



Vijayawada and Hamburg

International Urban Cooperation (IUC) - India

Urban Cooperation Local Action Plan

Solid Waste Management

Vijayawada

December, 2020





The Local Action Plan at a Glance

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| Cities | Vijayawada, India | Hamburg, Germany |
| State/Country | Andhra Pradesh/India | Germany |
| Population | 1.355.510 (2020) | 1,900, 000 (2020) |
| Size in km² | 61.88 | 755.22 |
| Pairing agreement signing date | September 19 th , 2018 | December 5 th , 2018 |
| Date of city visit to counterpart city | 3-7 December, 2018 | 25 Feb – 1 Mar, 2019 |
| Theme of cooperation | Solid Waste Management | |
| Key challenges of cooperation theme | <ul style="list-style-type: none"> • Source Segregation • Rapidly increasing areas to be served • Inadequate resources • Lack of advanced technology • High cost of manpower and low efficiency • Societal and management apathy • Increase in demand for service level deliveries • Environmental concerns | |
| Objective | <p>The main objective of the cooperation is to prepare a baseline report with regards to the current solid waste management (SWM) practices being followed in Vijayawada city (e.g., quantities, regulations, challenges, indicative recommendations, projections, national and international cases). The baseline study can set the framework for a more detailed feasibility study.</p> | |
| Short description of action and key activities | <p>Main activity: Baseline report for Solid Waste Management for Vijayawada.</p> <p>The objectives of the proposed study are to:</p> <ol style="list-style-type: none"> i. Provide all necessary baseline information that will enable a clear understanding of the current status of SWM operations in Vijayawada. <p>It is envisaged that the Baseline Study will cover broadly the following aspects:</p> <ol style="list-style-type: none"> i. To establish a baseline of the current practices to handle the SWM. This should include the policies, governance structures, organisational structure, quantities, characteristics (physical & chemical) and handling. ii. To estimate the amount and type of waste that will be generated over the next 2 decades in line with the urban development plan, demographics, proposed action plan and national norms. | |



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| | <p>iii. To present international experience (with a focus on the EU) on similar processes.</p> <p>iv. To set the basis for a more detailed Feasibility Study that will later look into more detail on technologies, economic-social-environmental criteria, business case analysis, etc.</p> |
| Expected benefits | <ul style="list-style-type: none"> • Baseline estimation regarding SWM in Vijayawada • Review of technical interventions • Preparation of the framework for a feasibility study • Consideration of Hamburg as a model case for EU projects |
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1. CITY OVERVIEWS: context and sustainable urban development challenge(s)

