



ROAD MAP FOR ZERO WASTE AHMEDABAD

A Visionary Document to Guide Ahmedabad towards becoming
a 'Resource Efficient and Zero Waste City' by 2031



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Contents

Executive Summary	4
Introduction	5
Background	6
About 'Road Map for Zero Waste Ahmedabad - 2031'	8
Multi-stakeholder Consultation towards Zero Waste Ahmedabad	8
Future Role of Ahmedabad Municipal Corporation	9
Waste Management in Ahmedabad	10
Waste Generation	10
Waste Collection	10
Waste Processing	10
Waste Disposal	10
Key Issues Identified with Municipal Waste Management at Ahmedabad	13
The Way Forward – Need for a Radical Paradigm Shift	14
Overarching Objectives of Ahmedabad Zero Waste Road Map	16
Zero Waste Road Map - Guiding Principles	17
Key Focus Areas and Strategic Actions	18
Successful Example of Implementing Zero Waste – Case of Zero Waste South Australia	24
Conclusion	25
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Attachment 1: Summary of Strategic Actions	26
Attachment 2: Consultation towards Zero Waste Ahmedabad	29
Attachment 3: Case Study – Zero Waste South Australia	30

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Executive Summary

The International Partnership for Expanding Waste Management Services of Local Authorities (IPLA) aims to foster partnerships to achieve sustainable waste management. This Road Map for Zero Waste Ahmedabad forms part of this initiative and has been prepared with assistance from the United Nations Center for Regional Development.

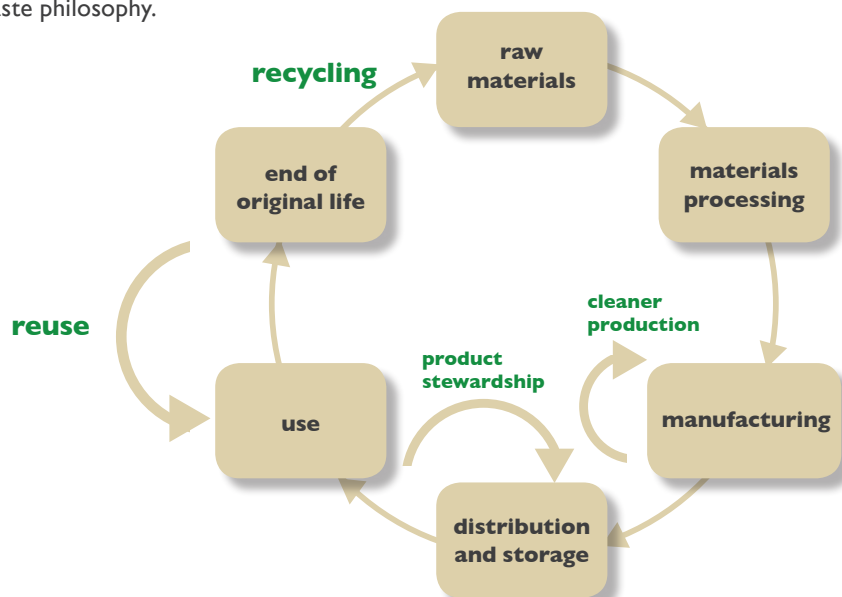
Recent years have seen greater recognition of the challenge that society's waste poses for the environment and the community. The responsibility is a serious concern for local authorities all over the world.

The concept of Zero Waste aims to minimize use of resources and maximize the ongoing benefits of the intrinsic value within the waste generated by society. Ahmedabad has become one of the first metropolitan cities from the developing world to adopt a zero waste goal.

Almost 110,667 metric tonnes (MT) of solid waste is generated from the city every month. Around 98 percent of this is collected by AMC. Of this, about 10,000 MT is currently processed. About 90 percent of the generated waste is being dumped in the open at the Pirana landfill site. Waste disposal is expensive, both financially and in terms of lost resources. A sustainable, preventative and comprehensive approach towards waste is needed.

The Concept of Zero Waste and the 3R Approach

The last decade, however, has seen the focus shift to prevention through introduction of a 3Rs – Reduce, Reuse, and Recycle hierarchy and a Zero Waste philosophy.



The focus of this road map is cradle to cradle processes, to view products in all its stages to minimize waste and maximise usefulness.

The 3 Rs are:

- Reduce - reduce generation of waste at the source
- Reuse - maximise recovery of materials for reuse
- Recycle - maximise recycling of discarded material

Zero Waste seeks to design and manage products and processes to reduce the quantity and toxicity of waste with an ultimate goal of eliminating waste that needs to be burned or buried or that can harm the environment and people.

The following guiding principles underpin the Zero Waste Road Map.

- resource conservation
- promoting the efficient use and recovery / reuse of resources
- environmental protection
- sustainable development
- polluter pays
- precautionary approaches
- continuous improvement
- shared responsibility.

Priorities and Strategic Action

Thirty-four strategic actions are proposed in ten focus areas:

1. environmental protection

2. health, sanitation and safety standards

3. dedicated institutional structures and governance arrangements

4. community awareness and ownership

5. segregation of waste streams

6. partnerships and collaborations

7. sustainable innovative infrastructure and technologies

8. education and awareness at all levels

9. investment in 3R infrastructure (eco-towns, science parks, eco-industrial zones)

10. implementation and systematic review process

For ease of reference the focus areas and strategic actions are summarised into a single page as Attachment 1.

More Information

Development of this report has involved wide ranging consultation. A summary of key information from that consultation forms Attachment 2.

Zero Waste South Australia has successfully implemented programs to reduce waste and the harm that waste can cause and have generously provided advice and support to the development of this road map. The authors would like to thank Zero Waste SA for its assistance. A conference paper presented to CSD Intersessional Conference on Building Partnerships for Moving towards Zero Waste, 2011, forms Attachment 3.

Conclusion

The Zero Waste Road Map will act as a visionary guiding document for AMC in its journey to achieve Zero Waste by the year 2031. AMC calls upon all relevant key stakeholders, including Government Departments, private and business sector, scientific and research institutions, NGOs, financial institutions, informal sector, and citizens to actively cooperate with AMC in achieving this goal.

Introduction

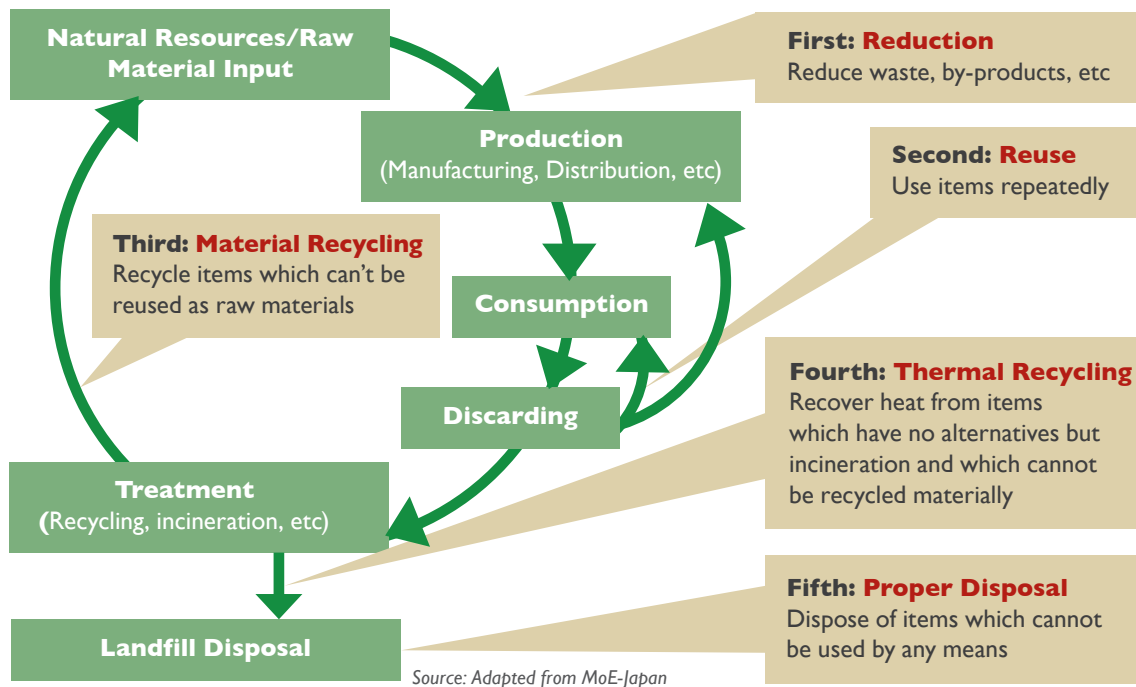
In the last few decades, the world has seen an exponential growth in consumption because of globalization, population growth, technology advancements and free market economies. The true environmental and economic impacts of this phenomenon are now becoming increasingly obvious.

