Comprehensive Action Plan (with Micro Planning) for Clean Air in Non-attainment Cities of Andhra Pradesh

Rajamahendravaram City

Andhra Pradesh Pollution Control Board

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Comprehensive Action Plan for Clean Air - Non-attainment cities: Rajamahendravaram

1. Hon'ble National Green Tribunal directions on non-attainment cities

Hon'ble National Green Tribunal, Delhi in its Orders, dated 06.08.2019 in O. A. No. 681 of 2018 on non-attainment cities has issued the following directions to comply with:

1. Action Plans need to be prepared by States for the additional 20 NACs on the pattern of 102 NACs within three months and after its approval by CPCB within two months, States must initiate time bound action on remediation within next three months.

In this order the Hon'ble National Green Tribunal, Delhi has directed that the "pattern of such plans for 102 cities, already prepared". These earlier plans were made according to the NGT orders, dated 08.10.2018 in O. A. No. 681 of 2018 on non-attainment cities. These have given the following directions to comply with:

1. All the States and Union Territories with non-attainment cities must prepare appropriate action plans within two months, aimed to bring down the air pollution levels to the prescribed norms within six months from the date of finalization of action plans.

2. Action plans may be prepared by 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 Air Quality Monitoring Committee (AQMC). The Committee will function under the overall supervision and coordination of Principal Secretary, Environment of the concerned State or the Union Territory. This may be further supervised by the Chief Secretaries concerned or their counter parts in Union Territories by ensuring intra-sectorial coordination.

3. The action plan will indicate steps to be taken to check different sources of pollution having speedy, definite and specific timelines for execution.

4. 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.

2. Constitution of Air Quality Monitoring Committee (AQMC)

In compliance to the directions of Hon'ble National Green Tribunal, Environment, Forests, Science & Technology Department, Govt. of Andhra Pradesh has issued the G. O. R. T. No. 167, dated 14.11.2018 constituting the Air Quality Monitoring Committee with the following members for preparation/ revision of action plans to control air pollution in the non-attainment cities of Andhra Pradesh. The same committee will look after the newly added eight non-attainment cities.

Table 1: Clean Air Action Plan Monitoring Committee

S. No.	Member of the Committee	Designation
1	Commissioner, Transport	Member
2	Commissioner, Industries	Member
3	Commissioner & Director, MA&UD	Member
4	Commissioner & Director, Agriculture	Member
5	Member Secretary, APPCB	Member Convener
6	Special Secretary to Government Environment, Forest, Science & Technology Department	Member

3. Newly Added Non-attainment Cities in Andhra Pradesh

Central Pollution Control Board (CPCB) had earlier identified five cities in Andhra Pradesh, namely, Visakhapatnam, Vijayawada, Guntur, Nellore and Kurnool as non-attainment cities. In addition to the above, Central Pollution Control Board (CPCB) has identified additional 08 cities and towns as non-attainment for not meeting the National Ambient Air Quality Standards (NAAQS) for PM10 in Andhra Pradesh. These include Srikakulam, Vizianagaram, Rajamahendravaram, Eluru, Ongole, Chittoor, Kadapa and Anantapur. (see table 2: PM 10 values in the new Non-attainment cities of Andhra Pradesh)

CPCB has issued directions to APPCB under Section 18 (1) (b) of the Air (Prevention and Control of Pollution) Act, 1981 for preparation of action plans, in coordination with stakeholder departments for control air pollution in the said cities and towns.

Table 2: PM 10 values in the new Non-attainment cities of Andhra Pradesh

S. No.	Cities	Particulate Matter (PM 10) µg/m^3							Annual standard
		2014	2015	2016	2017	2018	2019	2020	
1	Srikakulam	-	-	-	68	70	63	57	60 µg/m^3
2	Vizianagaram	-	-	-	63	65	65	59	
3	Rajamahendravaram	70	61	62	65	75	63	56	
4	Eluru	97	79	70	70	70	63	60	
5	Ongole	63	67	65	65	65	60	50	
6	Chittoor	68	69	63	69	61	54	42	
7	Kadapa	-	-	-	69	61	52	43	
8	Anantapur	76	86	85	72	71	67	60	

The Air Quality Monitoring Committee has prepared the multi-sector clean air action plans based on the information available from the concerned departments and implementing bodies.

The AQMC has considered the guiding principles linked with the National Clean Air Programme (NCAP), the Air (Prevention and Control of Air Pollution) Act, 1981 and other concerned regulations in different sectors and the good practices that have bearing on the quality and effectiveness of the plans to meet the NCAP target of 20-30 percent reduction by 2024.

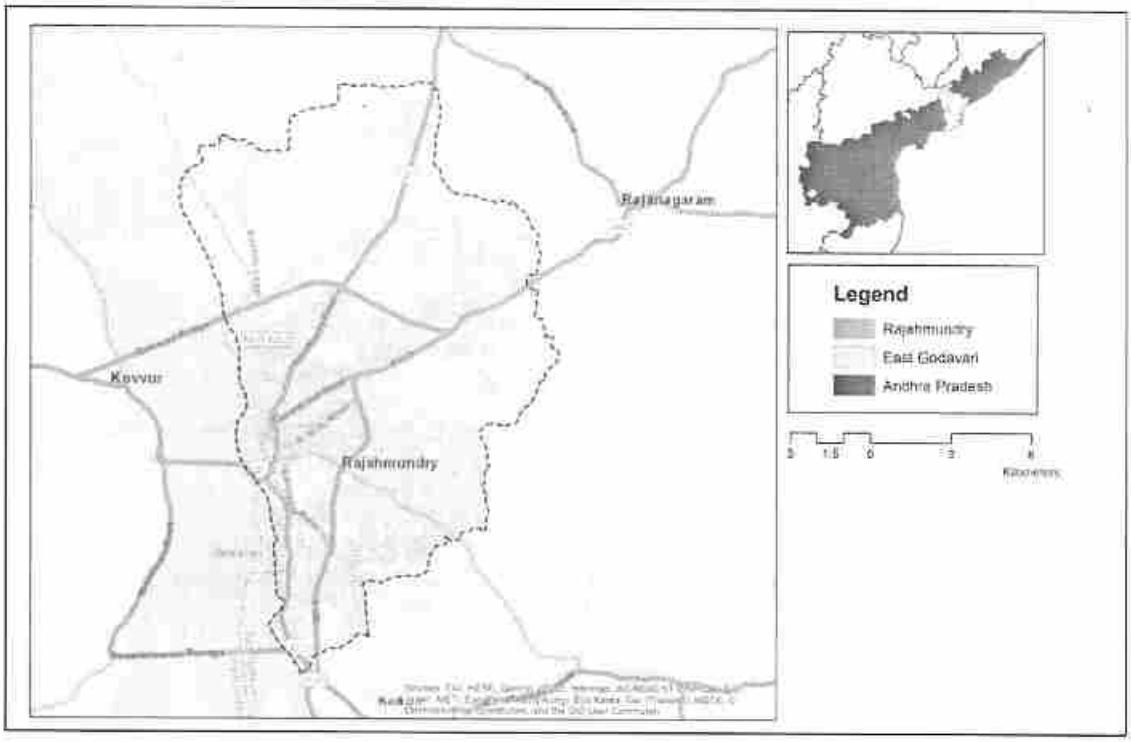
Accordingly, the approved action plans by AQMC for additional eight non-attainment cities namely Srikakulam, Vizianagaram, Rajamahendravaram, Eluru, Ongole, Chittoor, Kadapa & Anantapur in the state of Andhra Pradesh have been submitted to CPCB on 27.12.2019 for further approval. CPCB vide letter dt: 23.01.2020 has issued certain recommendations to revise the action plans.

The multi-sector plans have drawn upon the regulatory requirements in each sector and have sought robust pollution source assessment, monitoring and advanced air quality management strategies for measurable improvement in air quality. Measures that are part of the national and state regulatory requirements are common to all cities. Some measures are unique to a city depending on the local imperatives. The plans also seek to align the budget lines of the different sectors for more effective leveraging of the available resources. The plans include measurable outcomes and service level benchmarks and also indicate the improvement needed in the processes. The plans seek to promote equitious, affordable and innovative solutions. This also seeks air shed approach to reduce the regional influence on local air quality. This has outlined the institutional arrangement for effective implementation.

4. Rajamahendravaram City and its Air Quality

Rajamahendravaram is a city in East Godavari District, Andhra Pradesh. The city is situated on the banks of Godavari River. The city is located at 17°00'03.1"N 81°48'16.9"E. The city has a population of 3.76 lakh as per 2011 census & flourishing with an additional floating population of about 50,000 every day coming from other parts to the city. It is a commercial city and pilgrimage, and the city also experiences a seasonal influx of pilgrims and tourist.

Figure 1: Map of Rajamahendravaram City limits



APPCB has been monitoring the ambient air quality of Rajamahendravaram city. Initially, there was one station located at M/s Andhra Paper Ltd (Formerly M/s. International Paper APPM Limited), Sreeram Nagar (Industrial Area) under National Ambient Air Quality Monitoring Programme (NAMP) till date for the parameters, PM10, SO_2, NO_2 & ammonia as against 12 parameters, as per Notification No B-29016/20/90/PCI-L dated 18 November 2009 of CPCB.

At present, the ambient air quality of Rajamahendravaram city is monitored at five stations (with four stations run by CPCB under NAMP and one CAAQM station). APPCB has started monitoring PM2.5 at one station located at M/s Andhra Paper Ltd (Formerly M/s. International Paper APPM Limited), Sreeram Nagar (Industrial Area) & CAAQMS at Sri Venkateshwara Anam Kala Kendram, Seshayyametta, Opp to Municipal Office (Commercial Area) for assessing the fine particulate concentration in Rajamahendravaram city (See Table 3: Location and type of monitoring stations in Rajamahendravaram).

According to the CPCB criteria Rajamahendravaram has adequate number of manual monitors as well as real time monitors.

Table 3: Location and type of monitoring stations in Rajamahendravaram

S. No.	Location	NAMP / CAAQMS	Types of pollutant monitored	Category of station
1	M/s. Andhra Paper Ltd (Formerly M/s. International Paper APPM Ltd, Sreeram Nagar	NAMP	PM 2.5, PM 10, NH_3, NO_2, SO_2	Industrial
2	M/s. GAIL, Administrative Office, A.V. Appa Rao Road	NAMP	PM 10, NH_3, NO_2, SO_2	Residential
3	M/s. District Hospital, Near Central Jail	NAMP	PM 10, NH_3,NO_2, SO_2	Residential/ Sensitive
4	M/s. APEPDCL, Circle Office, Godavari Gattu	NAMP	PM 10, NH_3,NO_2, SO_2	Residential
5	Sri Venkateshwara Anam kala kendram Building Lakshmivarapupet, (Near Rajamahendravaram Municipal Corporation), Seshayya Metta	CAAQMS	PM 2,5, PM 10, SO_2, NO_2, NO, NO_x, Ozone, CO, NH_3 , Benzene, Toulene, Xylene	Commercial

Source: APPCB, 2020 and NAMP data accessed from http://www.cpcbenvis.nic.in/air_quality_data.html#

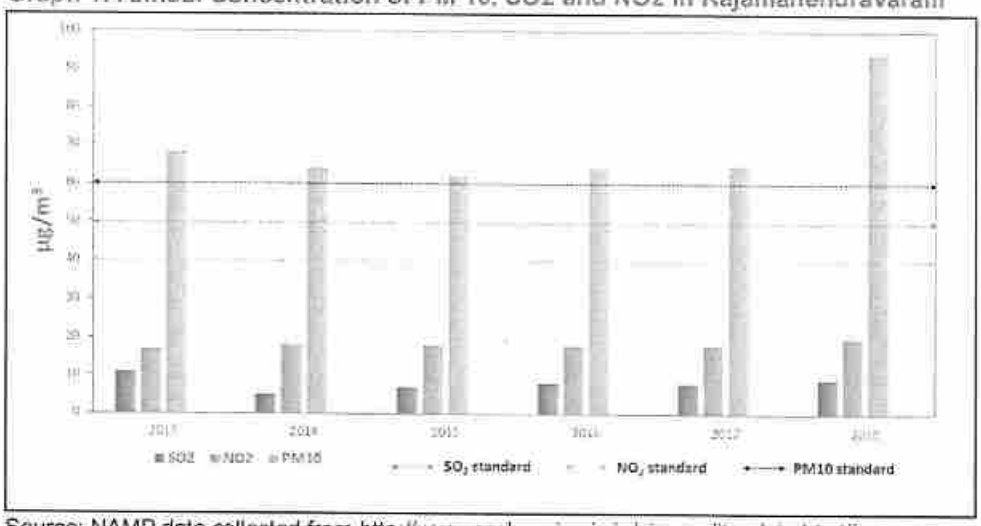
The air quality in the city has been medium since 2014. However, PM 10 levels continue to be higher than the national standards (See Table 4: Air quality monitoring results in Rajamahendravaram). In 2018, PM 10 levels were more than 25 percent above the prescribed standards for which urgent and stringent action is recommended. Both NO_2 and SO_2 standards are well within the limits, however, there is slight but definite rise in NO2 levels possibly due to an increase in vehicular traffic (See Graph 1: Annual concentration of PM 10, SO_2 and NO_2 in Rajamahendravaram). The air quality within the city is also influenced by the pollution sources around the city.

Table 4: Air Quality Monitoring results in Rajamahendravaram

S. No.	Parameter	2014	2015	2016	2017	2018	2019	2020	Annual Standard
1	PM10	70	61	62	65	75	63	56	**60**
2	SO2	12.6	8.2	8.4	9.1	9.9	8.2	8.0	**50**
3	NO_2	19.9	22.0	20.7	19.6	20.9	17.5	12.7	**40**
4	NH3	---	65	69	56	48	42	19.4	**100**
Average of no. of stations		1			2	4	5	5	---
5	PM2.5	---	---	---	38	38	35	28	**40**
Average of no. of stations		---	---	---	1	2	2	2	---
6	CO	---	---	---	0.7	0.9	0.7	0.6	**2**
7	Ozone	---	---	---	58	57	55	49.8	**100**
Average of no. of stations		---	---	---	1	1	1	1	---

Note: All values are expressed in $\mu g/m^3$ except CO. CO is expressed in mg/m^3.

Graph 1: Annual Concentration of PM 10, SO2 and NO2 in Rajamahendravaram

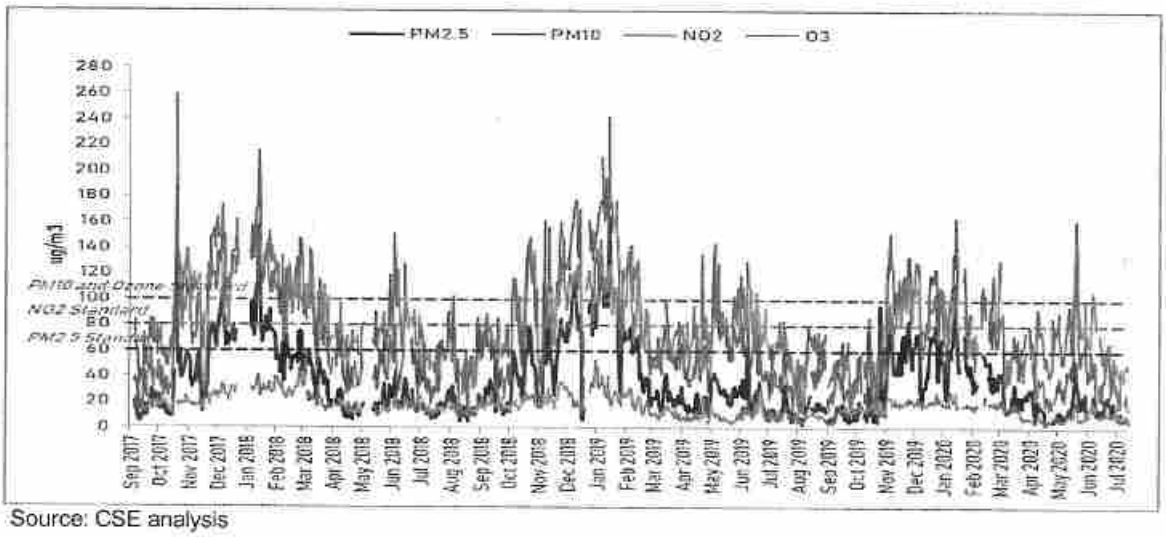


Source: NAMP data collected from http://www.cpcbenvis.nic.in/air_quality_data.html#
Note: From 2013 to 2017, data collected from M/s Andhra Paper Ltd, Staff club building, Sreeramnagar only. For 2018, data has been collected from all four NAMP stations mentioned in Table 3.

