Sl. no.	Name of the district	Name of the ULB	Population	Quantity of C&D waste generated per day (Tonne)	Area of solid waste disposal site (Acre)
1	Angul	Angul Municipality	43,795	1	3
2		Athmalik NAC	12,298	0.5	2
3		Talcher Municipality	55,000	3	1
4	Balasore	Balasore Municipality	1,18,162	0.5	-
5		Jaleswar Municipality	25,747	2	0.2
6		Remuna NAC	33,982	0	0
7		Nilagiri NAC	17,272	0.01	0.61
8		Soro Municipality	32,531	0	0
9	Bolangiri	Bolangiri Municipality	98,238	1.9	0.75
10		Kantabanjhi NAC	21,819	0.95	3.5
11		Patnagarh NAC	21,021	0.3	1
12		Titlagarh Municipality	31,258	0.15	0.15
13		Tusura NAC	10,638	0.3	0.9
14	Bargarh	Attabira NAC	17,243	0.4	11.2
15		Bargarh Municipality	80,625	2	3.49
16		Barpali NAC	20,841	1	1
17		Bijepur NAC	11,230	0.6	0.45
18		Padmapur NAC	17,625	1.5	0
19	Bhadrak	Basudevpur Municipality	33,690	0.2	1.5
20		Bhadrak Municipality	1,43,533	0.8	1
21		Chandabali NAC	26,844	0.25	0.22
22		Dhamnagar NAC	22,920	1.5	0.05
23	Boudh	Boudh NAC	20,435	3	1.96
24	Cuttack	Athagarh NAC	17,218	2	0.8
25		Banki NAC	17,521	0.1	0.5
26		Choudwar Municipality	42,784	2	5.82
27		Cuttack Municipal Corporation	7,00,000	35	10
28	Deogarh	Deogarh Municipality	22,390	1	0
29	Dhenkanal	Bhuban NAC	22,187	0.25	0.22
30		Dhenkanal Municipality	83,245	1.5	0
31		Hindol NAC	17,387	0.32	2
32		Kamakhyanagar NAC	16,810	0.2	0
33	Gajapati	Kasinagar NAC	11,035	0.8	1
34		Parlakhemundi Municipality	46,272	0.18	4
35	Ganjam	Aska NAC	21,428	1	3.5

36		Belaguntha NAC	-	0.037	0.1
37		Berhampur Municipal Corporation	4,15,363	2	1.5
38		Bhanjanagar NAC	21,198	0.31	0.21
39		Buguda NAC	15,176	1	1
40		Chhatrapur NAC	26,322	0.1	1.9
41		Chikiti NAC	11,645	1.6	2.3
42		Digapahandi NAC	13,192	6	0
43		Ganjam NAC	11,747	0	1.5
44		Gopalpur NAC	7,221	-	-
45		Hinjilicut Municipality	31,845	2	2
46		Kabisuryanagar NAC	17,434	0.1	0.5
47		Khalikote NAC	17,022	0.1	0.1
48		Kodala NAC	13,965	0.5	0.9
49		Polasora NAC	26,072	0.6	1
50		Purusottampur NAC	20,184	0.48	0
51		Rambha NAC	12,111	1.5	0.05
52		Surada NAC	18,864	1	2
53	Jagatsinghpur	Jagatsinghpur Municipality	36,994	2.45	1.5
54		Paradeep Municipality	68,585	1.25	0
55	Jajpur	Jajpur Municipality	37,458	0.5	1
56		Vyasanagar Municipality	48,911	0.5	0
57	Jharsuguda	Belpahar Municipality	38,993	3	2
58		Brajarajnagar Municipality	80,403	1	1
59		Jharsuguda Municipality	97,730	1.5	0
60	Kalahandi	Bhawanipatna Municipality	69,045	1	1
61		Dharmagarh NAC	19,819	0.4	0.6
62		Junagarh NAC	19,656	1	0.022
63		Kesinga NAC	19,239	0.06	0.35
64	Kandhamal	Baliguda NAC	25,894	6	0.022
65		G. Udaygiri NAC	11,296	0.13	0.5
66		Phulbani Municipality	37,371	0.4	0
67	Kendrapada	Kendrapada Municipality	47,600	2	2
68		Pottamundai Municipality	36,528	0.25	0.25
69	Keonjhar	Anandapur Municipality	39,585	1.5	1.5
70		Barbil Municipality	66,540	2	0.12
71		Champua NAC	22,326	0.6	1
72		Joda Municipality	46,631	0.1	0.5
73		Keonjhar Municipality	60,590	1.5	2.5
74	Khordha	Balugaon NAC	17,365	0.23	2.47