Communities all around the world are now confronting serious environmental issues such as climate change, deforestation, water pollution, air pollution, soil contamination and more. The world is also now confronting the serious issue of rapidly dwindling resources.

Local governments have a key role to play in dealing with these challenges as they have the primary responsibility of dealing with the ever-increasing quantity of waste produced by residents and businesses. In past decades, local governments adopted an 'end of pipe' approach to collect and dispose the wastes in an environmentally safe manner. The last decade, however, has seen the focus shift to prevention through introduction of a 3R hierarchy and a Zero Waste philosophy.

3Rs offer an environmentally friendly alternative to moving towards a zero waste society and to deal with impact of growing wastes on human health, economy and natural ecosystem

The zero waste International Alliance defines zero waste as “a goal that is both pragmatic and visionary, to guide people to emulate sustainable natural cycles, where all discarded materials are resources for others to use. Zero waste means designing and managing products and processes to reduce the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. Implementing zero waste will eliminate all discharges to land, water and air that may be a threat to planetary, human, animal or plant health”.



In the Outcome Document of the United Nations Conference on Sustainable Development (Rio+20), held at Rio de Janeiro from 20 to 22 June 2012 – *The Future We Want*, the Heads of State and Government, among others:

- acknowledge increasing resource efficiency and reduction of waste and achieving green economy in the context of sustainable development and poverty eradication are complementary to each other in enhancing the ability to manage natural resources sustainably and with lower negative environmental impacts
- recognize that urgent action on unsustainable patterns of production and consumption where they occur remains fundamental in addressing environmental sustainability and promoting conservation and sustainable use of biodiversity and ecosystems, regeneration of natural resources and the promotion of sustained, inclusive and equitable global growth
- call for development and implementation of policies for resource efficiency and environmentally sound waste management, including commitment to further 3Rs as well as to increase energy recovery from waste with a view to managing the majority of global waste in an environmentally sound manner
- call for development and enforcement of comprehensive national and local waste management policies, strategies, laws and regulations, and
- call for continued, new and innovative public-private partnerships among industry, governments, academia and other non-

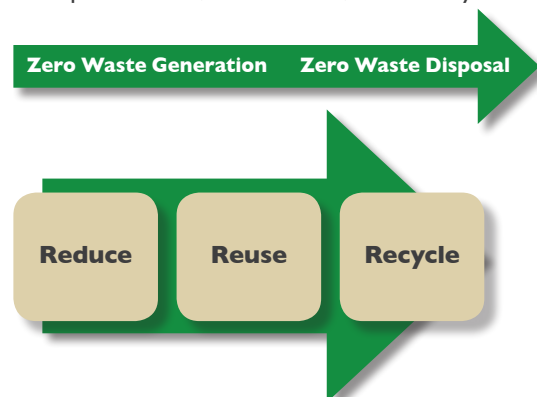
governmental stakeholders aiming to enhance capacity and technology for environmentally sound chemicals and waste management, including for waste prevention.

In this regard, Zero Waste reflects a shared global vision in which resources are used sparingly, efficiently and optimally, and systems are in place to manage waste without significant negative impacts on the health of citizens and the quality of the environment.

Zero Waste represents an aspiration to minimize use of resources in manufacture and distribution, minimize consumption by society and maximize the capture, reuse, recycling, and recovery of the intrinsic value within the waste generated by society.

Conservation of resources and environmental protection are the two fundamental objectives of Zero Waste. In simple terms, the key aspirational Zero Waste goals are:

- Zero Waste Generation focuses on the conservation of valuable resources
- Zero Waste Disposal focuses on the protection of public health, environment, and local system.





Background

The International Partnership for Expanding Waste Management Services of Local Authorities (IPLA) was formally launched at United Nations Commission on Sustainable Development (CSD-19) in May 2011. Its aim is to foster partnerships among local authorities, private and industry sector, international organizations, donor agencies, scientific and research institutions, and Non-Governmental Organisations (NGOs) to achieve sustainable waste management.

One of the main goals of IPLA is to help local authorities move towards a zero waste society as reflected in the IPLA Declaration for Moving towards Zero Waste, agreed at the Special Event of ISWA World Congress 2011 - *Moving Towards Zero Waste for Green Economy – Role of Local Authorities (LAs)*, Daegu, Republic of Korea, 17-18 October 2011.

As a party to the above Declaration, Ahmedabad Municipal Corporation (AMC), sought technical assistance from the United Nations Centre for Regional Development (UNCRD) to develop a *Road Map for Zero Waste Ahmedabad - 2031*. Ahmedabad has become one of the first metropolitan cities from the developing world to adopt a zero waste goal.

This document is the first outcome for this initiative.

About 'Road Map for Zero Waste Ahmedabad - 2031'

The Road Map for Zero Waste Ahmedabad (the road map) offers a visionary document to guide AMC to introduce and implement policies and strategies, and to raise awareness amongst private, business, industrial, scientific and research communities in Ahmedabad. The road map provides a focus to work together towards a resource efficient and zero waste society.

The road map builds on the ongoing work undertaken by AMC in improving the state of waste management in Ahmedabad in light of challenges posed by historical actions and present socio-economic constraints in India. The strategies outlined in this road map take into consideration world's best practice and the expressed views of stakeholders. The road map is specific to Ahmedabad and developed within the context of its social, economic, cultural and political environment.

Multi-stakeholder Consultation towards Zero Waste Ahmedabad

A stakeholders' consultation meeting was jointly organized by the AMC and UNCRD on 18 April 2012 in Ahmedabad, to solicit inputs and views of key stakeholders such as senior decision makers from the local and State Government of Gujarat, research institutes, non-government organisations, consulting organisations, and industries. The meeting reached a common understanding on the need for a mechanism to foster close inter-ministerial and departmental coordination to implement the road map. It was also clear that the goal of Zero Waste can only be achieved through stronger and formal collaborative arrangements between government, scientific and research institutions, and the industry sector.

The major recommendations and suggestions emerging from the stakeholders meeting are summarized in Attachment 2.