Air quality data from real time monitors (CAAQMS)

Rajamahendravaram also has one real time monitor under the Continuous Ambient Air Quality Monitoring Station) Program, located at Sri Venkateshwara Anam Kala Kendram, Seshayyametta,Opp to Municipal Corporation Office (Commercial Area). Rich data is available for PM 10, PM 2.5, NO, NO_2, NO_x, Ozone, CO, NH3, Benzene, Toulene and Xylene which shows some interesting trends. Long term analysis of daily average pollutant concentration suggests that winter months are most polluted, while monsoon is the cleanest (See Graph 2: Daily Average concentration trend in Rajamahendravaram, obtained from CAAQMS data).

Graph 2: Daily Average concentration trend in Rajamahendravaram, obtained from CAAQMS data

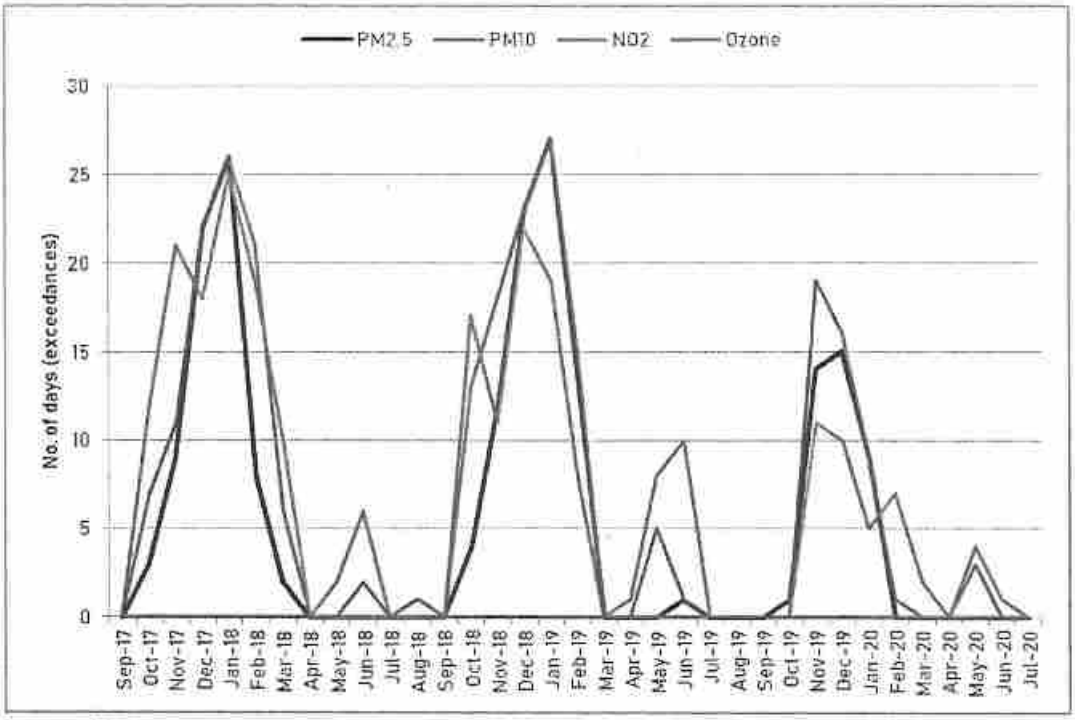


Source: CSE analysis

Monthly exceedances: Monthly averages between September 2017 and July 2020 were plotted and, on all years, it was found that November, December, and January are the months with maximum

exceedances for all four pollutants. Ozone pollution exhibits mild spike in months of May and June. Winter of 2019-20 was cleaner compared to previous two winters. NO_2 never breached the standard (See Graph 3: Number of days each pollutant exceeded NAAQS).

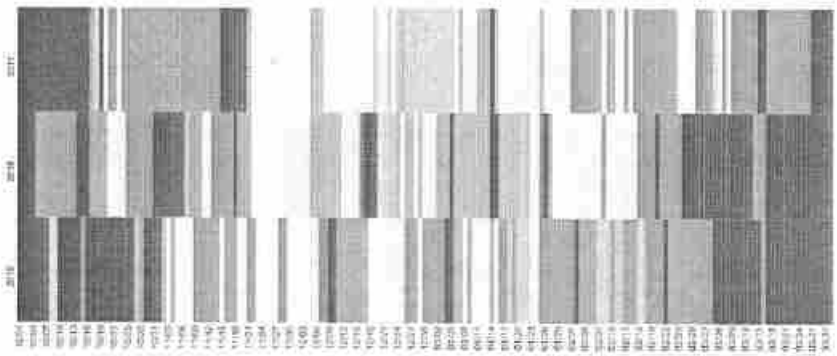
Graph 3: Number of days each pollutant exceeded NAAQS (monthly)



Source: CSE analysis

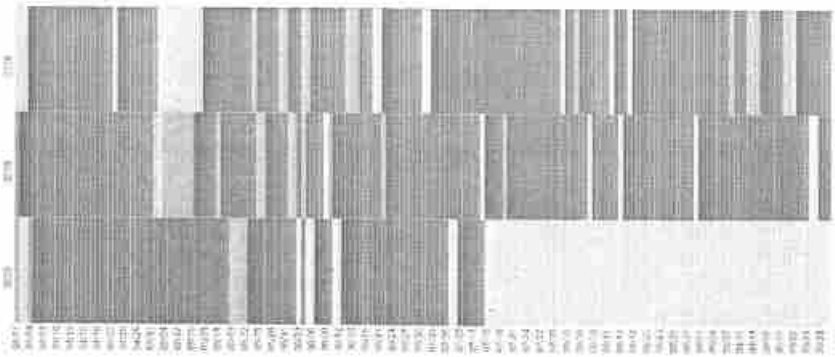
Heatmaps were plotted were for 2017, 2018 and 2019 for PM 2.5 and PM 10 daily averages. While summers were relatively clean with both levels below the standard, the winter months (1st October to 21st March) showed a significant increase, leading to poor air quality. PM10 levels were both very high in 2017 and 2018, but were relatively lower in 2019, though still remained well above the standard and in the poor category (See Figure 2, 3, 4 and 5: Heatmaps for PM 2.5 and PM10, Winter and Summer).

Figure 2: Heatmap for PM2.5: Winter (1 October to 31 March)



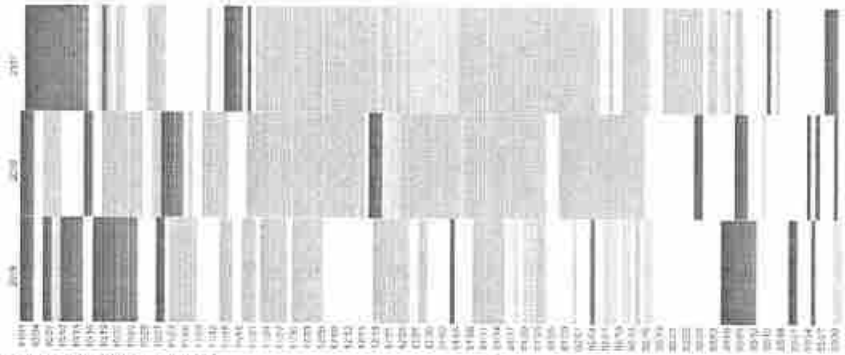
Source: CSE analysis

Figure 3: Heatmap: PM2.5: Summer (1 April to 30 September)



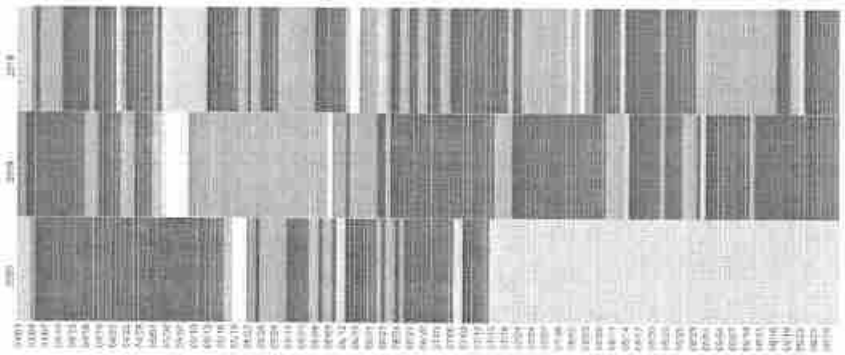
Source: CSE analysis

Figure 4: PM10: Winter (1 October to 31 March)



Source: CSE analysis

Figure 5: PM10: Summer (1 April to 30 September)

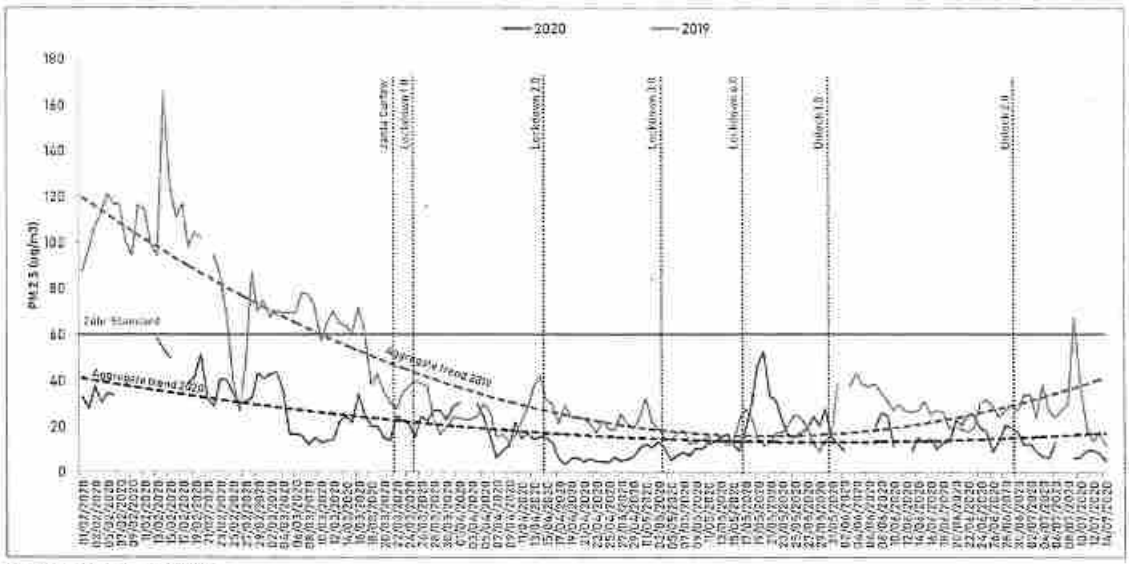


Source: CSE analysis

Effects of the lockdown: In 2020, there was a rather unusual and unplanned experiment. A nationwide lockdown was put in place to contain the raging Covid-19 pandemic. This allowed for collection of rich data, regarding how low the air quality levels could go and what were the effects on the concentration of summer pollutants like ozone. Further, one could see that the targets set forth by the NCAP were indeed achievable.

- **PM2.5**: 2020 was cleaner to start with, lockdown was marginally cleaner compared to 2019, and continued to have low concentration even during unlock period (See Graph 4: PM2.5 levels in Summer 2019 and Summer 2020)

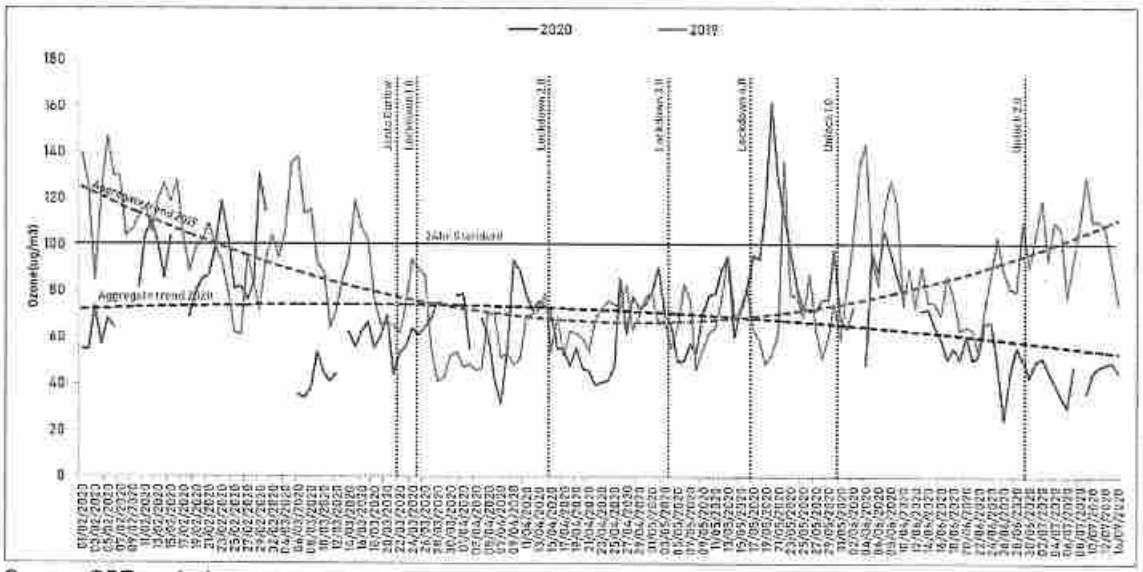
Graph 4: PM2.5 levels in Summer 2019 and Summer 2020



Source: CSE analysis

- Ozone: 2020 was cleaner to start with, but lockdown had no impact on ozone levels. Late summer build-up in ozone levels was not noted in 2020. Overall, the ozone levels in Rajamahendravaram were consistent across both pandemic and non-pandemic years (See Graph 5: Ozone levels in Summer 2019 and Summer 2020).

