ODISHA STATE CLEAN AIR ACTION PLAN

NCAP NATIONAL CLEAN AIR PROGRAMME

LiFE Lifestyle for Environment

G20 भारत 2023 INDIA

Azadi Ka Amrit Mahotsav

CPCB

ODISHA

ODISHA STATE CLEAN AIR ACTION PLAN

State Pollution Control Board, Odisha

Contents

PRADEEP KUMAR JENA, IAS
Chief Secretary & Chairman,
State Pollution Control Board, Odisha

Tel. : 0674-2534300
: 0674-2534300
Fax. : 0674-2536660
Email. : csori@nic.in

Foreword

It has always been an endeavour of the Government of Odisha to work towards environmental sustainability and minimise the pollution impacts of the rapidly growing economy of the state. From this perspective, air pollution is recognised as a growing public health concern and the State Government is committed to combat this challenge with early and preventive action.

Therefore, under the National Clean Air Programme (NCAP) and the relevant policies of the State Government, State level clean air programme has been initiated to mitigate pollution from widely different sources including industries, vehicles, road dust, open burning of solid waste, construction and demolition waste, household fuels, and widely dispersed area and episodic sources.

This action has taken deep roots and has also evolved in stages. From the initial efforts of framing and implementing clean air action plans in the seven non-attainment cities of Bhubaneswar, Cuttack, Rourkela, Balasore, Talcher and Kalinganagar, the scope of action has now been expanded to include the entire state to maximise air quality gains.

This Odisha State Action Plan (SAP) is being launched to address the growing air pollution problem at a regional scale. The geographical scope of this plan is the entire state of Odisha not only to reduce air pollution at a local level but also to minimise regional influence to enable accelerated transition towards clean air goals.

Through this initiative the Government of Odisha is committed to promote science-based air quality management to scientifically assess the contribution of air pollution sources and design air quality mitigation strategy for each sector. This plan is a time-bound implementation strategy with improved monitoring and compliance systems. This identifies the areas of action and improvement needed in infrastructure and systems, regulatory and institutional capacity, and strategies for compliance and enforcement, which will help in ensuring verifiable change in air quality.

This solution oriented strategy to meet time bound targets is designed to accelerate transition towards clean energy and clean technology across all sectors. This will enhance walking and cycling, zero emission vehicles, public transport so as to achieve a circular economy to bring back waste streams as a resource, reduce dust sources and achieve urban greening and large scale afforestation.

This State Action Plan is an opportunity to align and leverage the state and central governments' relevant policies, regulations, and funding strategies to maximise clean air gains. This envisages coordinated action by a wide spectrum of concerned departments for joint action to, industry, research institutions, and experts. Their coordinated action is expected to build capacity and ensure implementation with speed and scale.

(Pradeep Kumar Jena, IAS)
Chief Secretary, Odisha

1. Background

Hon'ble National Green Tribunal, Delhi, in OA No. 681 dated 08.10.2018, gave the following directions on non-attainment cities:

> All the States and Union Territories with non-attainment cities must prepare appropriate action plans within two months to bring down the air pollution levels to the prescribed norms within six months from the date of finalization of action plans.
>
> Action plans may be prepared by a six-member Committee comprising of Directors of Environment, Transport, Industries, Urban Development, Agriculture and Member Secretary, State Pollution Control Board or Committee of the concerned State. The Committee may be called the Air Quality Monitoring Committee (AQMC). The Committee will function under the overall supervision and coordination of the Principal Secretary, Environment of the concerned State or the Union Territory. This may be further supervised by the Chief Secretaries concerned or their counterparts in Union Territories by ensuring intra-sectoral coordination.
>
> The action plan will indicate steps to be taken to check different sources of pollution, having speedy, definite and specific timelines for execution.
>
> The Chief Secretaries of the State and Administrators / Advisors to Administrators of the Union Territories will be personally accountable for the failure to formulate action plans, as directed.

Thereafter, the Ministry of Environment, Forest and Climate Change (MoEFCC) launched the National Clean Air Programme (NCAP) on 10 January 2019 as a time-bound national-level strategy to reduce air pollution in a comprehensive manner. The objective has been to reduce particulate pollution by 20-30 per cent from 2017 level by 2024. This has been subsequently tightened with a reduction target of 45 per cent by 2026.

As of today the Central Pollution Control Board (CPCB) has identified about 134 non-attainment cities/towns based on the ambient air quality (AAQ) data with respect to particulate matter concentration for the years 2011-2015. Of these, seven cities belong to the state of Odisha. These include Bhubaneswar, Cuttack,

Rourkela, Balasore, Talcher, Angul and Kalinganagar. All non-attainment cities have prepared city action plans that have been approved by the CPCB and are under implementation.

Mandate of State Action Plan

According to the guidance document of the National Clean Air Programme (NCAP), a State Action Plan is needed to mitigate air pollution. The NCAP policy document includes an 'Appendix-VI: NCAP agencies and timelines at S.No.1.13' that mentions the requirement of State Action Plan for Air Pollution. The MoEFCC has therefore asked for a State Action Plan to address the air pollution problem at a larger regional scale.

To enable framing and implementation of the multi-tiered action plans in the state, the Government of Odisha has constituted the following three committees to monitor and implement the activities under the NCAP:

i) Steering committee formed as on 01.06.2019
ii) State-level air quality monitoring committee formed as on 15.11.2018
iii) District-level monitoring committee formed as on 16.03.2019 for six cities and 26.03.2021 for Kalinga Nagar

In addition to the state-level committee, city-level air quality management cells have also been formed to undertake activities in line with the NCAP guidelines.

For the purpose of preparation of the State Action Plan, Odisha State Pollution Control Board (OSPCB) 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 State Action Plan has taken cognizance of the relevant policies, regulations, programmes and funding strategies of the state and central governments in the relevant sectors, current status of actions, and best practice approaches. Several policies, schemes, programmes as well as the directives, orders and guidelines of state and central governments have already set the foundation for the abatement of air pollution in the region.

The multi-sector strategy of the State Action Plan has included within its scope the mitigation strategies needed in all key sectors of pollution that include industries, power plants, vehicles and transportation, diesel generator sets, municipal solid

waste/biomass burning, construction/demolition waste, road dust and urban greening, episodic problem of crop residue burning and forest fires and other dispersed sources.

Accordingly, the State Action Plan identifies the roadmap for the multi-sector strategy for air pollution mitigation. The timeframe for implementation is stratified as short-term (up to one year), medium-term (one-three years) and long-term plans (three-five years). For each indicator of action, timeline for completion, target, funding and utilization need to be indicated.

The State Action Plan identifies the areas of improvement needed in infrastructure and systems, regulatory and institutional capacity, and strategies for compliance and enforcement.

The geographical scope of this plan is the entire state of Odisha including all districts. It is recognized that there is a wide variation in the baseline action across the state due to varying levels of urbanization and development of infrastructure and systems. More advanced action in key urban centres including the Capital Region is expected to reduce air pollution exposures substantially.

The State Action Plan aims to meet the national ambient air quality standards state-wide through a multisector approach that includes transition to affordable clean fuels and technology in industry, transport and households; mobility transition by scaling up mass transit, electrification of vehicles, vehicle fleet renewal, inclusive street infrastructure to promote walking and cycling and low emissions zones, and strategies to reduce personal vehicle usage among others; circular economy for material recovery from waste to prevent its dumping and burning; dust management from construction and demolition, roads and open areas and greening measures; and stringent time-bound implementation strategies with improved monitoring and compliance systems.

This aims to reduce health risk from air pollution as the state-level disease burden estimates of 2017 carried out by Indian Council of Medical Research (ICMR) along with other agencies show that air pollution is the second-largest risk factor responsible for premature deaths in Odisha. If air pollution concentration can be lowered, life expectancy in Odisha can increase by 1.2 years – this on a cumulative population-wide basis can be a significant benefit.

2. Guiding principles

The roadmap of the State Action Plan is guided by the vision of meeting the clean air standards for:

- Reducing integrated exposures to protect public health and improve life expectancy and productivity.
- Need equitous, inclusive, affordable, innovative approaches and protection of vulnerable groups from the toxic risk.
- Need science-based air quality management with compliance and accountability framework.
- Enable multi-sector and a system-based approach for aligned action across the sectors.
- State Action Plan is an opportunity to take an airshed-based approach towards air pollution mitigation to minimize regional influence on local air pollution.

3. Integration of Mission LiFE (Lifestyle for Environment)

Mission LiFE was launched by the Government of India in 2022 as a global movement to safeguard the environment from the impact of climate change. It follows three strategies:

i) Nudging individuals to practice simple yet effective environment friendly actions in their lives (demand);
ii) Enabling industries and markets to respond swiftly to the changing demand (supply);
iii) Influencing government and industrial policy to support both sustainable consumption and production (policy).

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 and city action plans 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 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 include in Clean Air Action Plans.

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

- **Action no 2:** Use of public transport wherever possible
- **Action no 5:** Use bicycles for local or short commute
- **Action no 7:** Prefer CNG/EVs over petrol and diesel
- **Action no 39:** Prefer non-plastic eco-friendly cutlery during gatherings and events

GROWTH IMPERATIVES OF ODISHA STATE

Source: Odisha Geoportal gisodisha.nic.in

Odisha is among the high growth states in India. This has bearing on air pollution generation and control. According to the Odisha Economic Survey, prepared by the Directorate of Economics and Statistics, Planning and Convergence Department, Government of Odisha 2021-22, the Gross State Domestic Product has increased by 10.1 per cent during 2020-21 and the services Sector Growth Gross State Value Added has increased by 7.9 per cent. During the same time, as per the advance estimates, per capita income has grown by 16.8 per cent.

Industry sector has grown by 14.5 per cent and its share in Gross State Value Addition during 2021-22 has been 39.5 per cent. The share of basic metal in the industrial sector dominates at 56.2 per cent followed by coke and refined petroleum (20.1 per cent), chemicals and chemical products (4.9 per cent), other NMM products (4.7 per cent), food products (4.2 per cent) and others (4.7 per cent). The rest include electrical equipment, paper and paper products, beverages, fabricated metal products, rubber and plastic products, machinery and equipment, motor vehicles, trailers and semi-trailers, textiles, pharma, and medicinal, chemical and botanical products.

Overall mineral production is increasing in the state. Production of iron ore, coal and bauxite has increased whereas that of manganese ore and chromite has declined.

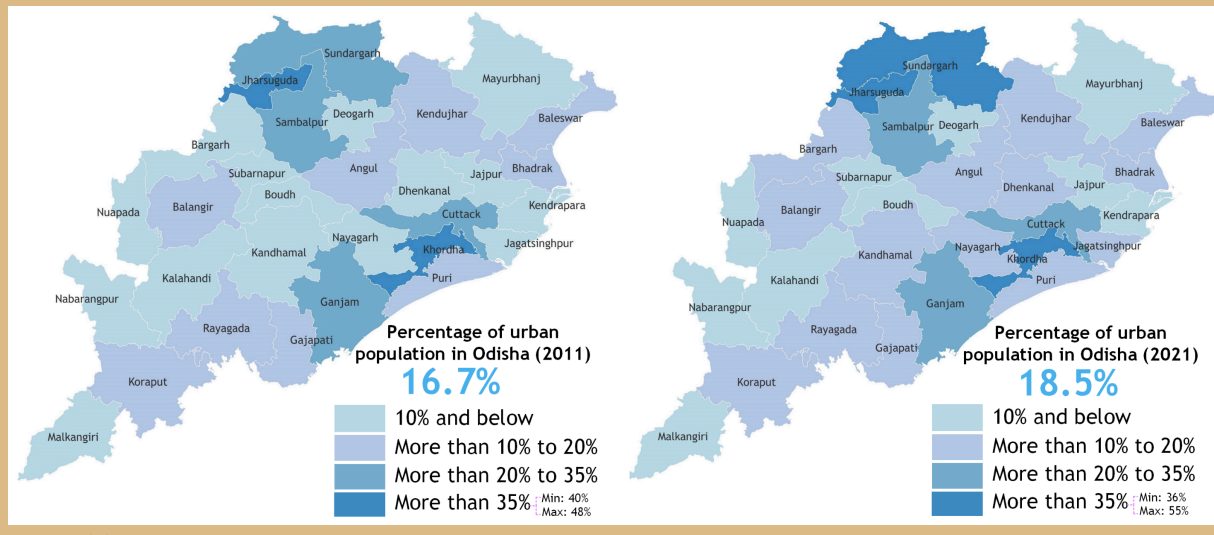
- **Action no 42:** Use recycled plastic over virgin plastic, wherever possible
- **Action no 47:** Compost food waste at home
- **Action no 52:** Contribute cattle waste, food waste and agricultural waste to biogas plants (provided under GOBARDhan)
- **Action no 53:** Practice segregation of dry and wet waste at homes
- **Action no 61:** Do not discard waste in water bodies and in public spaces
- **Action no 68:** Plant trees to reduce impact of pollution
- **Action no 73:** Discard gadgets in nearest e-recycling units

The LiFE Mission has asked for awareness generation on LiFE activities,signages for LiFE actions and posting of infographics/audio-visuals on social media platforms.

Installed capacity of power procured by GRIDCO is a combination of state thermal (2,537 MW), state hydro (2,083 MW), renewable energy (1,159 MW) and central sector (2,240 MW). Demand and availability of power shows that the state has surplus power. Renewable energy contributes 14.45 per cent of total power generation.

The state is also urbanizing. The state urban population that has grown from 16.7 per cent in 2011 to 18 per cent in 2021, is projected to grow to 21 per cent in 2036. The state covers an area of 60,119 square miles (155,707 square km) with a population of 41,947,358 as per the 2011 census. It is a tropical wet-dry climatic region with annual rainfall of about 1,500 mm.

Trend of urbanization in Odisha from 2011-2021



Source: Odisha Economic Survey, 2021-22

The State Action Plan has taken cognizance of this and has integrated the relevant action points as per the format suggested in the respective pollution sectors of this Action Plan separately.

4. Air Quality monitoring and management

4.1 Air Quality Monitoring

Air quality monitoring has begun to expand in the state. There are about 38 manual monitoring stations in 16 cities and 12 real-time monitoring stations in 10 cities (see *Table 1: Manual monitoring stations in Odisha* and *Table 2: Continuous ambient air quality monitoring stations in Odisha*). Major cities are yet to set up more real-time monitors. The monitors are concentrated in urban centres.

Air quality monitoring needs to be further strengthened to track changes in air quality over time, identify pollution hotspots and exposure patterns, and inform action plans.

Table 1: Manual monitoring stations in Odisha

Sr. no.	Cities	No. of manual monitoring stations
1	Angul	2
2	Balasore	3
3	Berhampur	1
4	Bhubaneshwar	6
5	Bonaigarh	1
6	Cuttack	3
7	Jharsuguda	3
8	Kalinga Nagar	3
9	Konark	1
10	Paradeep	3
11	Puri	2
12	Rajgangpur	1
13	Rayagada	2
14	Rourkela	4
15	Sambalpur	1
16	Talcher	2
	Total	38

Source: CPCB NAMP database

Table 2: Continuous ambient air quality monitoring stations in Odisha

Sr. no.	Cities	No. of real-time monitoring stations
1	Baripada	1
2	Bileipada	1
3	Brajrajnagar	1
4	Keonjhar	1
5	Nayagarh	1
6	Rairangpur	1
7	Rourkela	3
8	Suakati	1
9	Talcher	1
10	Tensa	1
	Total	12

Source: CPCB real-time air quality monitoring network

The manual stations monitor particulate matter (PM) of sizes less than 10 microns (PM10) and in some cases PM2.5, nitrogen dioxide (NO_2), and sulphur dioxide (SO_2). The real-time monitoring station monitors particulate matter (both PM10 and PM2.5), gaseous pollutants (SO_2, NO_2, ozone, carbon monoxide, volatile organic compounds and ammonia) and meteorological parameters such as temperature, relative humidity, wind speed, wind direction, pressure, solar radiation.

The long-term data of PM10 from the manual monitoring stations is available from the CPCB Envis centre database. Manual stations provide data for two days in a week, and there is a time lag.

The real-time daily trend is needed for daily calculation of air quality index for public information systems and graded response action plan (GRAP) during high pollution days. Criteria pollutants, which include PM10, PM2.5, NO_2, SO_2, ozone, and CO, are considered for GRAP implementation as these have serious short-term health impacts (in addition to longer-term health impacts) on those suffering from cardiac and respiratory conditions especially during smog episodes.

The expansion of real-time monitoring stations will help in taking more responsive action in the city. It may also be supported by air pollution forecasting and assessment of the regional movement of pollution.

Expansion of the monitoring grid can enable a multi-pollutant approach to control critical gases, including nitrogen dioxide and ozone. This can also help control secondary particulate matters that are formed in the atmosphere.

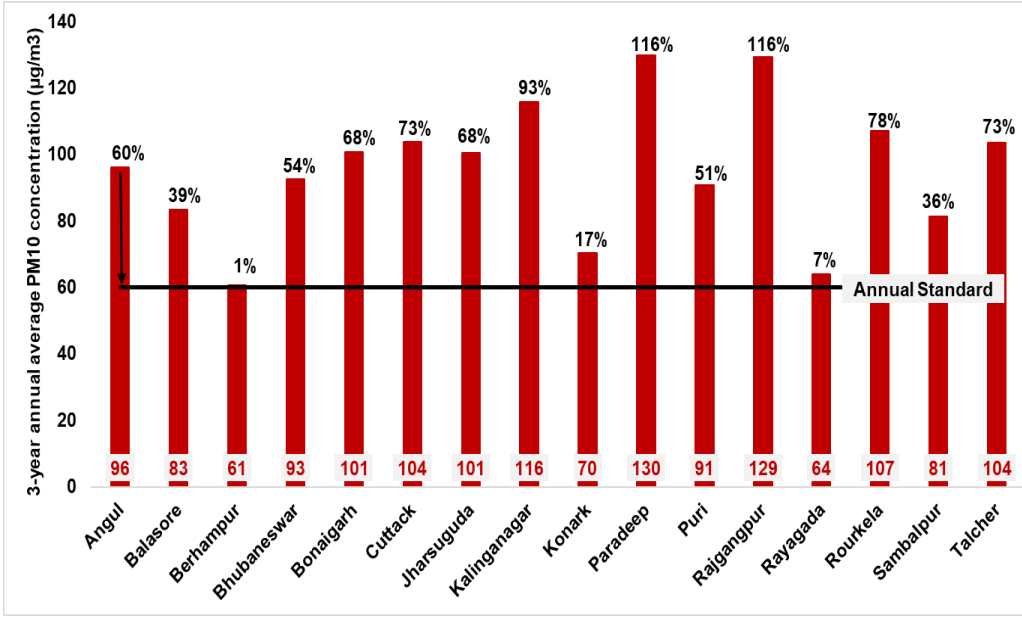
4.2 Air Quality Trend in Odisha

Non-attainment status of a city implies consistently high levels of air pollutants above the national ambient air quality standards. In Odisha, there are seven non-attainment cities namely Angul, Balasore, Bhubaneswar, Cuttack, Kalinganagar, Rourkela and Talcher. These cities have been identified as non-attainment based on the PM10 levels. While a predominant pollutant is considered a reason for non-attainment, the air in urban areas is laced with numerous pollutants - of these 12 are regulated under the National Ambient Air Quality Standards (NAAQS). As cities are setting up more monitoring stations, new areas of high exposure or high air pollution can be identified. In the longer term, emissions must be permanently reduced so that the NAAQS is maintained at least for 98 per cent 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 at the state level which is time-bound and requires a targeted reduction over time.

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), a rolling annual average of the previous three years is taken to define the base pollution level and, accordingly, targets for pollution reductions are estimated to guide action and prepare action plans. Trend analysis helps to understand the impact of actions on long-term ambient concentration.

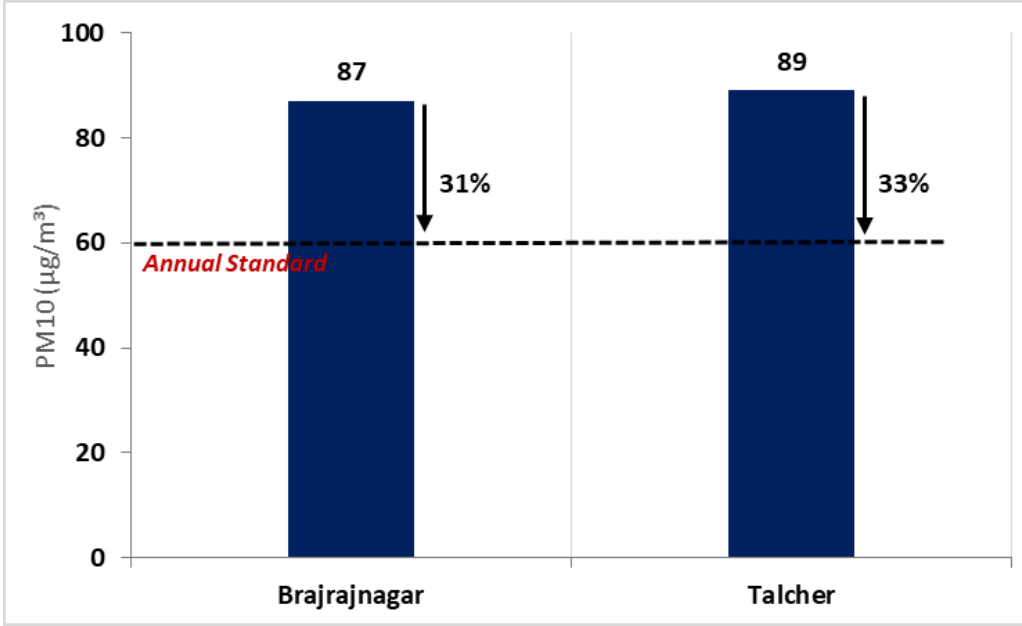
If a similar method is applied for the cities of Odisha based on the annual data available from CPCB Envis centre air quality database, the indicative reduction target can be worked out for the cities. The baseline year for the reduction target is considered as 2018-20. In all the 16 cities where data is available from the Envis centre database, cities have to reduce their annual average PM10 concentration varying from 1 per cent in Berhampur to 116 per cent in Paradeep and Rajgangpur each to meet the NAAQS standard (see *Graph 1: NAMP Station-wise PM10 reduction target in cities of Odisha*). Also, 2020 was a unique year with pandemic induced lockdowns which reduced pollution levels substantially. Recent data for PM10 was also available from the real-time monitoring stations at Brajrajnagar and Talcher which requires a reduction of 31 per cent and 33 per cent respectively in PM10 levels to meet the standard (see *Graph 2: Reduction target of PM10 based on the real-time monitoring for the cities of Odisha).*

Graph 1: NAMP Station-wise PM10 reduction target in cities of Odisha



Source: Based on the data available from CPCB Envis centre air quality database

Graph 2: Reduction target of PM10 based on the real-time monitoring for the cities of Odisha (the base year 2020-22)

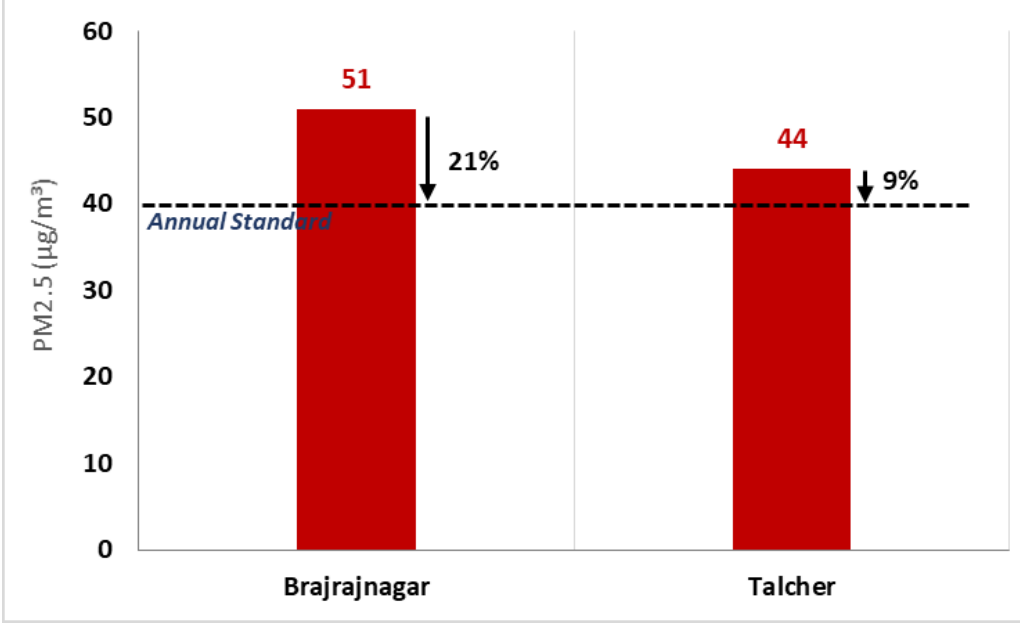


Note: 3 years Annual average of PM10 concentration is based on mean of daily values recorded at CAAQM stations

Source: CSE analysis of CPCB's real-time air quality data

These reduction targets are expected to define the level of detail and stringency needed in action to achieve clean air. However, it is important to emphasize that a more effective air quality profile will emerge once real-time monitoring is established in all cities. It is evident that manual monitoring underestimates pollution compared to real-time monitoring. PM2.5 is monitored in 12 real-time monitoring stations which have been recently set up in 10 cities of the state. The long-term and trend data is only available from two cities which are Brajrajnagar and Talcher (see *Graph 3: Reduction target of PM2.5 based on real-time monitoring for the cities of Odisha*).

Graph 3: Reduction target of PM2.5 based on real-time monitoring for the cities of Odisha (the base year 2020-22)



Note: 3 years Annual average of PM2.5 concentration is based on mean of daily values recorded at CAAQM stations

Source: CSE analysis of CPCB's real-time air quality data

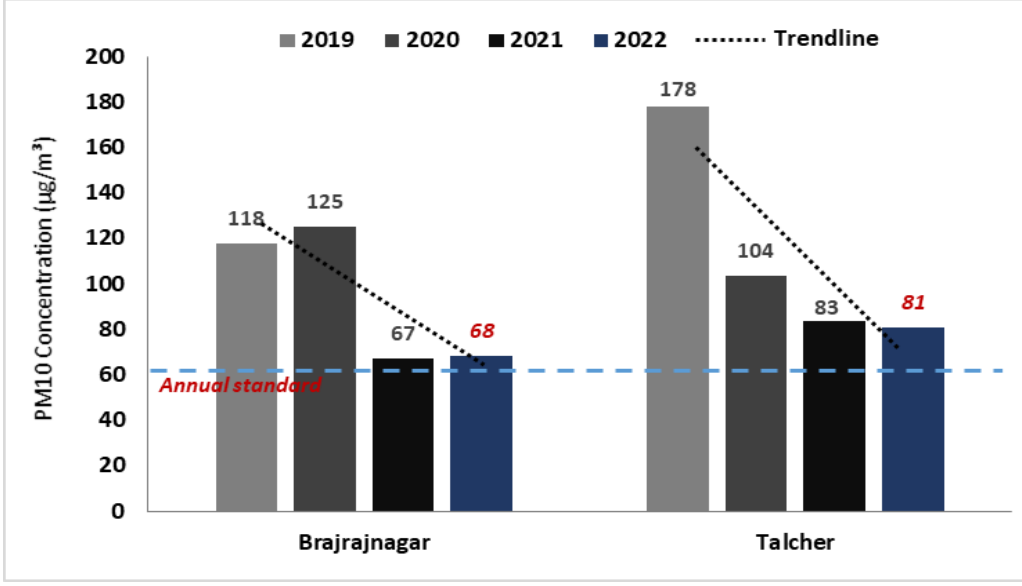
4.3 Long-term trend of annual average PM10

The available data of PM10 and PM2.5 from real-time monitoring stations was analysed from 2019 to 2022. A reduction in PM10 levels by 42 per cent was observed in Brajrajnagar and almost 55 per cent reduction was seen in Talcher between 2019 and 2022 (see *Graph 4: PM10 trend based on real-time monitoring station from 2019-22 in Odisha cities*).

A slight increase in PM2.5 concentration was seen in Brajrajnagar and a reduction of 19 per cent was seen in Talcher between 2019 and 2022 (see *Graph 5: PM2.5*

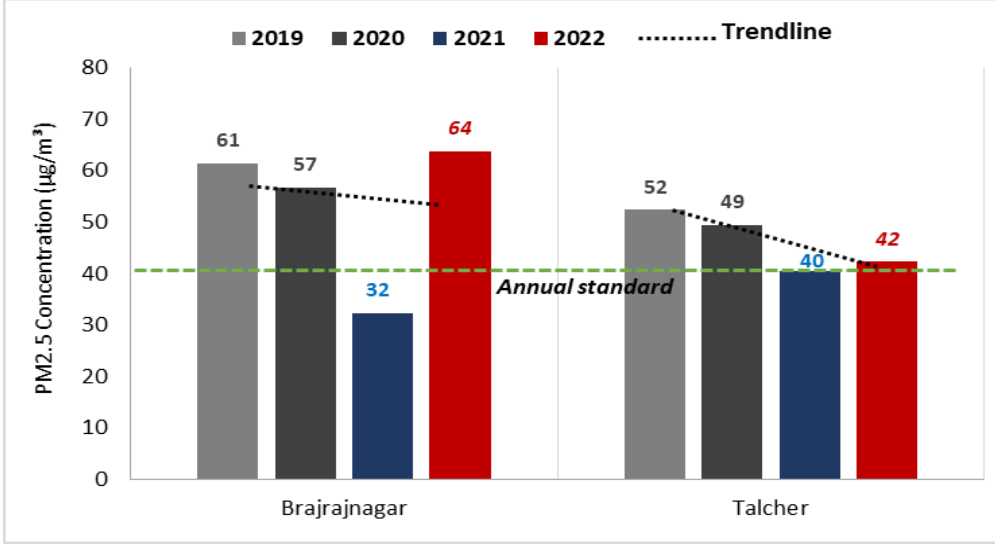
trend based on real-time monitoring station from 2019-22 in Odisha cities). Also, as per the available data, levels of gaseous pollutants like SO_2 and NO_2 are well within the prescribed limit of 50 and 40 microgramme per cum.

Graph 4: PM10 trend based on real-time monitoring station from 2019-22 in Odisha cities



Note: Annual average of PM10 concentration is based on mean of daily values recorded at CAAQM station.
Source: CSE analysis of CPCB's real-time air quality data

Graph 5: PM2.5 trend based on real-time monitoring station from 2019-22 in Odisha cities



Note: Annual average of PM2.5 concentration is based on mean of daily values recorded at CAAQM station.
Source: CSE analysis of CPCB's real timwe air quality data

4.4 Hotspot identification

The seven non-attainment cities have identified hotspot areas and prepared plans to implement the same. This can help identify local sources of pollution for hyper local action plans and to control pollution at the local level.

Table 3: List of hotspot areas

Sr. No.	City	Number of hotspot locations	Name of the hotspot locations
1	Angul	3	1. Area surrounding Railway Colony and Ranigoda 2. Tamrit Colony and adjoining industrial estate 3. Area surrounding Hari-Mohari Chhaka
2	Balasore	2	1. 2 to 2.5 km area surrounding Medical College and Hospital 2. Area including Mulannagar, Sunhat and Old Balasore
3	Bhubaneswar	5	1. Chandrasekharpur area 2. Mancheswar Industrial area 3. Lingaraj Temple area 4. Baramunda area 5. Sundarpada area
4	Cuttack	4	1. Barabati Stadium area 2. Sikharpur Area 3. Sartol Area 4. Area including Anand Vihar and Naya Bazar
5	Kalinga Nagar	2	1. Southern part of Kalinga Nagar Industrial Area 2. Area surrounding F.C colony
6	Rourkela	4	1. Chhend Colony, Vedvyas and Udit Nagar area 2. Rourkela Steel Plant area 3. Jalda and Deoga Area 4. Kuarmunda Area
7	Talcher	3	1. Dera Chhaka and surrounding area 2. Bypass Chhaka including Talcher Station and Ghantapada 3. Baghuabul area

4.5. Air pollution forecasting

Though currently air pollution forecasting systems are not available in the state, a roadmap may be adopted to enable its adoption. This can help to take preemptive and preventive action to protect public health and refine the action strategies. The non-attainment cities may be prioritized for its adoption.