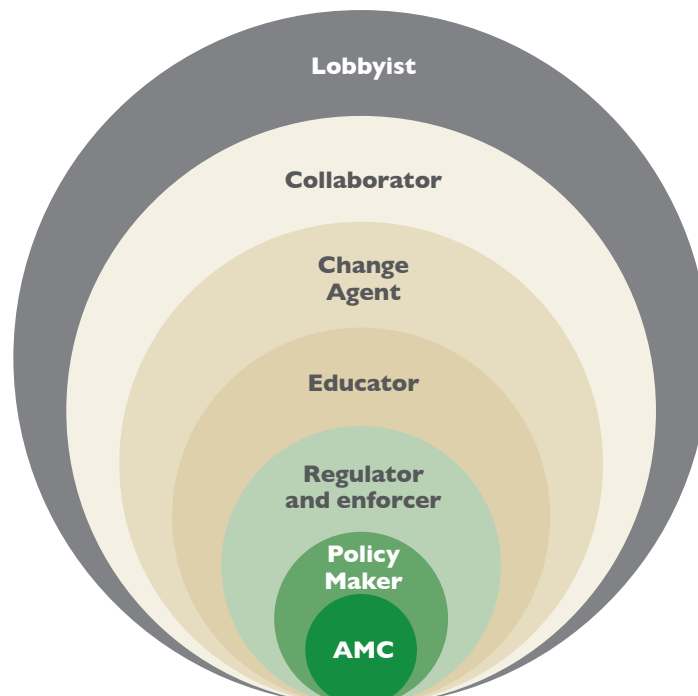


Future Role of Ahmedabad Municipal Corporation

Delivering the road map will need partnerships, concerted effort and coordination between all levels of government, scientific and business sectors and consumers. Whilst the initial focus would be on reuse and recycling, this will need to shift to fundamentally re-designing products, their manufacturing process and associated packaging. Throw-away products will need to be replaced with products designed for reuse, repair, recyclability and decreased toxicity.

Achieving zero waste is a shared responsibility. Whilst AMC has the regulatory responsibility for waste management, AMC will need to work in several different roles to achieve its goal.

AMC's Roles in Zero Waste Ecosystem



Waste Management in Ahmedabad

Waste Generation

Almost 110,667 metric tonnes (MT) of solid waste is generated from the city on a monthly basis.

Waste Collection

Approximately 106,000 to 110,000 MT (around 98 percent) of waste is collected monthly by AMC from various stream or sources of generation including:

- Door/gate to dump system (includes residences, commercial establishments, institutes, offices, etc)

- Street sweeping

- Hotels' and restaurants' kitchen waste

- Construction & Demolition (C&D) waste

- Waste from special markets (including slaughter house, meat / fish / vegetable markets)

- Lifting of dead animals.

Waste Processing

AMC has two processing plants, one for converting waste into compost and another for producing refuse derived fuel (RDF). In addition to existing processing plants with a cumulative capacity of 1000 MT per day, another 1300 MT per day capacity of processing plants are being setup in the city. Total Municipal Solid Waste (MSW) processed in Ahmedabad is 10,000 MT monthly out of a total of 110,667 MT.

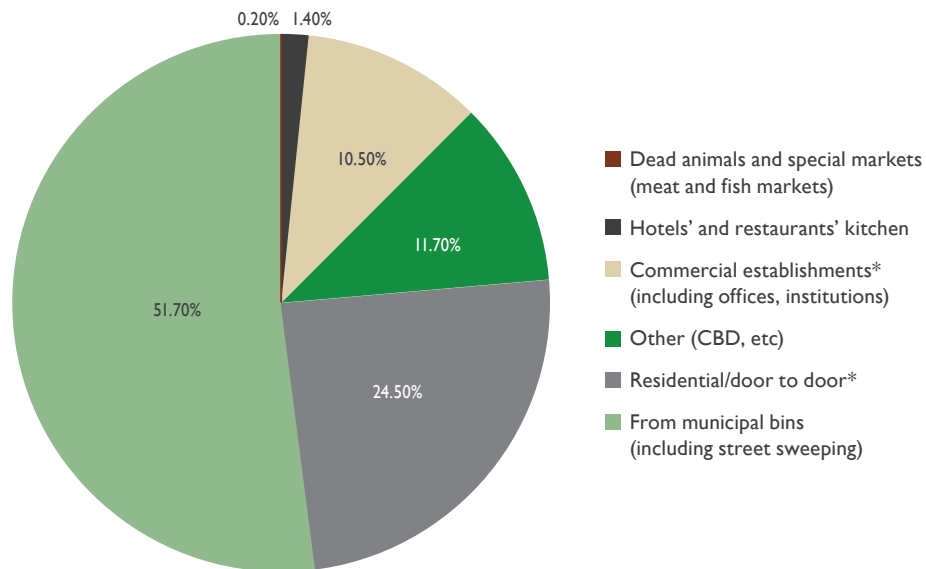
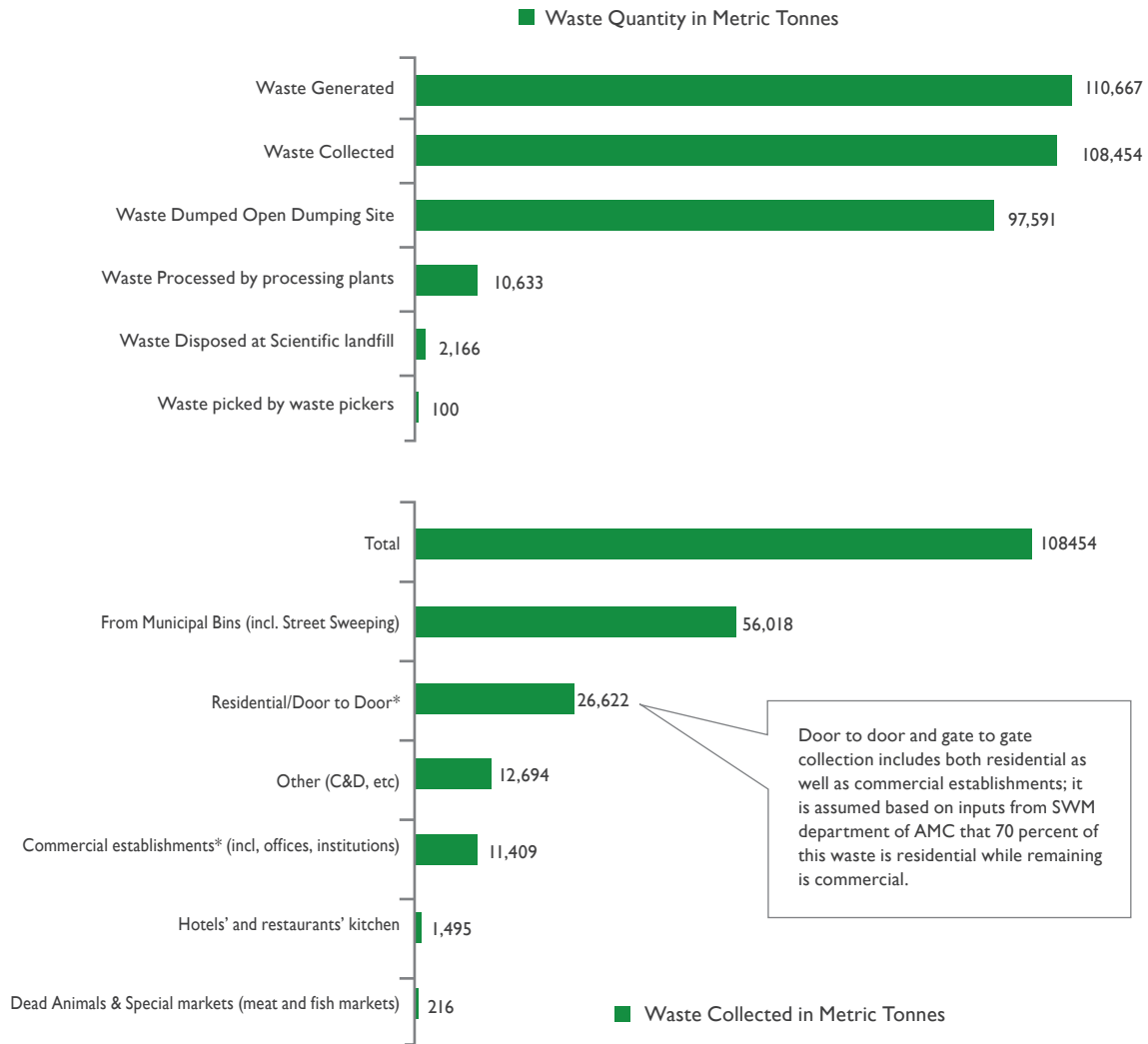
Waste Disposal

Presently, most of the waste (around 90 percent) is being dumped in the open at the Pirana landfill site. Of the remaining, around 8 percent of MSW is recovered while 2 percent of inert waste is disposed at scientific landfill site at Gaspur. A total of 97,000 MT of MSW out of 110,667 MT monthly is disposed at scientific landfill site.