75		Banpur NAC	19,599	0.78	1.2
76		Bhubaneswar Municipal Corporation	8,40,834	120	2.48
77		Jatni Municipality	55,896	0.08	0
78		Khordha Municipality	46,095	0.5	3
79	Koraput	Jeypore Municipality	84,830	1	0
80		Koraput Municipality	47,468	0.1	0
81		Kotpad NAC	16,326	1.1	0
82		Sunabeda Municipality	50,394	0.03	0
83	Malkangiri	Balimela NAC	13,000	0.5	1
84		Malkangiri Municipality	42,500	1	1
85	Mayurbhanj	Baripada Municipality	1,09,743	1	0
86		Karanjia NAC	22,748	0.75	0
87		Rairangpur Municipality	25,518	0.02	0
88		Udala NAC	13,152	0.45	0
89	Nabarangpur	Nabarangpur Municipality	30,041	0.2	0
90		Umerkote Municipality	6,556	0.25	1
91	Nayagarh	Daspalla NAC	18,471	0.25	0
92		Khandapara NAC	9,034	0.37	0
93		Nayagarh Municipality	17,034	1.5	0
94		Odagaon NAC	11,941	0.1	0
95		Ranpur NAC	19,500	0.5	2.05
96	Nuapada	Khariar NAC	15,087	0.8	0
97		Khariar road NAC	18,967	0.05	0
98		Nuapada NAC	16,208	0.6	4.3
99	Puri	Konarak NAC	16,779	0.012	0
100		Nimapara NAC	19,289	0.004	0
101		Pipili NAC	17,623	0.009	0
102		Puri Municipality	2,00,564	0.2	5
103	Rayagarh	Gudari NAC	6,931	0.1	0.5
104		Gunupur NAC	24,162	1.5	0
105		Rayagarh Municipality	71,208	1	6.17
106	Sambalpur	Kuchinda NAC	15,576	0.053	1
107		Redhakhol NAC	20,058	0.2	1.34
108		Sambalpur Municipal Corporation	3,35,761	1.5	0
109	Subarnapur	Binka NAC	15,765	1	0
110		Subarnapur Municipality	20,777	0.5	0
111		Tarava NAC	8,334	1	0

112	Sundargarh	Biramitrapur Municipality	33,442	0.03	1.5
113		Rajagangpur Municipality	51,314	0.7	0
114		Rourkela Municipal Corporation	3,09,639	5	5
115		Sundergarh Municipality	45,036	4.5	0.06
Total				**260.14**	**131.81**