4.6 Contribution of pollution sources to air quality

For effective air quality management, a detailed assessment of air pollution sources, their relative contribution to the pollution load and and their concentration in the ambient air are necessary. Such assessment can also help to understand the share of secondary particles (that form in the atmosphere from other gaseous pollutants from combustion sources, like sulfur dioxide, nitrogen oxides, ammonia and volatile

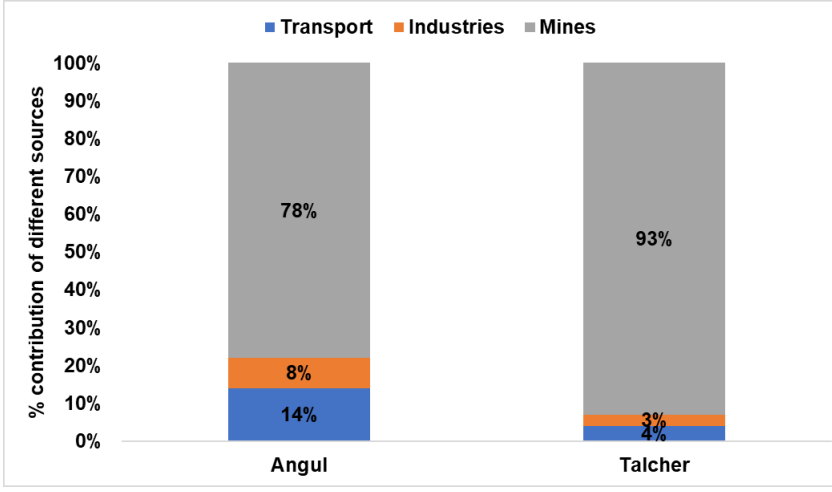
organic compounds, etc.). A state level inventory may also be considered to support state level action plan and enable target-oriented strategies and actions.

Currently, source apportionment and emission inventory studies have been initiated in non-attainment cities of Angul, Talcher, Kalinganagar, Rourkela, Cuttack and Bhubaneswar. In Balasore it is in the proposal stage.

These are expected to refine the action source-wise strategies. While during summer, the influence of dust on particulate concentration increases, its share during winter reduces and the contribution of combustion sources (vehicles, industry, biomass burning among others) increases.

Additionally, a rapid study for Angul and Talcher was done in August 2020 by the State Pollution Control Board. This shows that in the Talcher-Angul area, which is an industrial and mining area, mines contribute about 78 per cent and 93 per cent of the PM10 in Angul and Talcher respectively. A detailed SA and EI study for the entire region is important and can help to inform the policy and implementation strategy (see *Graph 6: Relative contribution of PM10 from major sources in Angul and Talcher*).

Graph 6: Relative contribution of PM10 from major sources in Angul and Talcher



Source: August, 2020, Rapid study on Emission inventory and source apportionment for Angul and Talcher

4.7 Regional action

There is growing evidence now of the regional influence on local pollution due to transboundary movements between upwind and downwind areas that require integrated and harmonized action across the region or the airshed. NCAP has

recognized the idea of regional approach and mentions that a comprehensive regional plan needs to be formulated incorporating the inputs from the regional source apportionment studies. State level plan is the first step in that direction to reduce the influence of regional air pollution on local air quality. The state-wide action that is envisaged in the SAP will enable that process.

4.8 Hybrid air quality monitoring for wider coverage

In addition to the regulatory monitoring grid network it is possible to adopt multi-dimensional air quality monitoring approaches to address data gaps and map exposures. As is already being practiced in other states, satellite-based monitoring can help to generate air quality data for a much larger region. The NCAP has taken this approach on board to address spatial and temporal data gaps. This does not replace ground-based regulatory-grade measurements of air pollution but improves the accuracy of the estimates and calibration and validation of data. Satellite remote sensing-based estimation of pollution from satellite retrievals of Aerosol Optical Depth (AOD) is a useful source of data for ground-level estimations with a potential for a wider regional coverage.

Additionally, high-density sensor-based monitoring networks are also an opportunity to fill data gaps and map exposures around pollution sources. The NCAP has taken on board the application of sensor monitors that are much cheaper than regulatory monitors. Under the ongoing Smart City programme of the Ministry of Housing and Urban Affairs (MoHUA), cities, such as Bhubaneswar, have installed sensors for smart monitoring and digitization. However, the CPCB gave a clarification to all state pollution control boards and pollution control committees in its advisory on 25 March 2022 that air quality data generation using any technology including low-cost sensors other than that specified in NAAQS is not to be used for regulatory purposes as its accuracy, linearity, reliability and long-term performance are not yet fully established. The CPCB has constituted a committee for development of a network of air quality monitoring to frame operational guidelines, protocol for monitoring air quality and also to optimize the CAAQMS requirements. The CPCB is considering a pilot study to evaluate the efficacy of sensors. The Bureau of Indian Standard (BIS) is currently developing a performance standard for sensors to address issues of quality and validation of data from them.

However, CPCB has stated that the SPCBs may examine the use of low-cost sensors for other qualitative applications such as relative assessment and comparison of air

quality owing to various dust control measures and interventions from time to time at construction sites, roads, right of ways, open spaces, hotspots etc. across the state.

4.9 Roadmap for air quality monitoring and pollution source assessment

- Implement a state-wide plan for expansion of air quality monitoring network for wider coverage of population, land-use, urban and rural scale, background levels.
- Expand real-time air quality monitoring, public information system based on daily air quality index and adoption of graded response action plan. Also enable air pollution forecasting.
- Carry out source apportionment and emissions inventory in the key regions of the state.
- Auditing of air quality monitoring systems for quality control of data.
- Adopt hybrid monitoring systems including satellite based monitoring for much wider coverage of the state and population.

5. Industrial pollution

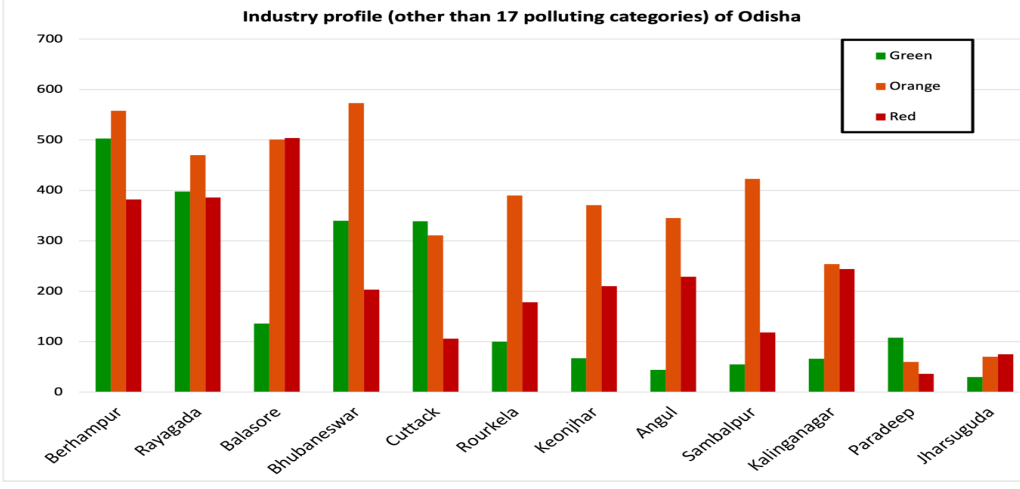
Odisha has witnessed substantial industrial growth and increase in mineral production. The industry structure is dominated by mining industries, iron and steel, aluminium, ferro alloys and chemical fertilizers and thermal power plants. There is also a special challenge of small- and medium-scale industries that face issues with respect to 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, etc.; material handling and loading/unloading; 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.

5.1. Industry inventory and compliance

The state of Odisha maintains a detailed inventory of the industrial enterprises within its jurisdiction, including the seventeen polluting categories and the others, along with their compliance status (see *Graph 7: Industry profile of Odisha other than 17 polluting categories)*.

The state PCB also plans on making a detailed fuel inventory for its industry sector to estimate the emission inventory and fuel consumption. This will enable the state to take necessary measures to reduce un-regulated emissions.

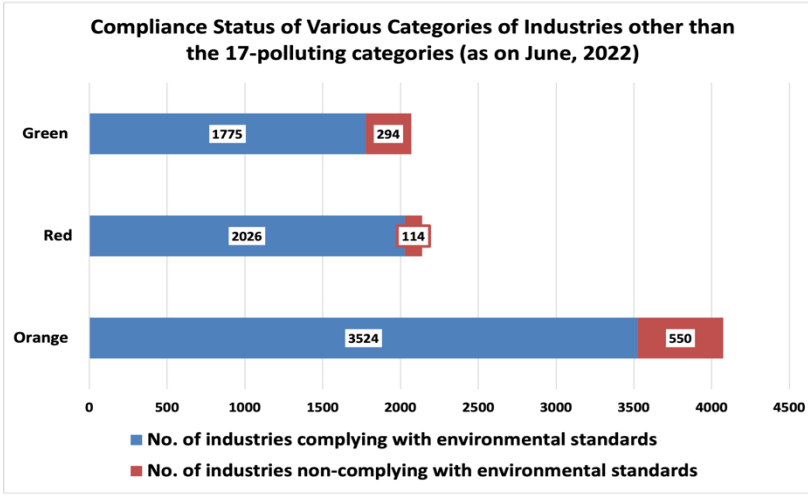
Graph 7: Industry profile of Odisha other than 17 polluting categories



Source: Odisha SPCB

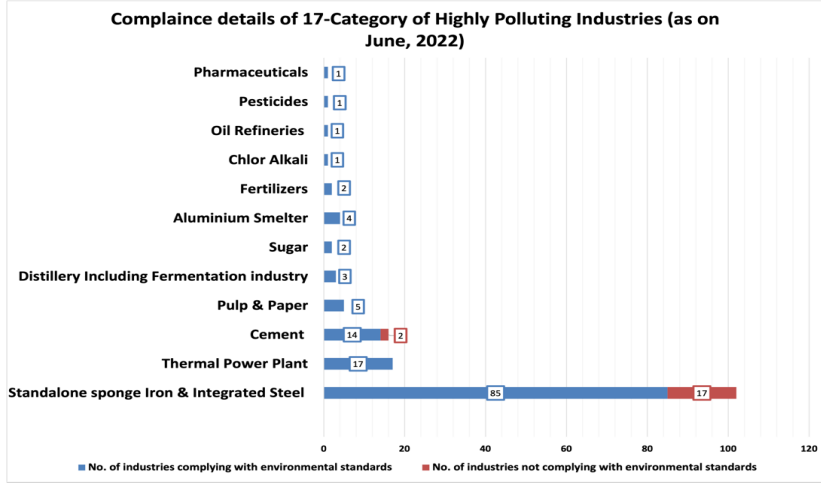
The enforcement mechanism captures the status of compliance with the emissions control standards and emissions control requirements based on periodic inspection and the challans issued (see *Graph 8: Compliance status of various categories of industries other than the 17-polluting categories* and *Graph 9: Compliance status of various categories of industries under the 17-polluting categories*). This helps to bring out the status of compliance and non-compliance.

Graph 8: Compliance status of various categories of industries other than the 17-polluting categories (as of June, 2022)



Source: Odisha SPCB

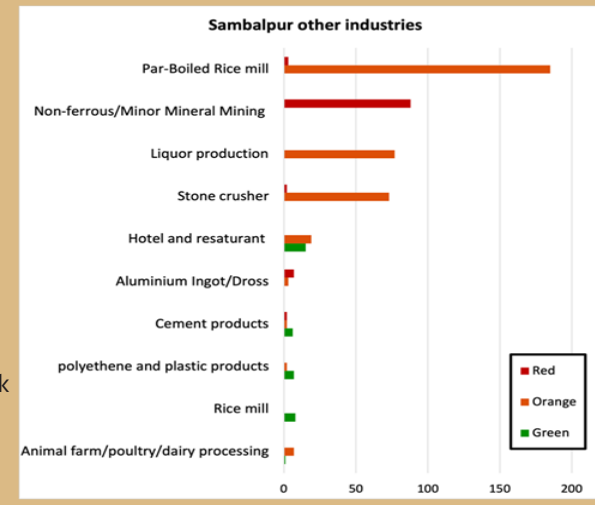
Graph 9: Compliance status of various categories of industries under the 17-polluting categories (as of June, 2022)

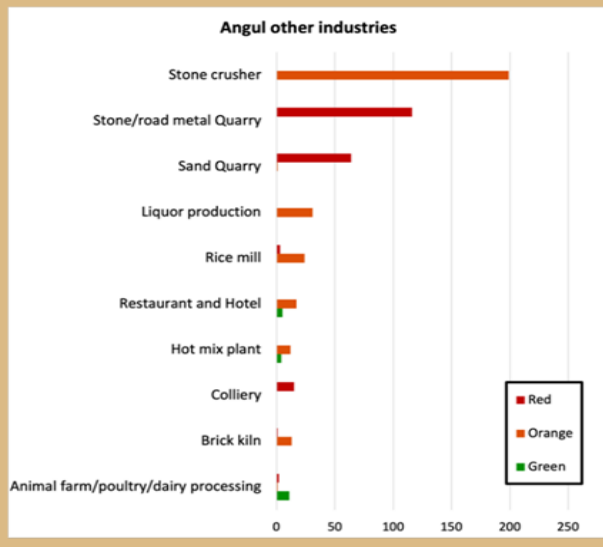


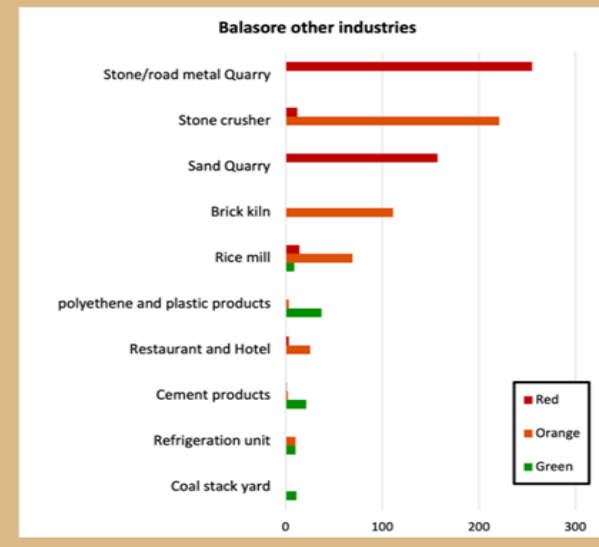
Source: Odisha SPCB

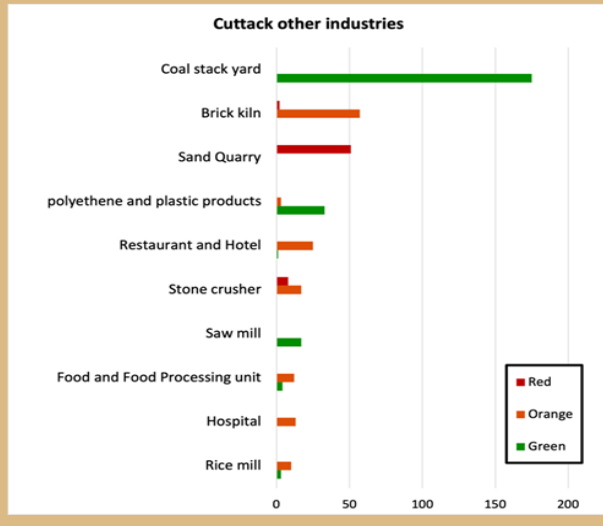
REGION-WISE INDUSTRY CATEGORIES (OTHER THAN THE 17 POLLUTING INDUSTRIES)

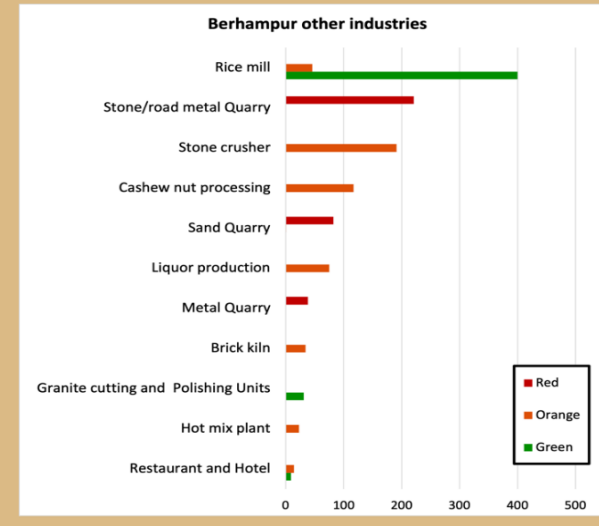
There is a distinct variation in the type and distribution of industrial units across the key regions of Odisha. Information available for Angul, Balasore, Cuttack, Behrampur, Bhubaneswar, Jharsuguda, Kalinganagar, Paradeep, Rayagada, Rourkela, and Sambalpur bring out this diversity. The key air polluting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

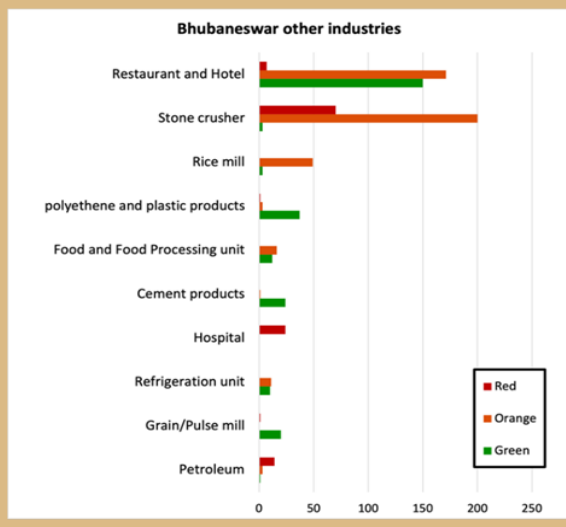


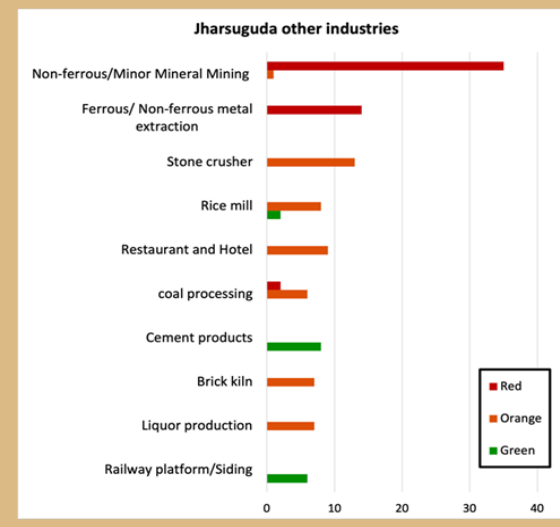


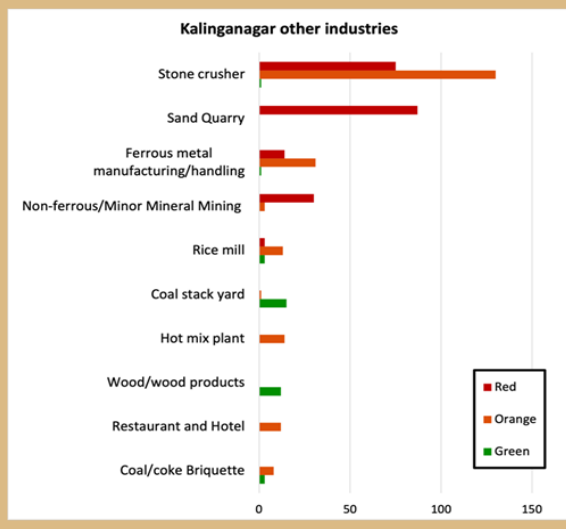


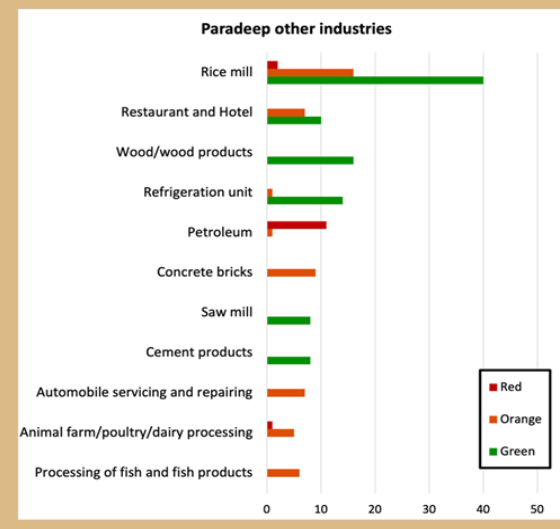


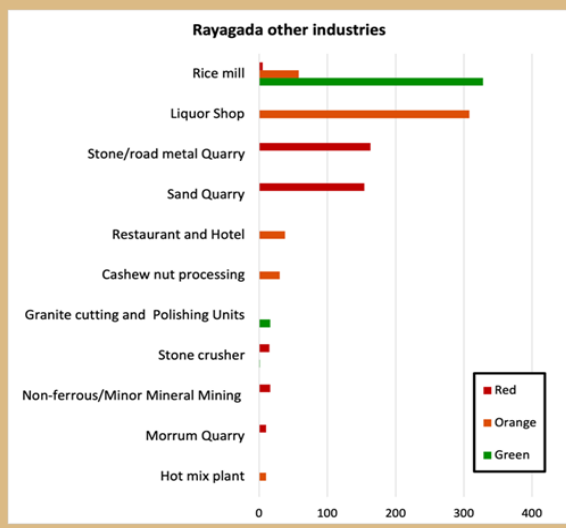


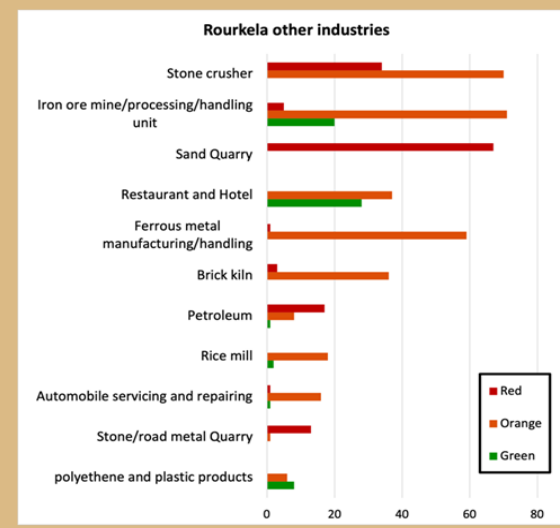

Bhubaneswar other industries
Restaurant and Hotel
Stone crusher
Rice mill
polyethene and plastic products
Food and Food Processing unit
Cement products
Hospital
Refrigeration unit
Grain/Pulse mill
Petroleum
Red
Orange
Green
0
50
100
150
200
250


Jharsuguda other industries
Non-ferrous/Minor Mineral Mining
Ferrous/ Non-ferrous metal extraction
Stone crusher
Rice mill
Restaurant and Hotel
coal processing
Cement products
Brick kiln
Liquor production
Railway platform/Siding
Red
Orange
Green
0
10
20
30
40


Kalinganagar other industries
Stone crusher
Sand Quarry
Ferrous metal manufacturing/handling
Non-ferrous/Minor Mineral Mining
Rice mill
Coal stack yard
Hot mix plant
Wood/wood products
Restaurant and Hotel
Coal/coke Briquette
Red
Orange
Green
0
50
100
150


Paradeep other industries
Rice mill
Restaurant and Hotel
Wood/wood products
Refrigeration unit
Petroleum
Concrete bricks
Saw mill
Cement products
Automobile servicing and repairing
Animal farm/poultry/dairy processing
Processing of fish and fish products
Red
Orange
Green
0
10
20
30
40
50


Rayagada other industries
Rice mill
Liquor Shop
Stone/road metal Quarry
Sand Quarry
Restaurant and Hotel
Cashew nut processing
Granite cutting and Polishing Units
Stone crusher
Non-ferrous/Minor Mineral Mining
Morrum Quarry
Hot mix plant
Red
Orange
Green
0
100
200
300
400


Rourkela other industries
Stone crusher
Iron ore mine/processing/handling unit
Sand Quarry
Restaurant and Hotel
Ferrous metal manufacturing/handling
Brick kiln
Petroleum
Rice mill
Automobile servicing and repairing
Stone/road metal Quarry
polyethene and plastic products
Red
Orange
Green
0
20
40
60
80

The State PCB has issued 19 show cause notices in total to the industries falling under the 17 polluting industry categories. Other than the high-polluting categories, the State PCB has also issued 106 show cause notices and 164 closure directions; and filed 614 legal cases. About 93 actions have been initiated and are under process.

5.2. Status and initiative on critically polluted areas

The State of Odisha does not have any critically polluted areas (CPA) since 2018**.** Currently, there are two severely polluted areas - Paradeep Port (2021 plan), and Jharsuguda Area (2010 plan when it was CPA) for which plans have been prepared and are under implementation.

The OSPCB has also developed a novel star rating program. This program is an initiative to inform residents in Odisha about the pollution from industrial plants in and around their localities. The Star Rating program utilizes the continuously monitored emissions data from major industrial plants to categorize industries from most polluting (1-star) to least polluting (5-star).

OSPCB's star-rating program is a transparency initiative. Besides informing residents and industries, the program also aims to strengthen OSPCB's regulatory efforts to reduce pollution in the state by engaging local communities, civil society groups and the media. The entire project is funded by the Tata Centre for Development (TCD).

5.3. Switching to cleaner fuels and technologies

The OSPCB has issued notifications on clean fuels and adopted action points to make transition to cleaner fuels and technologies. The key focus is on replacing polluting fuels like coal, pet-coke and furnace oil. The PCB has issued notification (Notification No. 22737, dtd. 07/11/2011 in F&E Dept) which gives the list of the approved fuels and guidelines for both fuel oil and pet coke usage. Use of furnace oil is banned. Petcoke cannot be used as combustion fuel but only as feedstock in industries/processes where SO_2 gets absorbed, such as cement, lime/dolo kiln, calcined pet coke, aluminium smelter, gasification, calcium carbide and graphite electrode subject to CTO/CTE.

Sulphur content of coal in Odisha is usually low - around 0.3 to 0.5 per cent.

To enable adoption of cleaner fuels like natural gas, distribution projects have been undertaken by GAIL. Implementation is underway and is expected to be completed by 2045. The expanding natural gas pipeline consists of JHBDPL that covers 13 districts viz. Angul, Bhadrak, Cuttack, Deogarh, Dhenkanal, Jagatsinghpur, Japur,

Jharsuguda, Kendrapara, Khordha, Puri, Sambalpur and Sundargarh with pipeline length of 769 km. In Bhubaneswar and Cuttack, city gas network pipelines and associated facilities are under execution.

In the meantime, the state government is also promoting cleaner production. Mostly the iron and steel industries are adopting cleaner production by adopting, continuous casting, heat recovery of waste gases i.e., coke oven gas, blast furnace gas, BOF gas and their gainful utilization as fuels inside the plant. Clean fuel transition in the industrial sector is critical for clean air action. This will require rapid transition to natural gas and reliable supply of electricity for industrial processes at affordable rates.

Small-scale units will require inventorization and assessment of pollution control potential especially if there is dependence on small boilers. It is also necessary to address the emissions control from manufacturing industries, especially metal-based industries, that use furnaces which largely operate on fuels like coal, wood and liquid fuel. The roadmap needs to enable transition to electric arc furnaces wherever feasible. All industries using furnaces need to have well maintained air pollution control devices. Furnaces and industrial processes should run on affordable electricity.

5.4. Control fugitive emissions

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 the 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
- 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 gate

5.5. Brick kilns

These require detailed inventory to identify 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) has been developed for brick kilns. This is a platform to improve environmental compliance of brick manufacturing units. Available data shows that there are 6 brick kilns in Angul; 8 kilns in Rourkela; 11 in Bhubaneswar (SAS area) but these are not in operation. Cuttack has 14 brick kilns but 13 have not applied for consent to operate.

Brick kilns need to make rapid transition from traditional draft kiln technology to improved zig zag technology. The MoEFCC issued a gazette notification on 22 February 2022 on emissions standards and kiln technology. This provides for tighter 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 shaft or on piped natural gas. The existing ones will also have to follow the same provisions within one year if they are within 10-km radius of non-attainment cities, and 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 brick making. Approach roads will have to be paved and transport vehicles covered. Also, minimum siting criteria have been established.

5.6. Industrial waste burning

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 get 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 industrial waste to prevent burning. Along with this, making industries and industry associations liable for safe collection and disposal is also equally important.

5.7. Thermal power plants

Odisha has seven power plants located across four districts that require to meet the emissions standards of 2015 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 are in Category A. However, the units in Odisha fall either under the 'B' or 'C' category. The deadline for compliance for these category 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 4: 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.

Table 3: Thermal power plants in Odisha state: Status of compliance with 2015 emissions standards

Sr. no.	Districts	Developer	Sector	Plants	Unit No.	Year of comm.	Capacity (MW)	Categorization	Deadline for compliance with emission norms	FGD status_ February, 2023
1	Sundargarh	NTPC	Central	Darlipali STPS	Unit 1	2019	800	C	2026	Bid awarded
2	Sundargarh	NTPC	Central	Darlipali STPS	Unit 2	2021	800	C	2026	Bid awarded
3	Angul	NTPC	Central	Talcher STPS	Unit 1	1995	500	C	2026	Bid awarded
4	Angul	NTPC	Central	Talcher STPS	Unit 2	1996	500	C	2026	Bid awarded
5	Angul	NTPC	Central	Talcher STPS	Unit 3	2003	500	C	2026	Bid awarded
6	Angul	NTPC	Central	Talcher STPS	Unit 4	2003	500	C	2026	Bid awarded
7	Angul	NTPC	Central	Talcher STPS	Unit 5	2004	500	C	2026	Bid awarded
8	Angul	NTPC	Central	Talcher STPS	Unit 6	2005	500	C	2026	Bid awarded
9	Dhenkanal	GMR	Private	Kamalanga TPS	Unit 1	2013	350	B	2025	Bid opened
10	Dhenkanal	GMR	Private	Kamalanga TPS	Unit 2	2013	350	B	2025	Bid opened
11	Dhenkanal	GMR	Private	Kamalanga TPS	Unit 3	2014	350	B	2025	Bid opened
12	Jharsuguda	IBPIL	Private	Utkal TPP (Ind Barath)	Unit 1	2016	350	C	2026	Feasibility study started
13	Angul	JITPL	Private	Derang TPP	Unit 1	2014	600	C	2026	Bid opened
14	Angul	JITPL	Private	Derang TPP	Unit 2	2015	600	C	2026	Bid opened
15	Jharsuguda	SEL	Private	Sterlite TPP	Unit 1	2010	600	C	2026	Feasibility study started
16	Jharsuguda	SEL	Private	Sterlite TPP	Unit 2	2010	600	C	2026	Feasibility study started
17	Jharsuguda	OPGC	State	IB valley TPS	Unit 1	1994	210	C	2026	Feasibility study completed
18	Jharsuguda	OPGC	State	IB valley TPS	Unit 2	1995	210	C	2026	Feasibility study completed
19	Jharsuguda	OPGC	State	IB valley TPS	Unit 3	2019	660	C	2026	Bid awarded
20	Jharsuguda	OPGC	State	IB valley TPS	Unit 4	2019	660	C	2026	Bid awarded

Source: Central Electricity Authority - CEA status report, February 2023.