Graph 5: See Graph 5: Ozone levels in Summer 2019 and Summer 2020

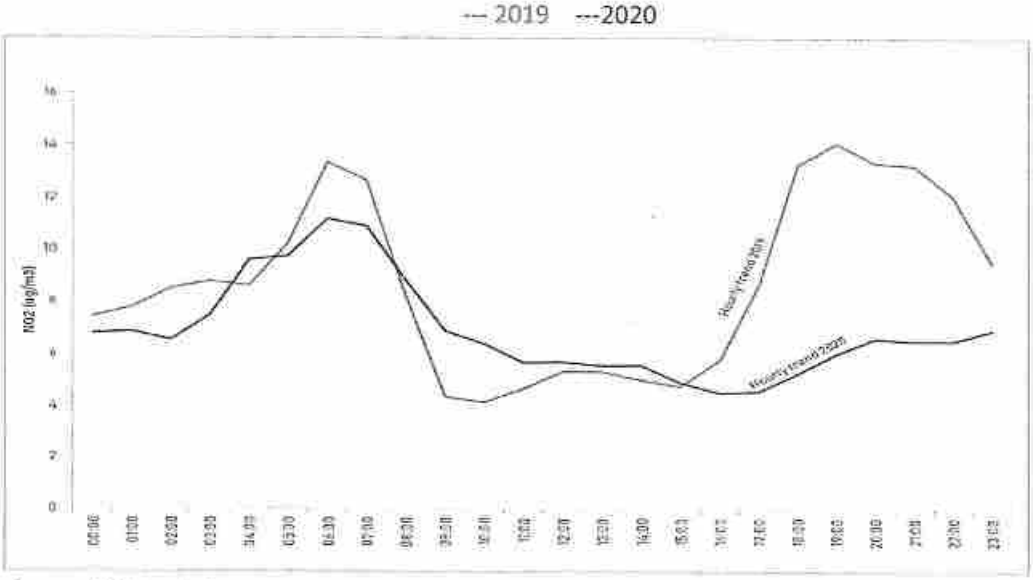


Source: CSE analysis

- NO_2: Hourly data for NO_2 was collected for the entire period. While the morning peaks showed only a slightly lower trend, evening peak for 2020 collapsed by 57 percent, owing to zero

vehicular traffic (See Graph: Typical NO2 concentration for an April day, 2019 v 2020 in Rajamahendravaram)

Graph 6: Typical NO2 concentration for an April day, 2019 v 2020 in Rajamahendravaram



Source: CSE analysis

5. National Air Quality Index and daily emergency response

The non-attainment cities under the NCAP are also required to adopt graded response action plan for short-term emergency response during smog episodes or high pollution days. The Ministry of Environment, Forest and Climate Change (MoEF&CC) had notified the National Air Quality Index (NAQI) and a corresponding health advisory in 2015. Based on this index, daily pollutant concentrations are classified and graded as good, satisfactory, moderate, poor, very poor and severe and color-coded so that the general public can understand the gravity of the problem. The health advisory has also been framed to indicate the expected health outcomes at varying severity of daily air pollution (see Table5: National Air Quality Index of India and Table 6: Health Advisory at different AQI levels in India).This is designed to control daily pollution peaks and reduce exposure and associated health risk. Smog episodes largely occur when weather is adverse with calm atmosphere or no wind, cold temperature, and lower mixing height of air that traps air and pollution very close to the ground. Short-term policy action can control further loading of emissions and prevent higher smog peaks.

Table 5: National Air Quality Index of India

AQI Category (Range)	PM10 24-hr	PM2.5 24-hr	NO2 24-hr	O3 8-hr	CO 8-hr (mg/ m3)	SO2 24-hr	NH3 24-hr	Pb 24-hr
Good (0-50)	0-50	0-30	0-40	0-50	0-1.0	0-40	0-200	0-0.5
Satisfactory (51-100)	51-100	31-60	41-80	51-100	1.1-2.0	41-80	201-400	0.5-1.0
Moderately polluted (101-200)	101-250	61-90	81-180	101-168	2.1-10	81-380	401-800	1.1-2.0

Poor (201-300)	251-350	91-120	181-280	169-208	Oct-17	381-800	801-1200	2.1-3.0
Very poor (301-400)	351-430	121-250	281-400	209-748*	17-34	801-1600	1200-1800	3.1-3.5
Severe (401-500)	430+	250+	400+	748+*	34+	1600+	1800+	3.5+

Note: Ambient concentration values of all regulated pollutants are compared with corresponding standards, and an exceedance factor is used for qualitative assessment of air quality. Air quality for a particular pollutant is defined as good, satisfactory, moderate, poor, very poor, and severe if concentration value is < 0.5, between 0.5 and 1.0, >1.0 but <1.5, and >1.5 times the standard value for that pollutant respectively.

Source: Ministry of Environment and Forest and Climate Change

Table 6: Health advisory at different AQI levels in India

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

6. Air Pollution Sources at Rajamahendravaram

As of 2020, pollution source inventory and source apportionment studies have not been carried out for Rajamahendravaram. Broad review shows that the major sources contributing to PM10 in Rajamahendravaram are industrial activities, re-suspension of road dust, emissions from vehicle movement, burning of biomass, municipal solid waste and other waste streams, construction activities, transportation of construction material such as sand, crusher metal, soil, congested roads, vehicle service centers, use of wood and coal for domestic and commercial cooking activities among others. The region also has about 87 stone quarries, and the city is home to a thriving horticulture industry. It is however not possible to assess their relative contribution. Thus, actions have been proposed for all these sources.

Industrial Emissions

The entire region is covered with paraboiled rice mills, stone crushers, mining, pulp & paper and metallurgical industries. As per the CPCB classification, there are 22 red category, 29 orange category and 32 green category industries within 15 km radius of the city boundary. The city has one large pulp and paper mill i.e., M/s Andhra Paper Mills Ltd, is existing in Rajamahendravaram. Andhra Pradesh Industrial Infrastructure Corporation (APIIC) has developed industrial estates such as Dowleswaram, Rajanagaram, Kadiyam, Samalkot and Peddapuram in East Godavari District, all of which in the same airshed of the city. The city does not have any major iron and steel plants in the vicinity. (See Table 7: List of red category industries in and around Rajamahendravaram.

Though all the major plants are registered under the APPCB, granular data collection on stack emissions, fuel used and status of air pollution control devices is required, along with data on the state of implementation of Continuous Emission Monitoring System (CEMS), management of fugitive emissions and use of clean fuel is required.

Table 7: List of red category industries within and upto 15 km radius of Rajamahendravaram city

S. No.	Name and address of the industry	Line of Activity	Distance from city in km
1	Andhra Paper Limited, Rajamundry, East Godavari District.	Pulp & Paper	Within the city limits
2	M/s. Andhra Sugars Pvt. Ltd., Kovvuru, West Godavari District.	Chemical unit	3
3	M/s.Glaxo Smithkline Consumer Health Care Limited, IDA, Dowlaiswaram(V&M), East Godavari District	Horlicks and its variants	3
4	M/s. Sri Sarvarya Sugars Ltd., Rsy.342/1B2, 342/A, 3C, 4C, 343/1, Vemagiri-V, Kadiyam, East Godavari District.	Manufacture & Bottling of aerated drinks	6
5	GMR Rajahmundry Energy Ltd., Vemagiri, Kadiyam (M), East Godavari District	Natural Gas Based Power plant	7
6	GMR Vemagiri Power Generation Limited, Vemagiri Village, Kadiyam Mandal, East Godavari District	Natural Gas Based Power plant	7
7	Andhra Paper Limited, MR Palem (V), Kadiyam (M), East Godavari Dist.,	Pulp & Paper	8
8	Sri Ramdas Paper Boards (P) Limited, (Unit – II), R.Sy.No. 66/4B, Jegurupadu (V), Kadiyam (M), East Godavari District	Waste Paper based Paper producing unit.	8
9	M/s. Omya India Private Ltd., (Formerly M/s. Calpro Minerals Corporation) Velugubanda, Chakradwarabandam (V), Rajanagaram (M), East Godavari District	Calcium Carbonate Slurry	9
10	M/s.Airports Authority of India (AAI), Rajahmundry Airport (Existing), Madhurapudi Village, Rajahmundry Rural, East Godavari District.	Air Port	9
11	GVK Industries Ltd., Jegurupadu, Kadiyam (M), East Godavari	Natural Gas Based Power plant	10
12	SBS Paper Board Private Ltd., Kanavaram(V), Rajanagaram, E.G.Dist.,	Kraft Paper Board	11
13	Indian Oil Corporation Ltd., Gokavaram Top, Gummalladoddi Korukonda (P)	Storage Terminal of Petroleum Products	12
14	Rajahmundry Paper Mills Pvt. Ltd., Parijallipeta (V), Rajanagaram, E.G. District.	Kraft Paper Board	12
15	Sri Ramalingeswara Paper Products (p) Ltd, Vemulapalli (V), Dwarapudi (M), E.G. Dist.	Waste Paper based Paper producing unit	12
16	EVB Technologies Ltd., Kanavaram, Rajanagaram	CBMWTF	12

Source: Andhra Pradesh Pollution Control Board

Often due to the difference in pricing, polluting fuels like pet coke, fuel oil, furnace oil are used. Tyre pyrolysis oil is popular in unregulated smaller units. An approved fuel list for a clean fuel strategy along with a fuel pricing policy can help to reduce emissions.

Fuels containing high levels of sulphur lead to high emission of particulates; gaseous emissions like SO_x and contribute to 'secondary' particulate load. High-sulphur fuels also contain heavy metals, which adds to the toxicity and contamination of the environment. The Supreme Court of India vide order of 24

October 2017 has banned use and sale of petroleum, coke and fuel oil in Haryana, Rajasthan and Uttar Pradesh. Delhi had banned these fuels in 1998. Only the cement, lime kiln, calcium carbide and gasification industries are allowed to use this as feedstock but not fuel. Further the order dated 13 July 2018, the Supreme Court has asked for a ban on import of pet-coke into India, with specific exemptions given to these four categories of Industries. The Ministry of Commerce, GOI has issued an order dated 17 August 2018 to this effect. Further, under India's commitments to the WTO, the country's laws are bound to treat imported and domestic pet coke equally. As of November 2018, the Ministry of Commerce &MoEF & CC are considering restricting the usage of all pet coke in India—domestic and imported. In future, policy instruments such as tax incentives might be explored as an option to incentivize industries to upgrade technologies and fuel that will bring down emissions. Following this CPCB has asked state governments to frame a policy to discourage pet coke and furnace oil as combustion fuels.

In addition, following the Supreme Court order dated 29 January 2018, CPCB notified NOx and SOx standards for 16 groups of industries out of 35 industries as directed by the Supreme Court. This will have to be enforced nation-wide. Accordingly the 16 category of industries need to be identified for implementation.

Since most of the other industries are large scale units, there needs to be thorough inspection to collect granular and transparent data on the following aspects,

- Stack emissions
- PM emission load per unit per day
- State of Air Pollution Control (APC) Devices
- State of CEMS monitoring
- Stack height
- Management of fugitive emissions
- Extent of green cover, buffer zones and plantations around major plants
- Paved roads within and around the factories to minimize dust due to freight and raw material transportation
- Detailed Environment Health and Safety norms inventory for all operating units

The city does have several rice mills and steel and alloy processing units, both of which are a rich source of fugitive emissions. Complete data on fugitive emissions was not available. It is suggested to monitor SO_x and NO_x, for all units. Generic guidance for management of fugitive emissions has been provided (See Table8: Generic Guidance to Reduce Fugitive Emissions from Rice mills and iron and steel processing units).

Table 8: Generic Guidance to reduce Fugitive Emissions from rice mills and iron and steel processing units

S. No.	Industry Type	Key sources of fugitive emissions	Suggested strategies for reduction
1.	Parboiled and Regular rice mills (Wastewater generation >=100 KLD or fuel >=12 MTD both).	Open storage bins, de-stoner machines, different stages of lifting and discharging of paddy /rice through bucket elevators, aspirators used for husk removal, boiler ash conveyance from boiler to trolley, uncovered and unprotected disposal sites, rice graders in the milling section, leakages in the	Ash generated in furnace to be manually taken out in pits. Storage of rice husk only in closed areas. Cyclone cum Bag-filters in pre-cleaning areas. Dust extraction systems for de-stoners, paddy weighing machines, paddy separator / huller and aspirators. Blowing of husk in storage areas to be done in a closed room. During transportation of husk through vehicles, it should be covered from all

		ducts/flanges from boiler to stack.	sides with tarpaulin to prevent wind blowing of husk. During loading & unloading of ash, water to be sprayed periodically to keep the ash heap in wet condition so that top layer remains wet thereby prevent blowing of ash particles due to wind. Mill location to be in line with CPCB guidelines (away from highways). The industry is plant thick plantation, to allow spreading crown trees all along the boundary wall of the plant. For large rice mills, a green belt of 3 m width shall be developed. For other rice mills, at least 2 rows of trees shall be developed along the boundary wall of plant
2.	Iron and Steel (Involving processing from ore, steel plants, sponge iron units AND processing of steel products using blast furnace/ open hearth furnace/ basic oxygen furnace. All similar industries attracting EIA Notification 2006.	Loading/ unloading of granular raw materials, leakage from coke oven battery doors, lids and gas off-takes, quenching of coke, crushing and screening of slag, tapping of molten metal, charging of furnace, pressure relief devices in gas / vapour service.	Use of hoods and enclosures for all process equipment, use of covered or enclosed conveyors, transfer points, hooding of emission controls of the blast furnace tapping operations, discharge of molten metal slag. Scrap Management Programme for prevention or minimization of contaminates in steel scrap and other feed materials, enclosures for emission controls of the charging and tapping operations. Use of appropriate sealing of flanges and valves, wet quenching of coke as opposed to conventional quenching, use of larger coke oven chambers and regulation of pressure within oven chambers.

Source: CPCB

Special attention will have to be given to management and disposal of industrial waste in industrial areas. There is not much information available on the small and medium scale units and industrial boilers. This assessment is needed to identify the mitigation strategies including common boiler policy, and clean fuel and pricing strategy.

Industrial Siting Policy

Like many other states, Andhra Pradesh Pollution Control Board has a siting policy in place. There are specific guidelines[i] for the establishment of cement factories, stone crushers, dairies, LPG bottling units, cashew processing units, rice mills, pesticide units and sponge iron manufactures. All units with investment of Rs 10 Crores and above must be away from residential areas, educational institutions and national highways. Additionally, they must also have clearly demarcated buffer zones, which can only be used for the following.

1. Vehicle parking.
2. Administrative building and security office.
3. Green belt.
4. Electrical Substation / transformers.

5. Fuel Station.
6. Water supply sumps and
7. Other non-industrial activities

Brick Kilns and Stone Crushers

There is an industrial cluster of Refractory Brick units are (about 7 units) located in Morampudi Village, adjacent to Rajamahendravaram City. There are over eighty quarry leases (See Annexure III) in the district all of which share the same airshed of the city, where routine digging, cutting and blasting of gravels, clay and china clay takes place. Additionally, there are about half a dozen stone crushers operating at Konthamuru Village which falls within 5 km distance from the Rajamahendravaram city. Konthamuru Village is also home to two hot mix plants. Though these are outside the city and exist only in the district, these would have significant bearing on the local air quality of the city. Thus this plan lists detailed actions for reducing emissions from brick kilns, stone crushers and hot mix plants.

Thermal Power Plants

There are no power plants located within the city limits and upto 25 km radius from the city limits.

Municipal Solid Waste

The city generates 180 TPD of municipal solid waste and 178 TPD collected per day through waste pickers by a system of door-to door collection. Dry and Wet waste segregation is carried out at the door-to-door level manually. The segregated dry waste is sent to MRF centre and wet waste is sent to Vermi Composting unit and some portion of wet waste is sent for home composting at door-to-door level. Luthergiri is the dumping site and is monitored for spontaneous fire and fire hydrants and sprinklers are placed at the dumpsite. Further, no waste burning is allowed and regular monitoring made by sanitary inspectors around the city. 100 per cent processing and treatment of waste and recycling will have to be planned for to avoid any possibility of open burning of waste.

Horticulture units are located at a distance of 2 to 5 km from the city boundary. The city has eight vermi-composting plants (See Annexure IV), where green waste is converted to manure. About 10 tonnes of wet waste is processed daily.

Bio-Medical waste is separately collected by a Private agency (M/s EVB Technologies). Government General Hospital and Private hospitals dispose biomedical waste daily through them for further processing. There are no bio-incinerators within the city limits and none are proposed for the near future. For dry waste, efforts are made to segregate it and recycle it through *Kabadi wallahs* (See figure 7: Images of waste collection and segregation centres in Rajamahendravaram). Rajamahendravaram Municipal Corporation (RMC) has a Memorandum of Understanding (MoU), for operation and maintenance of a dry waste collection centre with a private entity Hasiru Dala Company that carries out waste segregation, maintains the collection centre and the Material Recovery Facility (MRF) and supports livelihood of local waste pickers.