| Indian City: | Vijayawada |
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| City Context (e.g. population statistics, demography, location of the city, key industries, urban assets) | |
| <p>Vijayawada city is one of the thirty-five metropolitan cities in the country and the second largest city in the State of Andhra Pradesh after Visakhapatnam. It is located on the banks of river Krishna. Vijayawada has considerable historical importance and cultural heritage. It is considered as the agricultural and commercial capital of Andhra Pradesh. VMC is more than a century old and has been constituted as a municipality in 1888 with an area of 30 sq. km. It was upgraded as a Municipal Corporation in 1981. As of 2020, Vijayawada City with an extent of 61.88 sq.km of area and dwellings of 3.5 lac households has more than 1,355,510 (2020) population which constitute 3.9% of total urban population of the State of Andhra Pradesh.¹ As per an estimate, the projected population of Vijayawada for the year 2021 will be 1,396,853</p> <p>The landscape of city is marked by undulating small and medium sized hillocks with extensive plain lands between them. The Krishna River is a dominant part of the geography of City and runs through it. Although the hills here are a continuation of the Eastern Ghat chains, they, in general have a low elevation compared to the rest of the Ghats. Vijayawada is the only city in the world with two rivers - the Krishna & the Budameru. The city also has three canals – Bandar, Eluru and Ryves. The average ground water depth is 10 meters. The City falls under Earth Quake Zone-III declared by Government of India reports. With the natural vulnerability, Vijayawada City is exposed to multi hazard risk profile and considered most vulnerable in terms of Natural and Man-made disasters. As per a report carried out by USAID-UNDP, the city is exposed and vulnerable at varying degrees to various natural hazards including cyclonic wind, flood, heat wave, and rock fall. In addition to this, the city has history of outbreak of malaria epidemics. The city also experiences wide spread vector borne and water borne diseases.</p> <p>As of 2011 Census of India, the city had a population of 1,039,518. The total population constitute, 520,550 males and 518,968 females —a sex ratio of 997 females per 1000 males, higher than the national average of 940 per 1000. 92,848 children are in the age group of 0–6 years, of which 47,582 are boys and 45,266 are girls—a ratio of 951 per 1000. The average literacy rate stands at 82.59% (male 86.25%; female 78.94%) with 858,538 literates, significantly higher than the national average of 73%.</p> <p>Factors contributing to the city’s economic growth include agricultural exports, tourism, resources, industries and transportation etc. The economy depends largely on trade and commerce, which provides entrepreneurial growth. About 70% of working people are involved in tertiary activities. As per the historical data and future trends, the GDP of the city in 2010 was \$3 billion (Rs. 18,000 crore) and is expected to grow up to \$17 billion (Rs. 1,02,000 crore) by 2025. According to Oxford Economics report carried out by Oxford Economics Institution, the GDP of the city in 2018 was \$5.8 billion and is expected to grow up to \$21 billion by 2035².</p> | |

¹ http://www.vmcgm.org/city_profile.html

² <https://www.financialexpress.com/economy/worlds-top-10-fastest-growing-cities-are-all-from-india-check-which-cities-made-it-to-oxford-list/1585498/>

The city of Vijayawada is traditionally the main agricultural market centre for Krishna basin and acts as a major commercial centre to a host of wholesale and retail activities, dealing in consumer goods, textiles, automobiles and industrial products etc. It is also a major trading place for processed Virginia tobacco, cotton and turmeric. The agricultural commodities produced in this part of Andhra find its market in Vijayawada both local consumption and export. Vijayawada is also known for its mango exports, generating crores worth turnover annually.

Identify Sustainable **Urban Development** challenges that your city is planning to address through the IUC program *(please include a summary of existing strategies and policies relevant to these challenges, if any) Include data, information, analysis or other evidence about the extent of the challenge.*

Vijayawada City is spread across 61.88 km² and is divided into 34 sanitary divisions and 59 municipal wards for the purpose of SWM.

The total waste generated is around 620 metric tons per day of which, approximately 265 metric tons is wet waste and 285 metric tons is dry waste. The rest of the waste falls under mix category. The wet waste comprises of discarded vegetables, fruits and flowers and is composted at waste treatment plants and composting units located across the city to produce organic manure, while dry waste comprising of construction and demolition waste, silt, etc. is transferred to the dumping yards. The city is processing 240 metric tons of wet waste and 177 metric tons of dry waste to produce compost and other material of commercial value. The rest of the inert waste is sent it to the landfill site for final disposal. The city has an existing waste to energy plant and a bio methanization plant for processing the organic waste into manure and power generation. Vijayawada is the only city in India to completely use the waste generated for these purposes.³

There are a number of challenges related to waste management in VMC. The figure below lists the key challenges.