Need fly ash management: The state government is encouraging the use of fly ash bricks. Based on the notices issued by the government, new construction is required to use fly ash bricks. The government has also provided incentives for transportation of fly ash to the manufacturer's site to encourage more fly ash brick kilns. Currently, brick kilns with mobile chimneys are banned in the state and the ones with fixed chimneys are required to acquire environmental clearance for operation.

Industrial DG sets in industry: Use of diesel generator (DG) sets for captive power generation in industrial areas can be a significant contributor to local air pollution and toxic exposures. By improving access to natural gas and electricity, use of DG

sets can be reduced. A phase out plan is possible to replace DG sets with gas-based sets. The operational cost of gas-based sets can be lower as CNG prices are lower than the diesel prices. The options of dual fuel mode (piped natural gas and diesel) and retrofitment of Emission Control Devices (ECD) in DG sets of more than 800 KVA capacity are also possible as per the CPCB guidelines.

5.8. CEMS monitoring in industries

It is necessary to strengthen smart monitoring in industries with the help of continuous emission monitoring (CEMS) for efficient and transparent monitoring for compliance. This requires a strategy for ensuring correct CEMS installation, quality control of data, proper calibration, technology selection, operation and maintenance, adequate skills, and periodic check of CEMS performance. Quality control of data is needed for adoptions of market-based mechanisms like emission trading system and star labelling system.

5.9. Mining in Odisha

The state has a very active mining sector due to its rich mineral deposits. Major mineral mines include coal, iron and manganese, chromite, bauxite, limestone and dolomite (see *Table 5: Major mines under consent administration of State Pollution Control Board*).

Table 5: Major mines under consent administration of State Pollution Control Board

Sr. No.	Mineral ore	No. of mines	Mines having valid consent as of 26.04.2022
1.	Coal	35	29
2.	Iron & Manganese	165	69
3.	Chromite	21	12
4.	Bauxite	07	05
5	Limestone and Dolomite	25	07
Total		**253**	**122**

Source: OSPCB

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.

Key strategies for industrial pollution control

The areas of recommendations for the industry sector include:

- Transition to clean fuels as is consistent with the action point on clean fuels in LiFE MISSION.
- Addressing fugitive emissions and industrial waste burning
- Kiln technology transition in brick kilns
- Strengthen CEMS-based smart monitoring of industries
- Adoption of emission control systems in industrial DG sets and improving access to reliable electricity
- Meet 2015 emissions standards in all power plants and phase out old plants

Action plan: Controlling industrial pollution

Sr. no.	Activities	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. Currently there are two Severely Polluted Areas for which plans have been prepared and are under implementation – 1. Paradeep Port (2021 plan) 2. Jharsuguda Area (2010 plan when it was CPA)	Not applicable because currently there are no CPAs in the state	Not applicable Because currently there are no CPAs in the state	Not Applicable	Not Applicable	Not Applicable
2	Guidelines for laying city gas distribution network.	Ongoing	The CGD projects are under execution, GAIL has provided timelines for the completion for two pipelines in Odisha		Rs. 4,000 crores	Not Applicable	Not Applicable
3	Policy for replacement of heavy oil (eg., furnace oil, diesel, etc.) based industries to alternate energy sources (CNG / PNG / electricity)	• The Government of Odisha vide Notification No. 22737,dtd. 07/11/2011 in F&E Dept. • The notification enlists the approved fuels. • The State Fuel Policy has been issued by the State Government vide no.7485, Dated 12.04.2021. • Issued notification for usage of FO – Industries using FO shall install scrubbing system for more than 90% recovery of SO_2 emission and provide stack height within a period of 2 years from the date of notification (12/04/2021)	12/04/2023	Some of the industries have shifted to LHSS but, the SPCB does not have the number.	Not Applicable	Not Applicable	Not Applicable

Sr. no.	Activities	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)
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.7485, Dated 12.04.2021	Ongoing 23 CTOs sanctioned	Domestic Raw petcoke: 93,502 TPM Imported Raw petcoke: 13,023 TPM Domestic Calcined petcoke: 43,394 TPM Imported Calcined petcoke: 47,040 TPM	Not Applicable	Not Applicable	Not Applicable
5	Rules and Regulations on uninterrupted power supply in State/UT	OERC Notification dated 27.08.2019 has a penalty provision for failure of supply of electricity as per the code.	Completed	The policy is applicable all over the State	No	Not available	Not available
6	Policy for use of DG sets	• There is only a notification in place that categorizes the DG sets. • No policy in place to ban/ phase out DG sets • All major industries (17 categories) have DG sets • Existing DG sets monitored continuously for acoustic enclosure and stack height regulations.	Not available	Not available	Not available	Not available	Not available
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 1. All 17 cat. polluting industry 2. All opencast coal mining areas 3. Iron and manganese mines of 5 MTPA capacity. 4. Major industries having high pollution potential	Completed	The policy is applicable all over the State	No	Not available	Not available

Sr. no.	Activities	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)
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	No	Not available	Not available
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	Ongoing	All the 17 polluting category industries have fugitive emission control	Not available	Not available	Not available
10	Regulations for conversion of brick kilns to clean technologies	The government is encouraging the use of fly ash bricks	Ongoing	All the government constructions done with fly ash bricks	Not available	Not available	Not available
11	Regulations for Emission Trading Scheme (ETS)	Yet to start	Not available	Not available	Not available	Not available	Not available
12	Policy to set up e-waste recycling unit in industrial areas in compliance with e-waste management rules	No recycling units; only collection points in the state	Not available	Not available	Not available	Not available	Not available
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 1-star (most polluting) to 5-star (least polluting).	Not available	Not available	Not available	Not available	Not available

Sr. no.	Activities	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)
14	Number of industries in the state complying with emission standards	17 polluting categories Total industries – 155 Complying (as of June 2022) - 136 Other than 17 polluting categories Total industries – 7461 Complying (as of June 2022) - 977 Details in the above text.	Ongoing	17 polluting categories Show Cause Notice issued : 19 Closure directions issued: 0 Legal cases filed: 0 Action Under process: 0 Other than 17 polluting categories Show Cause Notice issued : 106 Closure directions issued: 164 Legal cases filed: 614 Action Under process: 93	Not available	Not available	Not available
15	Inventory of fuel consumed in the industries (type and quantity)	Information not compiled	Not available	Not available	Not available	Not available	Not available
16	Shifting of industries/ commercial units to gaseous fuels (CNG/ PNG/CBG)	Information not compiled	Not available	Not available	Not available	Not available	Not available

6. Vehicular pollution

Odisha is urbanizing and motorizing rapidly. Bhubaneswar and Cuttack are high growth cities and have a substantial vehicle stock. According to the VAHAN database of the Ministry of Road Transport and Highways (MoRTH), Odisha has approximately 10 million registered vehicles which accounts for 3.4 per cent of the total registered vehicles in India. *More than 60 per cent of these vehicles in Odisha have been registered in the* past decade. (see *Graph 10: Year-wise total number of registered vehicles in Odisha* and *Graph 11: Vehicle category-wise annual registration in state of Odisha*).

Annual vehicle registrations data shows that between FY 2011-12 and FY 2018-19, vehicle registration volumes doubled (from 4.27 lakhs to 8.58 lakhs per annum) and constantly created a new peak every subsequent year. *Though in the recent past the rate has declined by 30 per cent due to the pandemic, the number of registrations in FY 2021-22 was 5.3 lakh vehicles. In Bhubaneswar the share of car registration is higher than the rest of the state and constitutes as much as 23 per cent.*

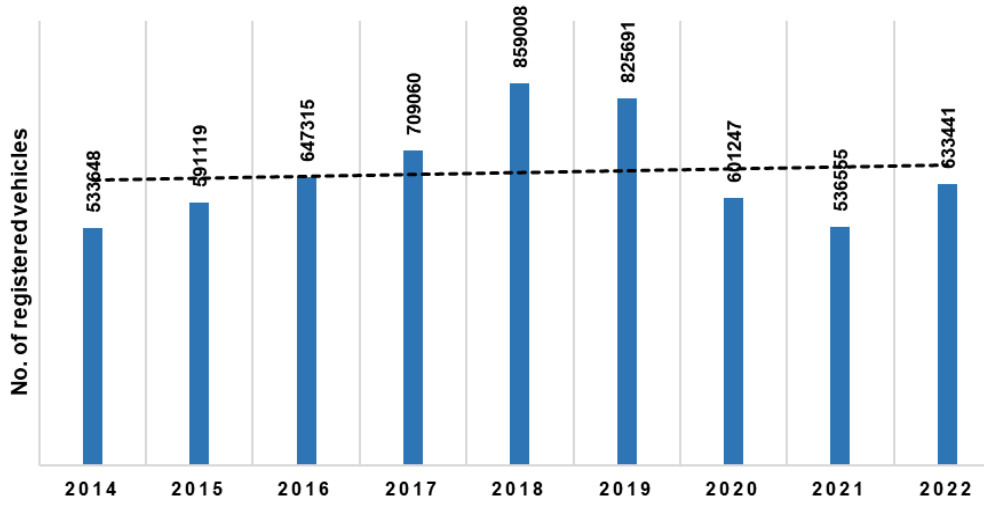
Two wheelers accounted for the lion's share at 82 per cent, followed by cars (8 per cent), goods carriers (5 per cent) and three-wheelers (3 per cent). A vehicle category-wise analysis reveals that in FY 2011-2019, annual registration of buses reduced drastically (from 3,258 to 1,394 per annum), and mobility requirements are being fulfilled with the use of personal vehicles, mostly two-wheelers and cars. The surge in travel demand has resulted in heavy dependence on private modes of transport. The high personal vehicle percentages create overcrowding and congestion during peaks on the main roads in the cities.

The annual registration of two-wheelers and cars has expanded by 2.1 and 1.8 times respectively in the same time period to meet this gap in mobility. In addition, demand for goods and services has increased along with an expansion in e-commerce in tandem. This has in turn increased demand for goods carriers.

The rapid increase of vehicular numbers is adding to the problem of air pollution. Over 99 per cent of the registered vehicles are propelled by internal combustion engines powered by fossil fuels.

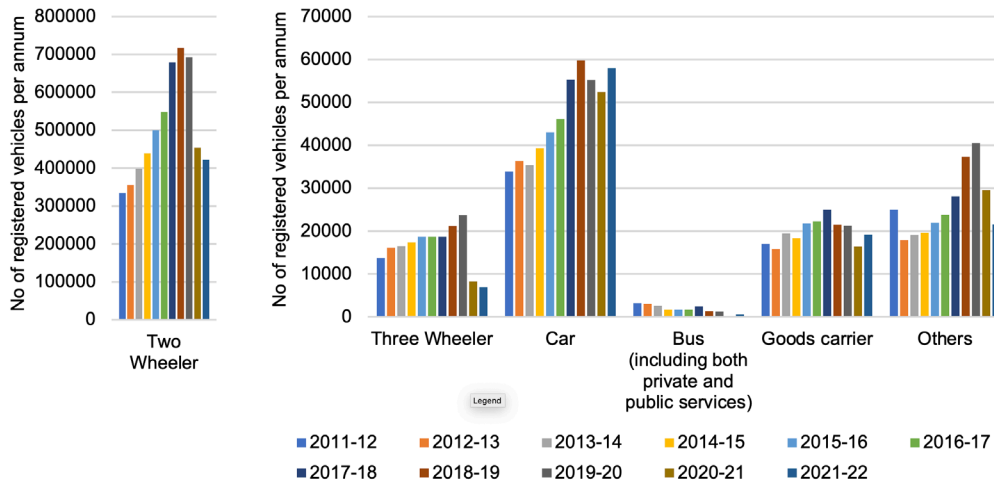
Vehicles are one of the prominent sources of pollution as there is a rapid increase in the vehicular population in Odisha.

Graph 10: Year-wise total number of registered vehicles in Odisha



Source: VAHAN database, MoRTH

Graph 11: Vehicle category-wise annual registration in state of Odisha



Source: Computed based on VAHAN database

Due to the progressive tightening of vehicle emissions standards, there has been a substantive improvement in tailpipe emissions from new vehicles. From Bharat Stage I (BS I) to Bharat Stage VI (BS VI) emissions standards, particulate emissions from diesel cars have reduced 31 times and from heavy-duty vehicles by 36 times. Similarly, NOx emissions from diesel cars have reduced by 6.25 times and from heavy commercial vehicles by 20 times.

While new vehicle technology and emissions control systems have significantly improved and will continue to improve and reduce tailpipe emissions in driving conditions, an equally stringent focus is needed to manage on-road vehicles. The objective is to keep on-road vehicles low emitting during their useful life on the road and to reduce direct exposure to toxic emissions; accelerate fleet renewal to leverage emissions gains from the technological advancement with introduction of BS VI emissions standards, and accelerate zero emissions transition with rapid electrification of targeted vehicle fleet to meet clean air target. Simultaneously, transportation and mobility strategies will be implemented to reduce vehicle miles travelled and achieve at least 80-85 per cent modal share by public transport systems.

6.1. On-road emission inspection and monitoring

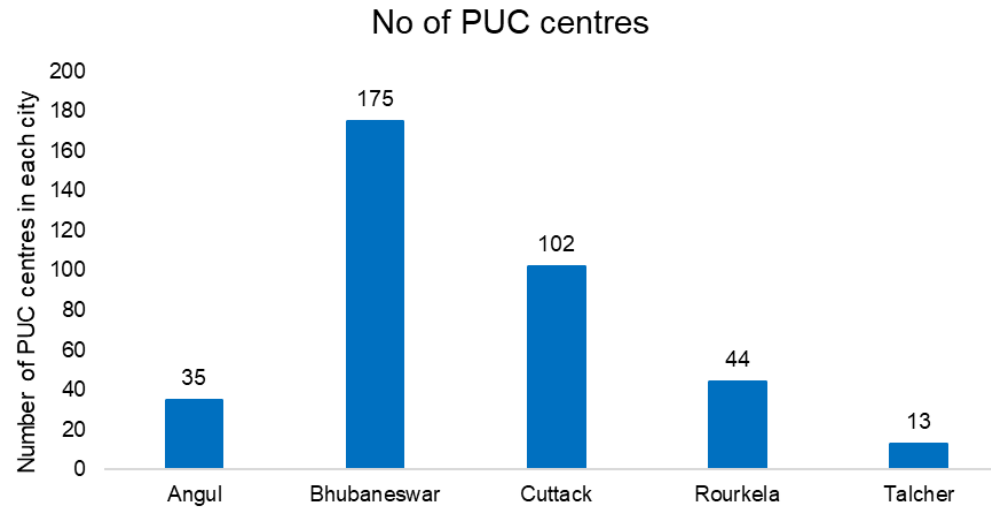
The only programme running right now for emission inspection and monitoring is the Pollution Under Control (PUC) certificate which includes idling emission test. The petrol vehicles are tested for carbon monoxide, hydrocarbons and lambda test whereas diesel vehicles are only tested for smoke opacity, 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.

This decentralized testing mechanism is very difficult to monitor for quality control. Several audits of PUC programmes across states of India have shown low level of compliance, lack of qualified and skilled PUC operators, inadequate calibration of machines, lack of knowledge of proper testing procedures, and improper testing and manual data reporting. Even though PUC centres have been linked with the central server, PUC database is mostly not usable due to lack of uniform protocol for recording of data (vehicle/fuel type-wise, age-wise etc.) and the central server is not amenable for remote monitoring. There are a number of PUC centres operational in Odisha and also challans are issued for the lack of PUC certificates (see *Graph 12: Number of PUC centres in the non-attainment cities of Odisha* and *Graph 13: Number of challans issued for the lack of PUC certificate in non-attainment cities of Odisha*).

Improvement in the enforcement systems include linking of the PUC with the VAHAN database, automatic alert to vehicle owners for renewal of PUC certificates, linking refuelling with valid PUC certificate and higher penalty. Another improvement will link the annual vehicle insurance with the PUC. In addition, all

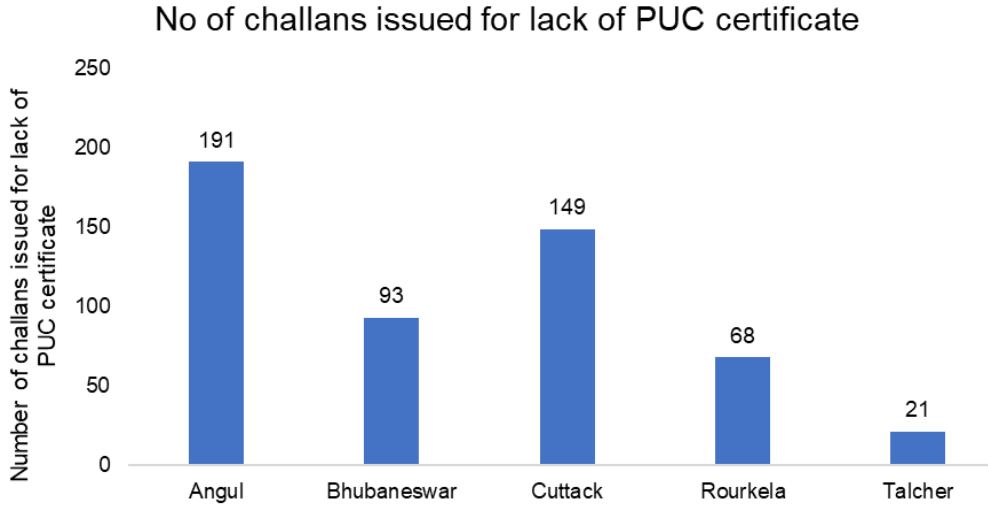
commercial vehicles must undergo annual roadworthiness and fitness tests under the Central Motor Vehicles Rules. Setting up of automated high-capacity centralized testing facilities has a scope of expansion within the state.

Graph 12: Number of PUC centres in the non-attainment cities of Odisha



Source: Based on the information available in the micro plans

Graph 13: Number of challans issued for the lack of PUC certificate in non-attainment cities of Odisha



Source: Based on the information available in the micro plans

6.2. Advancement of on-road emissions monitoring

New vehicle technologies have advanced considerably with the tightening of the mass emission standards from Bharat Stage IV (BS IV) to BS VI. There is a need to modernize the on-road emissions monitoring techniques and tests to address the emissions from vehicles in real world driving conditions. This is not possible with the idling testing under PUC. Remote sensing is one such strategy that has already been recommended in the clean air action plans of the non-attainment cities of Odisha. This is an absorption spectroscopy to measure exhaust emissions remotely as vehicles cross the light path on the road. It can detect CO, NO, NO_2 and HC. This allows large-scale fleet screening without the vehicles being taken for physical tests; determines average emissions of the fleet and effectively identifies high emitters based on threshold limit for worst polluters and also detects vehicles with systemic flaws in vehicle batches that cause high excess emissions.

MoRTH is framing rules for the implementation of this advanced technology for monitoring of vehicles on the road. MoRTH has framed draft AIS 170 rules to define the scope of the programme. The remote sensing technology is already in operation in West Bengal and testing has also begun for Delhi-NCR. Globally, on-road emissions surveillance has advanced considerably. It is necessary to prepare a roadmap for its implementation in the capital region on a priority basis.

6.3. Phase-out of old vehicles and scrappage of end-of-life vehicles

As new vehicles become progressively cleaner with the advancement in mass emissions standards, older on-road vehicles that deteriorate over time and emit significantly higher than they are designed to emit, it becomes necessary to renew and modernize the vehicle fleet. Different states are giving out directives to regulate the age of vehicles. An order by the transport department of Odisha has stated that all the government vehicles will be phased out and will be replaced by electric vehicles. Additionally, the state government will provide loans to government employees to purchase EVs.

Government of Odisha has provided single window clearance system with regard to registered vehicle scrapping facility and automated vehicle testing station to be established in the state through PPP or private investments - based on order no 704 dated 21.01.2022 issued by Commerce and Transport Department.

The Ministry of Road Transport and Highways on 15 March 2021 has issued:

- G.S.R. 653(E) regarding the Motor Vehicles (Registration and Functions of Vehicle Scrapping Facility) Rules, 2021, dated 23-09-2021

- G.S.R 220(E) regarding Concession in Motor Vehicle Taxes against submission of Certificate of Vehicle Scrapping, dated 26-03-2021
- Sec 59 of the CMV(A) Act, 2019 that provides for fixing age and restricting plying of unfit vehicles
- AIS 129 that defines the standards for manufacturers on reuse, recycling and material recovery from vehicles

The CPCB has also issued Guidelines for Environmentally Sound Facilities for Handling, Processing and Recycling of End-of-Life Vehicles in 2019.

6.4. Controlling emissions from heavy-duty vehicles

The major share of freight traffic originates in 10 states, Odisha being one of them. The intensity of road-based freight traffic is responsible for high toxic exposure and source of ambient particulate and nitrogen oxide concentrations. This segment requires strategies for fleet renewal, clean fuel, energy-saving strategies and reduced heavy-duty traffic intensity in densely populated areas to reduce toxic exposures.

The state EV policy has given individuals and fleet owners purchase incentives of Rs 30,000 to the first 5,000 electric goods carriages to be registered in the state; and waived road tax registration fees and SGST on selling electric goods carriages.

Rourkela, Cuttack, Balasore, Talcher and Angul are using off-peak passenger travel time to move freight and restrict entry of heavy vehicles into cities during the day, with periodic inspections. They have also proposed parking and rest areas on the highways. All these towns are equipped with adequate weigh-in-motion machines at all the entry points for checking over-loaded vehicles and imposing fines. The policy has been notified to define routes, permits, fares, vehicle design and safety standards, and vehicle technology standards for para-transit vehicles but has not yet been implemented on the ground.

This will also require to promote trucking on clean fuels. Highway-based CNG/LNG refuelling systems and charging infrastructure for electric vehicles can help to shift a substantial segment of long-haul trucking and other commercial vehicles to gas and electricity. Regional route clusters like the capital region can be identified where such a transition can be prioritized. This will have to be promoted with highway-based refuelling infrastructure and preferential incentives.

This will also require rationalization of logistics infrastructure to reorganize freight movement and enable shift to rail-based freight movement; development of efficient interlinkages with the regional Integrated Freight Complexes aligned with

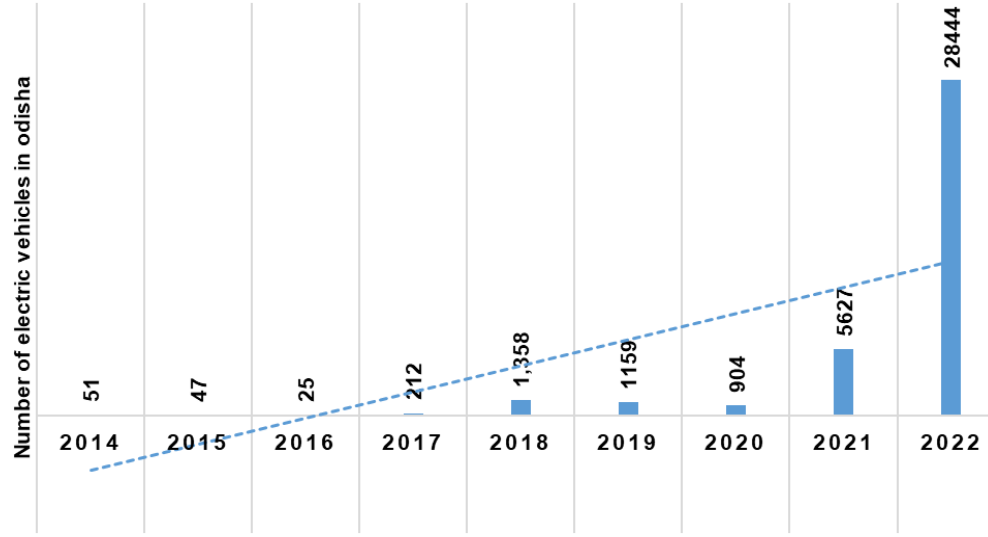
the freight distribution network of the city. Spatial and locational planning can help to mitigate truck traffic intensity and exposure. More efficient linking with regional rail-based freight systems and increasing share of rail-based freight will provide more sustainable solutions. An integrated plan needs to be developed.

The state has a rail network of 5,783 km covering all the districts. The major cities of Odisha are well connected to all the major cities of India. State Government has proposed to develop new lines and strengthen existing lines for better connectivity of the hinterland mining area to the ports. The Government has also proposed to build rail tracks from the mining heads to the nearest railheads which would decarbonize the logistics industry.

6.5. Electric vehicles

Currently, the penetration of electric vehicles (battery electric) in the state is negligible, i.e., just 2 per cent of the total registered vehicles in FY2021-22. However, the numbers are growing rapidly. During 2021-22, Odisha had registered more than 10,000 EVs. In 2022, same numbers have been registered within five months. It is possible to set realistic and achievable targets for each vehicle segment for the quick transformation. In FY 2021-22, this segment has witnessed around 5.2 per cent electrification of the new fleet. But it offers a much larger opportunity for about 60-70 per cent electrification as the current incentive programme has already helped to reach price parity with internal combustion engine (ICE) vehicles. This is also supported by citizen awareness programmes (see *Graph 14: Number of electric vehicles registered yearly in Odisha*).

Graph 14: Number of electric vehicles registered yearly in Odisha



Source: VAHAN database, MoRTH

Commercial e-2Ws for aggregator/e-commerce services segment are growing rapidly along with expansion of e-commerce in food, grocery and other goods deliveries. A policy mandate and time-bound target can transform this sector to achieve almost 100 per cent conversion to electric. Commercial passenger e-3Ws for individual/aggregator services has already achieved 17 per cent market penetration in FY 2021-22. Although almost 94 per cent of this development is driven by e-rickshaws, the sector offers huge potential for transformation. A recent study carried out by the Centre for Science and Environment in the state capital region shows that the appropriate interventions can transform 50 to 60 per cent of the current market.

In FY 2021-22, EV penetration level in the state was highest for commercial goods e-3Ws for individual/e-commerce services at 37 per cent. The high percentage is however due to the proliferation of small e-carts rather than goods-e-autos. Three-wheeler goods carriers involved in e-commerce and delivery businesses can be completely transformed into electric through regulatory intervention. With improved design of incentive structures, better quality vehicles can be scaled up.

So far, the passenger car segment has been slow to electrify. This is largely because of high upfront costs, lack of public incentive for personal cars, inadequate charging infrastructure that increases range anxiety and lack of adequate e-car models in the market. It is evident that a robust charging ecosystem can help to transform the segment by 15-20 per cent. The opportunity also exists in targeted support for government-owned vehicles for 70-80 per cent electrification.

The rate of electrification in commercial passenger e-4Ws for individual/aggregator services segment is almost negligible, but a definitive policy mandate can transform the same and help it to achieve almost 100 per cent penetration in ride hailing services.

The capital region has already set a good example in developing a bus programme – the Mo bus programme. Its future expansion and modernization can be linked with ambitious electrification programme to make mass transit carbon neutral and zero emission. Till date, Capital Region Urban Transport (CRUT) has inducted 10 e-buses in their service, and 50 more e-buses are being procured. A strong government mandate for at least 75 per cent EV bus share of all new bus procurements can transform the bus market and the bus services in this region.

As goods e-carriers/trucks have high mileage and are used more intensely, there is an opportunity to make them zero emission vehicles. But this segment is yet to witness adequate product development and product diversity. However, a proper incentive

mechanism and mandate can transform 5-10 per cent of the goods vehicles segment involved in deliveries with substantial benefits.

The state has developed an EV policy, intending to achieve 20 per cent battery electric vehicles in all vehicle registrations by 2025 and to promote the manufacture of electric vehicles and their components including batteries. The EV policy has provided for dedicated funds financed from cesses/levies and budgetary support. Incentives include 100% SGST reimbursement; 10 per cent capital subsidy - max limit of Rs 20 lakh per vehicle; concession to SCs, STs, women and industrially backward districts. Electricity tariff to be notified with special tariff for EV charging.

Batteries are to be labelled for collection of waste and recycling. EV battery manufacturers to have scheme for collection of batteries and not charge the users for collection. It will have synergy with current e-waste management. Benchmark labels of materials to be recycled from batteries. Policy for recyclers is to be notified.

To make it a successful programme, some on-ground challenges will have to be addressed. These include price parity, improving product diversity, improving range to minimize top up charging in a single trip, retrofitment with regulatory and quality checks, customized charging (night time-home and on-street charging, public charging), performance-linked funding, restrictions/disincentives on diesel/IC autos, etc.

Demand incentives need to be strengthened, branding of e-drive needs to be done to stimulate consumer interest, focus needs to be put on delivery fleet and OEM-led service provision.

As per the UMI report 2019 released by BDA, due to the low-carbon mobility plan (LCMP), GHG emissions will drop by 20-30 per cent by 2040.

6.6. CNG-operated vehicles

The state has promoted vehicles running on CNG. At this moment, only public transport vehicles running on CNG are available in Bhubaneswar and Cuttack. However, district administrations have planned to promote electric vehicles for public transport. Currently, some electric vehicles are being used by the municipality for door-to-door collection of solid wastes in the towns of Rourkela and Balasore.

GAIL has planned to build 15 CNG stations in Bhubaneswar and 10 others in Cuttack. There is a target to convert 30,000 diesel-run auto-rickshaws in Bhubaneswar and Cuttack to CNG. Bhubaneshwar has two CNG-filling stations. Two more at

Khandagiri and Tamando. Cuttack city has two stations. Bhubaneswar is laying 65 km of steel pipeline and 1,026 inch-km of MDPE network in next 5 years. Thirteen CNG stations (one in bus depot) are being set up. Conversion of 45,000 vehicles to CNG is being planned in the next five years. Cuttack is laying 41 km of steel pipeline and 989 inch-km of MDPE network for distribution of CGD. Conversion of 18,000 vehicles to CNG is in the cards. This all is planned to happen in the next 5 years.

There is a provision of sending liquefied CNG in cryogenic tankers from Dahej to Bhubaneswar and Cuttack. Natural gas has also been supplied from Kakinada in Andhra Pradesh. All these developments have created the opportunity to expand the CNG fleet in the state.

6.7. Public transport

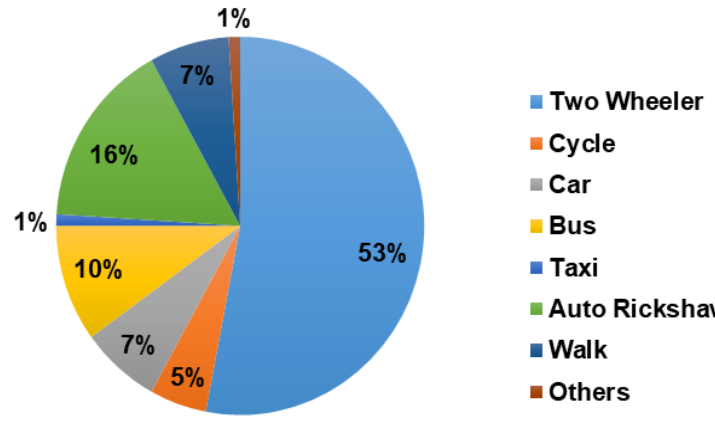
Vehicular pollution control will require transformative changes in the transportation and mobility patterns in the region to reduce the number and usage of vehicles, travel distances and traffic intensity. The heavy dependence on private transport is also attributed to the underperforming public transport services.

In 2019, data released from the Bhubaneswar Development Authority (BDA), shows that two-wheelers have the highest share at 53 per cent, followed by auto-rickshaws at 16 per cent. Though the data for 2019 shows that the mode share of buses is around 10 per cent, since the last 3 years the ridership of buses has increased by 4 times (see *Graph 15: Modal share in Bhubaneswar, 2018*).

Khurda, Cuttack, and Puri districts are among the major urban centres, accounting for over a third of the state's total urban population. Bhubaneswar is a large urban agglomeration including neighbouring districts of Cuttack, Jatni, Khurda town, Chowdwar, Barang and Puri. Greater travel demand has been created in this region as a result of the growth in urban and economic activities.

The district administrations of Talcher, Rourkela, Balasore, Kalinga Nagar and Angul have planned to promote the use of electric vehicles for public transport. Rourkela has been sanctioned one e-bus which CRUT will operate. And the other cities are in the discussion and planning stage.