Figure 6: Images of waste collection and segregation centres in Rajamahendravaram

Construction and Demolition Waste

Due to a vast number of infrastructure projects that are ongoing in the city premises, there is a continuous problem of construction and demolition waste (C&D). As of 2020, there are about 230 active construction sites within the city limits and about 25 Tonnes per day of C&D waste are generated in Rajamahendravaram. Most of it being stored at Luthergiri MSW dump site without any processing.

Infrastructure for collection, segregation, in-situ re-utilisation in the construction sites, transportation, recycling plants and market uptake of recycled products in the construction industry will have to be planned according to the Construction and Demolition Rules 2016 of CPCB. At present there are no C&D waste recycling plants in the city, however, 10 TPD C&D waste processing plant has been proposed by RMC. Tenders have been finalised to M/s. RSR & Sridevi (JV), Rajamahendravaram and land lease approvals are being awaited from State Government.

Rajamahendravaram Municipal Corporation has issued a circular on laws and regulations to deal with C&D Waste in accordance with the guidelines set forth by the CPCB. These guidelines are available for dust control from construction.

Household Emissions

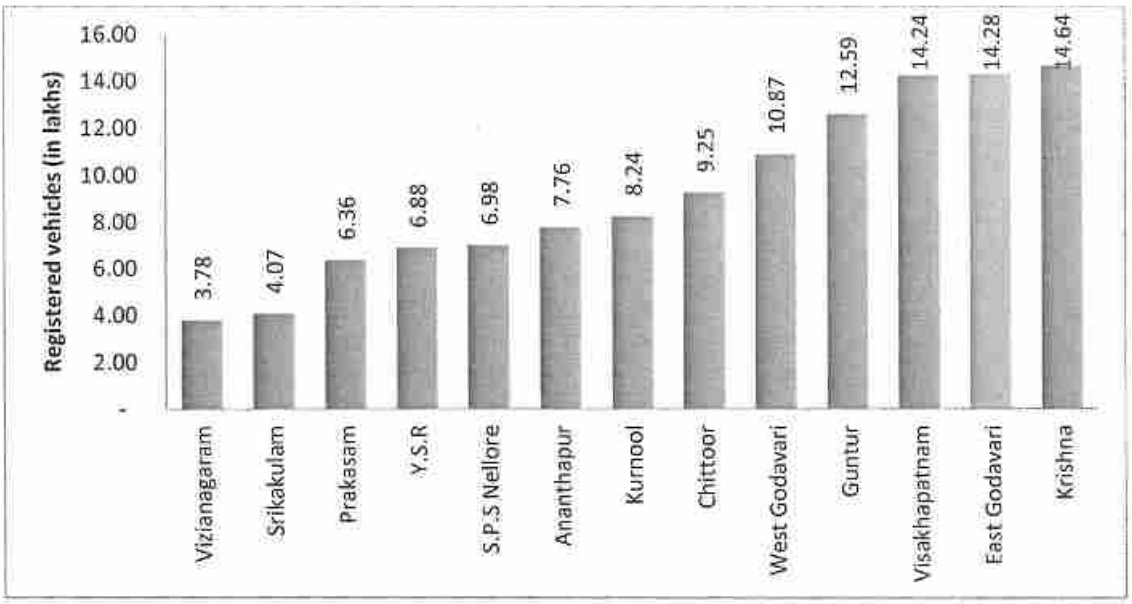
The city has excellent LPG penetration both at the commercial and household level. Within the RMC limits, almost 100 percent of households use LPG for cooking and connections have been awarded to families in the low-income strata through various government schemes. The ratio of the families which have LPG connections to the total number of EWS families is about 15,000:1. All commercial eateries and hotels use LPG and about 30 bakeries also use LPG.

Vehicular Emissions

Vehicles are among the dominant sources of air pollution and are responsible for high toxic exposure. Therefore, mobility strategy is a critical intervention point to control toxic emissions and exposure from vehicles.

As of March 2019, the East Godavari district had about 12 per cent (i.e. 14.28 lakhs) of the total registered vehicles in the state of Andhra Pradesh (i.e. 1.19 crores) *(see* **Error! Reference source not found.***)*. Between the years 2015-19, the vehicles in the district have grown at a rate of 7.8 per cent annually.

Graph 7: District-wise number of registered motor vehicles in Andhra Pradesh [March 2019]

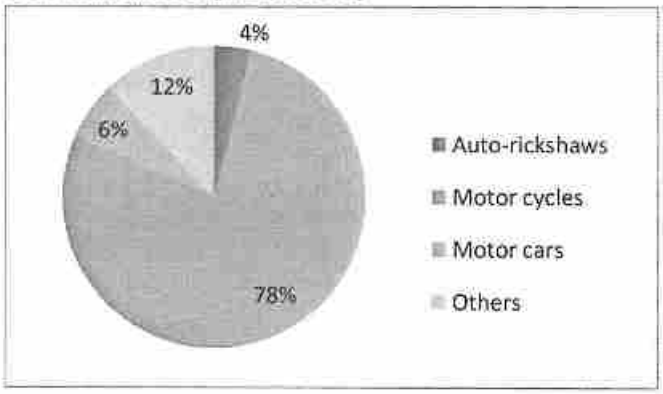


Source: Statistical abstract, 2019, Directorate of Economics and Statistics, Government of Andhra Pradesh

Two wheelers dominate the fleet- 78 per cent of the total registered vehicles *(see* **Error! Reference source not found.***)*.The district is second highest in terms of total registered vehicles and fourth highest in terms of vehicle per thousand population (i.e. 270) in the state *(see*

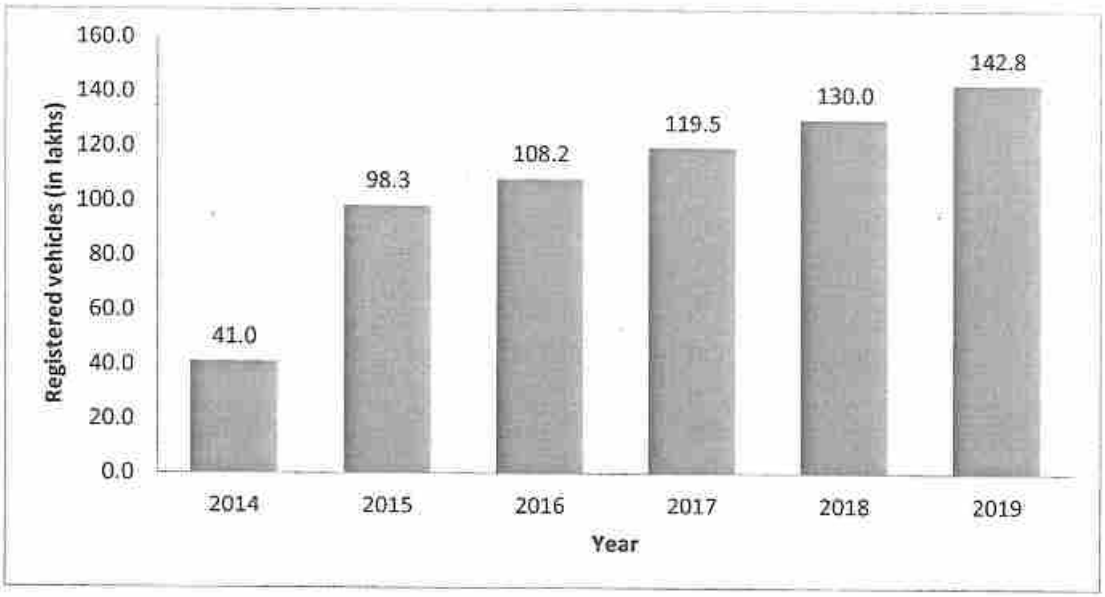
Graph 9: Year-wise growth of registered motor vehicles in East **Godavari district** *and Graph 10: District-wise registered motor vehicles per thousand population [March 2019]).*

Graph 8: Percentage distribution of registered vehicles as per vehicle category in East Godavari district [March 2019]



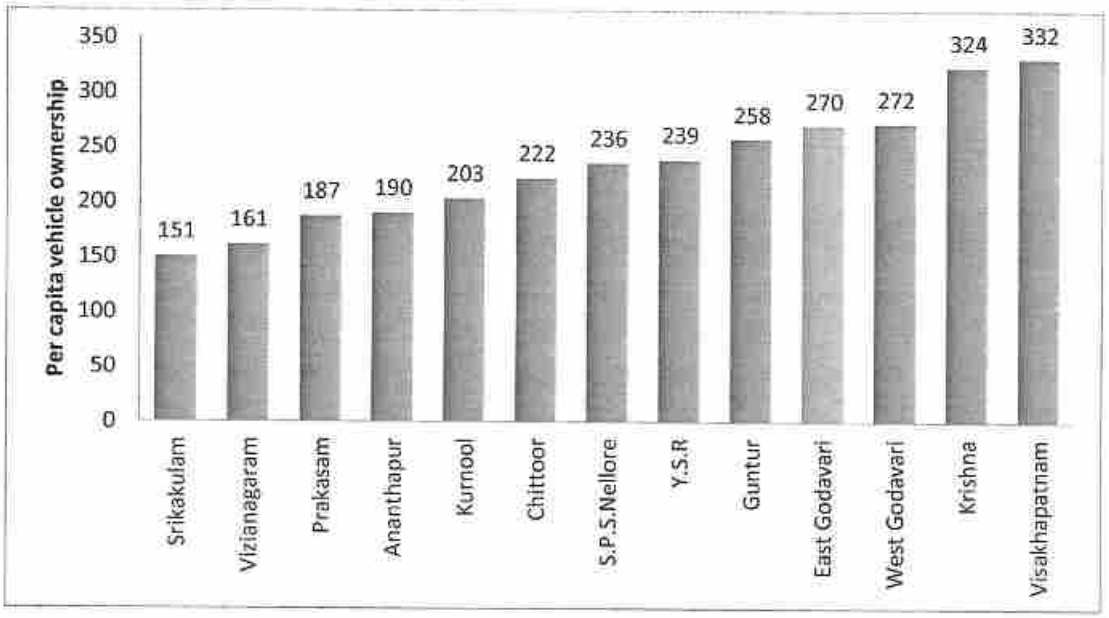
Source: Statistical abstract, 2019, Directorate of Economics and Statistics, Government of Andhra Pradesh

Graph 9: Year-wise growth of registered motor vehicles in East Godavari district



Source: Statistical abstract, 2014-19, Directorate of Economics and Statistics, Government of Andhra Pradesh

Graph 10: District-wise registered motor vehicles per thousand population [March 2019]

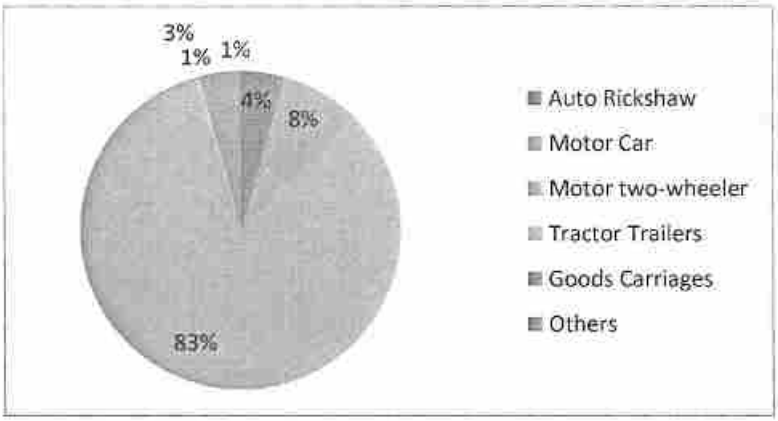


Source: Statistical abstract, 2019, Directorate of Economics and Statistics, Government of Andhra Pradesh

At present, there are around 4.49 lakhs vehicle in Rajamahendravaram city out of which highest are the two wheelers (i.e. 83 per cent) followed by cars (i.e. 8 per cent) and others. In the last decade, the

number of two-wheelers plying in the city has considerably gone up by 14 to 16 per cent and autos by 4.5 to 6 per cent approximately[i].

Graph 11: Distribution of vehicles as per category type in Rajamahendravaram city



Source: Statistical abstract, 2019, Directorate of Economics and Statistics, Government of Andhra Pradesh

There are several policy initiatives in place to address emissions from the on-road vehicular fleet. These include pollution under control certificate programme (PUC); checking of visibly polluting vehicles, green tax and gaseous fuel programme and electric vehicle programme.

Rajamahendravaram city has implemented PUC programme. There are about eight PUC testing centres in the city. However, not all of them are connected to the e-Vahan database of the Ministry of Road Transport and Highways. All of them have valid licences as of July 2020. Though a considerable number of vehicles do turn up for PUC testing, granular data is required to check the failure rate and the overall compliance level. The transport department has made efforts to keep tabs on the PUC centers. All the PUC centers have to submit monthly returns by fifth day of the succeeding month to the licensing authority concerned, with information as to the number of vehicles inspected, results of the inspections, and number of pollution under control certificates issued enclosing duplicate PUC certificates. Though this is a good start, strategies are required for further strengthening of the PUC programme based on periodic auditing of the system for credible and reliable tests and stringent compliance strategy.

At the city level, the traffic police also have a surveillance programme for detecting visibly polluting vehicles. These vehicles are heavily penalized.

Rajamahendravaram city has access to natural gas. This is an opportunity to expand the CNG programme especially for the public transport, intermediate public transport like autos and taxis, and small commercial vehicles. This requires a roadmap for targeted replacement of existing fleet with the vehicles on alternative fuels.

The State Government has also issued guidelines for levying "green tax"[ii], wherein older polluting vehicles are taxed higher to discourage them to ply. Vehicles over a certain age have to pay green tax, in accordance to the polluter pay's principle. Vehicles operating on LPG, CNG, Battery or Solar Power are exempt for paying green tax. This is expected to accelerate fleet renewal and phase out older vehicles. It must be noted that the green tax currently is very low (Transport vehicles are expected to pay only Rs 200 per annum after 7 years of registration and non-transport vehicles are expected to pay between Rs 250-500 for five years after 15 years of registration). It is recommended to incorporate a scrappage policy for older vehicles and implement green taxes more strictly.

Electric Mobility[iv]

The State Government of Andhra Pradesh notified the electric vehicle policy in the year 2018. The policy emphasizes on manufacturing of Electric Vehicles (EV) and its components, charging infrastructure, hydrogen generation and refuelling infrastructure, demand creation for EVs, and research and development.

The policy aims to achieve the following targets:

- Attract combined investments of over INR 30,000 crore in the next 5 years across the electric mobility ecosystem with an employment potential for 60,000 people.
- Target to bring in manufacturing units of high-density energy storage of at least 10GWh capacity in the next 5 years to cater to both domestic as well as export market.
- Target to convert 100 per cent of APSRTC bus fleet of over 11,000 buses into electric buses by 2029, with the first phase of 100 per cent conversion of bus fleet in top 4 cities by 2024.
- Phase out all fossil fuel based commercial fleets and logistics vehicles in top 4 cities by 2024 and all cities by 2030.
- All forms of government vehicles, including vehicles under government corporations, boards and government ambulances etc. will be converted to electric vehicles by 2024.
- Target to have 10 lakhs EVs, combined across all segment of vehicles, by 2024.
- Target to have 1 lakh slow and fast charging stations by 2024.

This is an opportunity to scale up zero emissions mobility in Rajamahendravaram city. The state level policy may be complemented by a city level electric vehicle policy with targeted electrification over the next five years. Rajamahendravaram city can set the milestones in terms of charging infrastructure and targeted electrification of three-wheelers, two-wheelers, small commercial vehicles, feeders and delivery fleet. Given the fact that the city is a tourist hub, linking electric mobility with eco-tourism will be an important opportunity.