ULB-wise MSW details in Odisha for FY 2023-24

Sl. no.	Name of the district	Name of the ULB	MSW generated in TPD	MSW collected in TPD	Qty processed in TPD
1	Angul	Angul Municipality	10.95	10.95	10.95
2		Athamallick NAC	1.8	1.46	0.4
3		Talcher Municipality	8	8	8
4	Balasore	Balasore Municipality	35.07	35.07	35.07
5		Soro Municipality	1.5	1.5	1.5
6		Jaleswar Municipality	1.5	1.5	1.5
7		Remuna NAC	0	0	0
8		Nilagiri NAC	6.5	6.5	6.5
9	Baragarh	Baragarh Municipality	35.5	35	30
10		Barapalli NAC	7.2	7.2	7.2
11		Padampur NAC	5	4.2	4.2
12		Atabira NAC	1.5	1.4	1.4
13		Bijepur NAC	1.98	1.98	1.98
14	Bhadrak	Bhadrak Municipality	36	32	18
15		Basudevpur Municipality	13	13	13
16		Dhamnagar NAC	6	6	3
17		Chandballi	4.5	2	2.5
18	Bolangir	Bolangir Municipality	28.3	28	26
19		Titilagarh Municipality	10	10	10
20		Kantabanjhi NAC	6.5	6.5	6.5
21		Patnagarh NAC	10	10	0
22		Tusura NAC	2.5	2.5	2
23	Boudh	Boudhgarh NAC	6	6	6
24	Cuttack	Cuttack Municipal Corporation	300	300	135
25		Choudwar Municipality	12	12	12
26		Banki NAC	4.84	4.84	3.64
27		Athagarh NAC	3	3	2.5
28	Deogarh	Deogarh Municipality	9.5	9.5	5.05
29	Dhenkanal	Dhenkanal Municipality	23	17	17
30		Bhuban NAC	3	1.5	1.5
31		Kamakshaya Nagar NAC	3	3	1.5
32		Hindol NAC	1.8	1.8	1.8
33	Gajapati	Paralakhemundi Municipality	8	1.5	1.8
34		Kasinagar NAC	2.1	2.1	2.1
35	Ganjam	Berhampur Municipal Corporation	124	124	124
36		Chhatrapur NAC	7.8	7.8	7.8

37		Hinjillicut NAC	1.6	1.6	1.6
38		Aska NAC	6.453	6.453	6.453
39		Bhanjanagar NAC	4	4	4
40		Polasara NAC	4.8	4.8	4.8
41		Purusottampur NAC	5	3	3
42		Kabisuryanagar NAC	5	5	5
43		Suruda NAC	5.1	4	4
44		Buguda NAC	5	5	5
45		Kodala NAC	5	2.8	2.3
46		Ganjam NAC	1.8	1.8	1.8
47		Khallikote NAC	5	3.4	3.4
48		Digapahandi NAC	3	2.5	2.5
49		Chikiti NAC	2.09	1.77	1.77
50		Rambha NAC	4.7	4.7	4.7
51		Belaguntha NAC	2.37	2.37	2.37
52		Gopalpur NAC	2.1	2.1	2.1
53	Jagatsinghpur	Paradeep Municipality	21	21	21
54		Jagatsinghpur Municipality	0.145	0.145	0.145
55	Jajpur	Vyasanagar Municipality	17.4	17.4	17.4
56		Jajpur Municipality	12	12	12
57	Jharsuguda	Brajarajnagar Municipality	10.1	10.1	8
58		Jharsuguda Municipality	28.82	28	20
59		Belpahar Municipality	10.1	10.1	10.1
60	Kalahandi	Bhawanipatna Municipality	21	21	14
61		Kesinga NAC	4.2	4.2	4.2
62		Junagarh NAC	5	1.5	0.3
63		Dharmgarh NAC	3.3	3.3	2.8
64	Kandhamal	Phulbani Municipality	6	5	4
65		Baliguda NAC	1.5	1	1
66		G.Udayagiri NAC	2.1	2.1	2.1
67	Kendrapada	Kendrapada Municipality	14	14	3.96
68		Patamundai Municipality	15	15	15
69	Keonjhar	Barbil Municipality	20	20	20
70		Keonjhar Municipality	24	24	24
71		Anandpur Municipality	10	10	10
72		Joda Municipality	16.5	16.5	16.5
73		Champua NAC	5	5	5
74	Khordha	Bhubaneswar Municipal Corporation	820	820	420
75		Jatani Municipality	11	8	8
76		Khordha Municipality	14	14	14
77		Banpur NAC	0.78	0.78	0.78
78		Balugaon NAC	1.25	1.25	1.25
79	Koraput	Jeypore Municipality	27	27	27
80		Sunabeda Municipality	5	4	0