Waste Stream Classification and Statistics for Ahmedabad Municipal Corporation (AMC)

Summary of SWM Profile of Ahmadabad





Waste Generation

Almost 110,667 MT of solid waste is generated from the city on a monthly basis.

Waste Processing

In addition to existing processing plants with a cumulative capacity of 1000 MT per day, another 1300 MT per day capacity of processing plants are being setup in the city.

Waste Disposal

A total of 97,000 MT of MSW out of 110,667 MT monthly is disposed in the open landfill site while 2,000 MT disposed at scientific landfill site.





Key Issues Identified with Municipal Waste Management at Ahmedabad

The following three major areas of concern have been identified:

- Extremely low diversion of waste from landfill
- Currently Ahmedabad achieves less than 10% diversion of waste from Landfill, a very low figure
- A highly polluted waste disposal facility
- The Pirana landfill and the surrounding environment is highly polluted as a result of historical and current practices
- Lack of community awareness, ownership and involvement.

The community is largely disinterested with very limited ownership of the waste problem and very little sense of personal responsibility

The findings are consistent with issues identified in the National Sanitation Ranking process undertaken by the Government of India in 2009. Amongst 423 cities surveyed in India, Ahmedabad was nationally ranked 19th. Against its peer mega cities, Ahmedabad ranked third.

At the same time, new emerging waste streams such as e-waste (WEEE), and industrial wastes (hazardous waste, construction and demolition waste, healthcare waste) further compound the challenges faced by AMC.

The predominant areas where AMC lost marks with reference to solid waste management were:

- Poor collection efficiency of MSW
- Extremely high level of littering
- Poor MSW treatment capacity and negligible scientific disposal of MSW
- Extremely poor performance in recycling of waste.

The Way Forward – Need for a Radical Paradigm Shift

It is obvious that a radical paradigm shift is needed to improve the current waste management situation in Ahmedabad, and to position its future as a modern, clean, attractive and liveable city. This is recognized by AMC and is a driving force behind its decision to develop the Zero Waste Road Map for Ahmedabad.

A sustainable, preventative and comprehensive approach towards waste is needed.

The broader community need to understand the long-term environmental and economic impacts of waste disposal. The prevalent 'out of sight, out of mind' attitude needs to be challenged and changed.

In natural eco-systems, nothing is 'waste'. The system is cyclic (cradle to cradle) and, as a result, sustainable. Currently waste is managed on a linear process (cradle to grave). This needs to be transformed to cyclic processes.

“We can't solve problems by using the same kind of thinking we used when we created them.”

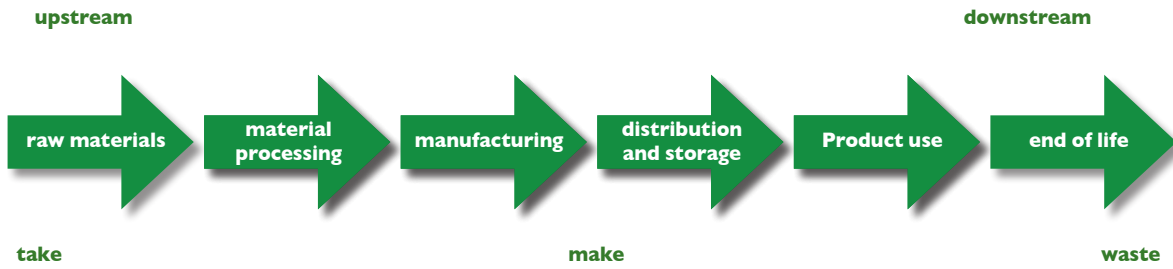
Albert Einstein

Waste Disposal is expensive, both financially and in terms of lost resources:

- Requires substantial inputs of labour (for collection and processing):
- Substantial materials input (construction of facilities for wastewater treatment, landfilling, incineration)
- Energy input (collection, treatment, incineration) Land resources (land-filling, incineration, treatment facilities).

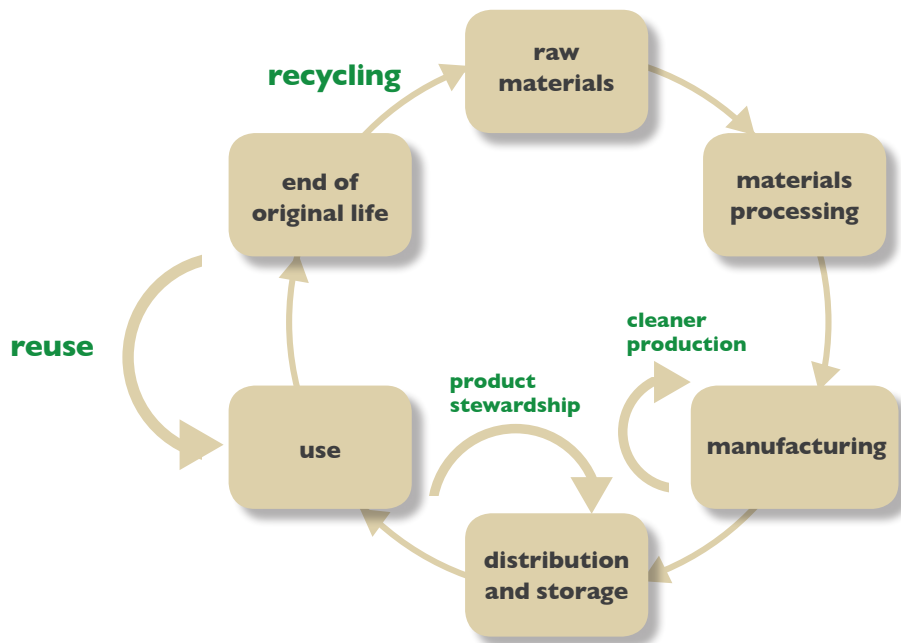
Government policies and programs focussing on conventional waste management solutions or end-of-pipe measures such as sanitary land filling or incineration are much more expensive than upstream measures aiming to minimize or reduce the actual waste load.

Current Linear Process (source 'Towards Zero Waste – Brisbane City Council)



Rather than the linear 'cradle to grave' process above, where a product has no use at the end of its life, we must think in cycles: 'cradle to cradle'. At the end of the original life of a product, it should be used to begin as another product - just like our natural eco-systems.

Future Cyclic Process towards Resource Efficient and Zero Waste Society



Overarching Objectives of Ahmedabad Zero Waste Road Map

A systematic 3R (Reduce, Reuse, and Recycle) waste management hierarchy is recommended, with high priority also given to the historical legacy of pollution resulting from unscientific and indiscriminate disposal of waste, restoring environmental eco-systems to reduce environmental and health impacts on the society.