³ <http://www.ourvmc.org/#/aboutvmc>



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| EU City: | Hamburg |
| City Context (e.g. population statistics, demography, location of the city, key industries, urban assets) | |
| <p>Hamburg, officially the Free and Hanseatic City of Hamburg, is the second-largest city in Germany after Berlin and 7th largest city in the European Union with a population of 1,900,000 with about 1,041,724 private households. Moreover, there are about 100,000 commercial enterprises. In addition, Hamburg has Europe's second-largest port and is an attractive location for industries and companies.</p> <p>Hamburg is at a sheltered natural harbour on the southern fanning-out of the Jutland Peninsula, between Continental Europe to the south and Scandinavia to the north, with the North Sea to the west and the Baltic Sea to the northeast. It is on the River Elbe at its confluence with the Alster and Bille</p> <p>The Gross domestic product (GDP) of Hamburg was 119.0 billion € in 2018, accounting for 3.6% of German economic output. GDP per capita adjusted for purchasing power was 59,600 € or 197% of the EU27 average in the same year. The GDP per employee was 132% of the EU average. The city has a relatively high employment rate, at 88 percent of the working-age population, employed in over 160,000 businesses. The average income in 2016 of employees was €49,332. The unemployment rate stood at 6.1% in October 2018 and was higher than the German average.</p> <p>Hamburg's most important economic sectors are the maritime industry, aviation, automotive, media and biotechnologies. Hamburg's port fulfils important functions in support of foreign trade, both for the German economy and for Germany's immediate European neighbors. In 2016, Hamburg was ranked the 3rd-largest container port in Europe.</p> <p>Hamburg's five largest employers are in the aviation, health, trade and transportation sectors. In 2017, 102,996 companies were located in Hamburg which represent 2.9% of the total amount of German companies. From this amount of companies, 99.49% are SMEs (less than 250 employees). This amount of large companies (522) in Hamburg is proportionally to its surface area important and positions the region in the upper half of the most important larger companies host regions.</p> | |
| Identify Sustainable Urban Development challenges that your city is planning to address through the IUC program (please include a summary of existing strategies and policies relevant to these challenges, if possible) | |



In Hamburg, a division is made between waste from private households, from commercial enterprises including public facilities, from wastewater treatment and street cleaning (infrastructure waste), construction and demolition waste, hazardous waste, and ash (slag) from municipal waste incineration. Private households generate the largest volume of waste, closely followed by commercial enterprises. Street cleaning waste represents the lowest volume of waste in Hamburg.

To ensure a successful waste management in Hamburg, a holistic approach to waste treatment is required. This includes the prevention of waste by the population. At the same time, environmentally friendly and efficient waste disposal systems are needed. As a third factor, innovative projects highlight new techniques and unimagined cooperation on micro and macro level.

1.1. Lowering Waste Production - City Projects and Citizens Engagement

The easiest and best way to protect the environment is the avoidance of waste. True to the motto: The best waste is the waste that is not produced in the first place. This is why Hamburg has participated in the joint Federal Waste Programme, which was adopted by the Federal Cabinet in 2013. The following measures taken by Hamburg to avoid waste should be highlighted.

First of all, there are two Horizon 2020 projects taken by Hamburg in the lead management of the European Union. The FORCE Project – Cities Cooperating for Circular Economy: This HORIZON 2020 project on recycling management (2016-2020), in which the Senate Chancellery, Stadtreinigung Hamburg, Aurubis, Hafen City University and the University of Applied Sciences are involved, is coordinated by the City of Copenhagen. The project aims to develop new concepts for waste prevention and treatment for four different recyclable materials (plastics, biomass, waste electrical equipment and wood - municipal waste). Within the framework of this project, Hamburg has dealt with old electrical appliances and established new processes that enable the continued use of these appliances.

Furthermore, there is the CIRCUIT Project – Demonstrating systemic urban development for circular and regenerative cities: Together with the City of Copenhagen and the Helsinki Region Environmental Services Authority, this recently launched project (2019-2023) aims to develop methods to reduce the consumption of raw materials in urban development and to increase the degree of reuse of building materials in a sustainable way. In Hamburg, the project is expected to realise a pilot building made of recycled building materials (Wilhelmsburg Town Hall district). In consultation with the senior building director and the IBA International Building Exhibition, building contractor Otto Wulff is currently drawing up a concept for the building project. In Hamburg, the City in the form of the Senate Chancellery, the Technical University Hamburg and the companies Otto Wulff, EGGERS Tiefbau and Dörner Kies und Deponien are involved in this project.