81		Koraput Municipality	3.5	1.5	1.5
82		Kotpad NAC	1.5	1	5
83	Malkangiri	Malkangiri Municipality	11.57	10	9
84		Balimela NAC	4	3	2.8
85	Mayurbhanj	Baripada Municipality	45	45	30
86		Rairangpur Municipality	3	3	3
87		Karanjia NAC	5	5	5
88		Udala NAC	3.2	3.2	3.2
89	Nawarangpur	Nawarangpur Municipality	7.92	7.92	4
90		Umerkote Municipality	11	3.29	3.29
91	Nayagarh	Nayagarh Municipality	8.2	8.2	6.5
92		Dapala NAC	5	5	1.5
93		Ranpur NAC	2	2	2
94		Odagaon NAC	2.5	2	2
95		Khandapada NAC	3	3	3.1
96	Nuapada	Khariar Road NAC	3	3	3
97		Khariar NAC	2.5	1.8	2.5
98		Nuapada NAC	5.2	5.2	5.2
99	Puri	Puri Municipality	70.4	70.4	70.4
100		Konark NAC	2.45	2.45	2.45
101		Nimapara NAC	1.2	1.2	1.2
102		Pipili NAC	1.5	1.5	1.5
103	Rayagada	Rayagada Municipality	24	24	22
104		Gunupur NAC	13	13	7
105		Gudari NAC	0.5	0.3	0.3
106	Sambalpur	Sambalpur Municipality	196	125	125
107		Redhakhol NAC	3.8	3.8	3.8
108		Kuchinda NAC	3	3	3
109	Sonepur	Subarnapur Municipality	10	10	10
110		Binika NAC	3	3	3
111		Tarava AC	2.8	2.8	2.8
112	Sundergarh	Rourkela Municipal Corporation	120	102	102
113		Rajgangpur Municipality	11	11	11
114		Sundergarh Municipality	13.5	13.5	13.5
115		Biramitrapur Municipality	4.95	4.95	4.95
Total			**2538.73**	**2395.47**	**1725.2**

ULB-wise plastic waste details in Odisha for FY 2023-24

Sl. no.	Name of the district	Name of the ULB	Plastic waste generation	Quantity of waste for use in TPA
1	Angul	Angul Municipality	6	6
2		Athamallick NAC	3	1
3		Talcher Municipality	2	0
4	Balasore	Balasore Municipality	592	592
5		Soro Municipality	9	8
6		Jaleswar Municipality	6	3
7		Remuna NAC	0	0
8		Nilagiri NAC	90	85
9	Baragarh	Baragarh Municipality	6000	6000
10		Barapalli NAC	12	1
11		Padampur NAC	188	188
12		Atabira NAC	4	0
13		Bijepur NAC	1	4
14	Bhadrak	Bhadrak Municipality	10	0
15		Basudevpur Municipality	15	0
16		Dhamnagar NAC	10	7
17		Chandballi	5	0
18	Bolangir	Bolangir Municipality	47	0
19		Titilagarh Municipality	85	0
20		Kantabanjhi NAC	1852	2
21		Patnagarh NAC	7	0
22		Tusura NAC	2	2
23	Boudh	Boudhgarh NAC	20	1
24	Cuttack	Cuttack Municipal Corporation	7665	7282
25		Choudwar Municipality	65	2
26		Banki NAC	11	0
27		Athagarh NAC	1	3
28	Deogarh	Deogarh Municipality	76	0
29	Dhenkanal	Dhenkanal Municipality	2170	1140
30		Bhuban NAC	3	0
31		Kamakshaya Nagar NAC	1	0
32		Hindol NAC	1	4
33	Gajapati	Paralakhemundi Municipality	0	0
34		Kasinagar NAC	1	1
35	Ganjam	Berhampur Municipal Corporation	9724	9724
36		Chhatrapur NAC	3	3
37		Hinjillicut NAC	190	0