Graph 15: Modal share in Bhubaneswar, 2018



Source: UMI 2019 report, BDA.

Bus service: In Odisha, OSRTC, the state owned intra-city public transport agency, operates around 22,158 buses, of which 10 per cent are owned by OSRTC and 90 per cent by private entities. During the past five years, the growth rate of procurement of buses has decreased. OSRTC has received various awards for its best practice in terms of fuel savings and operations. The agency conducts safety and eco-driving training for drivers and conductors on a regular basis.

Bus service in the capital region: The Bhubaneswar Bus Modernization Plan released by Bhubaneswar Smart City Limited, has demarcated 38.7 kms of priority transit corridors which will require 148 new electric buses to ferry 192,000 passengers daily. The smart city has also suggested deploying 500 e-rickshaws, allied infrastructure, and charging stations. But there is a huge gap in the current purchase of e-buses and e-rickshaws.

There has been substantial improvement in bus service provided by Capital Region Urban Transport (CRUT) in the capital region. In 2018 there were around 130 buses on 10 routes with unreliable services and unclean buses. Currently, around 250 buses ply on 32 routes including electric buses with reliable services and clean buses. From 50 bus queue shelters the numbers have increased to 200. During the year 2021, CRUT procured 10 electric buses for Bhubaneswar. In 2023 40 additional e-buses are going to be inducted in Bhubaneswar and Cuttack to mitigate air pollution. CRUT buses operate on 22 routes at a frequency of 1-6 buses per hour during a 17-hour operation cycle from 5.30 AM to 10.30 PM.

These initiatives have increased passenger convenience (including seating area, backlit signage board with MO Bus network map, and GPS-enabled passenger information system). At present, around 140 BQS are also equipped with the bike-sharing system (MO CYCLE), integrated to support last-mile connectivity. Procurement of 150 buses, including 50 electric buses, for wider coverage and better services is ongoing. An innovative strategy is to integrate the Mo bus service with electric three-wheelers for last mile connectivity. Around 50 e-autos have been deployed for this purpose.

The bus transport ridership has seen a significant improvement in Bhubaneswar and Cuttack i.e., from 50,000/day in 2018 to more than 200,000/day. CRUT also procured 100 BS VI buses for the hockey world cup event in Rourkela. CRUT has funded the development of the 'MO Bus' app which provides data such as ETA, live location of buses, route details and trip planner.

There are also multiple private operators running buses (72 in number) along specific routes, mainly connecting Cuttack and Khurda (BCBMP report, 2018).

The State EV policy has encouraged the purchase of e-buses by exempting road tax and registration fees for the first four years. A subsidy of 10 per cent (maximum limit of Rs 20 lakh per vehicle) is also extended to the buyers for passenger buses registered in the state with interest subvention of 5 per cent on loans.

Policy and schemes and criteria to be implemented for the bus system in cities of Odisha. Cities with more than 4 lakh population to have 60 buses per lakh of population;

- Cities with less than 4 lakh population have 40 buses per lakh of population (as per the service level benchmark of Ministry of Housing and Urban Affairs). - At least 50% of new buses will be electric
- Smaller towns – Create/strengthen bus service for clusters of towns as the small towns cannot have dedicated bus service
- Set target for bus route network augmentation (aligned with population distribution for service coverage as per MoHUA's service-level benchmark of average waiting time to be less than 4 min at bus stops, etc) – with monitoring and reporting requirements
- ITS system for managing bus fleet operation and for passenger information system for service delivery in each ward
- Fare policy and fare integration
- Implementation of multi-modal integration policy

6.7.1. Intermediate public transport (IPT)

In addition to providing last-mile services and connectivity between modes in large cities, auto-rickshaws – the most popular intermediate public transport system - also serve as the major mode of transportation in smaller cities and towns. At present, there are around 209,572 passenger autos and 2,349 e-rickshaws functioning across the state. This is an opportunity to replace them with electric autos in a phased manner. With electric mobility adoption, three-wheelers can be completely shifted to electric. Auto-rickshaws are a reliable feeder system and can integrate larger transportation networks. City-wise planning is needed to organize these for effective deployment.

This is in line with NITI Aayog's prediction that approximately 70 per cent electrification of two- and three-wheeler fleets is possible by 2030. Additionally, targeted electrification will be needed for taxi aggregators and ride-hailing services. Odisha's EV policy has waived off road tax, registration and permit fees, introduced open permit system, and provides incentives for purchasing and scrapping of existing older vehicles. Recently, the government has launched a web portal for people to claim state incentives for the purchase of EVs.

To initiate the transition from conventional autos, especially diesel autos, to e-rickshaws and to organize the rickshaw operators in Bhubaneswar and Cuttack, the city authority plans to introduce 500 e-rickshaws. The municipality of Talcher and Angul are targeting to boost the sale of e-rickshaws. Rourkela and Balasore are operating over 30 e-rickshaws each as intermediate public transport. Also about 53 e-rickshaws are in operation in Rourkela and Balasore for door-to-door waste collection.

A phased plan to replace diesel three-wheelers and its integration with other services can meet the mobility needs while reducing pollution.

6.8. Non-motorized transport

Bhubaneswar Smart City Ltd. has launched several schemes to implement NMT plans and policies. Already considerable infrastructure has been created with continuous carriageway, wide sidewalks, dedicated cycle tracks and provision of road infrastructures – public toilet/seating space/vending space/parking, etc. Bhubaneswar has implemented 49.7 km of footpaths and 40 km of cycle tracks. Smart Janpath has been conceptualized as complete streets. Cycle sharing with 1,500 cycles under Mo Cycle has been started and 11 km of cycle tracks, painted red to segregate bicycle lanes within the right of way, have been laid.

Under the smart city mission, a public bike sharing system called MO CYCLE is operated by CRUT with a fleet of 2,000 cycles and 363 stations. It is accessed through a mobile app. The Low Carbon Mobility Plan (LCMP), a long-term (20 years) strategic vision document for mobility, has been taken on board by the Bhubaneswar Development Authority and a city-level strategy is being framed which is in its final stages. Based on a rigorous examination of large data sets, including existing and prospective land use, transit routes and stops, travel patterns, cross-sectoral analyses, etc., the LCMP has proposed a 180-km citywide bicycle network.

BDA has started awareness-raising initiatives such as NMT day every week or month and encourages its use for government employees. Street reclaiming initiatives like Patha Utsav in which parts of streets are closed for motorized vehicles, cycle days or cycle-to-work events, pedestrian safety drives, etc. are being promoted. Due to poor planning, lack of awareness and poor maintenance, the cycles are not being used.

The street design guidelines for Bhubaneswar 2021 released by the BDA, include various design standards with the aim of reducing noise and air pollution in public spaces. This will enhance urban landscape, street orientation, NMT access, and elements of streetscaping. Bhubaneswar is also creating a low-emission zone around Lingaraj temple and its surrounding core city areas.

Similar action has started in other non-attainment cities as well. In February 2019, Cuttack, Talcher, Rourkela, Balasore and Angul Municipalities announced plans to build cycle tracks along the major roads to be completed by March 2024. Kalinga Nagar has prepared zonal plans to develop an NMT network with a target to complete by March 2023. Such plans will require dedicated funding and budget. Several municipalities have proposed NMT networks but these require a roadmap for implementation.

Most cities and towns of Odisha are compact and that reduces the average daily travel trips. In fact the average trip length is below 5.5 kilometers. 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.

6.9. Travel demand management: Parking policy

While scaling up the public transport system and walking and cycling infrastructure can help in creating safe and accessible public transport services and reduce dependence on personal vehicles, additional measures are needed for travel demand management. As a first step, the indicators developed by CPCB for progress reporting

on the city 's clean air action plan has asked for a parking policy. However, so far the focus has continued to remain on supply-side management of parking instead of designing it as a demand management measure to reduce vehicle miles travelled.

In Bhubaneswar, there are 32 on-street and 28 off-street designated parking areas with a total equivalent car space (ECS) of 5,500. Under the smart city mission, on street parking on Janpath is under construction.

However, Bhubaneswar Municipal Corporation has prepared a draft parking policy providing for Parking Management Area Plans (PMAPs) to take an area-wide approach. This needs to be taken forward to enable municipal ward-wise PMAPs to demarcate the legal parking areas after considering requirements of all other street level activities; notify areas where parking cannot be allowed like parks and green areas, footpaths, traffic intersections, emergency vehicle routes, etc; introduce variable parking pricing based on duration and user pay principle to manage demand; impose penalty on illegal parking; ask for proof of parking for purchase of vehicles; promote shared, priced and public parking to optimize use of assets; create IT-based parking area management; earmarking of parking revenue for local area development while meeting the parking requirements of buses and commercial vehicles. Multi-level parking needs to be decided by the PMAP of an area and not be a stand-alone project. This approach can improve management of parking and simultaneously reduce parking demand and vehicle usage. Parking requirements can be reduced in areas that are well served by public transport.

If the capital region implements bus rapid transit systems, it can additionally adopt transit oriented development policy to densify development along the bus corridor so that more people can access the bus routes and enhance walking and cycling facilities to improve access. This combination can reduce demand for motorized personal travel.

More steps are needed to restrain personal vehicle usage. As evident from the global experience, low emissions zones can promote walking, cycling, public transport usage, clean and zero emissions vehicles while restraining entry of polluting vehicles. Congestion charges need to be designed and implemented in targeted areas.

6.10 Key strategies for the vehicle and transportation sector

On-road emissions management

- While strengthening the ongoing programme of Pollution Under Control Certificate (PUC), advanced emissions monitoring of on-road vehicles needs

to be done with new generation strategies like remote sensing to control real world emissions.
- Implement state-wide policy for phasing out of old vehicles and scrappage of end-of-life vehicles
- Accelerate implementation of electric vehicle policy with a more ambitious target for the capital region.
- Reduce emissions from heavy duty freight with route realignment and bypasses to reduce population exposure, augment clean trucks on clean fuels like natural gas and electricity, reorganise logistics and integrate with railway freight to increase the modal share of railways state-wide.

Public transport and mobility strategy
- Augment intra-city and inter-city bus transport services and scale up bus infrastructure along with ITS-based service management, passenger information systems, fare integration, etc.
- City-wide target for scaling up of the walking and cycling infrastructure and adoption of street design guidelines for safe access.
- Implement parking policy and ward-wise parking management area plans along with parking pricing to provide organized legal parking without being in conflict with other street activities. This is to be designed as a demand management measure to reduce demand for parking and vehicle miles travelled.

Integration of action points of the LiFE MISSION

The strategy for this sector needs to align with the provision of the LiFE Mission. Several action points of the Mission pertain to reducing usage of personal vehicles, augmenting usage of public transport, augmenting walking and cycling infrastructure, and promoting clean fuels and zero emissions electric mobility. These include the following LiFE Mission action points:
- Action no 2: Use of public transport wherever possible
- Action no 5: Use bicycles for local or short commute
- Action no 7: Prefer CNG/EVs over petrol and diesel

The LiFE Mission has additionally asked for awareness generation on LiFE activities, signages for LiFE actions and posting of infographics/audio-visuals in social media platforms.

The action points of the LiFE Mission have been integrated with the action plan.

Action plan: Controlling vehicular pollution

Sr. no.	Activities/ Action plan	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)	Govt of Odisha is taking the initiative to phase out 15-year-old government owned and operated vehicles and replace them with zero emission vehicles: notification order to be attached once it is published. For the rest, the government will be following the same policy formulated by the Government of India.	Started to implement By March 2023, 7,000 old govt. vehicles will be sent for scrapping	Whole state	No	NA	NA
2	Policy for scrapping old vehicles	Govt is planning to declare a voluntary policy for phasing out 15-year-old vehicles and unfit vehicles based on fitness testing; discussions are underway in this regard. Government of Odisha has notified Policy for Setting up Registered Vehicle Scrapping Facility (RVSF) and automated vehicle testing stations. Government of Odisha has provided single window clearance system for registered vehicle scrapping facility and automated vehicle testing station to be established in the state. Based on order no 704 dated 21.01.2022 issued by Commerce and Transport Department.	2023 Six automated vehicle fitness testing centres are to be set up in districts. One ATS centre is operating in Cuttack. RVSF centres are yet to be set up by private entities.	Whole state	Yes	NA	NA

Sr. no.	Activities/ Action plan	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)
3	Policy/Plan for Li-battery waste management from scrapped vehicles	To follow CPCB guidelines	NA	NA	NA	NA	NA
4	Policy/Scheme for Eco-Friendly Mass Rapid Transport Systems	Government of Odisha has created a Special Purpose Vehicle (SPV) that is Capital Region Urban Transport (CRUT) for providing Public Transport Bus Services and last-mile connectivity in Bhubaneswar, Cuttack, Puri and Rourkela (Sundargah district)	At present, in the capital region around 300 diesel buses and 10 electric buses are operating; and additional 50 electric buses are planned to be inducted soon; CRUT has also deployed 100 buses in Rourkela. In capital region the bus ridership has increased from 50,000 per day during 2019 to more than 200,000 per day till date. In other cities OSRTC operates buses. There are more than 22,000 stage carriage / roadways buses being operated. For list-mile connectivity, around 55 electric rickshaws and 200 electric autos have been deployed into services. There are plans to further procure 300 electric buses.	Bus services information / statistics for all districts to be annexed along with augmentation, improvement plan (OSRTC and Transport Department to provide the information)		NA	NA

Sr. no.	Activities/ Action plan	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)
5	Policy to augment e-vehicles	The EV policy 2021 includes several incentives for procurement of e-vehicles.	Policy period from 01.04.2021 up to 31.08.2025.	Transport department to provide number of electric vehicles registered in different cities/districts and quantum of incentives provided till date and future plans to augment electric mobility in state.	NA	NA	NA
6	Notification and enforcement of PUC norms	PUC regulations are as per Central motor Vehicle Rules norms	Completed	Whole state	No	NA	NA
7	Online monitoring of PUC implementation	Transport department has access to PUC database and calibration, AMC compliance is regularly checked. Action taken report / data on non-compliant PUC centres can be included. However, there are reports of use of malicious software to generate false-pass certificates, therefore audit system should be improved and temper proof system should be developed.	PUC testing centres established across the state. SPCB has been requested to formulate the policy for 3rd party audit.	Whole state	NA	NA	NA

Sr. no.	Activities/ Action plan	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)
8	Mechanism for centralized record maintenance of PUC checks, certification and cross check by the concerned transport authorities to be incorporated	Transport department maintains centralized record keeping, and calibration and AMC details of PUC centres are checked.	Number of PUC centres in different districts – data can be attached by the transport department along with a future plan to improve PUC and inclusion of remote sensing based testing technology can be considered.	Whole state	No	NA	NA
9	Construction of bypass / ring roads	Bypasses, ring roads have been constructed in several districts, however full details to be provided by Public Works Department or Design, Planning and Implementation department or NHAI or state departments.				--	--
10	Re-filling Stations retrofitted with Vapor Recovery System	Department of petroleum / civil supplies department / oil companies and marketing agencies to provide full information	--	Whole state		--	--
11	Incentive of setting up R&D facilities related to Evs	No information available yet	--	Whole state		--	--
12	Any other policies, rules, standards, guidelines pertaining to vehicular emissions	Information to be provided by the department	--	--		--	--

Action plan: Integration of relevant Mission LiFE action to promote public transport, walking, cycling and electric mobility

Sr. no	Action	Indicator		Achievement against the target for 2023	Funds spent in Rs. For FY 2022-23
		Baseline	Target for FY 2022-23		
Relevant actions under LiFE themes for improvement of air quality					
1	Action no 2: Use of public transport wherever possible	Total length (km) of public transport network (roads, metro, last-mile connectivity) required to be developed in the city	Length (km) of public transport network (roads, metro, last-mile connectivity) in km		
2	Action no 5: Use bicycles for local or short commute	Length of non-motorized track (NMT) required in the city	Length of NMT constructed in the city		
3	Action no 7: Prefer CNG/EVs over petrol and diesel	• Capacity of existing EV charging station in kW • Total no. of vehicles in the cities	• Capacity of EV charging stations introducing in kW • No. of CNGs/EVs introduced/converted		
1	Awareness generation on LiFE activities for all 75 points	No. of persons in the city	No. of persons provided awareness through capacity building and public outreach programmes (CBPO)		
2	Signages for LiFE actions at important locations for all 75 points	No. of junctions, bus stops and important locations in the city	No. of locations where signages are provided		
3	Posting of infographics/audio-visuals on social media platforms	No. of days in a year in which infographics/ audio-visuals are posted on social media	No. of days in a year in which infographics/ audio-visuals are posted on social media		

See Annexure 1: Non-attainment cities: Action points of Mission LiFE to promote public transport, walking, cycling and electric mobility

1. Angul City Action plan: Integration of relevant Mission LiFE actions to promote public transport, walking, cycling and electric mobility
2. Balasore City Action plan: Integration of relevant Mission LiFE actions to promote public transport, walking, cycling and electric mobility
3. Bhubaneswar City Action plan: Integration of relevant Mission LiFE actions to promote public transport, walking, cycling and electric mobility

4. Cuttack City Action plan: Integration of relevant Mission LiFE actions to promote public transport, walking, cycling and electric mobility
5. Kalinga Nagar City Action plan: Integration of relevant Mission LiFE actions to promote public transport, walking, cycling and electric mobility
6. Rourkela City Action plan: Integration of relevant Mission LiFE actions to promote public transport, walking, cycling and electric mobility
7. Talcher City Action plan: Integration of relevant Mission LiFE actions to promote public transport, walking, cycling and electric mobility

7. Construction & Demolition Waste

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 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 bye-laws 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 to indicate disposal and utilization 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 RERA or EIA portals. Potential generation of waste can be estimated by using thumb rules such as those developed by TIFAC under the Department of Science and Technology. All EIA and RERA 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 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.

According to the Form VI submitted to OSPCB for the year 2021-22, it was estimated that a total of 612.309 MT of C&D waste generation was documented for Odisha across 114 ULBs. Rayagarh that generated 182.5 MT per day topped the list, followed by Cuttack (170 MT), Junagarh (60 MT), Koraput (50 MT) and Kotpad (50 MT). According to this report, the remaining ULBs were producing not more than 10 MT of C&D waste per day. About 74 ULBs were reportedly generating less than 1 MT of C&D waste per day. The C&D waste produced by five ULBs – Ganjam, Biramitrapur, Karanjia, Redhakhol, and Athamalik – was not reported. Despite having populations of 840,834, 309,639, 356,598, and 335,761, Bhubaneswar, Rourkela, Berhampur, and Sambalpur contributed about 7, 5, 1.5 and 1.5 MT of C&D waste per day, respectively.

7.1. C&D waste management in non-attainment cities

Bhubaneswar: In May 2016, the State Pollution Control Board of Odisha mandated (via order No.7617/IND-IV-MSW-141(Pt)) all waste generators and local authorities to comply with the Construction and Demolition Waste Management Rules 2016. According to the Guidelines on Environmental Management of Construction and Demolition (C&D) Wastes 2017, Bhubaneswar generated about 196.8 TPD of C&D waste in 2016. That has come down over the years. As per form III submitted by the ULB to the state pollution control board, the municipality generated 52 TPD construction & demolition waste in 2021, out of which 6–7 tonnes were collected.

An additional assessment of construction projects registered on the Real Estate Regulatory Authority, Govt. of Odisha (rera.odisha.gov.in) portal has shown that nearly 46 thousand tonnes of construction waste will be potentially generated from these projects. There are 215 projects in Bhubaneswar Municipal Corporation (BMC) that are registered with RERA.

BMC released the user fees and penalties for various waste related activities in 2015 (via order No. 3078—XXII (L)-53/2013). The order stipulates that the fine for piling C&D waste materials on public streets is calculated based on their volume: Rs 1,500 for each tractor trip and Rs 3,000 for each truck trip.

In September 2021, the government had notified the urban local bodies to identify spots where C&D waste had piled up and issue notice to the owners of the waste asking them to lift it at their own cost; and in case the owners wanted it to be collected

by the ULBs, required fees along with penalty (as per the quantity of waste) would be charged to the owner. The major violators are bulk generators.

BMC has made it mandatory for architects, builders, developers and contractors to submit a C&D waste management plan to get the permit for starting any construction activities. BMC has an on-call collection system for C&D waste in place. For any construction, renovation and demolition activity, waste generators can call a toll-free helpline number provided on the BMC's website to request for removal of debris.A public grievance portal (https://www.bhubaneswar.me) is also in place which allows citizens to report and ask for removal of construction materials and debris.

C&D waste generators which generate 20 tonnes or more in a day or 300 tonnes or more in a month must submit waste management plans to the ULB before taking up any construction or demolition activity. For the management of C&D waste, BMC has four enforcement teams in place

Two landfill sites of 2.48 acres in Pokhariput and 4 acres in Patia are being used for landfilling of this unprocessed waste.

BMC has a C&D waste processing plant in Pandra, Bhubaneswar (near micro-composting plants). It started in 2021 with a capacity of 10 TPD. The material is crushed to form aggregates and used to produce paver blocks. The processing plant is not yet mechanized, and segregation is done manually by representatives from a local self-help group and members of Mission Shakti. BMC has floated a tender for mechanized processing which is expected to be completed by the end of the year 2022. BMC is expanding the recycling capacity of the city. Multiple decentralized facilities (up to 5 TPD processing capacity) to be managed in partnership with the Mission Shakti Groups / transgender groups are being envisaged. The members of Mission Shakti Groups / transgender groups shall collect C&D waste from waste generators and transport the same to processing facilities. BMC has initiated procurement of a C&D waste recycling plant. The city has prepared a Request for Proposal and placed it for approval from the state government.

Cuttack: Cuttack Municipal Corporation (CMC) generated 10 TPD of C&D waste as per the City Air Action report 2022–23. A notification had been issued for strict enforcement of CPCB guidelines for construction dust control. About 128 vehicles of various types are available for C&D waste transportation. CMC has also proposed setting up a C&D waste processing facility with a processing target of 10 TPD.

Table 7: Construction and demolition waste transportation infrastructure in Cuttack

Type of vehicles	Numbers
Trucks	7
Truck Hydraulic	NA
Tractor Trailer	69
Dumper placers	6
Tricycle	20
Refuse Collector	NA
Others	26 auto tippers

Angul: Angul municipality generated 14 TPD of C&D waste as per the City Air Action report 2022–23. The city has three monitoring locations to ensure that the transportation of construction materials is conducted in covered vehicles. A notification has been issued for strict enforcement of CPCB guidelines for construction dust control. The municipality has set aside a separate area for the disposal of C&D waste generated within its boundary. The municipality has also proposed a C&D waste processing facility with a processing target of 18 TPD.

The municipality employs two tractor-trailers for transportation of C&D waste. Currently, the collected C&D waste is used for filling roadside areas or low-lying areas.

Talcher: The municipality generated 6 TPD of C&D waste as per the City Air Action report 2022–23. One landfill site of approximately one acre is used for landfilling of the unprocessed waste. All 21 wards are covered for the collection of C&D waste. The municipality has provided a separate area for the disposal of C&D waste generated within its jurisdiction. The municipality has proposed to set up a C&D waste processing facility. Currently, the collected C&D waste is used for filling low-lying areas. Every month, two to three inspections are carried out to ensure that the C&D Waste Rules are being followed. For C&D waste transportation, one truck and three tractor-trailers are employed.

Balasore: This municipality generated 0.5 TPD of C&D waste as per the City Air Action report 2022–23. One landfill site at Phulladi, Lumia Jodi Polo (ward no. 31) is used for landfilling of this unprocessed waste. All 31 wards are covered for the collection of C&D waste. About ten tractor-trailers are employed for transportation of C&D waste.

Rourkela: This municipality generated 20 TPD of C&D waste out of which 10 tonnes

were collected each day, as per the City Air Action report 2022–23. One landfill site of five acres is used for landfilling of this unprocessed waste. A notification has been issued (Letter no. 8906, Dt.03.10.2019) to ensure transportation of construction materials in covered vehicles. Another notification had been issued (Letter no. 8906, Dt.03.10.2019) for stringent enforcement of CPCB guidelines for construction dust control. The RMC has also proposed a C&D waste processing facility with a processing target of 10 TPD. Four truck tippers, two compactors, ten tractor-trailers, two dumper-placers and three JCBs have been employed for transportation of C&D waste.

Kalinganagar: This municipality generated 5 TPD of C&D waste, as per the City Air Action report 2022–23. A notification had been issued to mandate the construction of a tar road inside the construction site for the movement of vehicles carrying construction material. Ten officers have been deployed for regular inspections of construction sites and to restrict storage of construction materials along the road. The municipality also issued a notification for strict enforcement of CPCB guidelines for construction dust control (use of green screens, side covering of digging sites, etc.).

7.2. 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 practiced in other states, a web portal may be launched for C&D sites of 500 sqm and above plot areas for uploading of self-audits of dust pollution control. This may include registration, uploading of self-declaration, generation 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 is 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.

7.3. 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 cluster of towns and ULBs as needed
- Mandate bulk waste generators for collection and transport of waste
- Mandate use of recycled material and aggregates in new construction
- Enforce implementation of effective dust control measures in construction sites
- Amend municipal bye-laws as per the C&D waste rules and regulations 2018

Action plan: Managing construction & demolition waste

Sr. no.	Activities/ Action plan	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.	NA	Notification of the policy within 6 months for implementation of on-site C&D management, establishment of C&D waste collection centres for segregated waste, GPS-enabled transportation systems, number and schedule of C&D recycling plants to be set up for Bhubaneswar-Cuttack and other cluster of cities (depending on the tonnes per day (TPD) C&D waste generation) Implementation as per plan: 20% in 1st year 50% in 3rd year 100% in 5th year	Yes	Nil	NA
2.	Policies, 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. Proposal has been submitted to the MoHUA for implementation of dust mitigation measures in the seven National Clean Air Programme [NCAP] cities.	NA	i) Demolition waste management to be formulated & implemented -- Issue public Notice ii) Notification and monitoring of mandatory adoption of dust mitigation measures (with appropriate techniques and approaches), penalty provision and monitoring requirements for all dust generating activities including construction and road management in all districts/wards. iii) Notify collection points/transfer stations iv) Mandate fleet renewal of construction machinery to meet BS IV standards	NA Implementation: Full implementation by 3rd year	NA	NA

Sr. no.	Activities/ Action plan	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)
3.	Policy for use of C&D waste in laying and construction of state highways.	The state is at the preliminary stage of implementation.	NA	Notify policy and mandate for uptake of C&D waste and utilization in road construction within 6 months.	NA	NA	NA
4.	Penalty provisions for non-compliance of C&D waste management rules at construction sites	All ULBs have taken step for levying fine for putting building materials over road or empty lands in SWM bye-laws.		Notify penalty provision for non-compliance within 6 months with strong site specific monitoring system Immediate implementation	NA	NA	NA
5.	Demand creation for C&D waste and alternative use of C&D waste material	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 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.		Notify policy to mandate minimum uptake of 10-20% of recycled C&D waste from processing centres in new construction and reutilization of C&D waste in construction.			

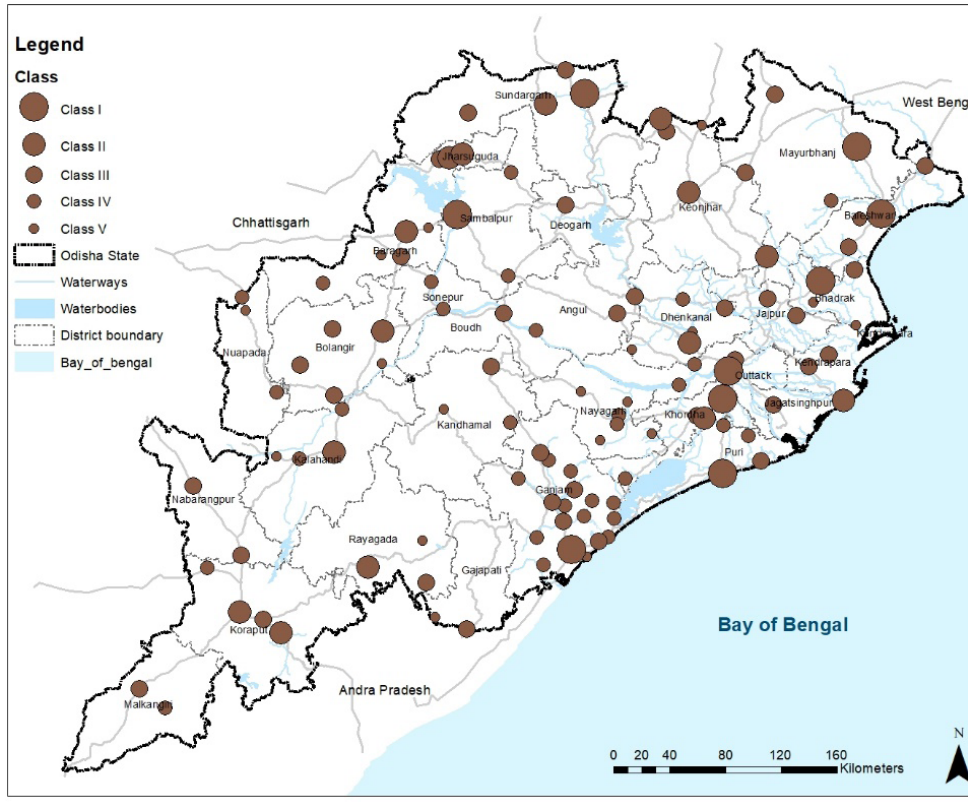
Sr. no.	Activities/ Action plan	Status of activity (Completed/ Ongoing/ To be Started)	Timeline for completion	Target (Coverage/ Percentage)	Financial implications (Yes/ No)	Funds allocated (Rs crore)	Funds utilized as on date (Rs crore)
6.	C&D waste processing plants	The state is at the preliminary 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 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.		Notification of state level plan for setting up C&D waste processing plants for cities/cluster of cities. Implementation target: 25% in the 1st year as per plan; 75% in the 2nd year 100% in 5 years			

Sr. no.	Activities/ Action plan	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)
7.	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 avoid dust mitigation. Proposal has been submitted to the MoHUA for implementation of dust mitigation measures in the seven National Clean Air Programme [NCAP] cities.		i) Develop online database of live construction sites ward-wise and district-wise for implementation of on-site C&D management and dust control, monitoring system along with penalty system within the 1st year. ii) Notification of ward-wise C&D waste collection centres for segregated C&D waste collection within the 1st year. iii) GPS-enabled transportation system with monitoring/tracking system. iv) implementation of dust control measures (with adequate and appropriate guidelines on methods of dust control measures) in construction sites. v) Notify regulation for demolition activities.			

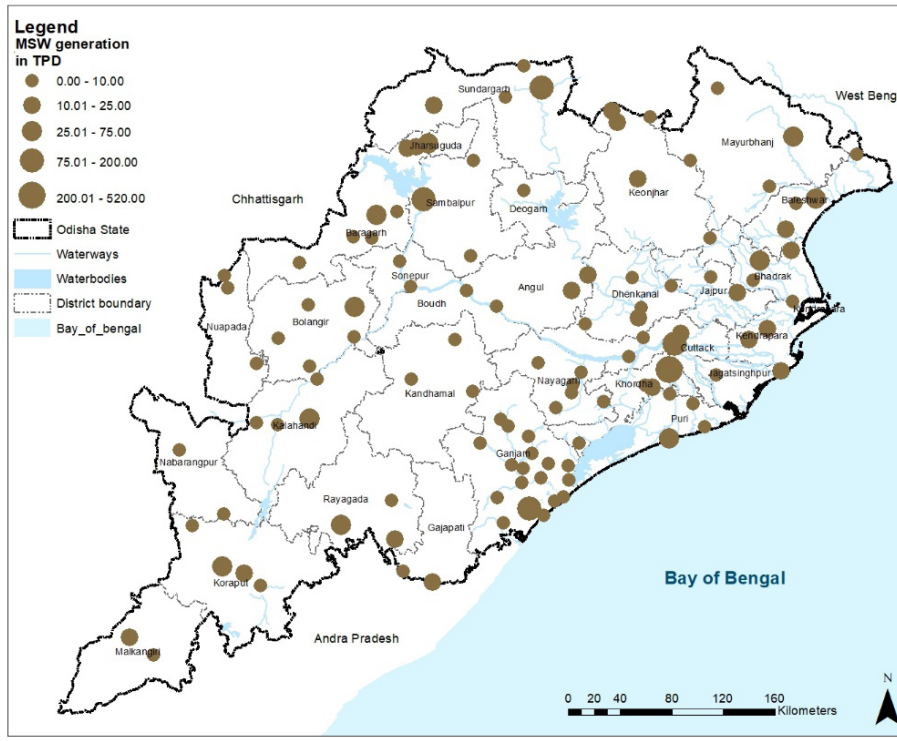
8. Waste management to control open burning of municipal solid waste and landfill fires

Open burning of waste and spontaneous fires in landfills contribute substantially to air pollution and cause high toxic exposure for local communities. This can be resolved only with comprehensive and effective waste management practices. This requires proper quantification of waste generation, adequately planned infrastructure for 100 per cent segregated waste collection, transfer and material recovery through recycling, and stopping fresh dumping of waste in landfills along with complete remediation of legacy waste. This strategy is a central focus of the LiFE Mission.