Connectivity & Mobility

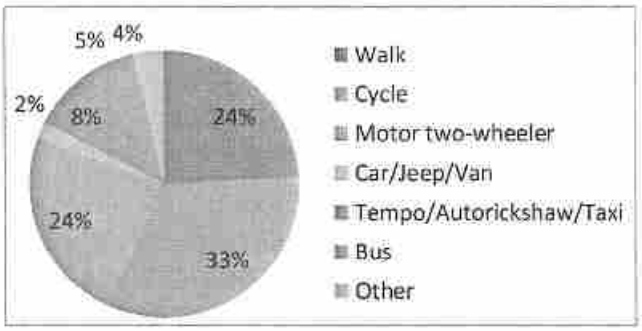
The Rajamahendravaram city is well connected via rail, road, and airport. The National Highway (NH 16) passes through the city which runs from Kolkata in the east to Chennai in the south, and passes through the states of West Bengal, Odisha, Andhra Pradesh and Tamil Nadu. The NH also connects the city with Kakinada Deep Water Port and Kakinada Anchorage Port which are used for exports and imports purposes with other countries. The State Highways (SH 12, 17, 126, 187, 189) connects the city with important towns & villages of the East Godavari district. The total road length which passes through the city is 406 km[v].

The city is situated on one of the busiest railway routes in India between Visakhapatnam and Vijayawada. The Rajamahendravaram railway station falls under South Central Railway (SCR) which primarily connects through Chennai-Howrah main broad-gauge line. The Rajamahendravaram airport is located at approximately 15 km distance from the city centre. It provides good connectivity to various cities in the state and nearby metropolitan cities.

The airport currently has operations of Indigo, Trujet and connecting major cities such as Bangalore, Chennai and Hyderabad. The city also falls on proposed National Waterways (NW 4) on Godavari River.

At the district level, according to the 2011 Census, 57 per cent of the total work trips in urban areas of the district are being made by walk and bicycle followed by motor two-wheeler and others *(see Graph 12: Modal share in urban areas of East Godavari District)*. Cycle trip dominate at about 33 per cent followed by walk and motor two-wheelers at 24 per cent each. Car share is 2 per cent. Share of bus transport is a mere 5 per cent.

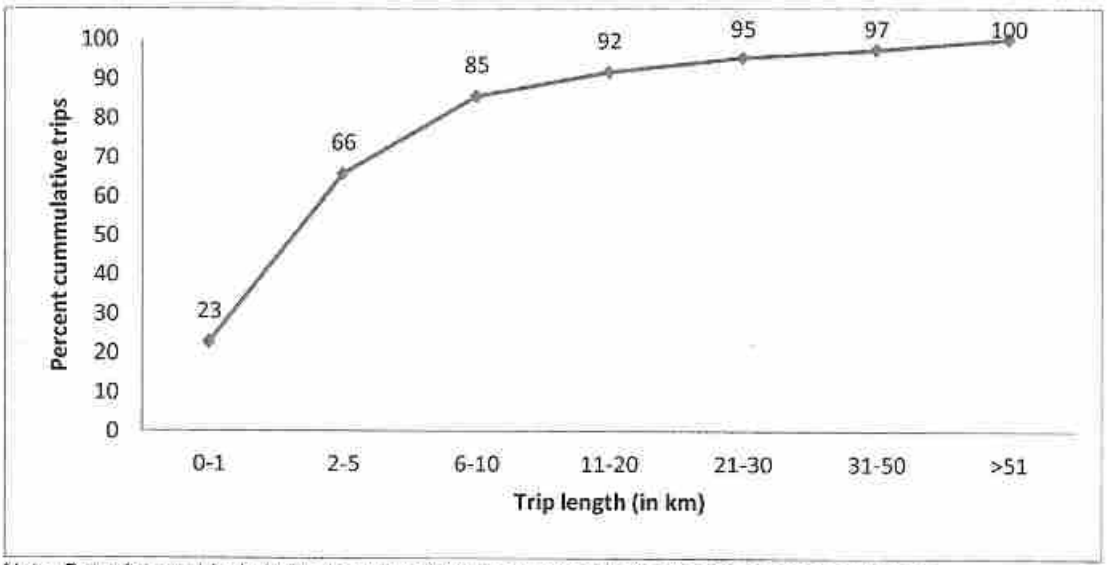
Graph 12: Modal share in urban areas of East Godavari District



Note: Data does not include "no travel" and "distance not stated" category in Census statistics
Source: Census of India 2011

The distribution of trips as per trip length shows that more than 50 per cent of the trips end within bicyclable distance which shows a potential to attract people towards bicycling provided adequate infrastructure is made available *(see Graph 13: Distribution of trip length from place of residence to workplace as per trip length in East Godavari district)*.

Graph 13: Distribution of trip length from place of residence to workplace as per trip length in East Godavari district



Note: Data does not include "no travel" and "distance not stated" category in Census statistics
Source: Census of India 2011

Public *transport service*

Rajamahendravaram city has 10 intra-city bus fleet which runs on three-routes[vi]. With population growth and change in travel pattern of the city, the bus fleet shall be parallelly augmented in such a way that bus system should have routes that penetrate within the city and should be in accordance to accepted level as per MOUD service-level benchmark.

Para Transit System

Along with the city buses service, there exists unorganized Intermediate Para Transit (IPT) in form of 15,000 auto-rickshaws**Error! Bookmark not defined.**. The bulk of the public transport service in the city is provided by IPT systems including autos and shared services. These are low occupancy but high frequency services that meet the local requirement and provide efficient connectivity including the last mile connectivity. Rajamahendravaram city should reorganize and modernize this system and upgrade these services with GPS, route rationalization, service level benchmark. This is an important opportunity to reduce dependence on personal vehicles. These vehicles can also be linked with electric vehicle programme.

Walking and Cycling

The condition of existing footpath is poor which forces pedestrians to walk on the carriage way. On street vendor encroachment, electric transformers, irregularly placed dustbins etc., are few reasons to name. The existing hawking activities should be accommodated with design such that they do not encroach upon the road side walking space. Also, the roads lack zebra markings and other safety measures that increase accident risk. But given the fact that walking and cycling share constitutes 57 per cent of the modal share and more than 50 per cent trips end within bicyclable distance in urban areas of East Godavari district, this presents an immense opportunity to promote infrastructure for walking and cycling to move towards zero emissions. This is an opportunity to reduce dependence on motorized travel for short distances. This can promote clean and active mobility for clean air.

Parking strategy to Reduce Traffic Volume

Rapid urbanization, motorization, haphazard development, narrow streets, and unorganized parking are all contributing to traffic congestion in the city. Most of the city roads are encroached with haphazardly parked vehicles. The city needs to adopt a city wide parking policy and rules at the early stages that will enable adoption of parking area management plan. This will help to identify the legal parking area and lead to demarcation in all land uses enable enforcement against illegal parking, allow parking charges to manage demand and reduce parking pressure, and prevent parking from happening in green areas, parks, on footpaths and near intersections. This can help to improve integrated management of off-site and on-site parking management, maximise utilisation of the available parking spaces. This can help to promote park and walk strategies. This city wide approach can reduce parking chaos, congestion and pollution. Parking management is considered an important demand management and pollution reduction measure.

Freight Transport

Around 12,000 trucks enter in the city on daily basis from 5 entry points. To prevent conflict between trucks and city traffic, trucks are not allowed to enter from morning 8.00 AM to 12.00 Noon and 4.00 PM to 8.00 P.M. as these hours are treated as peak hours. For diversion of non-destined trucks in the city, there are five diversion points at Bommuru, Morampudi, A.V.A.Road, J.N.Road, and Lalacheruvu.

Traffic Management and Enforcement

The city holds influx of one lakh people who come from various parts of East and West Godavari districts to the city on business, official and other works. As many as 10,000 autos, 100 school buses, 50,000 motor cycles, 1,000 cars and maxi cabs and 10,000 cycles etc. roam in the city. Because of

narrow roads and their poor maintenance, traffic congestion is observed on daily basisv. An outer ring road has been proposed to Kakinada City and Rajamahendravaram city to reduce traffic in city area. Out of total 44 major junctions in the city, 22 are signalized and 22 are non-signalized and are maintained by the city's municipal corporation. Police is working in co-ordination with Road Transport Department, Municipal authorities in the municipal areas and with the Panchayat Raj department in rural areas for creation of lanes either side of the roads. During the period between January to July 2020, total 19,251 cases were booked under traffic violations which generated revenue of 89.48 lakhs. Heavy vehicles are not allowed from morning 8.00 AM to 12.00 Noon and 4.00 PM to 8.00 P.M within city limits

Awareness campaigns are being conducted frequently with the common public and educating them about the steps being taken to control air pollution and asked them to use vehicles only in emergency and necessary purposes to control the air pollution. Vehicle users are asked to get their vehicles tested at the authorized pollution centre frequently. Further, the vehicle users are asked to maintain lane discipline and also asked not to come opposite direction on the plea of short cut to avoid collision of vehicles on the paths.

7. Comprehensive Clean Air Action Plan (CAP) for Rajamahendravaram

This pollution source-wise comprehensive action plan has been developed for Rajamahendravaram to meet the NCAP objective of 20-30 per cent reduction in particulate pollution by 2024. This plan indicates the nature, scale, scope and depth of action needed for effective reduction in different sectors.

This plan has integrated the on-going action of the state government in each sector and has further built upon that based on good practices. Sufficient indicators are included in the plan to define the nature and scope of each strategy.

This plan has identified the agencies responsible for implementation of each action point and has also indicated the timeline for implementation. This can be monitored for reporting and compliance.

This section deals with department-wise clean air action plan and compliance strategy to meet clean air standards. The following tables indicate the short, medium and long-term action along with agencies responsible for implementation of the action points in the city of Rajamahendravaram. This plan indicates short term as six months; medium term as up to one year and long term 1-2 years.

Comprehensive Action Plan (CAP): Short-, medium- and long-term measures Source-wise clean air action plan and compliance strategy for non-attainment cities to meet clean air standards.

1. Air Quality

S. No.	Source	Action Points	Micro level Action points	Present status	Agency responsible	Timeline	Budget
1.1.	Air quality monitoring and assessment	Installation and commissioning of CAAQM stations as per CPCB criteria.	Rationalise the monitoring network to capture pollution hotspots and all representative land uses.	There are 4 manual monitoring stations and 1 real time station	APPCB and CPCB	One year	Departmental funds/ NCAP funds
1.2.	Air quality monitoring and assessment	Reporting daily air quality data to public	Plan for public dissemination— web-based, billboard-based, through audio visual media, etc. Adopt as per graded response action plan.	The AQI data is available on APPCB website and paryavaran app.	APPCB	Continuous	Departmental funds/ NCAP funds
1.3.	Air quality monitoring and assessment	Quality control and quality assurance system for air quality data.	Ensure all monitors are functioning and recording data. Adopt detailed protocol for transparent reporting of CEMS data (wherever applicable) for industrial emissions monitoring and NAMP data	The NAMP data is being uploaded in the CPCB website for public dissemination.	APPCB	Continuous	Departmental funds
1.4	Air quality monitoring and assessment	Adopt satellite-based monitoring to complement ground-based air quality monitoring	Adopt an airshed approach for rural and peri-urban areas as recommended by NCAP and MoEFCC Explore application of sensor based monitoring for areas where there are no regulatory monitors and cover unmonitored areas and agricultural burning/forest fires that impacts urban air quality.	To be initiated	APPCB, CPCB, India Meteorological Department (IMD), Ministry of Earth Sciences (MoES)	One year	Departmental funds
1.5	Air quality monitoring and assessment	Adopt protocol for assessing annual and daily air quality trend for reporting compliance with the NAAQS and NCAP targets.	Adopt detailed protocol for transparent reporting of CEMS data (wherever applicable) for industrial emissions monitoring and NAMP data	The CEMS data of industries is connected to central server at APPCB, Head office and is being monitored for any abnormalities.	APPCB, CPCB	Six months	Departmental funds
1.6	Assessment of pollution sources	Source apportionment and Emission inventory studies to be carried out for the city	The SA study may be directed to a competent institution. The SA study must include the surrounding airshed along with a Health Impact Study incorporating exposure impacts.	National Knowledge Network (NKN) act as an advisory board to the CPCB. CPCB along with the advisory	APPCB, CPCB	One year	Departmental funds/ NCAP funds

				board identified the Institute of Repute (IoR) to carry out the SA & EI studies in all the states of Non-attainment cities. CPCB and APPCB jointly will carry out the SA, EI & CC studies.			
1.7	AQI forecasting	Adopt pollution forecasting system for implementation of graded response action plan.	This will also require monitoring of weather data and prior support from MOES and IMD. The system to be adopted could be on the lines of SAFAR	-	Department of Environment, APPCB, CPCB, MoES	One year	Departmental funds/ NCAP funds

2. Industries

S. No.	Source	Action Points	Micro Level Action points	Present Status	Agency responsible	Timeline for action	Budget
2.1	Industrial emissions	Implement SOx and NOx standards	Standards notified by MoEF & CC on 29 January 2018 for 16 categories of industries in and around the city – as applicable.	Under implementation	APPCB	Six months	Nil
2.2	Industrial emissions	Management of emissions from MSME sector	Inspection and monitoring surveillance of small, medium and large-scale category of industries and necessary penal action for violation of standards	Regular and random inspections are being taken up by the APPCB	APPCB, CPCB	One year	Departmental funds
2.3.	Industrial emissions	Introduction of Clean Fuels Notify approved fuel list for the state and ban use of pet coke and furnace oil.	Notify approved list of fuels for the state Ban use of pet coke and furnace oil Ensure conversion to CNG/PNG from pet coke/ furnace oil Strict enforcement against use of high sulphur content fuels and levying fines on the violators. Implement phase-in plan to promote clean fuels in industry like natural gas.	A condition of not to use pet coke in industries is being included in the CFO as per Hon'ble NGT order.	APPCB	One year	Nil
2.4	Industrial emissions	Use of CEMS	Enforce monitoring of polluting industries within urban air-shed zones via CEMS. Check for installation, upkeep and data collection.	The CEMS data of industries is connected to central server at APPCB head office and is being monitored for any abnormalities.	APPCB	Six months	Nil

S. No.	Source	Action Points	Micro Level Action points	Present Status	Agency responsible	Timeline for action	Budget
2.5	Industrial emissions	Control of fugitive emissions across all industries	Implementation of control measures during various industrial processes (in ancillary units, material transfer and handling etc). Construction of paved roads around all major industrial belts and estates; Installation of dust suppression system and green belt	All the required conditions are kept in the CFO and are being implemented by the concerned industries.	APPCB	Six months	Nil
2.6	**Natural gas based power plant**						
2.6.1	Industrial emissions	Control of pollution through technological advancements	Power plants should install Selective Catalytic reduction (SCR) and using oxygen for combustion instead of air. Usage of Selective non-catalytic reduction (SNCR) based on the temperature and reduction of NOx required.	-	APPCB	Six months	Nil
2.6.2	Industrial emissions	Clean fuel in gas turbines	Control of the pollution released during in the gas turbines as it produces NOx emissions. Use of low-Btu gases, such as landfill gas, have lower flame temperature and produce less NOx than burning natural gas.	-	APPCB	Six months	Nil
2.7	**Pulp & Paper industry**						
2.7.1	Industrial emissions	Control of gaseous emissions	Implementation of usage of bio-filters and bio-scrubbers which involves removal of pollutants from the gaseous phase which includes transfer of pollutants from air to liquid phase, transfer of pollutants from liquid phase to biofilm phase where microorganisms are located, and mineralization of pollutants by microorganisms.	-	APPCB	Six months	Nil
2.8	**Chemical Industries**						
2.8.1	Industrial Emissions	Control and monitoring of stack emissions	Ensure to comply with the NAAQS, 2009 outside the premises and stack/ chimney emissions as specified in the CFO order. Install and operate Air Pollution Controlling Equipment or Devices (APCE)	All the required conditions are kept in the CFO and are being implemented by the concerned industries. Industries not complying with the conditions are issued with notices, closure orders and reviewed in the Task Force Committee Meetings.	APPCB	Continuous	Nil

S. No.	Source	Action Points	Micro Level Action points	Present Status	Agency responsible	Timeline for action	Budget
2.9	**Bottling Plants**						
2.9.1	Industrial Emissions	Control of emissions from the storage tank	Ensure to install automatic leak detection system with alarm Ensure to comply with the NAAQS, 2009 Ensure to develop and implement SOP for emergency conditions during mishap / episodic events.	The industries are implementing all the conditions as specified in the CFO	APPCB	Continuous	Nil

3. Brick Kilns, Hot Mix Plants and Stone Crushers

S. No.	Source	Action points	Micro level Action points	Present status	Agency responsible	Timeline	Budget
3.1	Hot mix plants	Use of clean fuels	Establish a protocol to use cleaner fuels & technology for asphalt mixing and minimizing the number of hot-mix plants. Keep buffer	To be initiated	MoRTH, Municipal Corporation, APPCB	One year	Departmental funds
3.2	Hot mix plants	Emissions monitoring	Stack heights of these plants should be atleast 25 meters (as prescribed by Haryana government) or prescribed by MoEF&CC should be maintained	To be initiated	Municipal Corporation, APPCB	One year	Departmental funds
3.3	**Stone crushers**						
3.3.1	Stone crushers	Relocation of stone crushers	Remove stone crushers that are close to the city; adopt stringent dust control measures and greening as applicable. Green buffer zone should be maintained with a minimum width of 10 meters shall be maintained	To be initiated	Local administration, APPCB, Department of Industries, Commerce and Enterprises, MSME	One year	Departmental funds
3.4	**Brick Kilns**						
3.4.1	Brick Kilns	Inventory of brick kilns	Inventorize all illegal brick kilns. Mandatory conversion of all brick kilns in the district to zigzag technology and closure of all illegal brick kilns.	-	APPCB and Revenue dept.	Six months	Departmental funds
3.4.2	Brick Kilns	Design restrictions	1. Enforce restrictions on operations of brick kilns within urban airshed zones during high pollution periods; allow only those Brick kilns that comply with rectangular zig-zag design with induced draft or those with improved technology.	-	APPCB, Municipal Corporation, Department of MSME	One year	Departmental funds

S. No.	Source	Action points	Micro level Action points	Present status	Agency responsible	Timeline	Budget
			2. Convert all brick kilns to rectangular design induced zigzag technology– from FCBT natural draft.				