Recycling and upcycling: Likewise, the City of Hamburg implemented warehouses for used goods ("Stilbruch" <https://www.stilbruch.de/>) where citizens bring their clothes, furniture, toys and tableware. The goods are upcycled in repair shops and re-sold. This concept is broadly accepted by the citizens and contributes remarkably to decrease the amount of solid waste.

Beyond this, the free Zero-Waste-App, which is unique in this form for Hamburg, helps Hamburgers to find so-called Zero-Waste-Hotspots in their area. It offers them the opportunity to actively add



their own tips and suggestions. Zero-Waste-Hotspots include shops and cafés that place value on climate-friendly consumption and avoid avoidable packaging. (<https://www.hamburg.de/pressearchiv-fhh/12772940/2019-07-23-bue-zero-waste/>)

Finally, there is a clean-up campaign called "Hamburg tidies up!" which takes place annually. On a set day, volunteers clear public areas such as playgrounds, schoolyards or parks of loose rubbish. This clean-up campaign improves the quality of life of every citizen and raises awareness of our environment and nature. Having fun and getting things moving together also promotes a sense of community among everyone involved. (<https://www.hamburg-raeumt-auf.de/>)

1.2. Waste Separation

After waste prevention, waste separation is an important component of Hamburg's holistic approach. Waste in Hamburg is divided into different types of waste: Paper and cardboard, bio and green waste, metal, waste wood, glass, plastics, packaging and similar recyclables, electronic scrap, textiles, bulky waste and mixed commercial waste. Most of this waste is picked up by refuse collection vehicles of which the City of Hamburg has got about 200. Apart from that, there are 12 recycling yards in Hamburg where citizens can hand in bulky waste, green waste, recyclable and problem materials.

1.3. Processing of waste

At the next level, the waste is brought to one of Hamburg's waste incineration and processing plants. The Hanseatic City comprises two major waste processing plants, the waste processing plant Borsigstraße (MVB) and the waste processing plant Rugenberger Damm (MVR). MVB operates a plant with two lines for the thermal recycling of household waste and waste similar to household waste and a biomass cogeneration plant for the recycling of waste wood. In this way, environmentally friendly electricity can be generated and a large part of the basic supply of district heating can be ensured in the Hamburg districts. In 2019, MVB generated around 788,000 megawatt hours of district heating and over 118,000 megawatt hours of electricity for Hamburg's population from the recycling of over 340,000 tonnes (t) of municipal waste and more than 146,000 tonnes (t) of waste wood.

MVR also operates a waste-to-energy plant for the thermal treatment of household and similar waste. The plant has two incineration lines with a total annual waste capacity of about 320,000 tonnes. The energy generated is fed into the local supply networks in the form of process steam, electricity and district heating. It supplies industrial customers in Neuhof with process steam and the Neuwiedenthal district with heat. Operation of the former biogas plant was discontinued in the first quarter of 2019. In addition, Hamburg has a paper marketing company, a distribution company for compost products and one for slag, which is responsible for the distribution of slag produced in waste incineration plants as a building material, in particular for road and path construction.

The Centre for Resources and Energy (ZRE) will be built by 2025 on the former site of a decommissioned waste incineration plant, a combination of different plants for sorting and recycling waste that is unique in Germany until now. A core element is a sorting plant that will process up to 140,000 tonnes (t) of household waste per year. Recyclable materials are sorted out and passed on for processing. Residual waste and bio-waste are to be used to produce biogas. ZRE generates climate-friendly district heating and electricity with biogas, dried biomass and plants for the thermal



utilisation of waste wood and substitute fuel. All plant components together produce up to 60 megawatts of heat, up to 15 megawatts of electricity and around ten megawatts of biogas. ZRE will generate up to nine percent of the district heating produced in Hamburg and thus play a central role in the future supply of Hamburg households with climate-friendly district heating. (<https://www.stadtreinigung.hamburg/nachhaltigkeit/umweltdienstleistungen/verwertung/>)