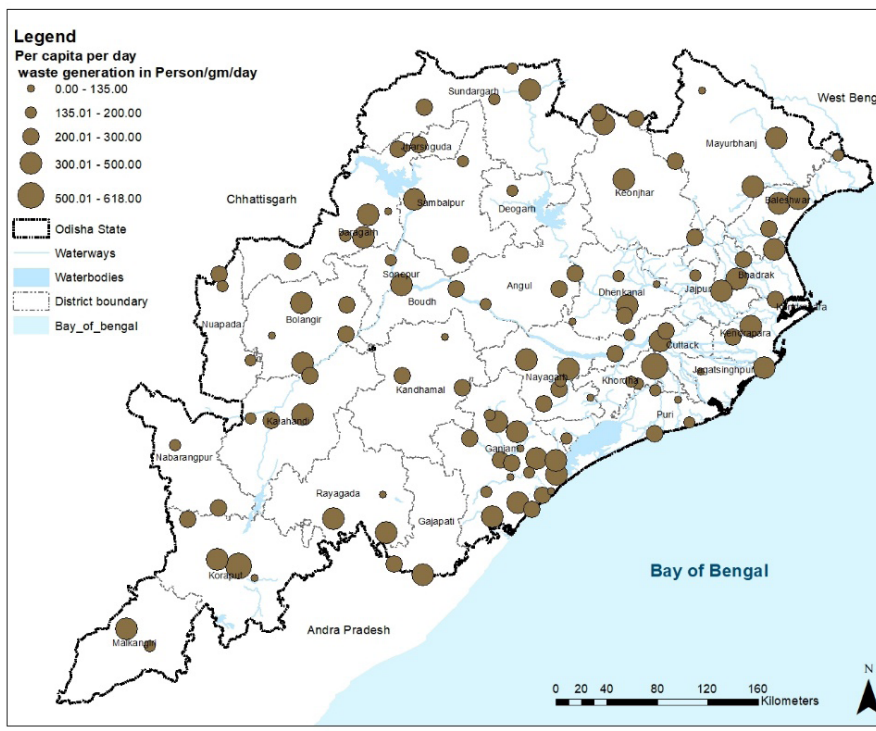
Map 1: Class-wise distribution of solid waste generated in Odisha: ULB-wise



Map 2: Total municipal solid waste generated in Odisha: ULB-wise



Map 3: Per capita solid waste generated in Odisha: ULB-wise

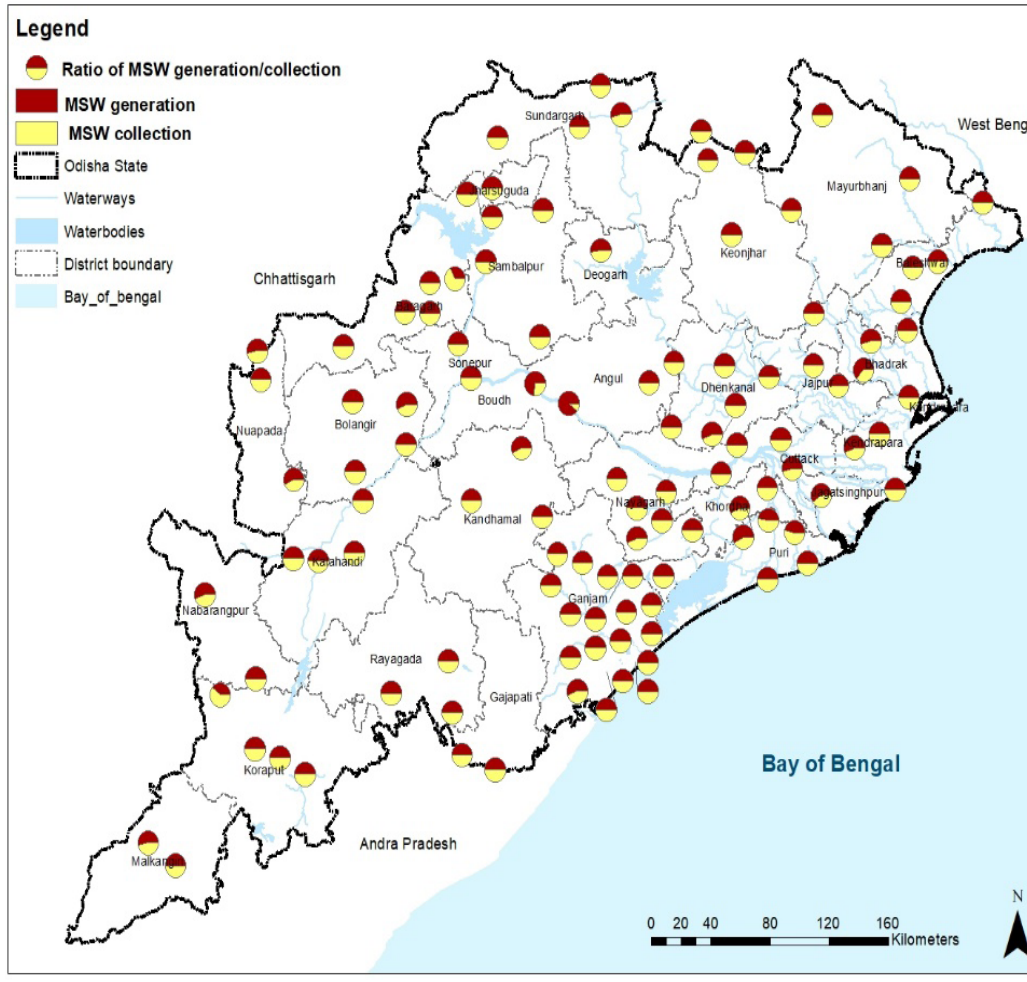


The 114 ULBs of Odisha generate 2,130 TPD of municipal solid waste according to the Form IV submitted to the OSPCB for 2021-22. Top generators are Bhubaneswar (520 TPD), Cuttack (200 TPD), Berhampur (143 TPD), Sambalpur (110 TPD) and Rourkela (102 TPD). These five cities are responsible for generating about half of the state's municipal solid waste.

8.1. Collection efficiency

Of the 114 ULBs, 84 have reported 100 per cent collection of the generated waste. This includes all Class 1 cities and the collection is done door-to-door. Remaining cities have more than 70 per cent collection except Phulbani (53 per cent), Jagatsinghpur (68 per cent), Kotpad (67 per cent), Athamallick (63 per cent), G Udayagiri (63 per cent), Daspala (30 per cent) and Odagaon (44 per cent).

Map 4: Ratio of municipal solid waste generated to collected

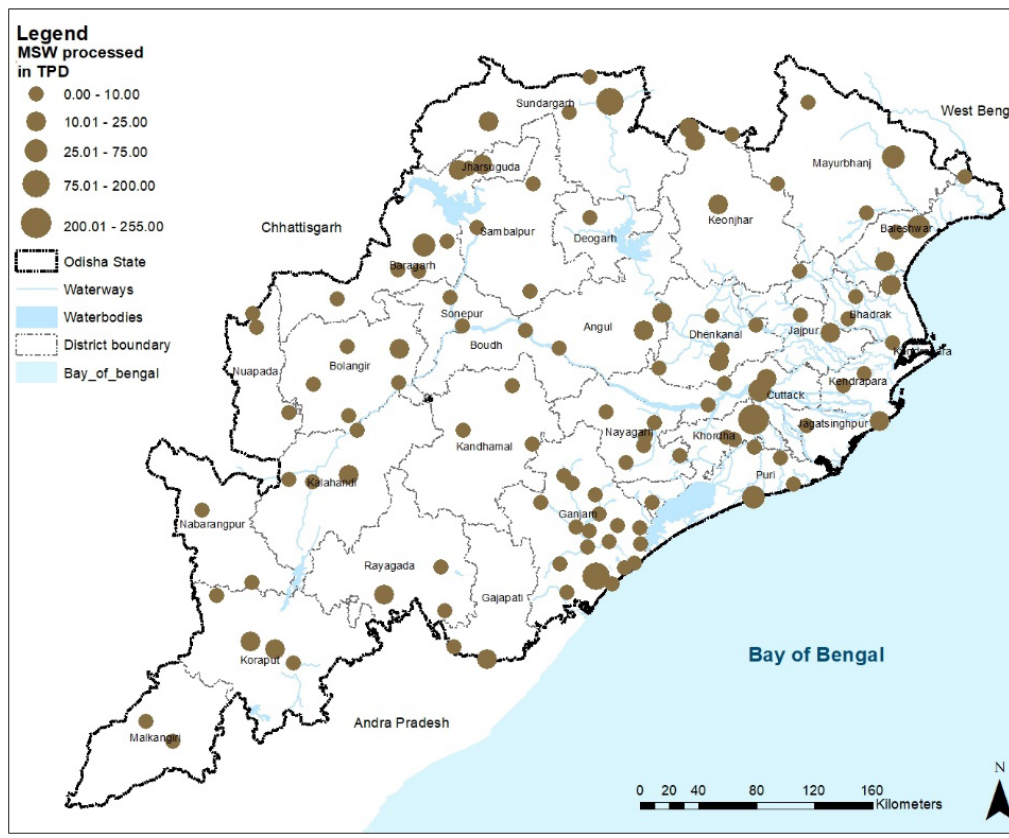


Segregation: While almost all the ULBs have reported complete segregation of waste, seven ULBs – Jatani, Anadapur, Aska, Buguda, Balimela, Athamallik and Atabira – have reported they have yet to improve segregation practices in the city.

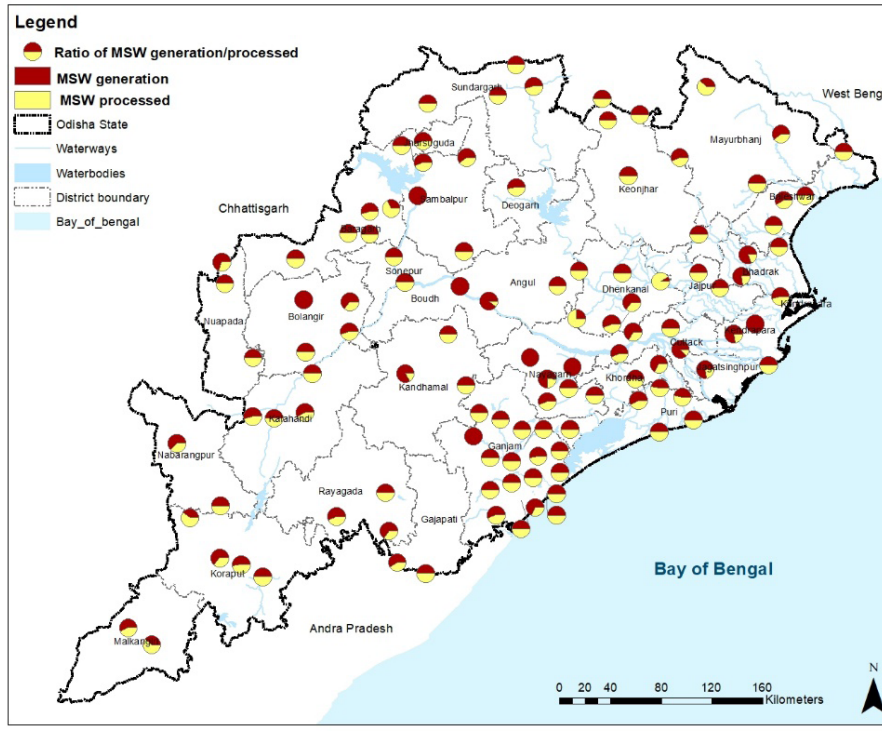
Processing/Treatment: According to the Form IV data compiled by OSPCB, Odisha is treating 64 per cent of the waste generated in the state. About 57 ULBs are treating 100 per cent of their waste generated, while 18 ULBs are treating less than 50 per cent of their waste.

Among the Class 1 cities, Berhampur, Balasore and Puri are treating 100 per cent of their waste. Other than this, 29 ULBs have a sanitary landfill. 62 ULBs do not have any proposal for improvement of solid waste management in their city according to the report. Cuttack is among these cities.

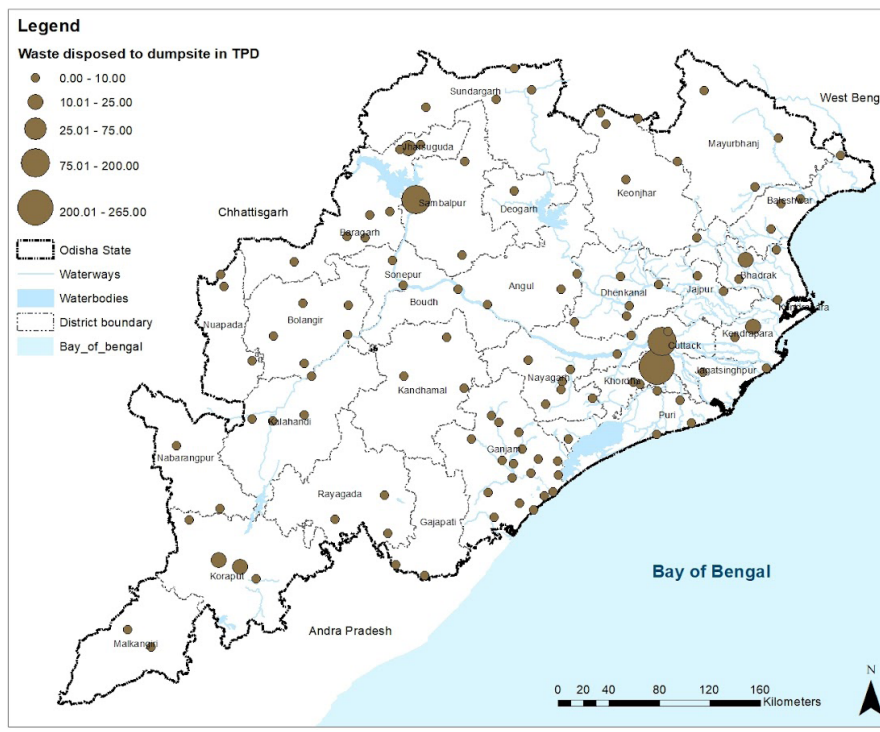
Map 5: Total municipal solid waste processed/treated in Odisha: ULB-wise



Map 6: Ratio of municipal solid waste generated to processed



Map 7: Waste disposed to dumpsite in Odisha: ULB-wise



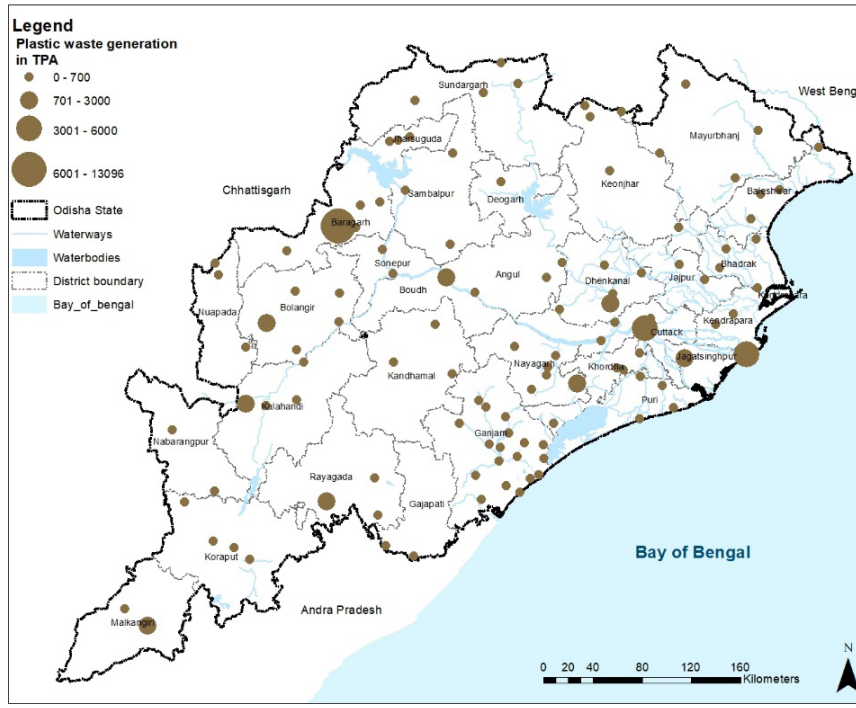
8.2. Plastic waste management: All ULBs

According to Form V submitted to the OSPCB for 2021-22, 111.49 tonnes of plastic waste is produced daily throughout 114 ULBs. All the ULBs had published draft bye-laws, but it would be preferable to have a final version that could be adhered to. According to the report, the state's total plastic waste generation for 2021–22 was 40,696.43 TPA, but only 19.39 per cent of it was channelized for use. More than half of the ULBs (64) failed to report the quantity of plastic waste being channelized.

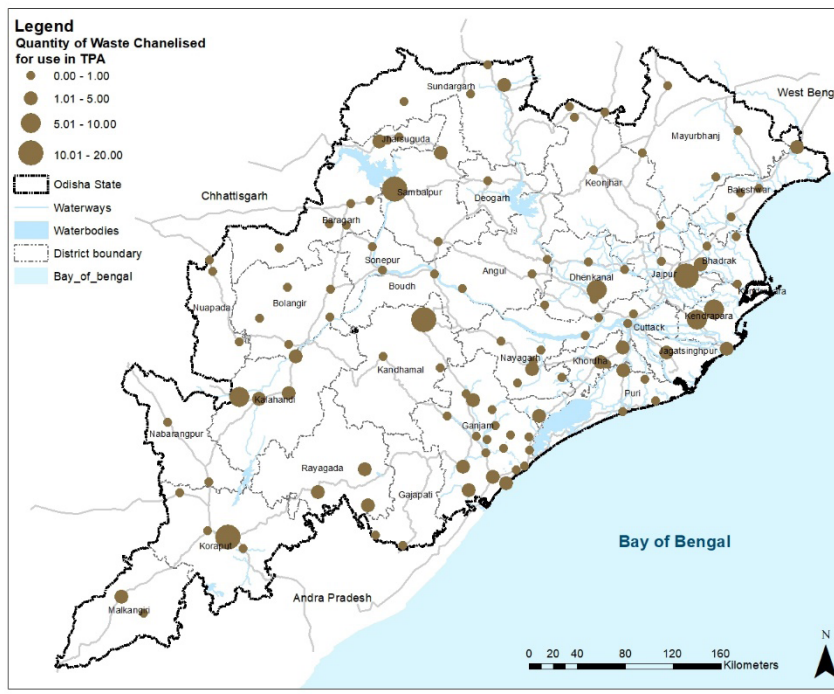
Bhubaneswar reported the highest plastic waste generation during the year 2021–22, i.e., 13,096 TPA, followed by Cuttack (5,475 TPA), Paradeep (3,124 TPA), Balasore (2,248 TPA), Rourkela (2,160 TPA), Berhampur (1,710 TPA), Dhenkanal (1,440 TPA), Kantabanji (1,252 TPA), Dharamgarh (1,108 TPA) and Ranpur (1,095 TPA). All other ULBs had relatively lower plastic waste generation, with Bellaguntha, Kotpad and Surada having as low as zero TPA. Less than one TPA of plastic waste was reported to have been produced in the ULBs of Rayagada (0.014 TPA), Balimela (0.05 TPA), Rambha (0.08 TPA), Nimapara (0.23 TPA), Pipli (0.24 TPA), Jaleswar (0.45 TPA), Gudari (0.45 TPA), Athamallik (0.52 TPA), Redhakhol (0.6 TPA), Bijepur (0.75 TPA), and Umerkote (0.8 TPA). Despite having huge populations of 335,761, 109,743 and 142,864, Sambalpur, Baripada, and Bhadrak were found to only produce 35, 30 and 10 TPA of plastic garbage, respectively.

Balasore (2,248 TPA) was stated to have the most plastic waste that was channelled for use, followed by Bhubaneswar (1,673 TPA) and Dharamgarh (1,108 TPA). According to the report, the ULBs of Balasore, Dharamgarh, Nuapada, Ganjam, Khalikote, Kesinga, Balliguda and Phulbani were identified to be the most effective processing, with all plastic waste produced being channelized (100 per cent) for usage. Rajgangpur (96.77 per cent), Bargarh (91.67 per cent), Puri (88.89 per cent), Padampur (88.89 per cent), Kodala (84.62 per cent), Barbil (72.22 per cent), Soro (66.67 per cent) and Keonjhargarh (60.00 per cent) were reported to have more than 50 per cent of the waste being channelled for usage. While, there was no channelisation of plastic waste (0 per cent) stated for Balugaon, Banpur, Chikiti, Khandapada, Choudwar, Paralakhemundi, Attabira, Anandapur, Vyasanagar, Kabisurya Nagar, Bhadrak, Dhmnagar, Purshottampur, Chandbali, Bhanjanagar, Sonepur, Talcher, Binka, Odagaon, Jaleswar and Rayagada.

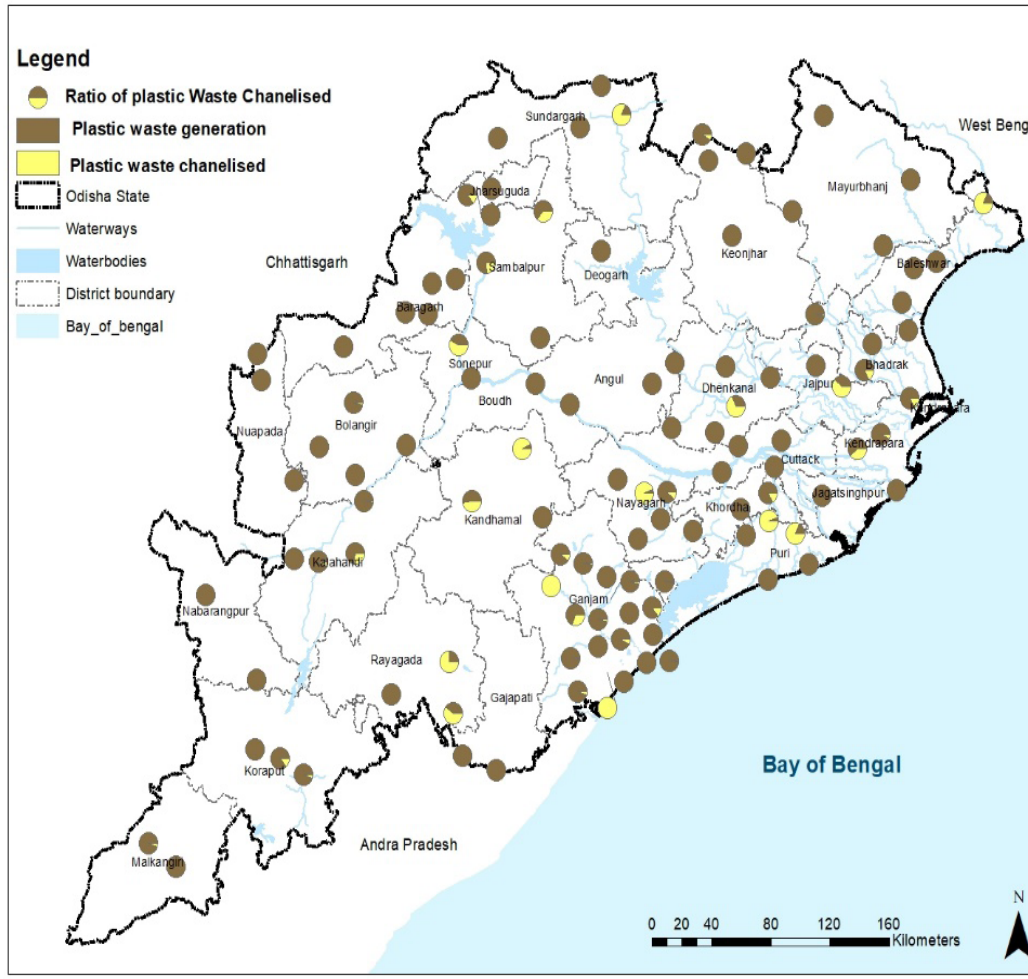
Map 8: Total plastic waste generated in Odisha: ULB-wise



Map 9: Total plastic waste channelized for use in Odisha: ULB-wise



Map 10: Ratio of plastic waste generated and channelized for use



8.3. Status of non-attainment cities: Municipal solid waste

Bhubaneswar: As per census 2011, Bhubaneswar has a population of 840,834 in 67 wards. The city generates 520 TPD of solid waste, of which 255 TPD (49 per cent) is processed and 265 TPD (51 per cent) is disposed of at the dumpsite. The city has one legacy waste landfill site located in Daruthenga. The sanitary inspectors conduct routine checks and inspections in 67 wards of Bhubaneswar Municipal Corporation, and women's self-help groups (WSHGs) promote the necessary awareness. There is no evidence that biomass, crop residue, waste, leaves or other materials have been burned within the BMC's boundary.

Map 11: Location of Bhubaneswar Municipal Corporation

Source: Based on the data of Odisha Geo portal; Generated by CSE

Operations: According to the Form IV (annual report format) of Solid Waste Management Rules 2016 submitted by BMC to OSPCB for 2021-22, all buildings in Bhubaneswar are segregating and storing their solid waste at source. As per the report, all households are covered under door-to-door collection. 80 per cent of the collection is done through motorized vehicles, 10 per cent using containerized tricycles/handcarts and remaining 10 per cent though battery operated vehicles.

Infrastructure: BMC has a solid waste storage capacity of 480.7 cum comprising 437 bins of volume 1.1 cum. All solid waste generated in Bhubaneswar is transported everyday using 382 vehicles of different types and capacities and making 771 trips (see *Table 8: Solid waste transportation infrastructure in Bhubaneswar*).

Table 8: Solid waste transportation infrastructure in Bhubaneswar

Type of vehicles	Numbers	Trips made
Vehicles engaged for animal carcasses	2	2
Tractors	10	20
Tipping truck	17	34
Dumper placers	9	27
Compactors	19	38
Light commercial vehicles	275	550
Battery operated vehicle	50	100
Total	**382**	**771**

BMC has already adopted the decentralized solid waste management system through micro-composting processing plants, material recovery facility plants, and a bio-methanation unit. BMC has proposed 43 decentralized micro-composting processing plants to treat wet waste and 26 decentralized material recovery facility processing units for dry waste management and recycling. It has established micro composting centres (MCC) with a combined treatment capacity of 255 TPD till date. Treatment capacity of 220 TPD is under construction as per the annual report submitted by BMC. In 2021-22, these MCCs produced 5,256 tonnes of compost of which nearly 48.7 tonnes were sold. BMC plans to use composting to treat their entire wet solid waste and material recovery facility for dry waste.

The city has one landfill site spread across an area of 61.48 acres. This site is in close proximity to an eco-sensitive area (Nandankan zoo) and has adjoining water bodies. There is a need to either remediate this site or install environmental safeguards at the site such as green belts, base lining, methane collectors among others. Biomining or legacy waste remediation was unable to begin at Bhuasuni Dumping Yard due to local agitation from Daruthenga villagers. A total of 1,584,400 metric tonnes of legacy waste at Bhuasuni dumping yard need to be remediated. Two fire engines are constantly available at the Bhuasuni dumping yard to douse the spontaneous fires that occur throughout the year.

Bhubaneswar: Plastic waste management

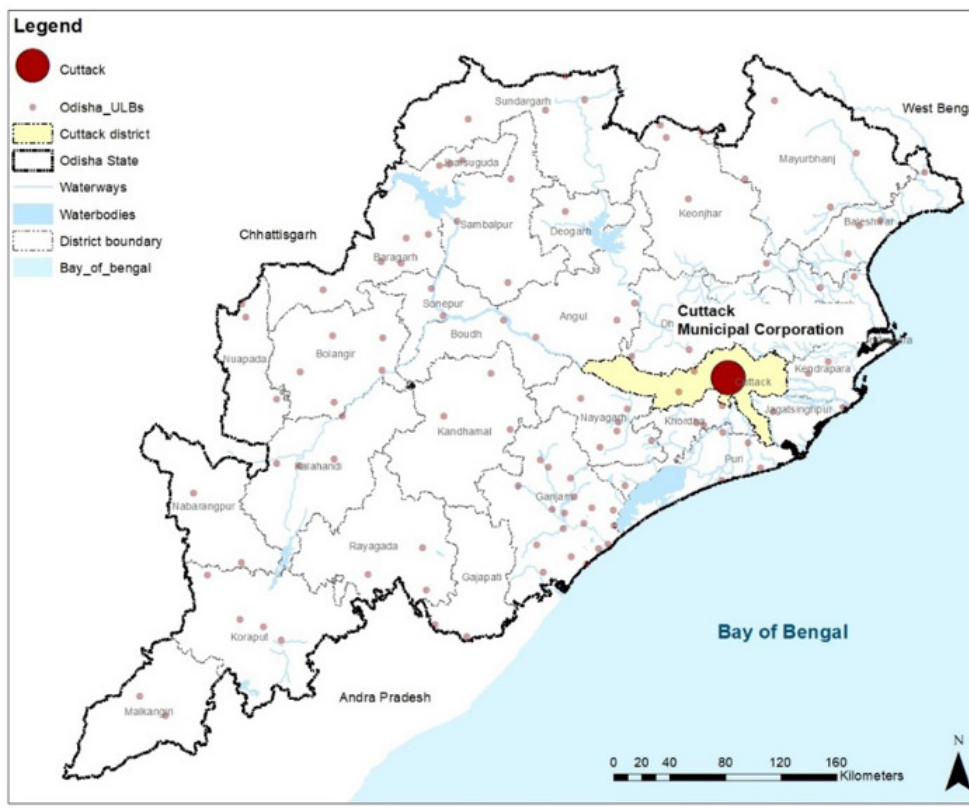
According to the Form V (annual report format) of Plastic Waste Management (Amendment) Rules, 2018 submitted by BMC to OSPCB for 2021-22, 675 rag pickers are involved in the mechanism of segregating plastic waste from municipal solid waste. 1,673 TPA of plastic waste was collected in a year and the same was channelized for recycling.

Currently, Bhubaneswar municipality is operating a (partnership between BMC-UNDP AND HCCB) Plastic Waste management project "Prithvi" Swachhata Kendra (plastic recycling plant located at Sainik school). All kinds of plastic waste collected from wards, commercial areas, shopping complexes, malls, etc. are sorted, segregated, cleaned and baled in baling machines. It is then further sent to the registered recyclers selected by BMC through a tender process. The municipality has tied up with seven NGO partners for door-to-door collection and segregation of waste and is operating ten MRF's at different locations with a combined capacity of managing 100 TPD of solid waste (including plastic waste). The municipality seized 1.6 MT of banned single-use plastics and imposed a fine of Rs 789,950 from January 2021 to December 2021 from different defaulters.