4. Vehicles

S. No.	Source	Action Points	Micro level action points	Present status	Agency responsible	Timeline	Budget
4.1	Vehicular emissions	Emission standards and fuel quality for new vehicles	Ensure implementation of Hon'ble Supreme Court order of October 24, 2018 and subsequent Central Government notification by MoRTH- Only BS VI compliant fuels and vehicles to be registered after April 1, 2020.	Only BS VI complaint vehicles are being registered after April 1, 2020. Regular / random checks are being conducted by RTO's to ensure the implementation of Hon'ble Supreme Court order.	Transport Department and Auto Industry Associations	Ongoing	Nil
4.2	Vehicular emissions	Gaseous fuel programme for vehicles	Shifting/ replacement of petrol/diesel driven vehicles viz., auto rickshaws, taxis and buses to CNG/LPG based vehicles.	-	Transport Department, Department of ICE, MoPNG	1 year	Nil
4.3	Vehicular emissions	Encourage clean fuels	Introduce favorable fiscal measures such as reduction in road tax to promote clean fuels and vehicles.	The State Government has issued guidelines to exempt levy of green tax on vehicles operated by LPG, CNG, battery and solar power.	Transport Department	1 year	Nil
4.4	Tail pipe emissions	Strengthen periodic auditing and over-sight of PUC centres and calibration of equipment and third-party checks.	1. Ensure PUC centers are upgraded to be capable of testing all the notified parameters and vehicles including BS VI. 2. Ensure further strengthening of ongoing linking of PUC centers with NIC vahan server to eliminate manual intervention in PUC testing. 3. Ensure all vehicles obtain valid PUC certificate vehicles without PUCcertificates are not allowed to ply. Link PUC certificate with annual vehicle insurance.	Communication has made to the MoRTH for taking necessary action in this matter. Integration with NIC vahan software is initiated. PUC program in place, though all not linked to e-Vahan server	Transport Department	1 year	Departmental Funds.
4.5	Tail pipe emissions	Ensure universal linking of PUC centres with remote server and eliminate	Implement testing of all notified emissions parameters including Lambda testing for petrol cars as notified by MORTH in 2004.	-	Transport Department	6 months	Nil

S. No.	Source	Action Points	Micro level action points	Present status	Agency responsible	Timeline	Budget
		manual intervention in PUC testing.					
4.6	Tail pipe emissions	Integrate on-board diagnostic (OBD) system fitted in new vehicles with vehicle inspection.	As per the MORTH advisory PUC centres have to check malfunctioning indicator light on dash boards of vehicles. If the light is found on vehicles to be sent back for testing in authorized workshops. Additionally, PUC centres need to check if the OBD is functioning properly.	Presently there is no OBD system within the city.	Transport Department	6 months	Departmental Funds.
4.7	Tail pipe emissions	Ensure availability of ammonia based urea for BS VI diesel vehicles	Ensure availability of the auto grade urea for the vehicles fitted with SCR system (selective catalytic reducing system) for NOx control in BS VI vehicles in coordination with the oil companies.	Steps will be taken to ensure availability of ammonia based urea in fuel stations as and when BS VI fuels available in the market.	Transport Department, Department of Civil Supplies and Oil companies	6 months	Nil
4.8	Tail pipe emissions	Penalising the visibly polluting vehicles	Remove/impose penalty/ challans, and launch extensive awareness drive against visibly polluting vehicles.	Traffic department is imposing and collecting the penalties from owners of visibly polluting vehicles.	Transport Department	Continuous 3 months	Nil
4.9	Tail pipe emissions	Set up modern centralized vehicle inspection centres for upgraded emissions	Ensure annual fitness and road worthiness tests for commercial vehicles and diesel vehicles are conducted in well equipped centralised testing centres. These centres can cater to the region	Transport department is regularly conducting the fitness checks to phase out vehicles which are 15 years & above and or completing the 2,50,000 km	Transport Department	6 months	Departmental Funds.
4.10	Emissions from older vehicles	Green Tax And Vehicle labelling or sticker programme to phase out old vehicles	Ensure measures to increase the green tax on petrol and diesel vehicles to encourage the LPG, CNG and battery operated vehicles. Ensure phasing out of old vehicles with the help of color coded sticker programme and age linked road tax policy. Set up scrapping infrastructure for scientific dismantling and disposal of old vehicles and material recovery as per the CPCB guidelines. Set up recycling units that are authorized with proper environmental guidelines and integrate the current informal scrapping units	The State Government has issued guidelines to exempt levy of green tax on vehicles operated by LPG, CNG, battery and solar power. Green tax need to be paid by Transport vehicles and Non-transport vehicles based on the age cap from the date of their registration.	Transport Department	6 months	Nil
4.11	**Freight Transport**						

S. No.	Source	Action Points	Micro level action points	Present status	Agency responsible	Timeline	Budget
4.11.1	Emissions from trucks	Diversion of truck traffic	• Rationalise movement pattern of heavy-duty trucks, and their routes and logistic infrastructure, spacing of warehouses/ wholesale marts etc, entry points and timing to reduce exposure levels • Provide truck rest areas/parks along national and state highways to prevent entry of trucks into cities during the day time or peak hours to continue. • Local trucks can shift to LNG/CNG • Use of off-peak passenger travel times to move freight and restrict the entry of heavy vehicles into cities during the day to continue.	An outer ring road is exist already exists and is being used for movement of non-destined vehicles thereby restricting the entry into the city limits. Required truck rest areas are provided at the entry of the city.	District and local administration, Municipal Corporation and PWD, NHAI	6 months	Nil
4.11.2	Emissions from trucks	Ensure fitness of trucks	Ensure fitness and road worthiness of trucks and compliance to set standards. Install weigh in motion bridges in all city entry points to control overloading	-	Transport Department	6 months	Departmental funds
4.12	**Fuel Quality and Clean Fuel standards**						
4.12.1	Poor fuel quality	Fuel quality testing to check adulteration	Ensure to create system to carry out regular/ periodic checks for fuel adulteration and monitoring the fuel quality through surprise fuel testing for all transport and non-transport fuels.	Department of Civil Supplies is ensuring the regular fuel checks through oil companies. Total 423 Retail Outlets were inspected and 524 Petrol & 580 Diesel samples were tested by Oil Industry Mobile Labs in 2019-20 in Andhra Pradesh.	MoPNG, Oil marketing companies, Department of Civil Supplies	Continuous	Departmental funds
4.12.2	Poor fuel quality	Emission control at Fuel Stations Install vapor recovery systems in fuel refueling outlets to reduce benzene and VOC emissions in cities.	Install vapour recovery systems in fuel outlets to reduce benzene and VOC emissions to comply with the Hon'ble NGT directions in respect of installation of stage I and Stage II vapour recovery system in all new retail outlets with capacity 300 KL MS per month in cities with population more than 1 lakh.	There is no monitoring system for VOC emissions in the city.	Department of Civil Supplies, Transport department, State Oil Coordinator	6 months	Nil
4.12.3	Poor fuel quality	Adopt favourable taxation policy for clean fuels	Reduce VAT and cess on CNG	-	Transport Department	6 months	Nil

5. Urban Mobility

S. No.	Source	Action Points	Micro level action points	Present status	Agency responsible	Timeline	Budget
5.1	**City Bus Service Improvement**						
5.1.1	Vehicular emissions	Ensure continuous augmentation up of Public transport intra city bus services	• Implement intra city bus services based on travel demand of city population. • Service level benchmark of Ministry of Housing and Urban Affairs should be followed to decide fleet size and network for adequate city penetration • Implement phase wise requirement of bus fleet, transit infrastructures i.e. depots, terminals and bus queue shelters etc. • Ensure adoption of EV buses through FAME II and notified state EV Policy. • Use modern technologies like Global Positioning Device (GPS), Public Information System (PIS) etc. to manage the services, locate buses and also to make it more attractive to commuters. • Introduction of Electronic Ticketing Machine for ticketing purposes. It helps to record and manage trip details, number of users, and other trip characteristics of public transport users.	Presently, there are no intra-city bus facility for the city	Bus Transport Undertaking	1 - 2 years	Departmental Budget
5.2	**Intermediate Para Transit (Autos, Shared IPT, Taxis, and electric rickshaws)**						
5.2.1	Vehicular emissions	Regularization operation of IPT through registration and planning	• Implementation of IPT operation plan and IPT route network connecting residential areas to important nodes (transport nodes, shopping areas, or other areas with high footfall) • Implement well planned dedicated parking and pick-up and drop-off points for IPT • Shared IPT/Autos – specify route, fix fare and carrying capacity. These should be mostly provided to connect very high footfall areas for easy pick-up and drop-off • Install GPS in autos for monitoring • Plan and enforce safety standards for	IPT system is un- organized.	RTO, Transport Department GoAP, Urban Local Bodies	1 – 2 Years	Departmental Funds

S. No.	Source	Action Points	Micro level action points	Present status	Agency responsible	Timeline	Budget
			IPT vehicles for driver safety and safety in driving etc to improve service				
5.3	**Non-Motorized-Transport Network**						
5.3.1	Vehicular emissions	Build adequate street network that is walkable, cyclable and provides safe mobility for all road users	All major arterial and sub-arterial roads should be redesigned to have dedicated/protected space for walking, cycling. Earmark street vending activities with respect to complete street principles and universal accessibility *(For good street design, refer to Design Standards can be followed from Indian Road Congress (IRC): 103-2012, or improved draft IRC code on road design, or any other adopted standards and good practices. Street design Guidelines document in Delhi, published by UTTIPEC can also be considered as a base document for improved road design needs)*	The condition of existing footpath is poor which forces pedestrians to walk on the carriage way. Also, the roads lack zebra markings and other safety measures that increase accident risk.	Urban Local Bodies	1 year	Departmental Funds
5.4	**Traffic Management**						
5.4.1	Vehicular emissions	Enforcement and monitoring of traffic movement to prevent congestion and ensure road safety	• Ensure installation of traffic signals at all major junctions within the city. • Levying and collection of hefty fines for traffic violation • Ensure removal of encroachments along the road stretches within the city • Explore use of Intelligent Transport Management System (ITMS) based monitoring for effectiveness and enforcement • Periodic safety audits of all the junctions within the city to ensure better planning, improvement and implementation.	Out of total 44 major junctions in the city, 22 are signalized and 22 are non-signalized and are maintained by the city's municipal corporation.	Traffic Police and Urban Local Bodies	6 months	Departmental Funds
5.5	**Parking Management**						
5.5.1	Vehicular emissions	Implement city-wide Comprehensive Parking Policy and Parking Area Management Plans (PAMP)	• Physically identify, demarcate and delimit on-street and off-street parking areas in all municipal wards based on local area assessment • Ensure no parks and green spaces are	In the city there are no designated paid parking areas. As of now parking is free of charge. And Most of the city roads are encroached with haphazardly parked vehicles.	Urban Local Bodies	1 year	Departmental Funds

S. No.	Source	Action Points	Micro level action points	Present status	Agency responsible	Timeline	Budget
		(Examples/Reference documents – Delhi parking Rules 2019, Punjab Parking Policy for Municipal towns of Punjab 2017)	converted into parking and all streets have at least one lane available all the time for free flow of traffic especially emergency vehicles. • Introduce strict fines for Illegal parking of vehicles in non-designated areas. • Introduce variable parking fees as per the location and time duration in all commercial and mixed use areas • In areas where both on-street and off-street parking is available, on-street parking charge should be higher than off-street parking charges • Wherever MLCP exists, it should be integrated with area level parking plan • On-street parking price should be higherthan MLCP to maximize use of MLCP • Introduce residential parking permit for residential areas • Implement commuter information system on availability of parking spaces in off street parking facilities. • Identify streets for parking/night time parking of commercial vehicles				

Adoption of Electric Mobility

S. No.	Source	Action Points	Micro level action points	Present status	Agency responsible	Timeline	Budget
5.6	**Adoption of Electric vehicles *(Implement the state's notified EV policy)*** *(As EV technology is new and continuously evolving, the ideas may change further to comply with most updated technology)*						
5.6.1	Vehicular emissions	Implementation of Electric Mobility policy notified by State Government. Integrating EV Infrastructure to	• Identify vehicle segment like IPT, buses, Two-wheelers – for targeted electrification • Ensure provision of required infrastructure like charging stations, maintenance depots/places, availability of spare parts, etc. • Amendment of Model building byelaws	The electric vehicle policy is yet to be implemented. The electric vehicles are not much in use and public awareness programmes needed to be planned.	Transport Department, Urban Local Bodies, New and Renewable Energy Development Corporation of	1-2 year	Departmental Funds

S. No.	Source	Action Points	Micro level action points	Present status	Agency responsible	Timeline	Budget
		create EV ecosystem (*facilitate EV adoption through integrating EV in infrastructure changes through amendment in existing byelaws and regulations)*	and state level building byelaws and design code to integrate these changes with respect to electric vehicle ecosystem. • Introduce charging facilities at residential locations by installing a dedicated metering system in accordance with electricity and energy board • Implement based on ground assessment dedicated parking facilities or priority parking of electric vehicles in designated parking areas		Andhra Pradesh Ltd. (NREDCAP).		
5.6.2	Battery waste	Management and Disposal of Batteries	• Develop and implement a policy for safe disposal of batteries after completion of their life time as per the Waste Management Rules, 2016 issued by MoEF& CC. • Notify the potential and authorized recycling facilities within the city	The electric vehicle policy is yet to be implemented.	APPCB, Transport Department and New & Renewable Energy Development Corporation of Andhra Pradesh Ltd. (NREDCAP)	1 year	Nil
5.6.3	Vehicular emissions	Enhance EV adaptation in IPT segment which is an important mode of public transport	• Incentives/schemes to IPT owners to transition from ICE vehicles to EV such as road tax rebate, concession on charges, credit on transition to EV, etc. • Provide registration for e-rickshaws	--		2 years	Nil
5.6.4	Vehicular emissions	Priority parking for EV*(Provision of dedicated on-street parking spaces for commercial and personal electric vehicles)*	• Carry out inventory of area where dedicated EV parking is feasible • Implement incentives like waiver of parking fees for electric vehicle among others.	--	Transport Department, Urban Local Bodies, APERC	1 year	Nil