Reduce - first priority - reduce generation of waste at the source

Reducing the waste creation at source is the first and most effective component of the waste hierarchy. Manufacture adopts cleaner production techniques and technologies that require fewer resources (raw material, energy, water) and generate less waste and pollution. From an economic perspective, the cost of making the processes efficient and preventing waste at source is much less than the cost of managing waste at the later stage. Market incentives could be provided at the same time so that consumers reduce their waste by switching to more durable eco-friendly or green products.

Reuse - second priority - maximise recovery of materials for reuse

A substantial amount of waste is created even with waste reduction strategies. A large proportion of this waste can be collected for reuse to reduce future environmental damage. Materials such as glass bottles and second hand electronic products can be reused in their existing forms so that minimal labor, material, water, and energy are required.

Recycle - third priority - maximise recycling of discarded material

After exhausting reduction and reuse opportunities, waste is still generated. Through proper segregation, collection and processing, materials such as glass, newspaper, aluminium, plastics, tins, cardboard and other valuable components can be recycled. These resources can be transformed to become an input to a new process. This requires substantial new input of materials, energy, and water.

Note: The '3R' waste management hierarchy, will form the centrepiece of Ahmedabad's Zero Waste Road Map. Considering Ahmedabad's unique challenges, AMC would also need to give strong consideration to other three 'R's – Restore, Recover and Refuse.

Restore - restore polluted eco-systems and improve public health.

Recover – maximise the calorific value from the remainder that cannot be either reused or recycled.

Refuse – refuse items and products that are not environmentally friendly or are designed for single use.

Zero Waste Road Map - Guiding Principles

The following guiding principles underpin the Zero Waste Road Map.

Resource conservation

Promoting the most efficient use of resources, including resource recovery and waste avoidance

Environmental protection

Reducing environmental harm, including pollution through waste

Sustainable development - delivering triple bottom line

Identifying and supporting solutions that offer value for money when social, environmental and financial considerations are taken into account

Polluter pays principle

Ensuring that 'whoever is responsible for damage to the environment should bear the costs associated with it.' (Taking Action, the United Nations Environmental Program)

Precautionary principle

'Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.' (Rio Principle 15, 1992)

Continuous improvement

Ongoing effort to improve products, services, or processes - a quality philosophy that assumes further improvements are always possible and that processes should be continuously re-evaluated and improvements implemented

Shared responsibility

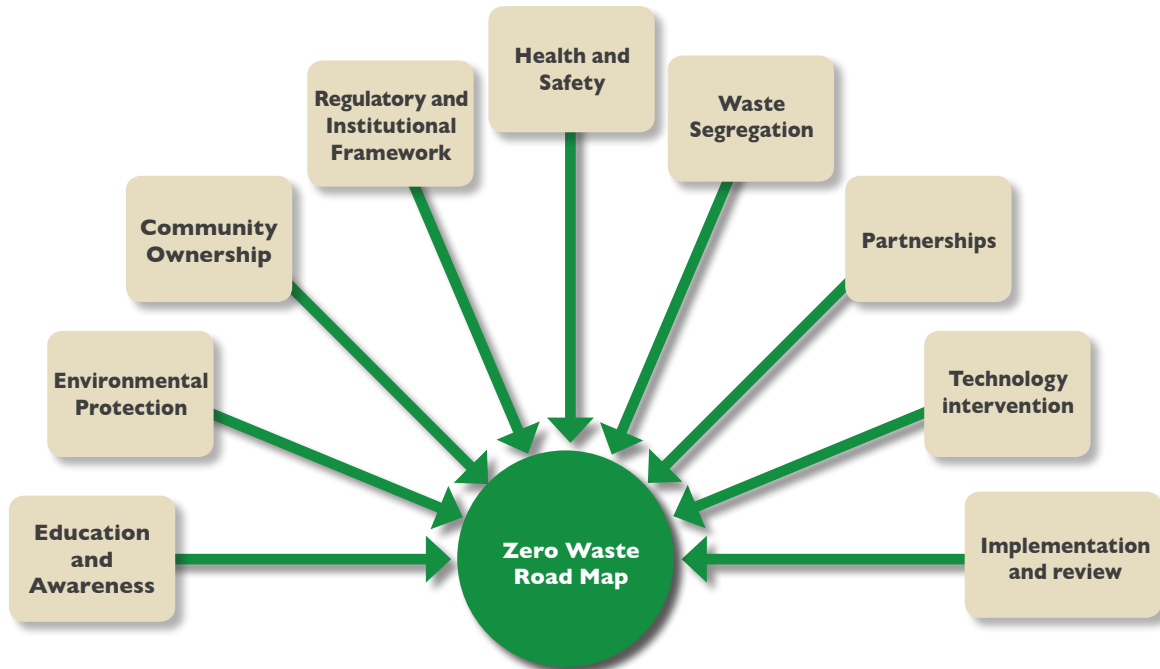
Zero Waste is a shared responsibility and requires partnerships and collaborations between all sectors of government, industry, research institutions, NGO's, and the general community

Beyond Municipal Solid Waste Management

Zero Waste philosophy should take into account all types of wastes in the context of sustainable urban management and development. The Zero Waste Road Map will need to identify and address policy, institutional and technological gaps keeping in mind existing and emerging wastes such as e-waste, hazardous & chemical waste, bio-medical waste, construction waste etc.



Key Focus Areas and Strategic Actions



The following section recommends key focus areas and strategic actions for AMC's consideration. AMC will need to take a long-term, preventative and comprehensive approach in implementing these strategies. This can be achieved by developing a concrete implementation plan with a 3-5 year horizon so that it is dynamic and can be reviewed on a regular basis.

Focus area I – environmental protection

Strategic Action 1

Ban open dumping of waste and develop a comprehensive master plan for the Pirana dump with an aim to reduce the current and future environmental impacts. The master plan should cover areas such as:

- a site operation plan
- environmental clean-up, a site remediation plan
- separation / buffer distances
- security and access
- an environmental monitoring plan
- a post-closure plan and a long term vision for value added / beneficial use of the landfill site
- landfill gas extraction and use for energy.

Strategic Action 2

Develop a comprehensive litter awareness and prevention plan for the City, backed up with stringent regulation and an enforcement mechanism. Work with key NGOs to promote better compliance.

Strategic Action 3

Introduce tighter regulation and enforcement to prevent illegal disposal and dumping of wastes. This regulation should cover all sections of the community (individuals, business, industry, hospitals) and particularly target items such as plastics, food waste, paper, hazardous wastes, bio-medical waste and packaging material.

Strategic Action 4

Work with the Gujarat Pollution Control Board to introduce better environmental management practices for the private sector involved in waste management and recycling. Introduction of licensing and enforcement mechanisms to monitor adoption of good environmental practices has been successful in other parts of the world and can be considered for Ahmedabad.

Focus area 2 – health and safety standards

Strategic Action 5

Develop appropriate policies and regulatory measures to formalize and systemize the informal waste management sector (rag pickers, scavengers, etc) to reduce the current high level of exposure to health, safety and environmental hazards. AMC should take specific measures to introduce health insurance for this informal sector and also eliminate illegal engagement of children as waste pickers.

Strategic Action 6

Develop a comprehensive health, sanitation, safety and environment plan covering the entire waste management workforce. A key focus of this plan should be strengthening the role of Sanitary Inspectors.

Strategic Action 7

Introduce appropriate safety gear and provide regular training to the workforce to improve skill level.

Strategic Action 8

Introduce a system of regular audits and a health monitoring program for the workforce.