Cuttack: Solid waste management

Cuttack has an area of 192.5 sq. km, population of 610,189 and 59 wards. The city generates 200 TPD of solid waste, all of which is collected and 30 TPD is processed. There are 24 identified bulk generators.

Map 12: Location of Cuttack Municipal Corporation



Source: Based on the data of Odisha Geo portal; Generated by CSE

Operations: According to the Form IV (annual report format) of Solid Waste Management Rules 2016 submitted by CMC to OSPCB for 2021-22, 62.5 per cent premises in Cuttack are segregating their solid waste at source. As per the report, 59 (100 per cent) wards are covered under door-to-door collection. 50 per cent of the collection is done through motorized vehicles and 40 per cent using containerized tricycles/handcarts.

Infrastructure: CMC has 147 open waste storage sites, 90 bins upto 1.1 cum, 1,100 bins upto 0.6 cum and 107 bins of 3.5 cum. The total capacity of waste storage is 759 cum. CMC has composting cum gardening site and proposes two recycling facilities for the processing of dry waste. The composting cum gardening site is selling the compost to the line departments (forestry, watershed, agriculture and farming) and local people.

Cuttack has 184 vehicles for transportation (including JCB, loader, excavators, etc.) of solid waste (see *Table 9: Solid waste transportation infrastructure in Cuttack*). 170 TPD of waste is transported daily which is 92 per cent of the total waste. 30 MT of raw materials is processed for composting daily and 0.65MT of final product is produced.

Table 9: Solid waste transportation infrastructure in Cuttack

Type of vehicles	Numbers	Trips made
Vehicles engaged for animal carcasses	1	2
Tractors	44 (BBG) 30 (CMC)	88 60
Tipping truck	6 Hyva (BBG) 1 Tipper (CMC)	12 2
Dumper placers	6 (BBG)	12
Compactors	2 (BBG)	4
Auto tipper	25 (CMC)	25
BOV	55	55*4
Chain mounted excavator	3 (BBG)	31*3
JCB	1 (BBG)	
Excavator	3 (CMC)	
Skid steer loader	5 (CMC)	
Mini excavator	2 (CMC)	
Total	**184**	

The city has one dumpsite spread across an area of 27 acres at Chakradharpur under Barang Tahasil. This site is 1.5 metres away from a water body and nearly 3 km from the nearest habitation. CMC has identified a location for landifll and is in the process of initiating it.

Cuttack: Plastic waste management

According to the Form V (annual report format) of Plastic Waste Management (Amendment) Rules, 2018 submitted by BMC to OSPCB for 2021-22, 5,475 tonnes of plastic waste was generated and collected in that year and 913 tonnes was channelized for recycling (over 16 per cent of the plastic waste collected).

The municipality is operating one MRF with a capacity of managing 10 TPD of solid waste (including plastic waste) at Potapokhari. Four MRFs are under construction.

Angul: Solid waste management

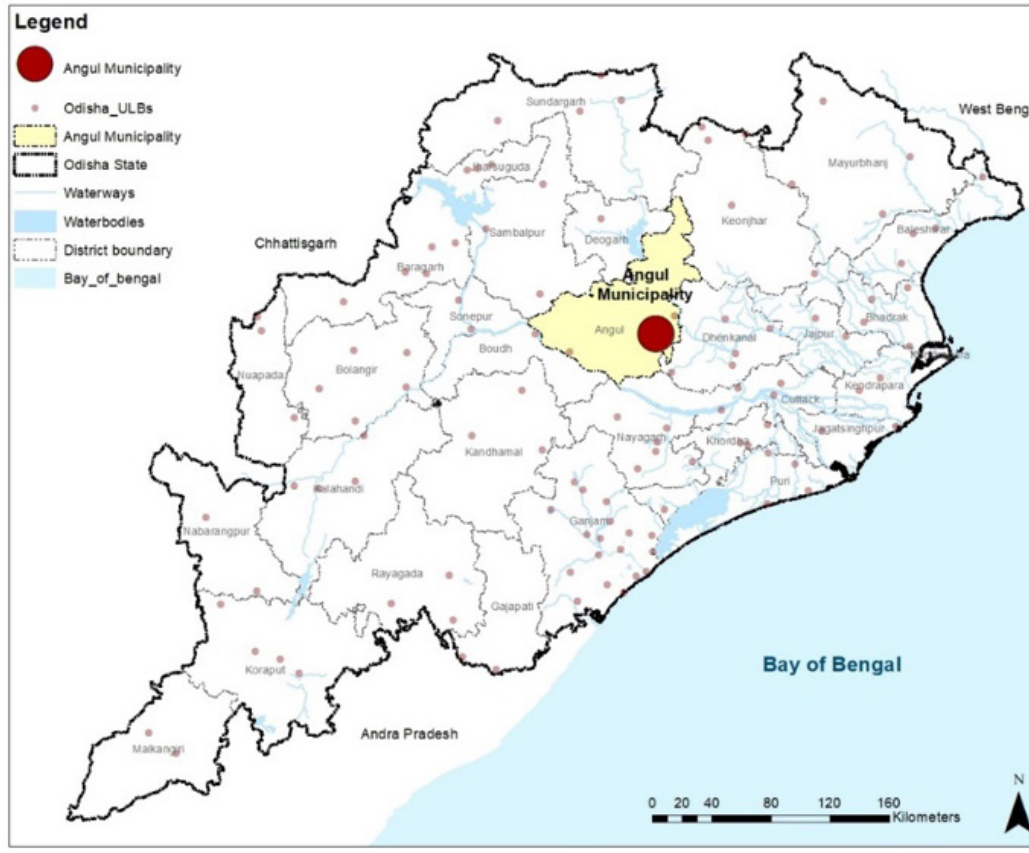
Spread across 25 sq. km, Angul has a population of 43,795. The city generates 12 TPD of solid waste, all of which is processed. The municipality has three organic composters (capacity: 5 TPD, 5 TPD and 2 TPD). In addition, there are three decentralized waste processing sites for dry waste collection, each with a 10 TPD MRF. A total of 36 inspections were conducted last year to control municipal solid waste burning.

Operations: According to the Form IV (annual report format) of Solid Waste Management Rules 2016 submitted by Angul Municipality to OSPCB for 2021-22, all buildings in Angul are segregating and storing their solid waste at source. As per the report, all 23 wards (9,758 households) are covered under door-to-door collection of waste. 70 per cent of the collection is done through motorized vehicles, 5 per cent using containerized tricycles/handcarts and remaining 25 per cent though battery-operated vehicles.

Infrastructure: Majority of road sweeping in the city of a total length of 386.7 km is done using mechanical sweepers (80 per cent) and remaining by manual sweeping (20 per cent). 85 per cent of the roads are swept every day, while 10 per cent are swept on alternate days. Remaining 5 per cent of the roads are swept only twice a week. One TATA Ace and one battery-operated vehicle are responsible for transportation of solid waste.

Angul's solid waste processing facility is operational and is situated 1 km away from the town boundary. The municipality has provided a deep burial pit at the Panchamahala dumpsite for the disposal of dead animals. Bleaching powder and

Map 13: Location of Angul Municipality



Source: Based on the data of Odisha Geo portal; Generated by CSE

earth material (soil) are being used for the covering of dead bodies after disposal. A landfill site and a waste-to-energy plant have been proposed.

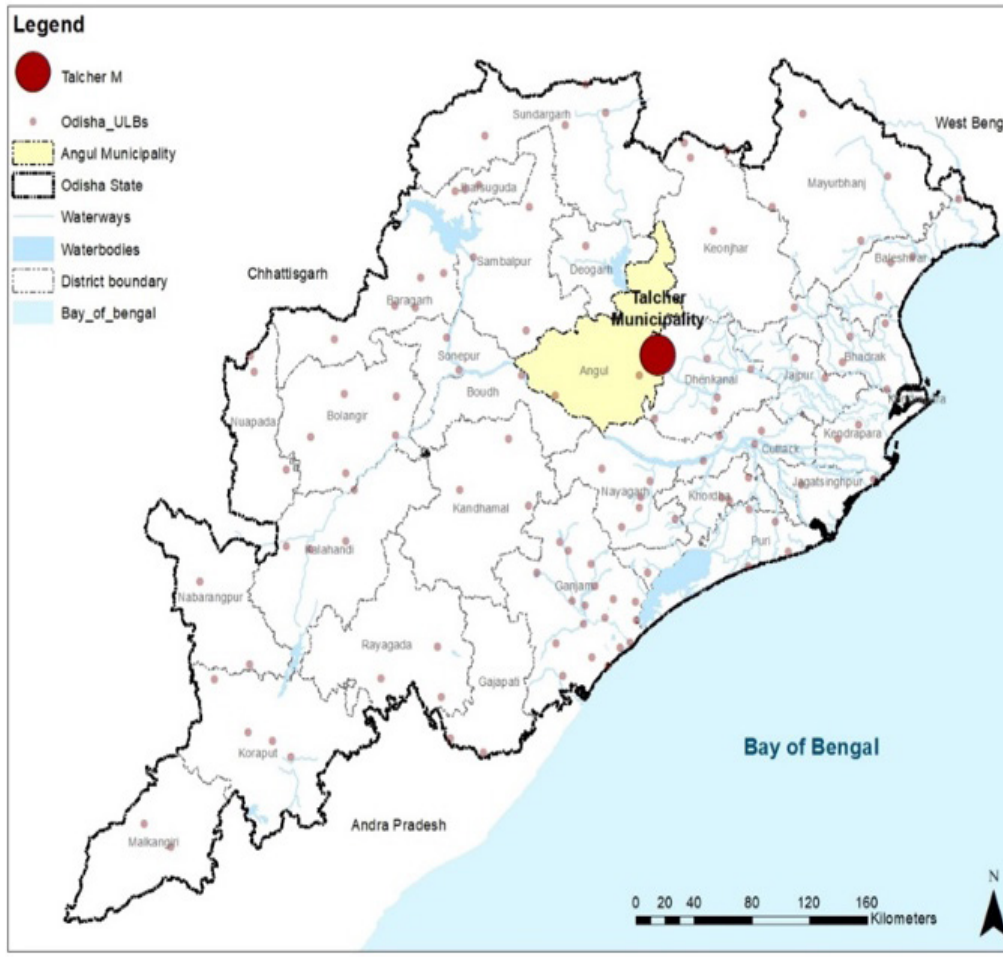
Angul: Plastic waste management

According to the Form V (annual report format) of Plastic Waste Management (Amendment) Rules, 2018 submitted by BMC to OSPCB for 2021-22, the area under jurisdiction of the municipality generated two tonnes of plastic waste, all of which was collected.

Talcher: Solid waste management

Spread across 25.5 sq. km, Talcher has a population of 51,800 and 21 wards. The city generates 13 TPD of solid waste, all of which is processed. The municipality has no organic composters. However, two decentralized waste processing sites are located at Ranipark and Baghuabol (under construction), both for composting wet wastes (two micro composting centers with a capacity of 10 TPD) and dry waste collection with MRFs (two MRFs with a capacity of 20 TPD).

Map 14: Location of Talcher Municipality



Source: Based on the data of Odisha Geo portal; Generated by CSE

Operations: According to the Form IV (annual report format) of Solid Waste Management Rules 2016 submitted by BMC to OSPCB for 2021-22, all buildings in Talcher are segregating and storing their solid waste at source. As per the report, all households are covered under door-to-door collection. 40 per cent of the collection is done through motorized vehicles, 20 per cent using containerized tricycles/handcarts and remaining 40 per cent though battery-operated vehicles.

Infrastructure: All the 76 bins (38 green and 38 blue) in the municipality are cleared daily. Sweeping of streets happens for a total length of 215 km, however the mode is not specified. Street sweeping is done manually every day in the city. Mahanadi Coalfield Limited (MCL) has also engaged mechanical road sweeping machines for the cleaning of roads. The municipality has proposed to procure or engage vehicle-mounted fog canons or mist sprays for water spraying on roads to suppress

dust. However, water sprinklers and fog canons are being deployed by MCL for dust suppression. The municipality has issued a float tender for the procurement of vehicle-mounted fog/mist canons for dust suppression. Talcher Municipality is now in the process of purchasing a road sweeping machine.

Solid waste generated in Talcher is transported everyday using eight LCVs and 12 battery-operated vehicles which are responsible for 13 trips in a day. Apart from this, three tractors are also used by the municipality for this purpose. Regular cleaning is done in 80 of the identified drains. After drying, the collected solid waste is disposed of in a dump facility.

The municipality has a land availability of 2.63 acres for waste processing at a distance of 2 km from the town boundary. The municipality has provided a deep burial pit at the Rani park dumpsite for the disposal of dead animals. Bleaching powder and earth material (soil) are being used for the covering of dead bodies after disposal.

Talcher: Plastic waste management

According to the Form V (annual report format) of Plastic Waste Management (Amendment) Rules, 2018 submitted by BMC to OSPCB for 2021-22, the area under jurisdiction of the municipality generated two tonnes of plastic waste, all of which was collected. The municipality operates one MRF of unspecified capacity.

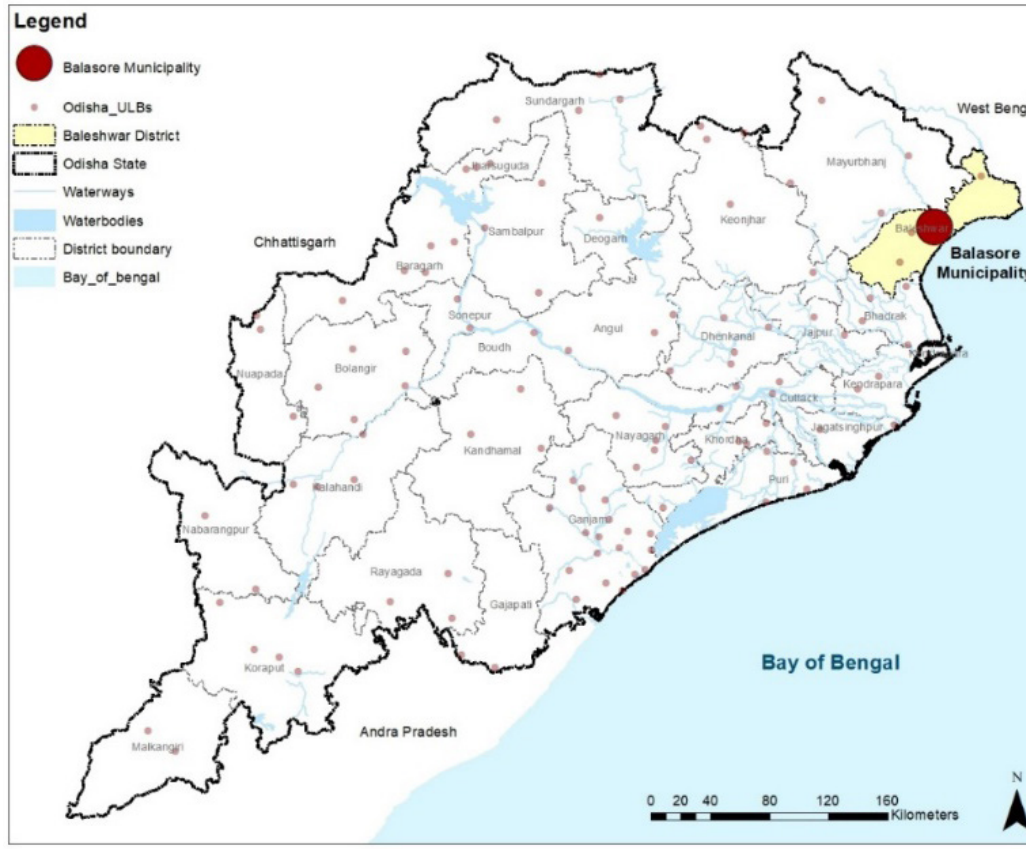
Balasore: Solid waste management

Spread across 19 sq km, it has a population of 118,162 and 31 wards. The city generates 37 TPD of solid waste, of which 1.8 TPD is disposed of at the dumpsite. The city has one dumpsite located in Chunabhati. The municipality has proposed three organic waste composters and three decentralized MSW processing plants. About one acre of open area has been identified for greening and vegetative barriers near road dividers. Six water bodies have also been identified according to the Balasore Municipality.

Operations: According to the Form IV (annual report format) of Solid Waste Management Rules 2016 submitted by BMC to OSPCB for 2021-22, all buildings in Balasore are segregating and storing their solid waste at source. As per the report, all 31 wards are covered under door-to-door collection. 100 per cent of the collection is done through motorized vehicles.

Regular cleaning is done in 75 of the identified drains. After drying, the collected solid waste is disposed of in MSW disposal facility.

Map 15: Location of Balasore Municipality



Source: Based on the data of Odisha Geo portal; Generated by CSE

Infrastructure: The municipality has 200 bins (100 green and 100 blue). 1.8 tonnes of solid waste is actually stored at waste storage depots daily. The municipality has 487.11 kilometres of road, of which 25 per cent is paved. In FY 2022–23, a total of 62 km of the road were repaired.

Balasore uses composting technology to treat its solid waste. It is focusing on micro composting centres (MCC) for wet waste and MRF for dry waste. The municipality has installed a plastic shredding machine where recyclable dry waste is shredded and used for different purposes. The city has one solid waste disposal facility (Chunabhati Dumping Yard) spread across an area of five acres within the city.

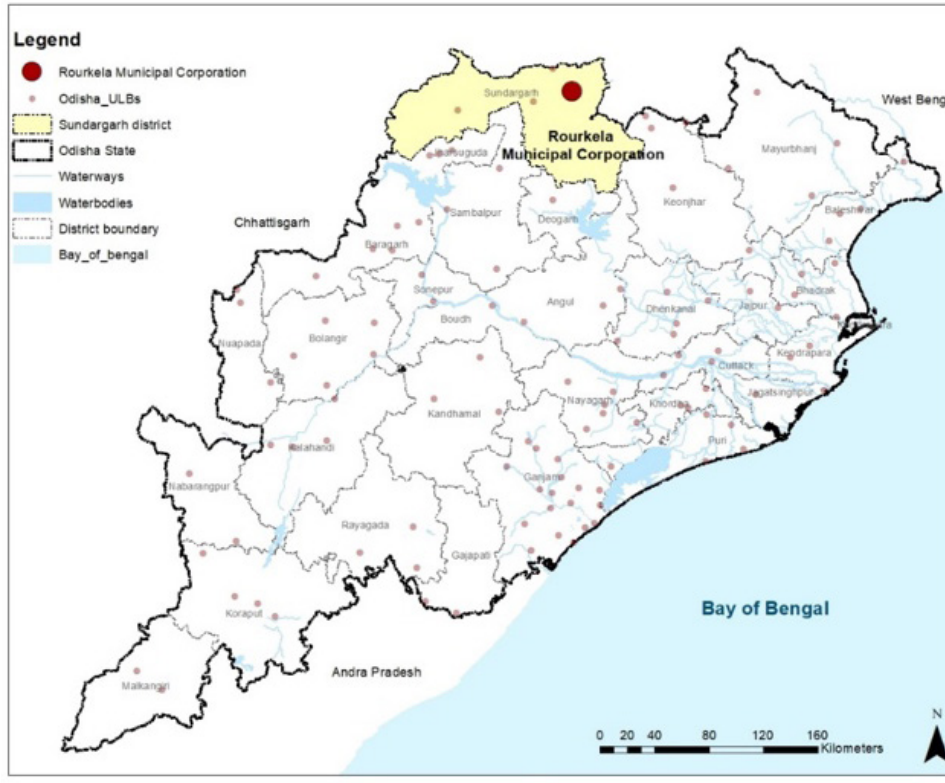
Balasore: Plastic waste management

According to the Form V (annual report format) of Plastic Waste Management (Amendment) Rules, 2018 submitted by BMC to OSPCB for 2021-22, the area under jurisdiction of the municipality generated 2,248 tonnes of plastic waste in a year, all of this waste was collected and channelized for recycling.

Rourkela: Solid waste management

Rourkela city with an area of 63.74 sq km has a population of 309,689 and 40 wards. The city generates 120 TPD of solid waste, of which 102 TPD (85 per cent) is processed. Dry waste is collected from households and commercial establishments and processed in eight MRFs.

Map 16: Location of Rourkela Municipal Corporation



Source: Based on the data of Odisha Geo portal; Generated by CSE

Operations: According to the Form IV (annual report format) of Solid Waste Management Rules 2016 submitted by RMC to OSPCB for 2021-22, all buildings in Rourkela are segregating and storing their solid waste at source. As per the report, all households are covered under door-to-door collection with containerized tricycles/handcarts. The corporation has achieved 100 per cent door-to-door waste collection through a third-party agency under Integrated Solid Waste Management Project of RMC. 60 MT of waste is actually stored at the waste storage depots daily.

Infrastructure: The municipality has multiple types of waste storage depots/bins in the town. (see Table 10: *Types of waste storage depots/bins in Rourkela*).

Table 10: Types of waste storage depots/bins in Rourkela.

Type of waste storage	Number	Capacity in cum
Cement concrete cylinder bins	16	48
Covered metals/plastic containers	90	10.8
Upto 1.1 cum bins	16	32

All solid waste generated in Rourkela is transported everyday using 109 vehicles of different types and capacities (see *Table 11: Solid waste transportation infrastructure in Rourkela*).

Table 11: Solid waste transportation infrastructure in Rourkela

Type of Vehicles	Numbers	Trips made
Tractors	3	9
Tipping truck	5	15
Dumper placers	2	4
Compactors	2	6
Light commercial vehicles	22	44
Battery-operated vehicle	73	146
CB/Loaders	2	

The municipality has land availability of 0.1 hectares for waste processing out of which 0.01 hectare is currently utilized. Rourkela uses composting technology to treat its solid waste. It has established eight micro composting centres (MCC), eight material recovery facilities and one vermi-composting plant. 4.150 MT of raw materials is processed for composting daily and 0.415 MT of final product is produced. Three tonnes of raw materials is processed for vermi-composting daily and 0.3 MT of final product is produced. RMC had identified three locations, i.e., Civil Township, Railway Colony, and Basanti Colony, to monitor for garbage burning. RMC has provided a deep burial pit at the temporary BPUT site for the disposal of dead animals. Bleaching powder and earth material (soil) are being used for the covering of dead bodies after disposal.

A total of 21 tonnes of combustible fuel was supplied to the cement plant.

Rourkela: Plastic waste management

According to the Form V (annual report format) of Plastic Waste Management (Amendment) Rules, 2018 submitted by BMC to OSPCB for 2021-22, the municipal area generated 2,160 MT of plastic waste a year. 1,944 MT of this plastic waste was

collected and 1,749 MT was channelized and sent for recycling. Eight MRFs exist in the municipality. The municipality has struck an agreement with Dalmia Cement and Clear Clouds Enviro Pvt. Ltd. for handling single-use plastics and to use in the cement plant on a regular basis. About 216 MT of inerts or rejects are sent to the landfill site. The municipality conducts activities and campaigns for public awareness on a regular basis. Violators of plastic ban are penalized and regular enforcement is conducted in the city.

Kalinganagar: Solid waste management

Kalinganagar is a planned industrial town in the Jajpur district. Kalinganagar has a population of 49,415 with an area of 9.37 square kilometers. The city generates 4 TPD of solid waste, of which 2 TPD is processed. The city has no dumpsite as per the City Air Action Report 2022–23.

Operations: As per the report, all wards are covered under door-to-door collection. 100 per cent collection of municipal solid waste is done within the city. Regular cleaning is done in 21 of the identified drains, both mechanically and manually. After drying, the collected solid waste is disposed of at a MSW disposal facility.

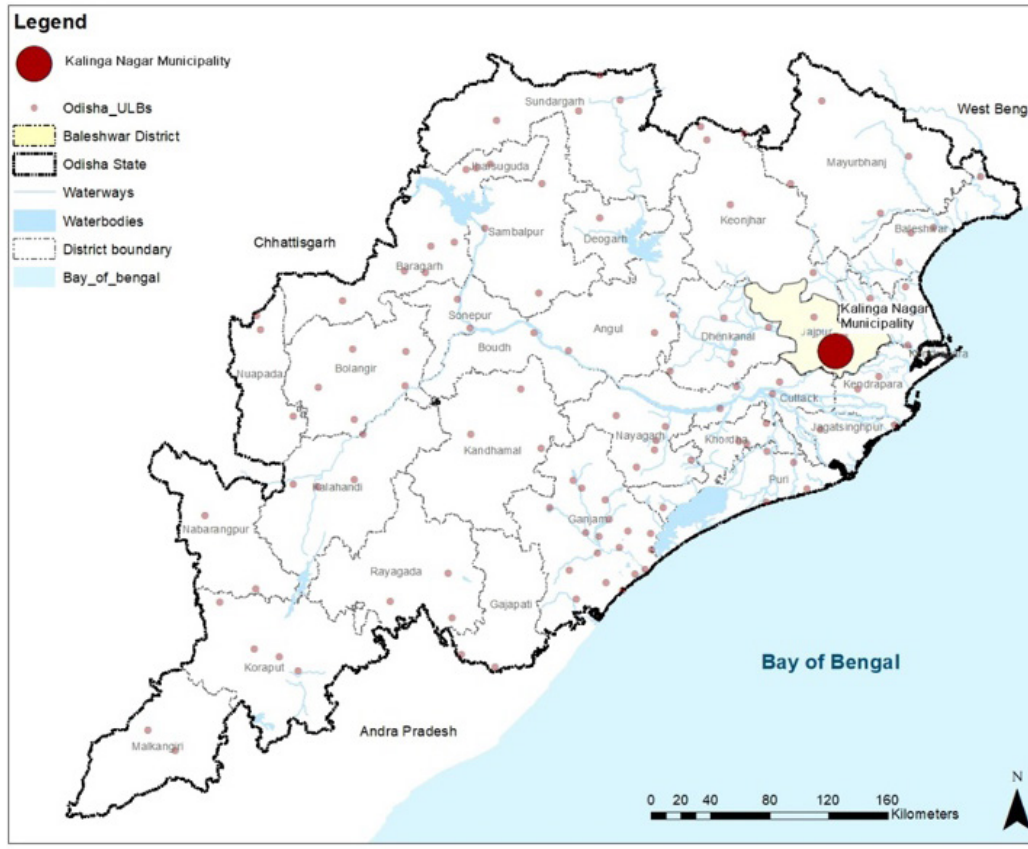
Infrastructure: The municipality has installed two Micro Composting Centers (MCC) at Jodabara (capacity: 5 TPD) and Chandama (capacity: 5 TPD) for the processing of biodegradable or wet waste generated from households and other facilities in the municipality area. Aerobic composting technology is adopted for the processing of such waste. At each MCC, a MRF has also been provided for the recovery and segregation of recyclable wastes such as metal, glass, plastic, paper, etc. One plastic baling unit has been installed at all MCCs for compaction of plastic and paper. Organic manure will be produced from the MCCs after the processing of waste. Manure will be produced after processing one tonne of biodegradable waste.

Kalinganagar has provided a deep burial pit at the MSW site for the disposal of dead animals. Bleaching powder and earth material (soil) are being used for the covering of dead bodies after disposal. Regular inspection is done on eight different locations to restrict open burning of waste.

8.4. Need effective leveraging of Swachh Bharat Mission Urban 2.0

Clean air action needs to leverage Swachh Bharat Mission Urban 2.0 (SBM 2.0) that has mandated remediation of legacy dumpsite through bio-mining, enforcement and incentivization for segregation through extensive bye-laws, augmentation of capacity for treatment-processing-recycle-recovery to meet existing and projected

Map 17: Location of Kalinga Nagar (Source: Based on the data of Odisha Geo portal; Generated by CSE)



generation of municipal solid waste and divert maximum waste from reaching the landfill. The ULBs are mandated to reduce landfilling of solid waste to a maximum of 20 per cent by 2025. This is to be achieved through 100 per cent source segregation (wet and dry, including domestic hazardous and sanitary waste); 100 per cent door-to-door collection of segregated waste from each household; 100 per cent scientific management of all fraction of waste; moving towards a minimal use of single-use plastics; and digital tracking and monitoring of waste management operations. This further requires integration of the informal sector, performance monitoring and real-time tracking of services. The focus is also on phased reduction in single-use plastic. Time-bound implementation of SBM 2.0 would minimize the problem of waste burning.

Dedicated funding is available for waste management and the ULBs can avail performance-linked Additional Central Assistance (ACA) for managing legacy waste and creating additional treatment. Disbursement of ACA requires cities with

less than 10 lakh population to complete bio-remediation by March 2023 and cities with more than 10 lakh population, by March 2024. The funding requires creation of additional facilities for treatment and waste management performance. If cities do not achieve at least 60 per cent segregation by 2023, cities would not be entitled to receive further additional central assistance.

8.5. Key strategies of SBM 2.0

- Divert and prevent fresh wet (bio-degradable) waste from reaching the dumpsites. Adopt decentralized model in collaboration with private agencies in PPP mode
- Remediation of legacy dumpsite as per the requirements of SBM 2.0 timeline
- For segregation of waste, collect wet waste daily and designate days for collection of dry and other streams of non-recyclable waste
- Incentivize source segregation through property tax rebate
- Map bulk waste generators and enforce *in-situ* management
- Set up material recovery facility-cum-micro composting site and engage informal sector to channelize recyclables to the local level aggregators.
- Scientific landfill to be used only for a negligible amount of residual wastes (rejects)
- Redesign concessionaire agreement to pay on the basis of treated quantity
- Create a business model around the waste ecosystem to ensure maximum resource recovery. For example, bio-CNG plant based on segregated wet waste can augment annual revenue of the municipalities.

Integrate LiFE Mission measures:
The action points of the LiFE Mission that have strong bearing on waste management and air quality are as follows:
Action no 39: Prefer non-plastic eco-friendly cutlery during gatherings and events
Action no 42: Use recycled plastic over virgin plastic, wherever possible
Action no 47: Compost food waste at home
Action no 52: Contribute cattle waste, food waste and agricultural waste to biogas plan (provided under GOBARdhan)
Action no 53: Practice segregation of dry and wet waste at homes
Action no 61: Do not discard waste in water bodies and in public spaces
Action no 73: Discard gadgets in nearest e-recycling units

The LiFE Mission has asked for awareness generation on LiFE activities, signages for LiFE actions and posting of infographics/ audio visuals on social media platforms.