1.4. Recycling and Energy production

In 1999, Hamburg became the first federal state to completely discontinue the landfilling of untreated municipal waste. This measure was not only a decisive step for the environmental service branch, but also an important contribution to climate protection. The fermentation of waste used to produce large quantities of greenhouse gases at landfills, including methane, which is extremely harmful to the climate. Today, we can avoid these emissions of around 500,000 tonnes (t) of CO₂ per year. By using waste sensibly, we save another 500,000 tonnes (t) of CO₂: Energy recovery from waste replaces fossil fuels, and by recycling valuable materials we reduce the consumption of primary raw materials. We assume responsibility for the aftercare of eleven old waste deposits. The overall share of recycled waste lies at around 58.2 percent (2019). The aim of the Hamburg Government is to reach 65 percent by 2030.

2. THEMATIC AREAS(S) OF COOPERATION AND MEASURABLE, SPECIFIC OBJECTIVES

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| Cooperation Area n°1: | <i>Solid Waste Management</i> |
| <p>Contribution to the Sustainable Development Goals:</p> <p><i>(see guidelines for full list)</i></p> |  <p>The initiative will directly contribute to sustainable development goals number 3, 6, 7, 11, 12, 13 and 17.</p> |



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| <p>Contribution to the EU Urban Agenda themes:</p> <p><i>(see guidelines for full list)</i></p> | <div data-bbox="574 317 1235 590" style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #0056b3; color: white; margin: 0;">12 PRIORITY THEMES</p> <p style="text-align: center; font-size: small; margin: 0;">PARTNERSHIPS WHICH ALREADY STARTED</p> <div style="display: grid; grid-template-columns: repeat(6, 1fr); gap: 5px;"> <div style="text-align: center;"> <small>INTEGRATION OF MIGRANTS & REFUGEES</small></div> <div style="text-align: center;"> <small>AIR QUALITY</small></div> <div style="text-align: center;"> <small>HOUSING</small></div> <div style="text-align: center;"> <small>URBAN POVERTY</small></div> <div style="text-align: center;"> <small>CIRCULAR ECONOMY</small></div> <div style="text-align: center;"> <small>CLIMATE ADAPTATION</small></div> <div style="text-align: center;"> <small>ENERGY TRANSITION</small></div> <div style="text-align: center;"> <small>URBAN MOBILITY</small></div> <div style="text-align: center;"> <small>DIGITAL TRANSITION</small></div> <div style="text-align: center;"> <small>PUBLIC PROCUREMENT</small></div> <div style="text-align: center;"> <small>JOBS & SKILLS IN LOCAL ECONOMY</small></div> <div style="text-align: center;"> <small>SUSTAINABLE USE OF LAND AND NATURE-BASED SOLUTIONS</small></div> </div> </div> <p>The initiative is relevant to:</p> <ul style="list-style-type: none"> • Air Quality • Circular Economy • Climate Adaptation • Sustainable use of Land and Nature-based Solutions |
| Focus: | <i>Solid Waste Management</i> |
| Specific Objective n°1: | <i>Preparation of a baseline report regarding current SWM practices – current waste handling practices, relevant policies and stakeholders</i> |
| Description: | The main objective of the cooperation is to prepare a baseline report with regards to the current solid waste management (SWM) practices being followed in Vijayawada city (e.g., quantities, regulations, challenges, indicative recommendations, projections, national and international cases). The baseline study can set the framework for a more detailed feasibility study. |
| Expected Result: | <ul style="list-style-type: none"> • Baseline estimation regarding SWM in Vijayawada • Review of technical interventions • Preparation of the framework for a feasibility study • Consideration of Hamburg as a model case for EU projects |
| Result indicator: | Development of baseline study |
| Target groups: | Vijayawada Municipal Corporation |