Focus area 3 – dedicated institutional structures and governance arrangements

Waste management initiatives world-wide have shown that better outcomes come from building responsibilities and accountability into the dedicated institutional structures and governance arrangements. This is clearly evidenced by the South Australian State Government's creation of Zero Waste SA.

Through collaboration, education, advocacy and financial incentives, Zero Waste SA is stimulating innovative practices to drive resource efficiency. From a very low base in 2003, when Zero Waste SA was established, South Australia has now achieved more than 75% diversion from landfill.

Strategic Action 9

Moving towards zero waste requires sustained focus and commitment of significant AMC resources. This can be facilitated by developing strong and dedicated institutional arrangements. AMC may consider either restructuring/redesigning the existing Solid Waste Management & Conservancy Services section, or consider establishing a dedicated entity (for example Zero Waste Ahmedabad) to raise the profile of the road map and to achieve greater efficiencies. The new entity should have a clear mandate to implement the road map with delineated authority, responsibility, staff and budget.

Strategic Action 10

Establish a regulatory framework with by-laws to support the new institutional arrangements taking into account new emerging waste streams.

Strategic Action 11

Undertake measures to build technical capacity within the new entity and within the waste sector generally in Ahmedabad.

Strategic Action 12

Liaise to establish political support from all political parties to ensure long term certainty for the new entity. The achievements will be gained over a long time frame and the institution will need to meet key performance indicators along the way.

Focus area 4 – community awareness and ownership

Strategic Action 13

Foster broader community ownership and individual responsibility through education, mass communication, regulation, stringent enforcement and appropriate pricing mechanisms to influence and bring about behaviour change.

Strategic Action 14

Systematically introduce improvements to waste collection systems to encourage individual responsibility, behavioural changes, waste segregation and discourage littering.

Strategic Action 15

Introduce means based pricing mechanisms such as 'pay as you throw' so that residents are charged for waste collection based on the amount of the household's waste.

Strategic Action 16

Introduce reasonable fines and penalties for littering and illegal dumping of wastes. The fines need to be severe enough to act as a deterrent and should be tightly enforced.

Focus area 5 – segregation of waste streams

Strategic Action 17

Identify and implement strong policies that will enable better waste collection, transport and storage infrastructure to maximise collection and segregation of recyclables from the waste streams.

Developing industries around better waste management practices and the 3R culture, has added benefits. It not only builds new businesses, it encourages greater resource efficiency, offers ongoing cost benefits and creates new jobs. Authorities can encourage this process with subsidies and incentives and establish regulations to allow these businesses to grow to independence.

For example, when granting construction permits AMC can require that responsible party (typically a contractor or developer) must develop and submit a plan showing how reducing, reusing and recycling waste will be incorporated into the development.

Strategic Action 18

Progressively introduce measures to modify the waste collection system with particular focus on collection bins and collection frequency. The current system of daily collection is not sustainable and does not encourage waste segregation at source or household.

Strategic Action 19

Progressively introduce regulation imposing bans on landfilling of recyclables (plastic, paper, metal, food, greens, construction and demolition waste, e-waste) as systems become better used and patronised. This ensures a supply of materials to the new recycling industries that will emerge to service Ahmedabad.

Focus area 6 – partnerships and collaborations

Strategic Action 20

Partner with research institutes and industry to develop practical solutions to deal with waste management issues, including development of local capacity to implement energy and resource efficient technologies in business and industry sectors. This would require public-private partnerships and co-investment opportunities to find solutions.

Strategic Action 21

Play a strong advocacy role in introducing product stewardship arrangements for a range of consumables such as electronic goods (TVs, computers, IT equipment), lead acid batteries, tyres, consumer packaging (including plastic bags), paint and mercury containing lamps.

Strategic Action 22

Work with other arms of the government and industry groups to promote business assistance programs for industry with a focus on lean manufacturing, cleaner production and waste recovery.

Strategic Action 23

Work with the manufacturing industry, business community and financial institutions to facilitate the creation of strong and sustainable markets for recyclables and green jobs.

Partnerships are key to expand waste management services of local authorities that lack resources, institutional capacity, and technological know-how

Partnerships offer alternatives in which governments and private companies assume co-responsibility and co-ownership for the delivery of solid waste management services.

Partnerships combine the advantages of the private sector (dynamism, access to financial resources and latest technologies, managerial efficiency, and entrepreneurial spirit, etc.) with social concerns and responsibility of the public sector (public health and better life, environmental awareness, local knowledge and job creation, etc.) Partnerships (PPP) are indispensable in order to develop and finance adaptation measures for creating resilient cities that in-turn become more attractive for private investments.

Partnerships provide win-win solutions both for the public utilities and private sector—if duly supported by appropriate policy frameworks. Such partnerships could lead to savings in municipal budgets where waste management usually consumes a large portion. The private sector, on the other hand, may use this opportunity to convert waste into environmentally friendly products and energy that could also serve as income generating opportunities.

Source: UNCRD / IPLA

Focus area 7 – sustainable innovative infrastructure and technologies

Strategic Action 24

Use a holistic Total Cost Assessment (TCA) approach to introducing technologies for waste collection, segregation and processing. A TCA approach helps in quantifying direct and indirect costs and encourages consideration of life-cycle impacts in decision making process.

Strategic Action 25

Encourage and support investment in innovative resource management technologies and infrastructure, for example recycling precincts with dedicated facilities for recycling plastics, aluminium, steel, paper, glass and other recyclables. This can be done through subsidy schemes, soft loans and other economic incentives.

Total Cost Assessment was developed in 1991 by the Tellus Institute for the EPA and New Jersey Department of Environmental Protection.

Total Cost Assessment is the consideration of all-environmental and health (E&H) costs associated with a decision, including direct costs, risks and liabilities, and costs borne by others.

- Direct costs are capital investment, labor, raw materials, operating, and maintenance costs.
- Future and contingent liability costs include fines and penalties caused by non-compliance, personal injury and property damage lawsuits, natural resource damages, industrial accident costs and clean up costs.
- External costs are costs borne by society that are caused by pollution and deterioration of the environment over the long term.

Focus area 8 – education and awareness at all levels

Strategic Action 26

Deliver clear and targeted education and awareness programs to meet the needs of the community, businesses, industry and the waste management industry.

Strategic Action 27

Introduce a best practice waste management demonstration program at strategic locations in Ahmedabad to raise awareness of the community, including awareness raising programmes and activities related to health and safety aspects of e-waste.

Strategic Action 28

Develop measures to influence behaviour and build a 3R culture so that households and businesses are encouraged to take responsibility for minimising their own waste and using resources effectively.

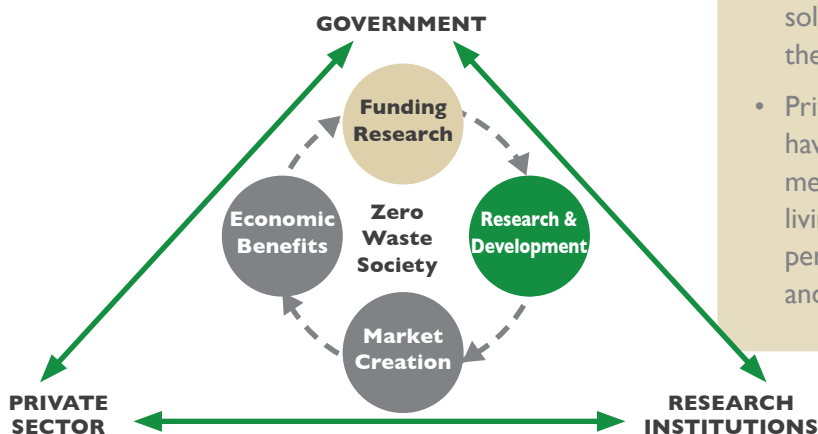
Strategic Action 29

Work with the education sector to introduce zero waste education in the school curriculum.