Action plan: Municipal solid waste and plastic waste

Sr. no.	Activities/ Action plan	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 and enforcement of municipal solid waste (MSW) management rules	HUDD has notified "Odisha Urban Sanitation Policy, 2017" and "Odisha Urban Sanitation Strategy, 2017" in Notification no. 30586 and 30593, each Dated 30.12.2016 and the same were published in the Odisha Gazette in Notification No. 5 Dated 03.01.2017 and No. 6 Dated 03.01.2017 respectively for implementation of different sanitation services at ULB level including Solid Waste Management		Notification within 6 months			
2.	Policy for MSW management	As a state-level SWM plan to implement provisions of SWM Rules, 2016, the HUDD has issued a Standard Operating Procedure (SOP) for decentralized SWM and also SOP for Operation & Maintenance of Wealth Centres i.e., MCCs & MRFs in the year 2019 (vide Letter no. 13408 dtd. 30.07.2019). Subsequently, the SOP for O&M of Wealth Centres (MCC – Micro Composting Centre & MRF) was issued by HUDD vide Letter no. 19700 dtd. 18.12.2020.		Notification of policy for MSW management within 6 months To set the target of 100% diversion of organic waste from dumpsite through local level segregation, processing and treatment Odisha processes close to 88% of the generated waste in the state. (As per letter no. 17746, Quarterly Compliance Report for the Quarter ending September 2022)	Yes	47.4369 Under SBM – Urban 2.0	

Sr. no.	Activities/ Action plan	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)
3.	Policy for legacy waste management at dumpsites	As per SOP issued by HUDD for Decentralized Solid Waste Management (vide Letter no. 13408 dtd. 30.07.2019 & 19700 dtd. 18.12.2020), dumping yard is no more required as the waste is collected in segregated manner from source itself and transferred directly to the processing centres in segregated manner. However, the smaller ULBs have taken action by cleaning their existing dumping yard scientifically, i.e., some of the dumpsites have been levelled & waste processing infrastructure have been set up over there & some have been converted to green park, whereas, the action plan for bio-remediation of 38,96,448 MT quantity of legacy wastes for 76 ULBs have been prepared along with budget plan of Rs. 130.15 cr. that have already been submitted to GoI (vide letter no. 2239, dtd. 10.02.2022)		Notification of policy within 6 months for complete remediation of legacy dumpsites within 3-5 years and prevent dumping of fresh waste. Meet the deadline of SBM 2.0 for remediation of legacy dumpsite with central funding assistance and other sources of funding by March 2024 in 1 million plus cities and March 2023 in cities with less than one million population. SBM 2.0 mandate and threshold for landfill is maximum 20% of total generation by 2025.	Yes	52.0582 Under SBM-Urban 2.0	

Sr. no.	Activities/ Action plan	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)
4.	Policy for implementation of ban on single-use plastics	Ban on plastic is reinforced through a committee constituted at ULB level. Massive awareness through IEC and behavioural change activities are also carried out to make people aware of the plastic ban.		Immediate			
5.	Policy for development and construction of waste to energy plants	The state is following waste to compost policy, i.e., is practising converting wet waste to organic compost by aerobic method & dry recyclable waste are sold to identified agencies & non recyclables are sent to cement factories for further co-processing. However, on due date the state has made 242 MCCs (1137.5 TPD capacity) & 203 MRFs (2090 TPD capacity) functional. Odisha has adopted a strategy to treat all biodegradable waste through Micro-Composting Centres. in order to achieve this, 29 MCC's have been added in the state since end of 2021 making it a total of 248 Micro-Composting Centres as of September 2022. (As per letter no. 17746, Quarterly Compliance Report for the Quarter ending September 2022)		Waste-to-Energy plants should be minimal and not a standard practice given the concerns over mixed waste and highly toxic emissions. To be implemented only with a stringent siting policy to keep them away from habitation, ecologically sensitive areas and vulnerable groups. Enforce stringent emissions standards and high level of technologies. Use them as a shared facility for clusters of cities. This requires stringent emissions monitoring with public disclosure system.			

Sr. no.	Activities/ Action plan	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)
		Along with this, the municipality of Berhampur has a mechanical composting plant.		An additional 29 MCCs are targeted to be made by end of 2022. (As per letter no. 17746, Quarterly Compliance Report for the Quarter ending September 2022)			
	(a) non-recyclable / combustible dry waste	The non-recyclable dry wastes are sent to cement factories for further coprocessing.		To develop plan for implementation as needed			
	(b) Bio-methanation / bio-CNG	For processing of wastes, the state has adopted the method of waste to compost as per which the wet wastes are being converted to organic Compost ("MO KHATA") aerobically at MCC & recyclable dry wastes are sold to authorized recyclers & non-recyclable dry wastes are sent to cement factories for further coprocessing.		City-wise bio-methanation plants to be set up as per the dumpsites and plan for the usage of bio-CNG. Implementation target: 50% as per plan in 1st year 100% in 2nd year			

Sr. no.	Activities/ Action plan	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)
	(c) Composting plant, etc.	The state has achieved 251 Micro-Composting Centres (1,182.5 TPD capacity) as of September 2022. (As per letter no. 17746, Quarterly Compliance Report for the Quarter ending September 2022). The wastes are collected in segregated manner from all wards in vehicles having separate compartments & are transferred directly to the processing centres.	An additional 132 TPD capacity is targeted to be added by end of 2022.	Ward-wise number and capacity of plants to be implemented as per generation of vegetative waste and identify the locations in each ward. Mandate uptake of the compost. Implementation target: 50% in 1st year 100% in 2nd year			
6.	Any other Policy/Rules/ Standards/ Guidelines pertaining to MSW Management	For setting up of MRF the SOP has been issued by H&UD Dept. vide letter no. 13408, dtd. 30.07.2019 The state pollution control board has certified recyclers for 'Plastic waste multiwall paper sacks' to manufacture 'flexible plastic pouches'. The certificate is granted subject to conditions specified in Plastic Waste Management Rules 2016.		i) Set up ward-wise material recovery centres ii) Map out district-wise and city-wise bulk waste generators to mandate in-situ waste processing and material recovery within a year. iii) Stringent implementation of Extended Producers Responsibility (EPR) for collection and recycling of plastic waste.			

Sr. no.	Activities/ Action plan	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)
7.	Waste collection status in the city	The wastes in segregated form are being collected from door step level at 100% efficiency as all ULBs have taken action for deployment of sufficient BOVs/ LCVs with separate compartments. Additionally, the collection is being supervised by Swachh Saathi & Supervisors assigned with 600 households & 2400 households respectively.		100% door to door collection from each household. Implementation target: 50% in the 1st year 100% in 1-2 years			
8.	Waste segregation status in the city	The IEC activities are being performed by Swachh Saathi & Supervisors assigned with 600 households & 2400 households respectively at 99% efficiency with the objective of behavioural change of citizen.		100% segregation of waste for collection – Separate out the days for collection of organic and dry waste to expedite segregation. Implementation target: 50% in the 1st year 100% in 1-2 years			

Sr. no.	Activities/ Action plan	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)
9.	Material Recovery Facility	The Dept. has issued SOP for processing the dry wastes at MRFs vide Letter no. 13408 dtd. 30.07.2019. At MRFs, the dry wastes are sorted into recyclable & non-recyclable dry wastes. The recyclables are sold to the identified agencies whereas the non-recyclables are sent to cement factories for co-processing. The state has achieved 216 MRFs (2,220 TPD, As per letter no. 17746, Quarterly Compliance Report for the Quarter ending September 2022) for sorting & storage of dry wastes.		Notify implementation plan and schedule for ward-wise material recovery centres Implementation target: 50% in the 1st year 100% in 1-3 years 29 MRFs have been added in the state since end of 2021 making it a total of 216 MRFs as of September 2022. (An addition of 323 TPD). An additional 70 TPD capacity (7 MRF plants) is targeted to be added by end of 2022. (As per letter no. 17746, Quarterly Compliance Report for the Quarter ending September 2022)			

Sr. no.	Activities/ Action plan	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)
10.	Waste to energy plants	For processing of wastes, the state has adopted the method of waste to compost as per which the wet wastes are being converted to organic Compost ("MO KHATA") aerobically at Micro Compost Centre (MCC) & recyclable dry wastes are sold to authorised recycler & non recyclable dry wastes are sent to cement factories for further coprocessing.		As per need to be planned based on siting criteria and full implementation of waste segregation.			
11.	Waste to compost plants	The Dept. has issued SOP for processing the wet wastes at Micro Compost Centres (MCCs) vide Letter no. 13408 dtd. 30.07.2019. At MCCs, the wet wastes are processed/ treated scientifically for converting into organic compost within a period of 42 days. The State has achieved 242 (1137.5 TPD capacity) MCCs (Micro Compost Centre).		Notify implementation plan and schedule for ward-wise composting plants Implementation target: 50% in the 1st year 100% in 1-2 years			

Sr. no.	Activities/ Action plan	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)
12.	Remediation of dumpsites in the city	As per SOP for decentralized solid waste management issued by H&UD Dept., there is no requirement for dumping yards because the segregated collected wastes are directly transferred to the processing centres (MCCS & MRFs) instead of disposal centre/dumping yard & all urban areas are using MCC & MRF on due date. However, the existing dumpsites of smaller ULBs have been scientifically cleaned , i.e. some of the dumpsites have been levelled & waste processing infrastructure have been set up over there & some have been converted to green park. The action plan for bio-remediation of 38,96,448 MT quantity of legacy wastes for 76 ULBs have been prepared along with budget plan of Rs. 130.15 cr. that have already been submitted to GoI vide letter no. 2239, dtd. 10.02.2022		Remediation of all legacy dumpsites by March 2024 in 1 million plus cities and March 2023 in cities with less than one million population. (SBM 2.0 mandate and threshold for landfill is maximum 20% of total generation by 2025.) 100% diversion of fresh wet waste from dumpsite for composting and reuse.			

Sr. no.	Activities/ Action plan	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)
13.	Control open burning of MSW	For open burning prevention, IEC activities are being carried out by the Swachh Saathis & Supervisors & the same is also being discussed in Swachh Charcha Diwas by all ULBs.		Immediate			
14.	Any other activity/ project pertaining to MSW management						

Action plan: Integration of relevant action under Mission LiFE for waste management

Sr. no.	Action	Indicator		Achievement against the target for 2023	Funds spent in Rs For FY 2022-23
		Baseline	Target for FY 2022-23		
Relevant actions under LiFE themes for improvement of air quality					
1	Action no 39: Prefer non-plastic eco-friendly cutlery during gatherings and events	No. of CBPO events organized	No. of CBPO events organized without using plastics cutlery		
2	Action no 42: Use recycled plastic over virgin plastic, wherever possible	• Quantity (TPD) of plastic waste collection out of total waste generation (TPD) • Capacity of plastic waste segregation plants (TPD)	• Quantity of plastic waste (TPD) proposed for collection out of total waste generation (TPD) • Capacity of plastic waste segregation plant (TPD) proposed		
3	Action no 47: Compost food waste at home	Capacity (TPD) of waste composting plants available	Capacity (TPD) of food waste composting proposed		
4	Action no 52: Contribute cattle waste, food waste and agricultural waste to biogas plan (provided under GOBARDHAN)	Wet waste (including food waste) generated in the city (TPD)	Capacity (TPD waste and m^3 of biogas) of biogas plants set up to process the food waste		

Sr. no.	Action	Indicator		Achievement against the target for 2023	Funds spent in Rs For FY 2022-23
		Baseline	Target for FY 2022-23		
5	Action no 53: Practice segregation of dry and wet waste at homes	Quantity (TPD) of waste segregated against total waste generation (TPD)	Quantity (TPD) of waste segregation proposed against total waste generation (TPD)		
6	Action no 61: Do not discard waste in water bodies and in public spaces	Present quantity (TPD) of waste collection out of total waste generation (TPD)	Propose quantity (TPD) of waste collection out of total waste generation (TPD)		
7	Action no 73: Discard gadgets in nearest e-recycling units	No. of e-waste collection centres available	No. of e-waste collection centres created		
1	Awareness generation on LiFE activities for all 75 points	No. of persons in the city	No. of persons provided awareness through capacity building and public outreach programmes (CBPO)		
2	Signages for LiFE actions at important locations for all 75 points	No. of junctions, bus stops and important locations in the city	No. of locations provided signages		
3	Posting of infographics/ audio-visuals in social media platform	No. of days in a year in which infographics/audio visuals are posted on social media	No. of days in a year in which infographics/audio visuals are posted on social media		

See Annexure II: Non-attainment cities: Action points of Mission LiFE for waste management

1. Angul City Action Plan: Integration of relevant actions under Mission LiFE for waste management
2. Balasore City Action Plan: Integration of relevant actions under Mission LiFE for waste management
3. Bhubaneswar City Action Plan: Integration of relevant actions under Mission LiFE for waste management
4. Cuttack City Action Plan: Integration of relevant actions under Mission LiFE for waste management
5. Kalinga Nagar City Action Plan: Integration of relevant actions under Mission LiFE for waste management
6. Rourkela City Action Plan: Integration of relevant actions under Mission LiFE for waste management
7. Talcher City Action Plan: Integration of relevant actions under Mission LiFE for waste management

9. Crop residue burning and forest fires

There are two types of episodic pollution events that are associated with crop residue burning and forest fires. Both can contribute significantly to local and regional air quality.

Crop residues are burnt during the time of harvests and are not a perennial issue. Smaller stubble left on the ground after harvesting is expensive to remove and therefore burning of residues is the easiest way for disposal. Agro-residue or crop residues are of different sizes and densities that include straw, stalks, leaves, fibrous materials, etc. Odisha is largely a paddy growing state and the waste-straw is mostly used as a cattle-feed. Cases of stubble burning in the state are also far and few.

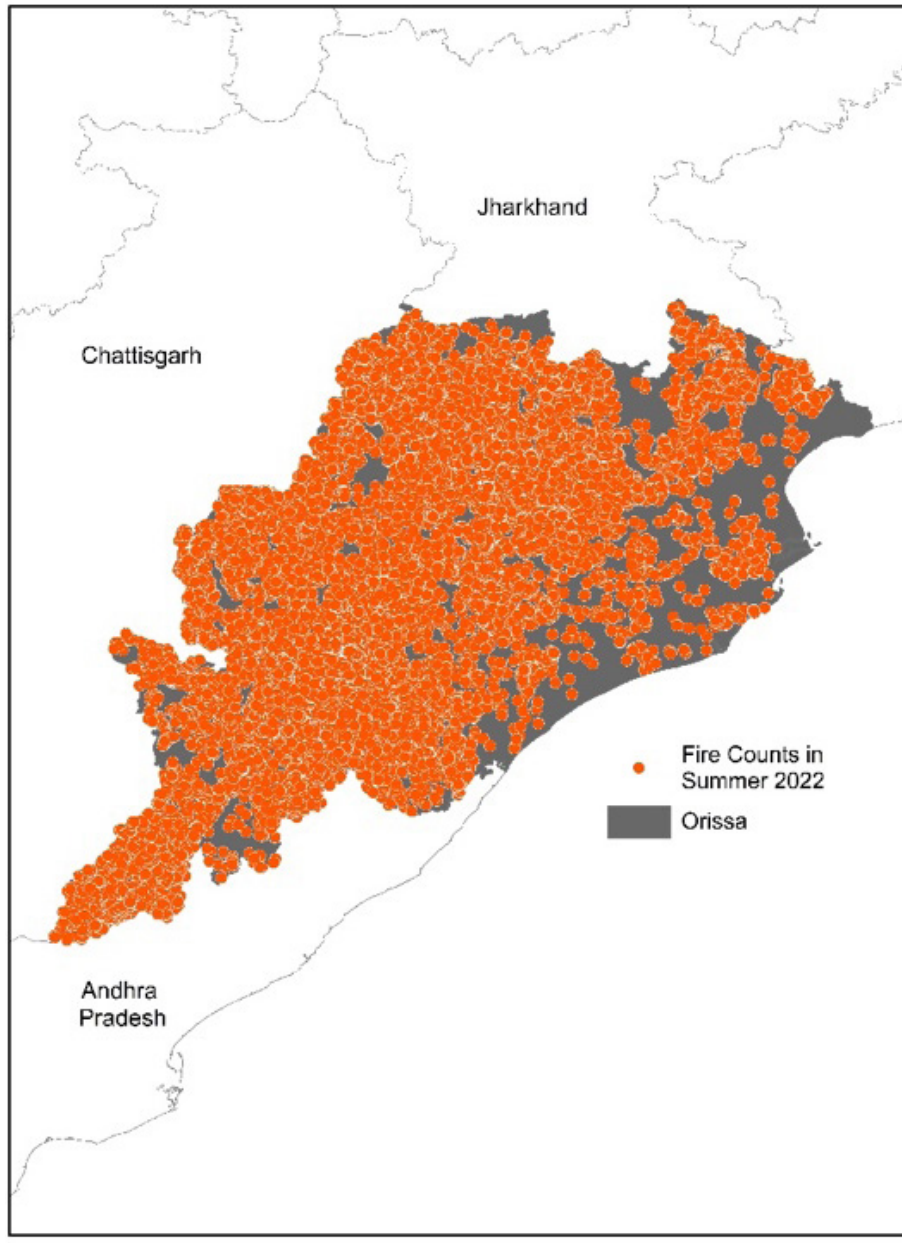
At a regional scale, air quality is also impacted by the forest fires which are seasonal. In Odisha, forest fires are more common in summer season (see *Map 18: Forest fire counts in Orissa in summer, 2022* and *Map 19: Forest fire counts in Orissa in winter, 2022*). The agriculture department of Odisha works to manage the stubble burning and forest fires. Both the problem will require different strategies for control.

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 the biomass 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, and storage and transport.

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

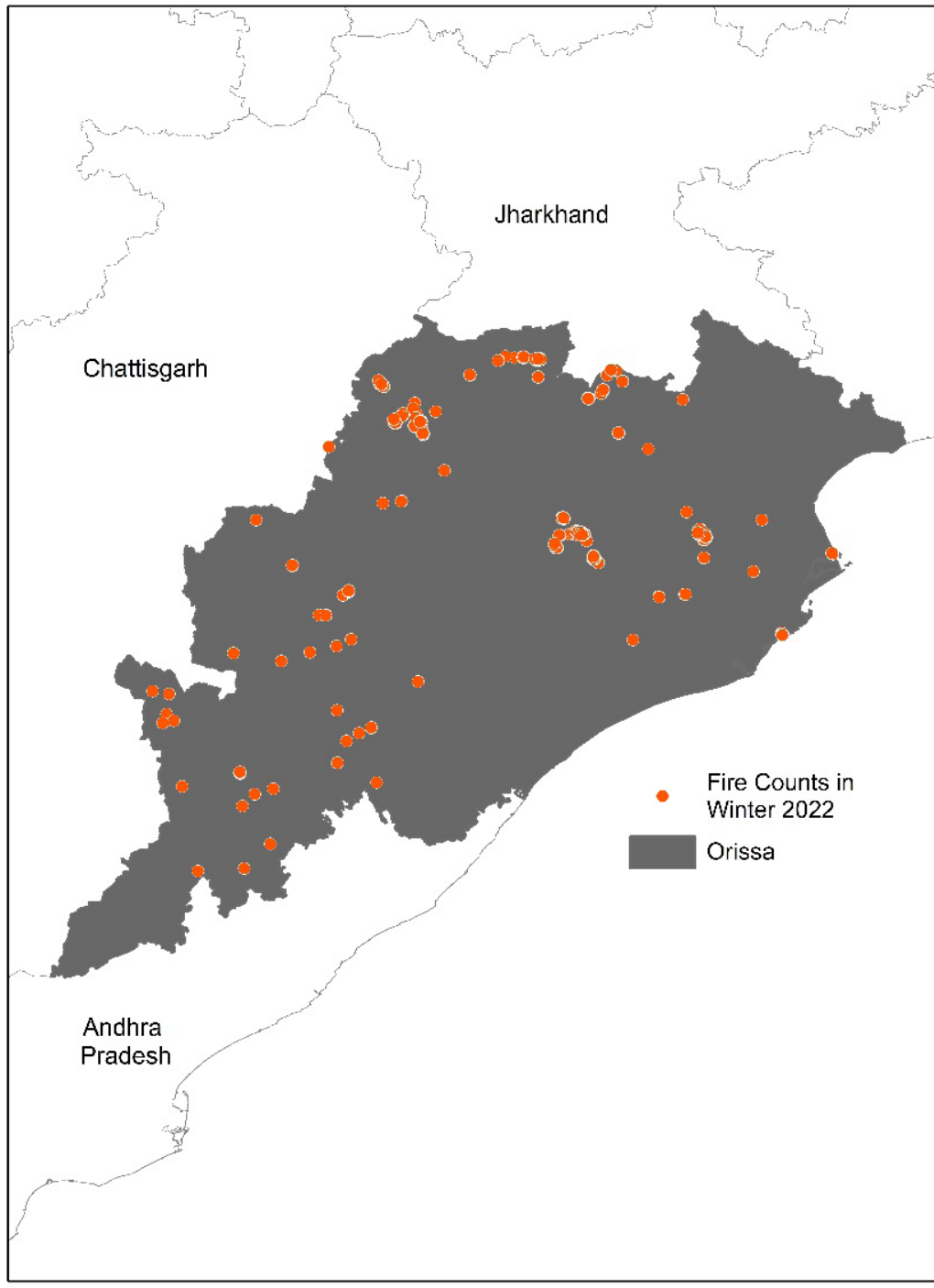
Forest department will need to strengthen the strategies for control and dousing of forest fires as per the defined methods and techniques.

Map 18: Forest fire counts in Orissa in summer, 2022



Source- CSE analysis, Based on the data provided by NASA

Map 19: Forest fire counts in Orissa in winter, 2022



Source- CSE analysis, Based on the data provided by NASA

Action Plan: Controlling crop residue burning and forest fires

Sr. no.	Activities/ Action plan	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	Yes	To be collected	To be collected
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	No	NA	NA
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	Yes	To be collected	To be collected

Sr. no.	Activities/ Action plan	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)
3.	Biomass projects with respect to the hotspots of crop residue burning	The proposed site for projects is in Bargarh & Sambalpur Districts.	Not finalized	Implementation of biomass-based projects and substitution of coal in targeted industry within a year	Yes	-	-
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			50% in 1st year 100% in 2nd year			
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			

Sr. no.	Activities/ Action plan	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)
8.	Collaboration with ISRO and preparation of satellite-based maps for monitoring of fire incidence			Immediate - within a year			
9.	Any other scheme/ program that may help in reducing air pollution			Centralized IT-based tracking system for disclosure of data on crop residue generation, deployment of machines and their usage; geo tagging of the machines to monitor usage and number of farmers reached. Information, outreach and education of farmers at district/ block/village level			

10. Household emissions

Household air pollution due to widespread use of solid fuels can be responsible for significant share of outdoor air pollution. This requires rapid energy transition to replace solid fuels in both urban and rural households with cleaner fuels. Even though there has been substantial expansion of LPG connection and piped natural gas (PNG) network in the region, the problem remains. Central government schemes including Pradhan Mantri Ujjwala Yojana (PMUY) and direct benefit transfer to LPG consumers (PAHAL) combined with state government initiatives has widened the coverage.

Low-income groups often do not have adequate access to reliable supply of affordable clean fuels. Expansion of PNG and LPG and electric cooking can help to improve access. Pradhan Mantri Ujjwala Yojana (PMUY) was launched on 1 May 2016 to distribute 50 million LPG connections to families which fall below the poverty line. PMUY 2.0 to offer 1 crore more LPG connections. The same is under implementation. Under PMUY, the total LPG domestic consumers (till 2021) are 22,819,027 in Odisha.
Details of the implementation are as follows:

- PMUY connection issued (till 2021) = 8,886,588
- Households using LPG as cooking fuels under PMUY= 39%
  (MOPNG, 2020-21, Page No. 59 and 61- Annexure VIII)
- Under PMUY – District-wise total LPG connection released= 11,685,031 (**Annexure IX**)

It is also necessary to promote induction cooking in all households, This has better thermal efficiency, and comparable cost effectiveness. It is also necessary to address 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 approved fuel list to mandate use of only clean fuels in open eateries, resturaunts and hotels and include this in permit condition, as applicable. The commercial licenses for setting up of these eateries need to be linked with a mandate for clean fuel.

Key strategies for curbing use of solid fuels for cooking

- Aim for 100 per cent 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

Action plan for controlling household air pollution

Sr. no.	Activities/ Action plan	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	Under Pradhan Mantri Ujjwala Yojana (PMYU) Total LPG domestic consumers (till 2021) = 22,819,027 PMUY connection issued (till 2021) = 8,886,588 39% households are using LPG as cooking fuels under PMUY (MOPNG, 2020-21, Page No. 59 and 61.) Under PMUY 2.0 – total LPG connections released = 11,685,031	Ongoing	1-2 years: Minimum average coverage of households at 50-75% in all districts 100% coverage of households in key cities 3 years: 100% households (with reliable refills)	No implications for the state government	NA	NA
2.	Amendments to the building bey-laws for "Indoor air quality management"	The Energy Conservation Building Code 2011 of Odisha has necessary provisions for managing indoor air pollution	Completed	Notification within 6 months	No	NA	NA
3.	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.	Completed	i. Approved fuel list to mandate use of only clean fuels in open eateries, resturaunts 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

11. Road dust and urban greening

Road dust is a significant contributor to coarse particles and its share increases during summer. This is also influenced by the local geo-climatic conditions and 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 road sides; 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).

Currently, the urban local bodies in Odisha are more focused on the maintenance of roads, mechanical and manual sweeping, and water sprinkling.

In Bhubaneswar, a total length of 2,140 km is cleaned using mechanical sweepers (60 per cent) and remaining by manual sweeping (40 per cent). Street sweeping is done every day in the city. Currently, two mechanical sweepers are operational through outsourcing, and a proposal for two mechanical sweepers has been submitted for procurement through e-tender. A total of nine parks have been constructed with an expenditure of Rs 3.60 crore.

In Cuttack, CMC has identified 10 km road stretches with high dust generation. Sweeping of streets happens for a total length of 860.57 km, however the mode is not specified. 90 per cent of the roads are swept every day, while 8 per cent are swept on alternate days. Remaining 2 per cent of the roads are swept only twice a week.

In Angul, a total of 1.80 km of road is paved from wall to wall. End-to-end paving was done for 2.5 km under the TAMDA fund in FY 2020–21. Angul municipality proposed one water fountain at a major traffic intersection after the identification of

a total of nine traffic junctions. In the city, pedestrian pathways have been provided along major roads. New pedestrian pathways are being constructed in wards 14 and 22 along a 6-kilometer stretch of the 10-kilometer road.

In Angul, 5 per cent of the total road is repaired every year. In the municipality, a total of 3 km of road length is paved and maintained. There are a total of six major traffic junctions identified and two road stretches (Bus Stand to Talbeda and Bus Stand to Pabitra Mohan Chhak) with high dust generation. However, no fountain has yet been proposed by the municipality for 2022–203. Talcher Municipality has planted trees to increase green cover of the city.

Angul Municipality has planted 2,098 trees, accounting for approximately 65 per cent of its annual green cover target. The municipality also issued a notice requiring builders to leave 25-33 per cent of their land for green belts in residential colonies.

In Balasore, majority of road sweeping in the city of a total length of 471 km is done on a daily basis using manual sweeping. Forty regular sweepers are employed for sweeping of main roads. One mechanical sweeper is required, which will be procured by the 2022-23 financial year, as reported by Balasore Municipality. The municipality also procured one water sprinkler to suppress road dust. The municipality also proposed two water fountains at major traffic junctions. The municipality takes actions to upgrade infrastructure and reduce congestion. All solid waste generated in Balasore is transported everyday using 10 tractors, 54 battery-operated vehicles and 199 wheel barrows.

In Rourkela, the city has a total length of 470.67 km of roads that are cleaned with mechanical sweepers (75 per cent) and manual sweeping (25 per cent). 70 per cent of the roads are swept every day, while 20 per cent are swept on alternate days. Remaining 10 per cent of the roads are swept only twice a week. A total of 42 km road widening master plan is being prepared by RMC to reduce traffic congestion. The municipal corporation has procured one water sprinkler to suppress road dust. The municipality also proposed 23 water fountains at major traffic junctions. The municipality takes actions to upgrade infrastructure and reduce congestion. RMC has planted 200 trees for increasing green cover. Mandatory conditions are imposed on builders for providing at least 40 per cent green cover during the grant of environmental clearance and consent to establish.

In Kalinganagar majority of road sweeping in the city is done on a daily basis using manual sweeping. The municipality proposed 100 per cent brick lining, paving, and plantation of roads along the canals and nalas within the city boundary. The

municipality has planted trees for increasing green cover in seven locations in a 1.5-acre area. The municipality has imposed mandatory conditions on builders for providing at least 33 per cent green cover during the grant of environmental clearance and consent to establish.

Key strategies for road dust control and urban greening

- Municipal ward-wise street network redevelopment plans for paving and greening as per IRC guidelines, without impeding the needs of other road users including pedestrians.
- Hotspot action for road cleaning with GPS-enabled mechanical sweepers; desilting of canals/nullah's; brick lining of side roads; dedicated helpline with MIS support; and citizen interface to enable geo-tagging for complaints.
- Urban greening agenda with greening of open areas, urban forestry, plantation for green walling and protection of all forest areas to act as sink. Align with afforestation and plantation programmes of the forest department.

Action plan: Road dust and urban greening

Sr. no.	Activities/ Action plan	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 development of green belt/ open spaces and street-side greening on state highways			Notify per capita green area requirement in all development and redevelopment projects. Inventorize all existing green belt, open areas, afforestation projects and designated forest areas ward-wise and district-wise and set target for new areas for greening. Identify network of road/ street network per ward for greening and avenue plantation, etc. as per design guidelines. Implementation target: 20% of the plan in 1st year 50% in 3rd year 100% in 5th year	NA	NA	NA

Sr. no.	Activities/ Action plan	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)
2	Maintenance, repair and paving of state highways			Inventorize and identify road network for repair/ paving district-wise and set timebound target for maintenance and repair of targeted stretches with a monitoring system and penal provision for non-compliance.	NA	NA	NA
3	Monitoring of road dust especially in and around hotspot areas and in the vicinity of state highways	Suitable instruction has been issued to ULBs & certain action is being taken accordingly. Mechanical sweeping is being adopted by some ULBs to avoid dust mitigation.		Inventorize ward-wise/ city-wise and district-wise road network that are unpaved and require paving and repair and identify hotspots for dust control measures. Implementation target: 50% of the plan in 1st year 100% of the plan by 3rd year	Yes	2.6667	NA
4.	Mechanism for development and maintenance of road infrastructures for industrial states and clusters			Inventorize road network haul routes that are unpaved or require repair of entire right of way including footpaths for implementation in industrial areas. Implementation target: Within a year	NA	NA	NA
5.	Greening of open spaces/ parks developed			Notify plan for district-wise inventory of open and green spaces and targeted greening of open areas, parks, plantation/ afforestation, and roadside greening. Implementation target as per plan to be provided.			

Action plan: Integration of Mission LiFE actions for greening

Sr. no	Action	Indicator		Achievement against the target for 2023	Funds spent in Rs. For FY 2022-23
		Baseline	Target for FY 2022-23		
Relevant actions under LiFE themes for improvement of air quality					
1	Action no 68: Plant trees to reduce impact of pollution	Percentage of geographical area under green cover	Area (hectare) of open spaces / parks / roads proposed for plantation / greening and percentage area increased under green cover		

See Annexure III: Non-attainment cities: Action points of Mission LiFE for greening

1. Angul City Action plan: Integration of Mission LiFE actions for greening
2. Balasore City Action plan: Integration of Mission LiFE actions for greening
3. Bhubaneswar City Action plan: Integration of Mission LiFE actions for greening
4. Cuttack City Action plan: Integration of Mission LiFE actions for greening
5. Kalinga Nagar City Action plan: Integration of Mission LiFE actions for greening
6. Rourkela City Action plan: Integration of Mission LiFE actions for greening
7. Talcher City Action plan: Integration of Mission LiFE actions for greening

12. Institutional framework and funding strategy

State-wide implementation of clean air action plan will require strong and integrated institutional framework and institutional processes and systems. Already the government of Odisha has put in place the following institutional framework for monitoring of the implementation of clean air plans.

- Steering committee
- State-level monitoring and implementation committee
- District-level implementation committee

In addition to the state-level committee, city-level air quality management cells have also been formed to undertake activities in line with the NCAP guidelines.

This framework will need to facilitate more aligned and harmonized action with strong accountability and transparent monitoring for compliance across all concerned departments for implementation of this multi-sector plan.

For each sector, specific schemes and programmes will have to be identified or devised to enable implementation of the priority strategies and indicators included in the state plan.

Simultaneously, the plan needs to leverage the other relevant programmes and schemes (both central and state) for effective leveraging of different lines of funding and programmes to deliver on clean air objectives. These include SBM 2.0, Amrut, Smart City Programme, bus funding, FAME II programme, etc.

Pollution control policies and regulations have evolved considerably to set the regulatory standards, compliance strategy and deterrence frameworks in each sector – industry and power plants, waste streams, vehicles and transport among others. This needs to be fully leveraged for implementation and compliance.

All Programme Monitoring Units or Air Pollution Cells require strong monitoring methods, standard operating procedures, management information system and data protocol for tracking compliance against targets, defining the scope of the programme, protocol for data recording for targeted strategies within each department, etc. This requires adequate detailing of scope of action at the departmental level.

Action needs to be measurable and verifiable to be able to meet the clean air targets and the NAAQS at the end of the plan period.

Strengthen institutional, regulatory and technical capacity of the departments to enable planning and implementation of clean air programme.