3. PLANNED ACTIONS

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| Reference to cooperation area: | <i>Solid Waste Management</i> |
| Specific Objective 1: | <i>Preparation of a baseline report regarding current SWM practices – current waste handling practices, relevant policies and stakeholders</i> |
| 1.1. Action or Pilot Name: | Baseline report for Solid Waste Management in Vijayawada city |
| City to be implemented: | Vijayawada |
| Activity leader: | <i>Vijayawada Municipal Corporation</i> |
| Brief Description: | |

The contents of the study are presented below:

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| 2 | Introduction | 2-3 |
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| Sub Activity 1.1.1 | <ul style="list-style-type: none"> • Identification of key stakeholders concerning Solid Waste Vijayawada city • Collection of relevant information for the estimation of baseline scenario concerning SWM, its characteristics and other relevant baseline information. • Establishment of a baseline of the current practices to handle the waste. This should include the policies, governance structures, organisational structure, quantities, characteristics (physical & chemical) and handling. • Estimation of the amount and type of waste that will be generated over the next 2 decades in line with the urban development plan, demographics, proposed treatment plants and national norms. |
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| Sub Activity 1.1.2 | <ul style="list-style-type: none"> • Presentation of international experience (with a focus on the EU) on similar processes. • Setting the basis for a more detailed Feasibility Study that will later look into more detail on technologies, economic-social-environmental criteria, business case analysis. |
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| Outputs Expected: | One Baseline study for SWM in Vijayawada city |
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| Specific Timeframe: | 3-4 months |
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| Estimated Total Budget, if applicable: | NA |
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| EU Stakeholder(s) | Description & main role and responsibilities |
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| Hamburg City | <ul style="list-style-type: none"> • Assessment of baseline scenario regarding solid waste - amount of waste and its characteristics • Stakeholder engagement and crucial discussions • Exchange of information and best practices in the areas of solid waste management |



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| IUC/India | Support with networking, coordination, and formulation of study. |
| Non-EU Stakeholder(s) | Description & main role and responsibilities |
| Vijayawada Municipal Corporation | <ul style="list-style-type: none"> • Information sharing • Discussions and stakeholder consultations • Provision of feedback and reviews • Assistance in preparation of a baseline study concerning solid waste for the city of Vijayawada |

4. CALENDAR OF KEY EVENTS AND MILESTONES

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| Sept.-Dec. 2018 | <ul style="list-style-type: none"> • Signing of pairing agreements with Vijayawada and Hamburg Cities • First Exchange visit from Vijayawada to Hamburg |
| Feb.-March 2019 | <ul style="list-style-type: none"> • Exchange visit from Hamburg to Vijayawada |
| October 2019 | <ul style="list-style-type: none"> • EU workshop on Sustainable Urbanization |
| July-Dec. 2020 | <ul style="list-style-type: none"> • Collection of data for the preparation of baseline report on SWM • Finalization of the draft baseline report on SWM • Preparation of the draft UCAP • Submission of baseline report to VMC |

5. KEY LEARNING AND CHALLENGES

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| <ul style="list-style-type: none"> • Proactive planning to compensate for procedural delays • Collection of accurate information is key to planning and appropriate solutions • Maintaining rapport with the relevant stakeholders for the provision of crucial information and planning important activities • Strengthening the existing partnerships with innovative methodology and requisite technical support • Identification of specific challenges is the key to building strong partnerships and recommending appropriate solutions |
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6. THE FUTURE: Sustainability of the cooperation process

- Strong relationship built through the cooperation between the two cities to ensure the sustainability of cooperation between the cities
- Vijayawada and Hamburg to work on further scale up and replication of the pilot activities on a city-wide scale
- Both the cities to explore various other areas of working together where the cities have mutual interests
- Updates on regular basis on the monitoring and evaluation process of the activities
- Participation in global networking events