Focus area 9 – investment in 3R infrastructure

Strategic Action 30

Develop policies and programs favorable to promoting triangular cooperation between government, private/industry sector, and scientific and research institutions towards realizing eco-towns, science parks, eco-industrial zones.



Strategic Action 31

Establish a '3R Think Tank' with participation from experts and leaders in the private sector, research institutes and government.

Each sector has an important role to play:

- National governments are well placed to develop policies, new institutions and financing mechanisms to support 3R frameworks, such as partnerships, new technology, procurement and cooperation measures
- Local government can educate communities on the 3R culture and integrate resource efficiency into the urban and regional environments through transport, facilities, and resource efficient infrastructure.
- Private enterprise and industry can find and develop economic ways to commercialise the new thinking, producing and promoting green products, cleaner production and waste exchange.
- Financial institutions can set up practical investment and loan schemes for innovative projects and green schemes.
- Scientific/ Research organisations and universities can develop dedicated R&D projects and collaborations to focus on new solutions to existing issues within the national community.
- Private citizens and NGO sectors have skills in communicating messages that improve community living and can raise awareness on personal levels to modify behaviour and expectations around waste.

Focus area 10 – implementation and systematic review process

Strategic Action 32

Prepare an implementation plan with a 3-5 year term. The plan should demonstrate adherence to the 3R waste hierarchy and strategic actions outlined in the *Zero Waste Road Map*. The plan should include targets and key performance indicators for review on a yearly basis. The plan should cover:

- The projects to be undertaken each year listed under the strategy headings, including a brief description of the intended activities and outcomes and budget
- The positions and roles responsible for delivering the project
- A 3-5 year sequential funding outlook for the project or project area.

Strategic Action 33

Introduce an independent, third party review process. The review will include an analysis of how AMC is meeting the overall objectives of the *Zero Waste Road Map*. The review will track progress made by AMC in delivering the implementation plan and measure achievements against the key performance indicators.

Strategic Action 34

Prepare a data collection matrix to include key data parameters for measuring progress against the key performance indicators. Continually improve the quality of data collection, management and reporting throughout the life of the *Zero Waste Road Map*.



Multi-stakeholder Consultation on the Pre-final Draft Road Map for Zero Waste Ahmedabad- 2013 – 2031

Key Inputs / Suggestions/ Actions from the participants (These can be considered for inclusion in the Implementation Plan):

- Introduce waste audits for government departments and industries.
- More NGOs should be involved in raising public awareness.
- Generate power from green waste. The waste of vegetable/fruit markets, parks, restaurants, hospitals etc can be used for this. Pilot project can be started.
- A rigorous 3rd party review process should be implemented in analyzing whether all objectives of Zero Waste Road Map are met by AMC.
- AMC should consider buying power from waste to energy plants.
- Light plastic waste can be used for producing diesel. In Chennai such plan is in operation.
- Solid waste activities should be decentralized. Waste to Wealth concept should be taken into consideration.
- Introduce best practice waste management demonstration program at identified locations to raise community awareness (consider waste segregation trials, composting etc).
- Zero waste education can be included in the school curriculum by Education Department.
- Tax rebate should be given to those maintaining cleanliness and non-compliance should be penalized.
- From public health point of view, sufficient sanitation facilities should be provided in order to totally eliminate open defecation.
- More power should be given to the Sanitary Inspectors.

Successful Example of Implementing Zero Waste – Case of Zero Waste South Australia

The last decade has seen a number of government institutions around the world adopting Zero Waste frameworks. Zero Waste South Australia is an example of successful case study. Zero Waste SA is recognized for its leadership in recycling and resource management. It has successfully achieved South Australian targets for resource efficiency through collaboration, education, technological intervention, advocacy and financial incentives (refer Attachment 3).

Conclusion

By committing to the goal of Zero Waste by 2031, AMC has demonstrated its commitment towards better city and better life. This Zero Waste Road Map will act as a visionary guiding document for AMC in its journey to achieve 'Zero Waste' by the year 2031. AMC calls upon all relevant key stakeholders, including Government Departments, private and business sector, scientific and research institutions, NGOs, financial institutions, informal sector, and citizens to actively cooperate with AMC in achieving this goal.

Attachment I: Summary of Proposed Strategic Actions for Ahmedabad Municipal Corporation

Focus area 1 – environmental protection

Strategic Action 1

Ban open dumping of waste and develop a comprehensive master plan for the Pirana dump with an aim to reduce the current and future environmental impacts. The master plan should cover areas such as:

- a site operation plan

- environmental clean-up, a site remediation plan

- separation / buffer distances

- security and access

- an environmental monitoring plan

- a post-closure plan and a long term vision for value added / beneficial use of the landfill site

- landfill gas extraction and use for energy.

Strategic Action 2

Develop a comprehensive litter awareness and prevention plan for the City, backed up with stringent regulation and an enforcement mechanism. Work with key NGOs to promote better compliance.

Strategic Action 3

Introduce tighter regulation and enforcement to prevent illegal disposal and dumping of wastes. This regulation should cover all sections of the community (individuals, business, industry) and particularly target items such as plastics, food waste, paper, hazardous wastes and packaging material.

Strategic Action 4

Work with the Gujarat Pollution Control Board to introduce better environmental management practices for the private sector involved in waste management and recycling. Introduction of licensing and enforcement mechanisms to monitor adoption of good environmental practices has been successful in other parts of the world and can be considered for Ahmedabad.

Focus area 2 – health and safety standards

Strategic Action 5

Develop appropriate policies and regulatory measures to formalize and systemize the informal waste management sector (rag pickers, scavengers, etc) to reduce the current high level of exposure to health, safety and environmental hazards.

Strategic Action 6

Develop a comprehensive health, safety and environment plan covering the entire waste management workforce.

Strategic Action 7

Introduce appropriate safety gear and provide regular training to the workforce to improve skill level.

Strategic Action 8

Introduce a system of regular audits and a health monitoring program for the workforce.

Focus area 3 – dedicated institutional structures and governance arrangements

Strategic Action 9

Moving towards zero waste requires sustained focus and commitment of significant AMC resources. This can be facilitated by developing strong and dedicated institutional arrangements. AMC may consider either restructuring/redesigning the existing Solid Waste Management & Conservancy Services section, or consider establishing a dedicated entity (for example Zero Waste Ahmedabad) to raise the profile of the road map and to achieve greater efficiencies. The new entity should have a clear mandate to implement the road map with delineated authority, responsibility, staff and budget.

Strategic Action 10

Establish a regulatory framework with by-laws to support the new institutional arrangements.

Strategic Action 11

Undertake measures to build technical capacity within the new entity and within the waste sector generally in Ahmedabad.

Strategic Action 12

Liaise to establish political support from all political parties to ensure long term certainty for the new entity. The achievements will be gained over a long time frame and the institution will need to meet key performance indicators along the way.

Focus area 4 – community awareness and ownership

Strategic Action 13

Foster broader community ownership and individual responsibility through education, regulation, stringent enforcement and appropriate pricing mechanisms to influence and bring about behaviour change.

Strategic Action 14

Systematically introduce improvements to waste collection systems to encourage individual responsibility, behavioural changes, waste segregation and discourage littering.

Strategic Action 15

Introduce means based pricing mechanisms such as 'pay as you throw' so that residents are charged for waste collection based on the amount of the household's waste.

Strategic Action 16

Introduce reasonable fines and penalties for littering and illegal dumping of wastes. The fines need to be severe enough to act as a deterrent and should be tightly enforced.