6. Waste Management

S. No.	Source	Action Points	Micro level Action points	Present Status	Agency responsible	Timeline	Budget
6.1	Municipal Solid Waste	Ensure Implementation of Solid Waste Management Rules, 2016 notified by	• Implement a plan for collection and management of waste based on the quantity of solid waste collected daily. Quantify waste stream for each	The Rajamahendravaram Municipal Corporation has issued a circular to implement Solid Waste Management Rules, 2016 in city limits.	Municipal Corporation, Office of the District Magistrate	6 months	Nil

S. No.	Source	Action Points	Micro level Action points	Present Status	Agency responsible	Timeline	Budget
		MoEF & CC.	municipality and peri urban areas to plan infrastructure for collection and recycling. • Implement household level segregation, segregated transport, recycling facilities and composting facilities • Ensure GPS tracking of waste collection and transportation vehicles to dump yards and mobile spot check squads for enforcement. • Implement a plan to monitor garbage burning within city limits through sanitation team. • Levy and collect hefty fines from the violator's viz., dumping of solid waste in open areas or unauthorised places, burning of solid waste/ biomass and other waste. • Stringent implementation of amended by laws and collect fine from the violators • Mapping of all waste dumping grounds in the region as well as mobile spot check squads for enforcement.	Regular inspection is done by Ward Sanitation and environment secretaries to control open burning of solid waste.			
6.2	Municipal Solid Waste	Management of Dumping yards and treatment facilities	• Plan to convert R & B VAMBAY Houses, Ludhergiri dumping yard into scientific processing facility to ensure further processing of municipal solid waste. • The processing facility should be planned and grounded in a time bound manner to avoid further open dumping of the collected solid waste • Ensure safety measures and management at dump yard to avoid spontaneous fire at the site. Use landfill management techniques based on CPCB guidelines.	The solid waste collected from the household is being dumped at the R & B VAMBAY Houses, Ludhergiri without any further treatment. Water facility is provided to arrest the fire in emergency situations.	Municipal Corporation, Office of the District Magistrate	1 Year 6 months	Departmental Funds.
6.3	Municipal Solid Waste	Zero landfill policy	• Adopt roadmap for zero landfill policy by promoting decentralized waste segregation, reuse and recycling	About 20 per cent of dry waste treated by MRF system and 15 per cent of wet waste is processed by Vermi compost at MSR nagar, Cherukurinagar,	Municipal Corporation, APPCB	1 Year	Departmental Funds.

S. No.	Source	Action Points	Micro level Action points	Present Status	Agency responsible	Timeline	Budget
				Narayanapuram Park, GAIL office and Veerabhadranagar in Rajamahendravaram municipal Corporation area			
6.4	Solid Waste	Control of burning of biomass and crop reside and	• Ensure proper collection of horticulture/ garden waste (bio-mass) from parks and open areas and its disposal through composting within the premises. • Ensure ban on burning of agriculture waste and crop residue and its implementation.	Extensive programmes were launched by agriculture department like Polambadi & Polam pilustondi, for creating awarenss in Farming Community not to burn agricultural waste/ Stubbles	Agriculture department, MA & UD	6 months	Departmental Funds.
6.5	Municipal Solid Waste	Installation of waste to energy plant.	• Ensure to avoid installation of Waste to Energy plant if the city is having an efficient waste segregation system in place. • If required develop a proper plan with strong siting policy to locate the Waste to Energy plant away from habitation and sensitive areas including neighbourhoods of low-income groups. • Ensure stringent emission norms and real time monitoring of the emissions data through CEMS; Use of state-of-the-art technology and provide real time emissions data to SPCB.	No waste to energy plant is located either within the Rajamahendravarm city or East Godavari district	Municipal Corporation, Office of the District Magistrate and APPCB	1 year	Departmental Funds.
6.6	Incinerators	Siting policy and CEMS	Develop a siting policy for biomedical incinerators. Implement CEMS for incinerators and provide data on emissions on an open platform progressively.	No incinerators planned at this stage	APPCB	1 year	Departmental Funds.
6.7	Construction and Demolition waste	Ensure implementation of Construction & Demolition Waste Management Rules, 2016 and its subsequent amendments. Adopt and implement dust	• Ensure implementation of central C&D waste management rules of 2016 • Provide a C&D waste management facility for segregation and disposal of collected waste from the construction sites across the city. • The Waste Management Plan should be combined with building permits and made compulsory before any construction/demolition/remodeling activity by the bulk waste generators.	Around 25 TPD of C&D waste is being generated and dumped at the existing MSW dump site without further processing.	Municipal Corporation & APPCB	6 months	Departmental Funds.

S. No.	Source	Action Points	Micro level Action points	Present Status	Agency responsible	Timeline	Budget
		control measures for all types of construction - buildings and infrastructure.	• The preventive measures as mentioned in CPCB guidelinesvii. Construction agencies to be made liable. Impose penalty for non-compliance.				
6.8	Construction and Demolition waste	Zoning of construction activities	Enforce restrictions on construction activities within urban airshed zones during high pollution period	At present, C&D waste is being dumped in the low lying areas. The corporation yet to identify scientific dump yard for segregation and disposal of C & D waste.	Municipal Corporations	6 months	Departmental Funds.
6.9	Construction and Demolition waste	Notify rules to segregate construction and demolition waste in accordance to the C&D waste management rules notified in 2016 by CPCB.	Provide a network of decentralized C&D waste segregation and collection sites across the city. For material handling, construction and demolition, it should be obligatory on part of the developers to provide evidence of debris on-site recycling and/or disposal at designated sites.		Municipal Corporations	1-2 years	Departmental Funds.
6.10	Construction and Demolition waste	Set up facilities to recycle construction and demolition waste	Quantify C&D waste generation from both building and infrastructure construction. Mandate certain percentage of the material for new construction to be recycled construction waste. Implement provision of Central regulations for construction and demolition waste management rules of 2016.		District and local administration, Municipal Corporation, APPCB	1-2 years	Departmental Funds.

7. Household emissions and other strategies

S. No.	Source	Action Points	Micro level Action points	Present Status	Agency responsible	Timeline	Budget
7.1	Renewable Energy Policy and Household Emissions	Maximum access of LPG by low-income neighbourhoods, as well as roadside eateries/dhabas/ restaurants etc.	• A targeted programme towards 100 percent coverage of LPG supply to all the households and commercial activities like road site eateries/ dhabas/ restaurants, etc. • Mandate and link commercial license to clean fuels. • Create schemes like PMUY for low turnover eateries to access LPG	As of Q1 of 2020-21 total 1.38 Crs LPG Connections are released in Andhra Pradesh which is 100% penetration of HHs as per 2011 Census. Additionally, Non-Domestic LPG connections are released by Oil Companies on continuous basis	Department of Civil Supplies and Oil Companies	1 Year	Departmental Funds.

S. No.	Source	Action Points	Micro level Action points	Present Status	Agency responsible	Timeline	Budget
7.2	Gensets	Control of emissions from Diesel Generator (DG) sets.	• Ensure all the DG sets are meeting the emission norms and provided with acoustic enclosures. • Ensure power supply of 24/7 in the city to prevent usage of alternate power generating equipment. • Curtail use of DG sets in social events by providing temporary electric connections • Explore rooftop solar programme to reduce dependence on DG sets. • Ensure to obtain power connection prior to construction of large construction projects to avoid use of DG sets.	There is no or rare power cut in all over the state of Andhra Pradesh.	APPCB, APTRANSCO, APGENCO	Immediate	Departmental Funds.
7.3	Multiple Sources	Public Awareness Campaign	• Organizing the continuous public awareness campaigns engaging the schools, colleges and other academic institutions. • Organizing deeper public engagement and forums for public consultation for public understanding of the nature of solutions needed to address the complex problem of sustainable industrial development and urban mobility.	-	APPCB in collaboration with a local Civic Society Organization	6 months	Departmental Funds.
7.4	Others	Public Grievance Redressal Portal (PGRP)	• An online portal need to be created to register the complaints by public on air pollution along with a supervisory mechanism for its disposal at time bound manner. • Ensure to publicize about the online portal and its usage to all the citizens for deeper and better improvements. • Create a portal or a citizen's charter on APPCB website	A PGRP system has been established in the APPCB website and concerned officers are attending the complaints lodged by the public.	APPCB and other concerned departments.	6 months	Departmental Funds.

S. No.	Source	Action Points	Micro level Action points	Present Status	Agency responsible	Timeline	Budget
7.5	Others	Urban Green and Forests	• At least 15 – 20 % of the area in new development projects in urban areas should be developed as green cover. • Urban planning to provide for green roofs and vertical greens linked to infrastructure development. Green walling with plantations around dust generators and also to be dust barriers to be integrated with the urban forestry and forest policy.	Around 26% of the city is under green cover and it will be maintained	Forest Department, Municipal corporations	1 year	Departmental Funds.
7.6	Episodic events: All kinds of fires, leakages and explosions	Use satellite-based monitoring and on-ground enforcement to control such episodes.	• An online platform needs to be developed to integrate the meteorological and air quality data of the city for prompt and immediate actions from the emergency response system/ disaster management authority.	Andhra Pradesh State Disaster Management Authority is in the process of developing an online system for emergency situations.	APSDMA and APPCB	1 Year	Departmental Funds.
7.7	Seasonal/ Episodic events	Firecrackers during festival season	Ensure to regulate and control usage of fire crackers including restrictions on timing as per the Supreme Court and CPCB and PESO guidelines.	During Diwali festival PESO is taking steps to observe the safety like awareness programmes in public interest through print and electronic media, providing licenses for sale of the local fireworks and regular inspections to the ensure only licensed vendors are selling the crackers.	District and local administration, Police Department. APPCB, RWAs, Supported by Chief Controller of Explosives, Petroleum & Explosive Safety Organization (PESO)	Immediate	Departmental Funds.

a. Graded Response Action Plan (GRAP) proposed for Rajamahendravaram

The proposed Graded Response Action Plan is meant to be temporary measures for duration of smog episodes and is implemented according to the severity of the daily air pollution levels. Once the levels come down and stabilize, measures are withdrawn. The objective of the GRAP is to prevent pollution from getting worse when adverse weather conditions trap and spike pollution.

The proposed GRAP includes set of measures to be implemented with greater vigor and stringency to prevent and avoid high level of air pollution in cities. This is linked to the national air quality index that categorizes daily air quality as good, satisfactory, moderate, poor, very poor, severe, and emergency. All actions suggested for each category are cumulative and add up to the level of emergency as air quality worsens. For implementation of GRAP, the scientific Task Force under APPCB will advise the District Level monitoring committee on the daily pollution levels and forecasting based on real time monitoring. Accordingly, the Committee may issue notices to the city authorities to implement the pre-defined action. Each implementing department will appoint a nodal officer to facilitate implementation. The action notified for moderate and poor categories that are largely about stringent enforcement in different sectors can become default action for continuous implementation throughout the year. Additional measures meant for very poor and severe may be notified which such situation develops especially during calm and inversion conditions.

This will require daily air quality data reporting on the SPCB website and public dissemination system on air quality and health alert.

Graded Response Action Plan (GRAP) for reducing Air Pollution in Non-Attainment Cities of Andhra Pradesh

Moderate to poor **Poor - When PM2.5 levels are between 91-120 microgramme per cum or PM10 levels are between 251-350 microgramme per cum;** **Moderate - When PM2.5 is between 61-90 microgramme per cum or PM10 is between 101-250 microgramme per cum**	
Action to be taken	**Agency responsible**
Stringently enforce/stop garbage burning in landfills and other places and impose heavy fines on person responsible	Municipal Corporations
Close/stringently enforce all pollution control regulations in brick kilns and industries	Revenue and State Pollution Control Board
Stringently enforce pollution control in thermal power plants through Pollution Control Board monitoring	State Pollution Control Board
Do periodic mechanized sweeping on roads particularly in roads with heavy traffic and water sprinkling every two days	Municipal Corporations Traffic Police and PWD
Strict vigilance and no tolerance for visible emissions – stop plying of visibly polluting vehicles by impounding or heavy fine	Department of Transport Traffic Police
Stringently enforce rules for dust control in construction activities and close non-compliant sites	Municipal Corporation / District Administration, Police
Deploy traffic police for smooth traffic flow at identified vulnerable areas	Traffic Police
Divert non-destined truck traffic	Municipal Corporations Traffic Police
Strictly enforce Supreme Court orders on firecrackers	SPCB / District Administration in consultation with Chief Controller of Explosives, Petroleum and Explosive Safety Organization (PESO); Police
Ensure fly ash ponds are watered every alternate day during summer months (March-May)	Plant in charge of Power Plants
Information dissemination, social media, mobile Apps should be used to inform people about the pollution levels, contact details of control room, enable them to report polluting activities/sources to the concerned authorities, and actions that will be taken by government based on the level of pollution.	State Pollution Control Board District Administration

Very Poor When PM2.5 levels are between 121-250 microgramme per cum or PM10 levels are between 351-430 microgramme per cum	
Action to be taken	**Agency responsible**
Control use of diesel generator sets by improving electricity supply	APEPDCL and Municipal Corporation
Restrict parking and enhance parking fee by 3-4 times in commercial areas to reduce usage of personal vehicles	Municipal Corporations
Augment public transport services by increasing frequency and ensure adequate para transit services	Department of Transport State Transport Corporation
Stop use of coal/firewood in hotels and open eateries	Municipal Corporations
Alert in newspapers/TV to advise people with respiratory and cardiac patients to avoid polluted areas and restrict outdoor movement.	State Pollution Control Board Health Department

Severe When PM2.5 levels are above 250 microgramme per cum or PM10 levels are above 430 microgramme per cum	
Action to be taken	**Agency responsible**
Close brick kilns, Hot Mix plants, Stone Crushers and other highly polluting units or as applicable locally	State Pollution Control Board District Administration Police
Shut down / minimize operation of coal based polluting industrial units and plants, if emissions are found to be beyond permissible limit; Allow plants on cleaner fuels like natural gas, electricity etc.	State Pollution Control Boards
Intensify public transport services. Introduce differential rates to encourage off-peak travel.	Transport Department State Transport Corporations
Increase frequency of mechanized cleaning of road and sprinkling of water on roads. Identify road stretches with high dust generation.	All road owning agencies including Municipal Corporations, Public Works Department and National Highway Authority of India
Restrict movement of trucks inside the coal field mine areas	State pollution control board, Department of mines

Severe + or Emergency When PM2.5 levels cross 300 microgramme per cum or PM10 levels cross 500 microgramme per cum (or 5 times above the standard) or persist for 48 hrs or more.	
Action to be taken	**Agency responsible**
Stop entry of diesel truck traffic into city (except essential commodities)	Traffic Police Municipal Corporations
Stop construction activities	Pollution Control Board, Municipal Corporations
Introduce some form of vehicle restraint measures for private vehicles based on license plate numbers (odd/even scheme), or introduce low emissions zones in the city to stop entry of polluting vehicles (old and ageing and polluting diesel vehicles etc).	Transport Department, Traffic Police
State Pollution Control Board Task Force to take decision on any additional steps including shutting of schools	SPCB and Educational dept.