38		Aska NAC	10	10
39		Bhanjanagar NAC	4	4
40		Polasara NAC	40	40
41		Purusottampur NAC	8	8
42		Kabisuryanagar NAC	34	34
43		Suruda NAC	360	220
44		Buguda NAC	1	0
45		Kodala NAC	46	35
46		Ganjam NAC	50	50
47		Khallikote NAC	4	4
48		Digapahandi NAC	192	29
49		Chikiti NAC	428	257
50		Rambha NAC	1	1
51		Belaguntha NAC	1	1
52		Gopalpur NAC	570	3
53	Jagatsinghpur	Paradeep Municipality	3124	5
54		Jagatsinghpur Municipality	14	5
55	Jajpur	Vyasanagar Municipality	20	20
56		Jajpur Municipality	13	10
57	Jharsuguda	Brajarajnagar Municipality	3081	0
58		Jharsuguda Municipality	165	62
59		Belpahar Municipality	59	0
60	Kalahandi	Bhawanipatna Municipality	250	12
61		Kesinga NAC	18	18
62		Junagarh NAC	2	1
63		Dharmgarh NAC	10	7
64	Kandhamal	Phulbani Municipality	1	0
65		Baliguda NAC	2	1
66		G.Udayagiri NAC	2	2
67	Kendrapada	Kendrapada Municipality	40	0
68		Patamundai Municipality	4	5
69	Keonjhar	Barbil Municipality	58	58
70		Keonjhar Municipality	762	762
71		Anandpur Municipality	120	120
72		Joda Municipality	12	12
73		Champua NAC	3	3
74	Khordha	Bhubaneswar Municipal Corporation	19665	4065
75		Jatani Municipality	6	3
76		Khordha Municipality	50	15
77		Banpur NAC	11	11
78		Balugaon NAC	9	9
79	Koraput	Jeypore Municipality	8	8
80		Sunabeda Municipality	0	0
81		Koraput Municipality	780	10

82		Kotpad NAC	0	0
83	Malkangiri	Malkangiri Municipality	88	51
84		Balimela NAC	4	60
85	Mayurbhanj	Baripada Municipality	25	0
86		Rairangpur Municipality	0	5
87		Karanjia NAC	17	0
88		Udala NAC	15	0
89	Nawarangpur	Nawarangpur Municipality	1	0
90		Umerkote Municipality	12	2
91	Nayagarh	Nayagarh Municipality	36	0
92		Dapala NAC	74	35
93		Ranpur NAC	3	0
94		Odagaon NAC	4	0
95		Khandapada NAC	0	0
96	Nuapada	Khariar Road NAC	165	45
97		Khariar NAC	165	45
98		Nuapada NAC	329	235
99	Puri	Puri Municipality	806	564
100		Konark NAC	5	5
101		Nimapara NAC	5	1
102		Pipili NAC	7	7
103	Rayagada	Rayagada Municipality	6	0
104		Gunupur NAC	1	0
105		Gudari NAC	1	0
106	Sambalpur	Sambalpur Municipality	35	35
107		Redhakhol NAC	1	0
108		Kuchinda NAC	4	4
109	Sonepur	Subarnapur Municipality	3	0
110		Binika NAC	1	1
111		Tarava AC	2	0
112	Sundergarh	Rourkela Municipal Corporation	5110	39
113		Rajgangpur Municipality	0	5
114		Sundergarh Municipality	18	18
115		Biramitrapur Municipality	3	3
Total			**65,854**	**32,133**

State Pollution Control Board, Odisha

A/118, Nilakantha Nagar, Unit-VIII, Bhubaneswar-751012, Odisha, India