Funding strategies: The state of Odisha has received funds under the NCAP for the non-attainment cities. From 2022 onwards the funding under NCAP and also from XV Finance Commission have become performance-based supplemental grant to address a critical gap in plans (see *Table 12: Funds allocation under NCAP*).

As per the office memorandum of MoEFCC, sanction of funds under NCAP for the next financial year are linked to achievement of targets provided under the Mission LiFE components. This will be included in PRANA portal for reporting and monitoring progress. The components identified for implementation include public transport, cycling and walking, CNG and electric vehicles, reducing use of consumer plastic products, use of recycled plastic over virgin plastic, composting of food waste at home, biogas plan from cattle waste, food waste and agricultural waste, segregation of dry and wet waste at homes, no waste dumping in water bodies and in public spaces, tree plantation, and discarding gadgets in nearest e-recycling units.

Table 12: Funds allocation under NCAP

Sr. no.	City name	FY 2019-20 (Cr)	FY 2020-21 (Cr)	FY 2021-22 (Cr)	FY 2022-23 (Cr)	Grand total (Cr)
1	Angul	0.03	0.57	0.11	0.45	1.16
2	Balasore	0.06	0.76	0	2.3	3.12
3	Bhubaneswar	3.6	0	2.052	14.87	20.522
4	Cuttack	2.4	0	1.368	12.28	16.048
5	Kalinga Nagar	0	3	0	0.45	3.45
6	Rourkela	0.06	1.14	0	7.25	8.45
7	Talcher	0.03	0.57	0.11	0.92	1.63
Grand total (Cr)		**6.18**	**6.04**	**3.64**	**38.52**	**54.38**

Source: Data provided by OSPCB

Funding strategies in all sectors need to be consistent with the objective of clean air action. Align the objectives of multiple funding schemes and programmes in different sectors to maximize gains. Specific funding instruments are already available in different sectors that can be aligned like SBM2.0, FAME II, spending on infrastructure, among others.

The central and state government schemes and budget may be further supported with innovative fiscal instruments to generate additional revenue and make subsidies and incentives more revenue neutral. Market-based instruments may be explored to incentivize industrial and private sector investments in pollution control.

Million-plus cities Challenge Fund (MCF), based on a tripartite Memorandum of Understanding (MoU) between MoEFCC, the state government and the concerned ULB, needs a year-wise action plan. Responsibility of the nodal entity will be to achieve performance based on a range of criteria. These include strengthening of pollution monitoring mechanism; source-wise cause analysis for air pollution; progress on action plans and compliance with statutory guidelines; quantification and evaluation of air quality improvements; reduction in air pollution level (particulate matter) and frequency of exceedance in AQI levels.

These parameters have been weighted and linked with performance for the release of grants. SBM 2.0 grant for waste management is also performance linked. Thus, defining the scope of action and strategy for implementation in each sector and verifiable improvement in air quality becomes critical to maximize air quality gains.

ANNEXURES

Annexure 1: Non-attainment cities: Action points of Mission LiFE to promote public transport, walking, cycling and electric mobility

1. Angul City Action plan: Integration of relevant Mission LiFE actions to promote public transport, walking, cycling and electric mobility

Sl. no.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 2: Use of public transport wherever possible	Total length (km) of public transport network (roads, metro, last mile connectivity) required to be developed in the city	35 (Kms)	Length of public transport network (roads, metro, last mile connectivity) in km	0 (Kms)	No work has been carried out in the FY 2022-23
2	Action no 5: Use bicycles for local or short commute	Length of non motorized track (NMT) required in the city	15 (Kms)	Length of NMT constructed in the city	0 (Kms)	No work has been carried out in the FY 2022-23
3	Action no 7: Prefer CNG/EVs over petrol and diesel	• Capacity of existing EV charging stations in kW • Total no of CNG/ electric vehicles in the cities	0 (kW) 0 (Nos)	• Capacity of EV charging stations introducing in kW • No. of CNG/ electric vehicles introduced/ converted	4 (kW) 16 (Nos)	
4	Awareness generation on LiFE activities for all 75 points	No. of persons in the city	43,759 (Nos)	No. of persons provided awareness through capacity building and public outreach programmes (CBPO)	76 (Nos)	
5.	Signages for LiFE actions at important locations for all 75 points	No. of junctions, bus stops and important locations in the city	17 (Nos)	No. of locations provided signages	0 (Nos)	No location has been provided for signages in the FY 2022-23
6	Posting of infographics/audio-visuals on social media platforms	No. of days in a year in which infographics/audio-visuals are posted on social media	0 (Nos)	No. of days in a year in which infographics/ audio-visuals are posted on social media	2 (Nos)	

2. Balasore City Action plan: Integration of relevant Mission LiFE action to promote public transport, walking, cycling and electric mobility

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 2: Use of public transport wherever possible	Total length (km) of public transport network (roads, metro, last mile connectivity) required to be developed in the city	438.28 (Kms)	Length of public transport network (roads, metro, last mile connectivity) in km	0 (Kms)	No work has been carried out in the FY 2022-23
2	Action no 5: Use bicycles for local or short commute	Length of non motorized track (NMT) required in the city	50 (Kms)	Length of NMT constructed in the city	0 (Kms)	No work has been carried out in the FY 2022-23
3	Action no 7: Prefer CNG/EVs over petrol and diesel	• Capacity of existing EV charging station in kW • Total no. of CNG/ electric vehicles in the cities	0 (Kw) 457 (Nos)	• Capacity of EV charging stations introducing in kW • No. of CNG/ electric vehicles introduced/ converted	0 (Kw) 0 (Nos)	No work has been carried out in the FY 2022-23
4	Awareness generation on LiFE activities for all 75 points	No. of persons in the city	129,980 (Nos)	No. of persons provided awareness through capacity building and public outreach programmes (CBPO)	400 (Nos)	
5	Signages for LiFE actions at important locations for all 75 points	No. of junctions, bus stops and important locations in the city	17 (Nos)	No. of locations provided with signages	0 (Nos)	No location has been provided for signages in the FY 2022-23
6	Posting of infographics/ audio visuals on social media platform	No. of days in a year in which infographics/audio-visuals are posted on social media	3 (Nos)	No. of days in a year in which infographics/ audio-visuals are posted on social media	3 (Nos)	

3. Bhubaneswar City Action plan: Integration of relevant Mission LiFE action to promote public transport, walking, cycling and electric mobility

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 2: Use of public transport wherever possible	Total length (km) of public transport network (roads, metro, last mile connectivity) required to be developed in the city	186 (Kms)	Length of public transport network (roads, metro, last mile connectivity) in km	0 (Kms)	No work has been carried out in the FY 2022-23
2	Action no 5: Use bicycles for local or short commute	Length of non motorized track (NMT) required in the city	11 (Kms)	Length of NMT constructed in the city	04 (Kms)	
3	Action no 7: Prefer CNG/EVs over petrol and diesel	• Capacity of existing EV charging station in kW • Total no of EV vehicles in the cities • Total Number of CNG vehicles existing the cities	0 (Kw) 13107 (Nos) 3539 (Nos)	• Capacity of EV charging stations introduced • No. of CNGs/ EVs introduced/ converted • Total number of CNG vehicles to be introduced/converted	0 (Kw) 3,237 (Nos) 188 (Nos)	
4	Awareness generation on LiFE activities for all 75 points	No. of persons in the city	1,261,251 (Nos)	No. of persons provided awareness through capacity building and public outreach programmes (CBPO)	631,126 (Nos)	
5	Signages for LiFE actions at important locations for all 75 points	No. of junctions, bus stops and important locations in the city	45 (Nos)	No. of locations provided with signages	11 (Nos)	
6	Posting of infographics/ audio visuals on social media platform	No. of days in a year in which infographics/audio-visuals are posted on social media	35 (Nos)	No. of days in a year in which infographics/ audio-visuals are posted on social media	10 (Nos)	

4. Cuttack City Action plan: Integration of relevant Mission LiFE action to promote public transport, walking, cycling and electric mobility

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 2: Use of public transport wherever possible	Total length (km) of public transport network (roads, metro, last mile connectivity) required to be developed in the city	1126.99 (Kms)	Length of public transport network (roads, metro, last mile connectivity) in km	876.99 (Kms)	
2	Action no 5: Use bicycles for local or short commute	Length of non motorized track (NMT) required in the city	0 (Kms)	Length of NMT constructed in the city	0 (Kms)	No work has been carried out in the FY 2022-23
3	Action no 7: Prefer CNG/EVs over petrol and diesel	• Capacity of existing EV charging station in kW • No. of CNG/electric vehicles introduced/ converted	0 (Kw) 0 (Nos)	• Capacity of EV charging stations introducing in kW • No. of CNG/ electric vehicles introduced/ converted	0 (Kw) 5,888 (Nos)	
4	Awareness generation on LiFE activities for all 75 points	No. of persons in the city	6,87,206 (Nos)	No. of persons provided awareness through capacity building and public outreach programmes (CBPO)	40 (Nos)	
5	Signages for LiFE actions at important locations for all 75 points	No. of junctions, bus stops and important locations in the city	0 (Nos)	No. of locations provided signages	0 (Nos)	No location has been provided for signages in the FY 2022-23
6	Posting of infographics/ audio visuals on social media platform	No. of days in a year in which infographics/audio-visuals are posted on social media	44 (Nos)	No. of days in a year in which infographics/audio-visuals are posted on social media	8 (Nos)	

5. Kalinga Nagar City Action plan: Integration of relevant Mission LiFE action to promote public transport, walking, cycling and electric mobility

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 2: Use of public transport wherever possible	Total length (km) of public transport network (roads, metro, last mile connectivity) required to be developed in the city	35.5 (Kms)	Length of public transport network (roads, metro, last mile connectivity) in km	0 (Kms)	No work has been carried out in the FY 2022-23
2	Action no 5: Use bicycles for local or short commute	Length of no. of motorized track (NMT) required in the city	0 (Kms)	Length of NMT constructed in the city	0 (Kms)	No work has been carried out in the FY 2022-23
3	Action no 7: Prefer CNG/EVs over petrol and diesel	• Capacity of existing EV charging station in kW • Total no. of CNG/ electric vehicles in the cities	0 (Kw) 33 (Nos)	• Capacity of EV charging stations introducing in kW • No. of CNG/ electric vehicles introduced/ converted	0 (Kw) 242 (Nos)	No work has been carried out in the FY 2022-23
4	Awareness generation on LiFE activities for all 75 points	No. of persons in the city	56,946 (Nos)	No. of persons provided awareness through capacity building and public outreach programmes (CBPO)	275 (Nos)	
5	Signages for LiFE actions at important locations for all 75 points	No. of junctions, bus stops and important locations in the city	21 (Nos)	No. of locations provided signages	0 (Nos)	No location has been provided signages in the FY 2022-23
6	Posting of infographics/ audio visuals in social media platform	No. of days in a year in which infographics/ audio-visuals are posted on social media	11 (Nos)	No. of days in a year in which infographics/audio-visuals are posted on social media	05 (Nos)	

6. Rourkela City Action plan: Integration of relevant Mission LiFE action to promote public transport, walking, cycling and electric mobility

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 2: Use of public transport wherever possible	Total length (km) of public transport network (roads, metro, last mile connectivity) required to be developed in the city	102 (Kms)	Length of public transport network (roads, metro, last mile connectivity) in km	10 (Kms)	No work has been carried out in the FY 2022-23
2	Action no 5: Use bicycles for local or short commute	Length of non motorized track (NMT) required in the city	4 (Kms)	Length of NMT constructed in the city	2 (Kms)	No work has been carried out in the FY 2022-23
3	Action no 7: Prefer CNG/EVs over petrol and diesel	• Capacity of existing EV charging stations • Total no of CNG/ electric vehicles in the cities	0 (Kw) 3235 (Nos)	• Capacity of EV charging stations introducing • No. of CNG/electric vehicles introduced/ converted	0 (Kw) 0 (Nos)	No work has been carried out in the FY 2022-23
4	Awareness generation on LiFE activities for all 75 points	No. of persons in the city	309689 (Nos)	No. of persons provided awareness through capacity building and public outreach programmes (CBPO)	332 (Nos)	
5	Signages for LiFE actions at important locations for all 75 points	No. of junctions, bus stops and important locations in the city	25 (Nos)	No. of locations provided signages	5 (Nos)	No location has been provided for signages in the FY 2022-23
6	Posting of infographics/ audio visuals in social media platform	No. of days in a year in which infographics/ audio-visuals are posted on social media	25 (Nos)	No. of days in a year in which infographics/audio-visuals are posted on social media	4 (Nos)	

7. Talcher City Action plan: Integration of relevant Mission LiFE action to promote public transport, walking, cycling and electric mobility

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 2: Use of public transport wherever possible	Total length (km) of public transport network (roads, metro, last mile connectivity) required to be developed in the city	25 (Kms)	Length (km) of public transport network (roads, metro, last mile connectivity)	0 (Kms)	No work has been carried out in the FY 2022-23
2	Action no 5: Use bicycles for local or short commute	Length of non motorized track (NMT) required in the city	10 (Kms)	Length of NMT constructed in the city	0 (Kms)	No work has been carried out in the FY 2022-23
3	Action no 7: Prefer CNG/EVs over petrol and diesel	• Capacity of existing EV charging stations • Total no of CNG/ electric vehicles in the cities	0 (Kw) 0 (Nos)	• Capacity of EV charging stations introducing in kW • No. oof CNG/ electric vehicles introduced/ converted	0 (Kw) 5 (Nos)	No work has been carried out in the FY 2022-23
4	Awareness generation on LiFE activities for all 75 points	No. of persons in the city	40,841 (Nos)	No. of persons provided awareness through capacity building and public outreach programmes (CBPO)	40 (Nos)	
5	Signages for LiFE actions at important locations for all 75 points	No. of junctions, bus stops and important locations in the city	10 (Nos)	No. of locations provided signages	0 (Nos)	No location has been provided signages in the FY 2022-23
6	Posting of infographics/ audio visuals in social media platform	No. of days in a year in which infographics/ audio-visuals are posted on social media	0 (Nos)	No. of days in a year in which infographics/ audio-visuals are posted on social media	1 (Nos)	

Annexure II: Non-attainment cities: Action points of Mission LiFE for waste management

1. Angul City Action Plan: Integration of relevant action under Mission LiFE for waste management

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 39: Prefer non-plastic eco-friendly cutlery during gatherings and events	No. of CBPO events organized	1 (Nos)	No. of CBPO events organized without using plastic cutlery	1 (Nos)	
2	Action no 42: Use recycled plastic over virgin plastic, wherever possible	• Quantity of plastic waste collection out of total waste generation • Capacity of plastic waste segregation plants	0.04 (TPD) NIL (TPD)	• ·Additional quantity of plastic waste proposed for collection out of total waste generation • ·Additional capacity of plastic waste segregation proposed	0 (TPD) 6 (TPD)	No additional quantity of plastic waste collected in the FY 2022-23
3	Action no 47: Compost food waste at home	Capacity of waste composting plants available	12 (TPD)	Capacity of food waste composting proposed	0 (TPD)	No additional capacity of food waste composting proposed in the FY 2022-23
4	Action no 52: Contribute cattle waste, food waste and agricultural waste to biogas plan (provided under GOBARdhan)	Wet waste (including food waste) generated in the city	2.2 (TPD)	Capacity of biogas plants set up to process the food waste	0.2 (TPD)	
5	Action no 53: Practice segregation of dry and wet waste at homes	Quantity of waste segregated against total waste generation	2.2 (TPD)	Quantity of waste segregation proposed against total waste generation	0.2 (TPD)	
6	Action no 61: Do not discard waste in water bodies and in public spaces	Present quantity of waste collection out of total waste generation	2.2 (TPD)	Proposed quantity of waste collection out of total waste generation	0.2 (TPD)	
7	Action no 73: Discard gadgets in nearest e-recycling units	No. of e-waste collection centres available	3 (Nos)	No. of e-waste collection centres created	0 (Nos)	No additional e-waste collection centres created in the FY 2022-23

2. Balasore City Action Plan: Integration of relevant action under Mission LiFE for waste management

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 39: Prefer non-plastic eco-friendly cutlery during gatherings and events	No. of CBPO events organized	02 (Nos)	No. of CBPO events organized without using plastic cutlery	02 (Nos)	
2	Action no 42: Use recycled plastic over virgin plastic, wherever possible	• Quantity of plastic waste collection out of total waste generation • Capacity of plastic waste segregation plants	02 (TPD) 40 (TPD)	• ·Additional quantity of plastic waste proposed for collection out of total waste generation • ·Additional capacity of plastic waste segregation proposed	1.3 (TPD) 0 (TPD)	No additional quantity of plastic waste collected in the FY 2022-23
3	Action no 47: Compost food waste at home	Capacity of waste composting plants available	20 (TPD)	Capacity of food waste composting proposed	0 (TPD)	No additional capacity of food waste composting proposed in the FY 2022-23
4	Action no 52: Contribute cattle waste, food waste and agricultural waste to biogas plan (provided under GOBARdhan)	Wet waste (including food waste) generated in the city	18 (TPD)	Capacity of biogas plants set up to process the food waste	0 (TPD)	No work has been carried out in the FY 2022-23
5	Action no 53: Practice segregation of dry and wet waste at homes	Quantity of waste segregated against total waste generation	35 (TPD)	Quantity of waste segregation proposed against total waste generation	0 (TPD)	No work has been carried out in the FY 2022-23
6	Action no 61: Do not discard waste in water bodies and in public spaces	Present quantity of waste collection out of total waste generation	35 (TPD)	Proposed quantity of waste collection out of total waste generation	0 (TPD)	No work has been carried out in the FY 2022-23
7	Action no 73: Discard gadgets in nearest e-recycling units	No. of e-waste collection centres available	4 (Nos)	No. of e-waste collection centres created	0 (Nos)	No additional e-waste collection centres created in the FY 2022-23

3. Bhubaneswar City Action Plan: Integration of relevant action under Mission LiFE for waste management

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 39: Prefer non-plastic eco-friendly cutlery during gatherings and events	No. of CBPO events organized	41 (Nos)	No. of CBPO events organized without using plastic cutlery	11 (Nos)	
2	Action no 42: Use recycled plastic over virgin plastic, wherever possible	• Quantity of plastic waste collection out of total waste generation • Capacity of plastic waste segregation plants	91 (MTPD) 140 (TPD)	• ·Additional quantity of plastic waste proposed for collection out of total waste generation • ·Additional capacity of plastic waste segregation proposed	15 (TPD) 30 (TPD)	
3	Action no 47: Compost food waste at home	Capacity of waste composting plants available	170 (TPD)	Capacity of food waste composting proposed	50 (TPD)	
4	Action no 52: Contribute cattle waste, food waste and agricultural waste to biogas plan (provided under GOBARdhan)	Wet waste (including food waste) generated in the city	108 (TPD)	Capacity of biogas plants set up to process the food waste	NIL (TPD)	
5	Action no 53: Practice segregation of dry and wet waste at homes	Quantity of waste segregated against total waste generation	158 (TPD)	Quantity of waste segregation proposed against total waste generation	16 (TPD)	
6	Action no 61: Do not discard waste in water bodies and in public spaces	Present quantity of waste collection out of total waste generation	208 (TPD)	Proposed quantity of waste collection out of total waste generation	75 (TPD)	
7	Action no 73: Discard gadgets in nearest e-recycling units	No. of e-waste collection centres available	17 (Nos)	No. of e-waste collection centres created	02 (Nos)	

4. Cuttack City Action Plan: Integration of relevant action under Mission LiFE for waste management

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 39: Prefer non-plastic eco-friendly cutlery during gatherings and events	No. of CBPO events organized	0 (Nos)	No. of CBPO events organized without using plastic cutlery	0 (Nos)	No CPBO events organized in the FY 2022-23
2	Action no 42: Use recycled plastic over virgin plastic, wherever possible	• Quantity of plastic waste collection out of total waste generation • Capacity of plastic waste segregation plants	0.14 (TPD) 60 (TPD)	• ·Additional quantity of plastic waste proposed for collection out of total waste generation • ·Additional capacity of plastic waste segregation proposed	0.11 (TPD) 60 (TPD)	
3	Action no 47: Compost food waste at home	Capacity of waste composting plants available	60 (TPD)	Capacity of food waste composting proposed	60 (TPD)	
4	Action no 52: Contribute cattle waste, food waste and agricultural waste to biogas plan (provided under GOBARdhan)	Wet waste (including food waste) generated in the city	85.6 (TPD)	Capacity of biogas plants set up to process the food waste	87 (TPD)	
5	Action no 53: Practice segregation of dry and wet waste at homes	Quantity of waste segregated against total waste generation	40.31 (TPD)	Quantity of waste segregation proposed against total waste generation	60.31 (TPD)	
6	Action no 61: Do not discard waste in water bodies and in public spaces	Present quantity of waste collection out of total waste generation	165 (TPD)	Proposed quantity of waste collection out of total waste generation	62.8 (TPD)	
7	Action no 73: Discard gadgets in nearest e-recycling units	No. of e-waste collection centres available	0 (Nos)	No. of e-waste collection centres created	0 (Nos)	No additional e-waste collection centres created in the FY 2022-23

5. Kalinga Nagar City Action Plan: Integration of relevant action under Mission LiFE for waste management

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 39: Prefer non-plastic eco-friendly cutlery during gatherings and events	No. of CBPO events organized	26 (Nos)	No. of CBPO events organized without using plastic cutlery	16 (Nos)	
2	Action no 42: Use recycled plastic over virgin plastic, wherever possible	• Quantity of plastic waste collection out of total waste generation • Capacity of plastic waste segregation plants	0.5 (TPD) 01 (TPD)	• ·Additional quantity of plastic waste proposed for collection out of total waste generation • ·Additional capacity of plastic waste segregation proposed	0 (TPD) 01 (TPD)	No additional quantity of plastic waste collected in the FY 2022-23
3	Action no 47: Compost food waste at home	Capacity of waste composting plants available	10 (TPD)	Capacity of food waste composting proposed	0 (TPD)	No additional capacity of food waste composting proposed in the FY 2022-23
4	Action no 52: Contribute cattle waste, food waste and agricultural waste to biogas plan (provided under GOBARdhan)	Wet waste (including food waste) generated in the city	0 (TPD)	Capacity of biogas plants set up to process the food waste	0 (TPD)	No work has been carried out in the FY 2022-23
5	Action no 53: Practice segregation of dry and wet waste at homes	Quantity of waste segregated against total waste generation	04 (TPD)	Quantity of waste segregation proposed against total waste generation	02 (TPD)	
6	Action no 61: Do not discard waste in water bodies and in public spaces	Present quantity of waste collection out of total waste generation	05 (TPD)	Proposed quantity of waste collection out of total waste generation	02 (TPD)	
7	Action no 73: Discard gadgets in nearest e-recycling units	No. of e-waste collection centres available	2 (Nos)	No. of e-waste collection centres created	0 (Nos)	No additional e-waste collection centres created in the FY 2022-23

6. Rourkela City Action Plan: Integration of relevant action under Mission LiFE for waste management

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 39: Prefer non-plastic eco-friendly cutlery during gatherings and events	No. of CBPO events organized	28 (Nos)	No. of CBPO events organized without using plastic cutlery	8 (Nos)	
2	Action no 42: Use recycled plastic over virgin plastic, wherever possible	• Quantity (TPD) of plastic waste collection out of total waste generation (TPD) • Capacity of plastic waste segregation plants (TPD)	8.16 (TPD) 80 (TPD)	• ·Additional quantity of plastic waste proposed for collection out of total waste generation • ·Additional capacity of plastic waste segregation proposed	0.9 (TPD) 0 (TPD)	
3	Action no 47: Compost food waste at home	Capacity (TPD) of waste composting plants available	40 (TPD)	Capacity of food waste composting proposed	0 (TPD)	No additional capacity of food waste composting proposed in the FY 2022-23
4	Action no 52: Contribute cattle waste, food waste and agricultural waste to biogas plan (provided under GOBARdhan)	Wet waste (including food waste) generated in the city (TPD)	0 (TPD)	Capacity of biogas plants set up to process the food waste	5 (TPD)	
5	Action no 53: Practice segregation of dry and wet waste at homes	Quantity (TPD) of waste segregated against total waste generation (TPD)	102 (TPD)	Quantity of waste segregation proposed against total waste generation	3 (TPD)	
6	Action no 61: Do not discard waste in water bodies and in public spaces	Present quantity (TPD) of waste collection out of total waste generation (TPD)	102 (TPD)	Proposed quantity of waste collection out of total waste generation	3 (TPD)	
7	Action no 73: Discard gadgets in nearest e-recycling units	No. of e-waste collection centres available	3 (Nos)	No. of e-waste collection centres created	0 (Nos)	No additional e-waste collection centres created in the FY 2022-23

7. Talcher City Action Plan: Integration of relevant action under Mission LiFE for waste management

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 39: Prefer non-plastic eco-friendly cutlery during gatherings and events	No. of CBPO events organized	1 (Nos)	No. of CBPO events organized without using plastic cutlery	1 (Nos)	
2	Action no 42: Use recycled plastic over virgin plastic, wherever possible	• Quantity of plastic waste collection out of total waste generation • Capacity of plastic waste segregation plants	0.03 (TPD) NIL (TPD)	• ·Additional quantity of plastic waste proposed for collection out of total waste generation • ·Additional capacity of plastic waste segregation proposed	0 (TPD) 0 (TPD)	No additional quantity of plastic waste collected in the FY 2022-23
3	Action no 47: Compost food waste at home	Capacity of waste composting plants available	10 (TPD)	Capacity of food waste composting proposed	0 (TPD)	No additional capacity of food waste composting proposed in the FY 2022-23
4	Action no 52: Contribute cattle waste, food waste and agricultural waste to biogas plan (provided under GOBARdhan)	Wet waste (including food waste) generated in the city	1.5 (TPD)	Capacity of biogas plants set up to process the food waste	0.2 (TPD)	
5	Action no 53: Practice segregation of dry and wet waste at homes	Quantity of waste segregated against total waste generation	1.5 (TPD)	Quantity of waste segregation proposed against total waste generation	0.2 (TPD)	
6	Action no 61: Do not discard waste in water bodies and in public spaces	Present quantity of waste collection out of total waste generation	1.5 (TPD)	Proposed quantity of waste collection out of total waste generation	0.2 (TPD)	
7	Action no 73: Discard gadgets in nearest e-recycling units	No. of e-waste collection centres available	2 (Nos)	No. of e-waste collection centres created	0 (Nos)	No additional e-waste collection centres created in the FY 2022-23

Annexure III: Non-attainment cities: Action points of Mission LiFE for greening

1. Angul City Action Plan: Integration of relevant action under Mission LiFE for greening

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 68: Plant trees to reduce impact of pollution	Geographical area (in hectare) under green cover as on 01.04.2022	425 (Hectare)	Additional area of open spaces/parks/ roads proposed for plantation/greening	12.75 (Hectare)	
		Percentage of geographical area under green cover	22 (%)	Area of open spaces/ parks/ roads proposed for plantation/greening and percentage area increased under green cover	3 (%)	

2. Balasore City Action Plan: Integration of relevant action under Mission LiFE for greening

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 68: Plant trees to reduce impact of pollution	Geographical area (in hectare) under green cover as on 01.04.2022	0 (Hectare)	Additional area of open spaces/parks/ roads proposed for plantation/greening	0 (Hectare)	No work has been carried out in the FY 2022-23
		Percentage of geographical area under green cover	0 (%)	Area of open spaces/parks/ roads proposed for plantation/greening and percentage area increased under green cover	0 (%)	

3. Bhubaneswar City Action Plan: Integration of relevant action under Mission LiFE for greening

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 68: Plant trees to reduce impact of pollution	Geographical area (in hectare) under green cover as on 01.04.2022	220 (Hectare)	Additional area of open spaces/parks/ roads proposed for plantation/greening	15 (Hectare)	
		Percentage of geographical area under green cover	66 (%)	Area of open spaces/parks/ roads proposed for plantation/greening and percentage area increased under green cover	10 (%)	

4. Cuttack City Action Plan: Integration of relevant action under Mission LiFE for greening

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 68: Plant trees to reduce impact of pollution	Geographical area (in hectare) under green cover as on 01.04.2022	0 (Hectare)	Additional area of open spaces/parks/ roads proposed for plantation/greening	0 (Hectare)	
		Percentage of geographical area under green cover	0 (%)	Area of open spaces/parks/ roads proposed for plantation/greening and percentage area increased under green cover	0 (%)	

5. Kalinga Nagar City Action Plan: Integration of relevant action under Mission LiFE for greening

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 68: Plant trees to reduce impact of pollution	Geographical area (in hectare) under green cover as on 01.04.2022	1 (Hectare)	Additional area of open spaces/parks/ roads proposed for plantation/greening	0 (Hectare)	No work has been carried out in the FY 2022-23
		Percentage of geographical area under green cover	2 (%)	Area of open spaces/ parks/ roads proposed for plantation/greening and percentage area increased under green cover	0 (%)	

6. Rourkela City Action Plan: Integration of relevant action under Mission LiFE for greening

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 68: Plant trees to reduce impact of pollution	Geographical area (in hectare) under green cover as on 01.04.2022	225.1 (Hectare)	Additional area of open spaces/parks/ roads proposed for plantation/greening	0 (Hectare)	No work has been carried out in the FY 2022-23
		Percentage of geographical area under green cover	62 (%)	Area of open spaces/ parks/ roads proposed for plantation/greening and percentage area increased under green cover	0 (%)	

7. Talcher City Action Plan: Integration of relevant action under Mission LiFE for greening

Sl. No.	Action	Indicator Baseline as on 1st April 2022	Figure	Indicator Target for FY 2022-23	Figure	Remark
Relevant actions under LiFE themes for improvement of air quality						
1	Action no 68: Plant trees to reduce impact of pollution	Geographical area (in hectare) under green cover as on 01.04.2022	225 (Hectare)	Additional area of open spaces/parks/roads proposed for plantation/ greening	10.75 (Hectare)	
		Percentage of geographical area under green cover	22 (%)	Area of open spaces/ parks/ roads proposed for plantation/greening and percentage area increased under green cover	2 (%)	

References

1. Anon 2020. *Action Plan for abatement of pollution in industrial areas of Paradeep*, State Pollution Control Board, Odisha. Available at http://ospcboard.org/wp-content/uploads/2021/03/Action-Plan-for-Abatment-of-Pollution-in-In-dustrial-Areas-of-Paradeep.pdf
2. Anon 2016. *Implementation status and action plan in critically polluted areas – Ib Valley-Jharsuguda*, State Pollution Control Board, Odisha. Available at http://ospcboard.org/wp-content/uploads/2017/01/Action_Plan_Inplementation_Status_IbValley_Jharsuguda-2.pdf
3. Anon 2021. *Fuel policy of the state of Odisha*, Forest and Environment Department, Odisha. Available at http://ospcboard.org/wp-content/uploads/2022/02/Notification-on-Fuel-Policy-of-the-State-of-Odisha..pdf
4. Ishita Garg and Nivit Kumar Yadav 2022. *Implementation Challenges of Environmental Guidelines in the Stone-Crusher Industry: A Case Study from Delhi-NCR*, Centre for Science and Environment, New Delhi
5. http://ospcboard.org/wp-content/uploads/2021/03/Action-Plan-for-Abatment-of-Pollution-in-In-dustrial-Areas-of-Paradeep.pdf
6. http://ospcboard.org/wp-content/uploads/2017/01/Action_Plan_Inplementation_Status_IbValley_Jharsuguda-2.pdf
7. http://ospcboard.org/wp-content/uploads/2022/02/Notification-on-Fuel-Policy-of-the-State-of-Odisha..pdf
8. Anon 2021. *Odisha EV policy 2021*, Government of Odisha Commerce and Transport Department. Available at https://www.transportpolicy.net/wp-content/uploads/2019/09/Orissa2021.pdf as accessed on 1 January 2023
9. Anon 2014. *New railways new Odisha*, MoRTH. Available at https://indianrailways.gov.in/railwayboard/uploads/directorate/secretary_branches/State_Wise_2019/EcOR_Odisha.pdf as accessed on 1 January 2023