Action to be taken by public

While the National Air Quality Index (AQI) and health advisory will inform people about the dangers of exposure, people are also expected to take precautionary measures to protect themselves. Suggested actions by public are listed below:

Level according to AQI	Action
Very poor, severe	Those suffering from heart diseases, asthma, and other respiratory disease may consider avoiding undue and prolonged exposure

	Schools to suspend all outdoor activities and sport events
	Report visible emissions from vehicles, industries, power plants, garbage burning, and other non-compliances to the respective control rooms
	Do not use diesel and kerosene generators
	Maintain vehicles properly (PUC certificate, replace car air filter, maintain right tire pressure)
	Minimize unnecessary travel, use public transport & avoid using private vehicles

b. Monitoring Mechanism for Implementation

As per the directions of the Hon'ble National Green Tribunal, dated 08.10.2018, the Air Quality Monitoring Committee (AQMC) with six members has been constituted by the Govt. of Andhra Pradesh, vide G.O. Rt. No. 167, dated 14.11.2018 for the preparation of Action Plans. The Committee, as directed will function under the overall supervision coordination of Principle Secretary, Environment. This will further be supervised by Chief Secretary by ensuring intra sectorial coordination.

MoEF & CC vide its Letter No. D.O.No. Q-16017/12/2019-CPA Dated: 24.04.2019, requested to constitute three committees at state level for effective implementation of NCAP. Accordingly Govt. of Andhra Pradesh, vide G.O. Rt. No. 46, dated 11.06.2020 has constituted three committees namely **Steering Committee**: Headed by the Chief Secretary, **Monitoring Committee:** Head of the Departments and **Implementation Committee:** District Head/ In-charge for effective implementation of NCAP to control air pollution in the 13 Non-attainment cities and towns of Andhra Pradesh.

These Action Plans will further be communicated to all the stakeholders for compliance for control of ambient air quality in Rajamahendravaram city. Regular meetings will be convened by Implementation Committee to ensure implementation of the action plans at District level and the Compliance of the Action Plan points by the concerned stakeholder departments will be reviewed at regular intervals by the Principal Secretary, Environment & the Chief Secretary, Government of Andhra Pradesh.

MEMBER SECRETARY

Annexure I - Rajamahendravaram City: Ambient Air Quality monitoring data - PM10 values

2014															
S. No.	Stations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual average	Standard
1	M/s. Andhra Paper Ltd, Sreeram Nagar	69	69	63	67	61	65	78	58	61	61	129	64	**70**	**60**
2015															
S. No.	Stations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual average	Standard
1	M/s. Andhra Paper Ltd, Sreeram Nagar	61	59	62	62	63	60	62	47	61	61	64	68	**61**	**60**
2016															
S. No.	Stations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual average	Standard
1	M/s. Andhra Paper Ltd, Sreeram Nagar	69	69	66	62	57	56	58	60	60	64	65	63	**62**	**60**
2017															
S. No.	Stations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual average	Standard
1	M/s. Andhra Paper Ltd, Sreeram Nagar	64	65	63	64	63	61	54	49	54	68	64	102	**64**	**60**
2	Aanam Kalakshetram (CAAQMS)	Monitoring was not started							38	37	69	83	131	**72**	
	City Average	**64**	**65**	**63**	**64**	**63**	**61**	**54**	**44**	**46**	**69**	**74**	**117**	**65**	
2018															
S. No.	Stations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual average	Standard
1	M/s. Andhra Paper Ltd, Sreeram Nagar	114	85	80	50	48	59	46	44	52	77	91	119	**72**	**60**
2	M/s. GAIL, Administrative Office, A.V. Appa Rao Road	Monitoring was not started									82	87	126	**98**	
3	M/s. District Hospital, Near Central Jail	Monitoring was not started											112	**112**	
4	Aanam Kalakshetram (CAAQMS)	139	113	79	43	48	60	47	44	54	91	102	130	**79**	

City Average		127	99	80	47	48	60	47	44	53	83	93	122	75	
2019															
S. No.	**Stations**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual average**	**Standard**
1	M/s. Andhra Paper Ltd, Sreeram Nagar	148	95	46	43	59	44	22	29	28	38	103	94	**62**	**60**
2	M/s. GAIL, Administrative Office, A.V. Appa Rao Road	138	80	48	36	50	41	28	33	31	40	97	95	**60**	
3	M/s. District Hospital, Near Central Jail	150	77	46	40	57	45	30	36	31	38	102	100	**63**	
4	M/s. APEPDCL, Circle office, Godavarigattu.	61	84	45	42	50	44	30	39	32	43	113	101	**57**	
5	Aanam Kalakshetram (CAAQMS)	156	100	59	46	75	59	37	42	29	42	106	98	**71**	
City Average		**131**	**87**	**49**	**41**	**58**	**47**	**29**	**36**	**30**	**40**	**104**	**98**	**63**	
2020															
S. No.	**Stations**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual average**	**Standard**
1	M/s. Andhra Paper Ltd, Sreeram Nagar	96	71	54	No Data	No Data	35	30	26	36	50	88	111	**60**	**60**
2	M/s. GAIL, Administrative Office, A.V. Appa Rao Road	88	63	52			35	26	27	28	43	71	102	**54**	
3	M/s. District Hospital, Near Central Jail	91	76	49			No Data					75	99	**78**	
4	M/s. Andhra Paper Ltd, Sreeram Nagar	102	72	56			34	32	33	32	43	75	104	**58**	
5	Aanam Kalakshetram (CAAQMS)	89	73	53	31	53	40	27	29	33	65	88	140	**60**	
City Average		**93**	**71**	**53**	**31**	**53**	**36**	**29**	**29**	**32**	**50**	**79**	**111**	**56**	

Annexure II - Air Quality Monitoring in the region

Andhra Pradesh Pollution Control Board (APPCB) is the regulatory body to oversee all air pollution activities all over the state. As per the provisions of the Air (Prevention and Control of Pollution) Act, 1981, APPCB is monitoring ambient air quality in cities and important towns including district headquarters of the State of Andhra Pradesh. Details of the cities and towns monitored for ambient air quality are as follows:

S. No.	City/town	NAMP	SAAQMS	CAAQMS	Total
1	Visakhapatnam	9	1	2	12
2	Vijayawada	9	—	1	10
3	Guntur	4	—	—	4
4	Vizianagaram	4	1	—	5
5	Kakinada	4	—	—	4
6	Rajamahendravaram	4	—	1	5
7	Eluru	4	—	—	4
8	Srikakulam	4	—	—	4
9	Ongole	4	—	—	4
10	Nellore	4	—	—	4
11	Tirupati	4	—	1	5
12	Tirumala	1	—	1	2
13	Chittoor	4	—	—	4
14	Anantapur	4	—	—	4
15	Kurnool	4	—	—	4
16	Yerraguntla	1	—	—	1
17	Kadapa	4	—	—	4
18	Amaravati	—	—	1	1
Total		**72**	**2**	**7**	**81**

Source: APPCB, 2020

Note: NAMP – National Ambient Monitoring Program; CAAQMS: Continuous Ambient Air Quality Monitoring Station; SAAQMS: State Ambient Air Quality Monitoring Program

Annexure III – Total Existing Quarry Leases in the Jurisdiction of East Godavari District (15 km radius)

S. No.	Lease Holder Name	Name of Minerals	Mandal	Village	Extent in Hects.	Type of land	Status
1	Sri DVV Ramana Reddy	China Clay	Gandepalle	Neeladriraopeta	1.033	Patta Land	Working
2	G.Yesu Raju	Gravel	Gandepalle	Surampalem	0.809	Patta Land	Working
3	K.Srinivasa Rao	China Clay	Gandepalle	Zamindar Ragampeta	2.412	Patta Land	Working
4	Sri K.Venkata Rao	China Clay	Gandepalle	Zamindar Ragampeta	1.01	Patta Land	Working
5	Aparna Enterprises Limited	China Clay	Gandepalle	Zamindar Ragampeta	2.55	Patta Land	Working
6	Smt K.V.V.S.A.Subba Laxmi	Fireclay	Gandepalle	Zamindar Ragampeta	0.729	Patta Land	Working
7	Sri D. Subba rao	Fireclay	Kadiam	Kadiam	1.66	Patta Land	Working
8	Sri S.Sitharama Raju	Fireclay	Kadiam	Kadiam	2.233	Patta Land	Working
9	M/s Gowri Shankar Mines	Fireclay	Kadiam	Kadiam	1.214	Patta Land	Working
10	S.Seetharama Raju	Fireclay	Kadiam	Kadiam	2.614	Patta Land	Working
11	K Veerababu	Gravel	Mandapeta	Dwarapudi	1.756	Patta Land	Working
12	K.Linga Doraji	Gravel	Mandapeta	Kesavaram	1.261	Patta Land	Working
13	U Gopi	Gravel	Mandapeta	Kesavaram	1.59	Patta Land	Working
14	N.Ganesh	Gravel	Mandapeta	Kesavaram	5	Patta Land	Working
15	M/s Ch. Veerraju & Co.,	Road Metal	Rajamahendravaram Rural	Kolamuru	1.842	Patta Land	Working
16	Pidikiti Sridevi	Gravel	Rajamahendravaram Rural	Morampudi	6.791	Patta Land	Working
17	M/s Sangam Minerals	Fireclay	Rajanagaram	Konda Gunturu	13.967	Govt Land	Working
18	M/s Ratna Granites	Road Metal	Rajanagaram	Palacharla	1.571	Patta Land	Working
19	M/s Ch.Veerraju &Co.,	Road Metal	Rajanagaram	Palacharla	24.059	Patta Land	Working
20	M/s Ratna Granites	Road Metal	Rajanagaram	Palacharla	6.43	Patta Land	Working
21	Sri Venkateswara Metals	Road Metal	Rajanagaram	Palacharla	1.74	Patta Land	Working
22	M/s Hindustan Sanitaryware and Industries Ltd	China Clay	Gandepalle	Neeladriraopeta	1.78	Patta Land	Non Working
23	Jetty Satyanarayana & Others	Road Metal	Gandepalle	Yellamilli	5.75	Patta Land	Non Working
24	Sri K.Seetha Rama Laxmana Reddy	Road Metal	Gokavaram	Kalijolla	2.19	Govt Land	Non Working
25	M/s Swasthik Metals	Road Metal	Gokavaram	Kalijolla	1.456	Govt Land	Non Working
26	Sri K.Nagi Reddy	Road Metal	Gokavaram	Kalijolla	1.274	Govt Land	Non Working
27	Sri P.Ananda Reddy	Road Metal	Gokavaram	Kalijolla	2.02	Govt Land	Non Working
28	Sri P.Veera Reddy	Road Metal	Gokavaram	Kalijolla	2.02	Govt Land	Non Working
29	Sri S.Subash Chandra Bose	Road Metal	Gokavaram	Mallavaram	2.5	Govt Land	Non Working
30	Sri M.Srinivas	Road Metal	Gokavaram	Mallavaram	2.63	Govt Land	Non Working
31	M/s Swasthik Metals	Road Metal	Gokavaram	Mallavaram	0.886	Govt Land	Non Working

32	M/s Swasthik Metals	Road Metal	Gokavaram	Mallavaram	0.575	Govt Land	Non Working
33	Prudhvi Granites	Road Metal	Gokavaram	Mallavaram	2	Govt Land	Non Working
34	T.Nageswara Rao	Road Metal	Gokavaram	Mallavaram	2	Govt Land	Non Working
35	Sri S.Veera Reddy	Fireclay	Kadiam	Dowleswaram	8.672	Govt Land	Non Working
36	N.Ganapathi Rao	Gravel	Kadiam	Vemagiri	0.821	Patta Land	Non Working
37	N.Ganapathi Rao	Gravel	Mandapeta	Kesavaram	2.205	Patta Land	Non Working
38	Smt. K.Suramma	Gravel	Mandapeta	Vemulapalli	2.023	Patta Land	Non Working
39	Sri V.S.N Murthy	Fireclay	Rajamahendravaram Rural	Dowleswaram	4.388	Patta Land	Non Working
40	Sri S.Veera Reddy	Gravel	Rajamahendravaram Rural	Dowleswaram	3.634	Patta Land	Non Working
41	A.Venkata Kishore	Gravel	Rajanagaram	Konda Gunturu,	2.023	Patta Land	Non Working
42	M/s Sangham Minerals	Gravel	Rajanagaram	Konda Gunturu	2	Govt Land	Non Working
43	Smt M. Lalitha Kumari	Road Metal	Rajanagaram	Palacharla	2.81	Patta Land	Non Working
44	M/s.CH Veerraju & Co	Road Metal	Rajanagaram	Palacharla	3.7	Patta Land	Non Working
45	M/s.Cherkuri Veerraju & others	Road Metal	Rajanagaram	Palacharla	24.156	Patta Land	Non Working
46	M/s Ch.Veerraju &Co.,	Road Metal	Rajanagaram	Palacharla	24.253	Patta Land	Non Working
47	M/s Cherkuri Veerraju Associates	Road Metal	Rajanagaram	Palacharla	10.08	Patta Land	Non Working
48	M/s Ch.Veerraju &Co.,	Road Metal	Rajanagaram	Palacharla	19.421	Patta Land	Non Working
49	Sree Sai Chaitanya & Co	Road Metal	Rajanagaram	Palacharla	0.81	Patta Land	Non Working
50	Sri Medapati Veera Raghava Reddy	Road Metal	Rajanagaram	Palacharla	0.886	Patta Land	Non Working
51	M.Suresh Kumar	Fireclay	Rajanagaram	Patha Thungapadu	2.326	Govt Land	Non Working
52	M/s Venkateswara Granites	Road Metal	Rajanagaram	Rajanagaram	5.099	Patta Land	Non Working
53	Venkata Krishna Metal Crusher	Road Metal	Rajanagaram	Rajanagaram	7.294	Patta Land	Non Working
54	Smt K.Ganga Bhavani	Road Metal	Rajanagaram	Rajanagaram	3.156	Patta Land	Non Working
55	Sri M.V.V.Satyanarayana	Road Metal	Seethanagaram	Chinakondepudi	2.82	Govt Land	Non Working
56	Sri M.V.V.Satyanarayana	Road Metal	Seethanagaram	Chinakondepudi	1.21	Govt Land	Non Working
57	Smt.N.Jeevendra	Road Metal	Seethanagaram	Nagampalle	0.785	Govt Land	Non Working
58	Smt N.Kasi Annapurna	Road Metal	Seethanagaram	Nagampalle	1.214	Govt Land	Non Working
59	M.Suryakantham	Road Metal	Seethanagaram	Nagampalle	0.5	Govt Land	Non Working
60	M.Srhari Reddy	Road Metal	Seethanagaram	Nagampalle	1	Govt Land	Non Working
61	M/s Chamundeswari Minerals	Road Metal	Seethanagaram	Nagampalle	1.618	Govt Land	Non Working
62	M/s Balatripura Sundari Metal Suppliers	Road Metal	Seethanagaram	Nagampalle	1	Govt Land	Non Working
63	Sri M.Ramakrishna	Road Metal	Seethanagaram	Nagampalle	1	Govt Land	Non Working
64	Smt D.Padma	Road Metal	Seethanagaram	Purushothapatnam	2	Govt Land	Non Working

Source: APPCB, 2020

Annexure IV – List of Vermi-composting units in Rajamahendravaram

RAJAMAHENDRAVARAM MUNICIPAL CORPORATION			
VERMI COMPOST PLANTS			
Sl. No.	Area at vermi compost	Capacity of Tonnage	Processing
1	IOC	2.5	1.125
2	Gadalammanagar	2.5	1.125
3	MSR Nagar	2.5	1.125
4	Cherukurinagar	2.5	1.125
5	Narayanapuram Park	2.5	1.125
6	Narayanapuram Park	2.5	1.125
7	GAIL OFFICE	2.5	1.125
8	Veerabhadranagar	2.5	1.125
9	Wet waste Composter at vehicle Yard	1	1
	Total	**21**	**10**

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