Focus area 5 – segregation of waste streams

Strategic Action 17

Identify and implement strong policies that will enable better waste collection, transport and storage infrastructure to maximise collection and segregation of recyclables from the waste streams.

Strategic Action 18

Progressively introduce measures to modify the waste collection system with particular focus on collection bins and collection frequency. The current system of daily collection is not sustainable and does not encourage waste segregation at source or household.

Strategic Action 19

Progressively introduce regulation imposing bans on landfilling of recyclables (plastic, paper, metal, food, greens, construction and demolition waste, e-waste) as systems become better used and patronised. This ensures a supply of materials to the new recycling industries that will emerge to service Ahmedabad.

Focus area 6 – partnerships and collaborations

Strategic Action 20

Partner with research institutes and industry to develop practical solutions to deal with waste management issues, including development of local capacity to implement energy and resource efficient technologies in business and industry sectors. This would require public-private partnerships and co-investment opportunities to find solutions.

Strategic Action 21

Play a strong advocacy role in introducing product stewardship arrangements for a range of consumables such as electronic goods (TVs, computers, IT equipment), lead acid batteries, tyres, consumer packaging (including plastic bags), paint and mercury containing lamps.

Strategic Action 22

Work with other arms of the government and industry groups to promote business assistance programs for industry with a focus on lean manufacturing, cleaner production and waste recovery.

Strategic Action 23

Work with the manufacturing industry, business community and financial institutions to facilitate the creation of strong and sustainable markets for recyclables and green jobs.

Focus area 7 – sustainable innovative infrastructure and technologies

Strategic Action 24

Use a holistic Total Cost Assessment (TCA) approach to introducing technologies for waste collection, segregation and processing. A TCA approach helps in quantifying direct and indirect costs and encourages consideration of life-cycle impacts in the decision making.

Strategic Action 25

Encourage and support investment in innovative resource management technologies and infrastructure, for example recycling precincts with dedicated facilities for recycling plastics, aluminium, steel, paper, glass and other recyclables. This can be done through subsidy schemes, soft loans and other economic incentives.

Focus area 8 – education and awareness at all levels

Strategic Action 26

Deliver clear and targeted education and awareness programs to meet the needs of the community, businesses, industry and the waste management industry.

Strategic Action 27

Introduce a best practice waste management demonstration program at strategic locations in Ahmedabad to raise awareness of the community, including awareness raising programmes and activities related to health and safety aspects of e-waste.

Strategic Action 28

Develop measures to influence behaviour and build a 3R culture so that households and businesses are encouraged to take responsibility for minimising their own waste and using resources effectively.

Strategic Action 29

Work with the education sector to introduce zero waste education in the school curriculum.

Focus area 9 – investment in 3R infrastructure

Strategic Action 30

Develop policies and programs favorable to promoting triangular cooperation between government, private/industry sector, and scientific and research institutions towards realizing eco-towns, science parks, eco-industrial zones.

Strategic Action 31

Establish a '3R Think Tank' with participation from experts and leaders in the private sector, research institutes and government.

Focus area 10 – implementation and systematic review process

Strategic Action 32

Prepare an implementation plan with a 3-5 year term. The plan should demonstrate adherence to the 3R waste hierarchy and strategic actions outlined in the Zero Waste Road Map. The plan should include targets and key performance indicators for review on a yearly basis. The plan should cover:

- The projects to be undertaken each year listed under the strategy headings, including a brief description of the intended activities and outcomes and budget

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Strategic Action 34

Prepare a data collection matrix to include key data parameters for measuring progress against the key performance indicators. Continually improve the quality of data collection, management and reporting throughout the life of the Zero Waste Road Map.

Attachment 2: Consultation towards Zero Waste Ahmedabad

Multi-stakeholder Consultation Comments

Towards Zero Waste Ahmedabad, 18 April 2012, Ahmedabad, Gujarat, India

According to the recent report of U.N, India will witness the highest increase in urban population in the next 40 years followed by China. India is expected to add another 497 million to its urban population between 2010 and 2050. Though India's urban areas make a major contribution to the country's economy (currently cities and towns generate over 2/3 of the country's GDP and account for 90% of government revenues), the deteriorating urban environment is taking a toll on people's health and productivity and diminishing their quality of life. There is an urgent need for city and municipality authorities to set the policy directions rightly and accordingly aiming for resource efficient and zero waste society.

Waste management should be looked at in the context of sustainable urban development and sustainable cities; zero waste is an inherent requirement for better city and better life.

Zero waste is much more beyond solid waste management; it should be linked to protection of freshwater resources/ecosystem, bio-diversity, public health, employment, energy security, etc.

There is a need for waste free society, not just ambient pollution free locality, not just transfer of the problem (waste) from one place to another.

Proper collection and segregation is a fundamental problem in all major cities of India; 60-70% of the household waste is biodegradable/organic waste; Pune city provides a good example on efficient waste collection and separation; large opportunities exist for composting for mass scale urban agriculture and greening; any new residential complex coming up within Pune Municipality is mandated to be zero waste; in Kerala it is mandated to compost all kitchen waste; as per Indian Supreme Court's order waste should be segregated at source.

Many problems (such as health, insurance, working condition, behavioral issues, etc) are associated with the informal sector though it is contributing to recycle business; how can these informal sectors be built into AMC; approximately 6-7% recyclable waste materials go back to the industries though the informal waste pickers.

There is need to ingrain the 3Rs/zero waste concept among ordinary citizens, school children for greater awareness; common people do not understand the value of recyclables such as plastics, precious metals, etc.; there is a need to educate people to harness their support.

There is a need to exploit opportunity beyond AMC, e.g., inter-municipal cooperation for waste exchange and treatment based on the available facilities; industrial symbiosis, etc.

Considering the growing quantities of construction waste, need to involve builders and construction companies as one of the important stakeholders; 2 or 3 recycling plants in the city to reduce the transportation cost in handling the construction waste.

Active and dynamic cooperation/collaboration between government, private/business/industry sector, and research and development in the context of driving technological innovations towards zero waste and 3Rs (reduce, reuse, and recycle) and building 3R infrastructures, eco-cities, eco-towns, and eco-industrial zones.

Interagency cooperation is extremely important as there is need to look into waste management in the context of waste to energy (WtE), employment, and GHG emission reduction.

Green economy, one of the key theme for Rio+20, is a major development opportunity, and in this regard waste management should be looked in the development context.

Complete elimination of open dumping and burning is fundamental to achieve zero waste and resource efficient society.

There is a need to form a society in AMC to drive the zero waste vision.

Proper pricing mechanism instituted by AMC to make the whole waste management efficient and operational.

Need to consider differential rate/charging for waste without segregation and with segregation.

Responsibilities of the producers/manufacturers need to be adequately addressed; extended producer's responsibility (EPR) should be integral part of the overall waste management policy. Also there are many problems associated with SMEs, and there is need to address resource efficiency of SMEs.

Attachment 3: Case study – Zero Waste South Australia

Zero Waste SA

Zero Waste SA's primary objective is to promote waste management practices that, as far as possible, eliminate waste or its consignment to landfill, and advance the development of resource recovery and recycling.

Zero Waste SA provides strategic policy advice, guidance and leadership to government and stakeholders to bring about change. Zero Waste SA establishes programs and projects that maximise waste reduction, and promote recycling and ecological sustainability.

South Australia's Waste Strategy 2011-2015, released by the State Government in December 2011, has two key objectives:

- maximising the useful life of materials through reuse and recycling
- avoiding and reducing waste.

The Waste Strategy provides a mechanism for State Government to engage with all South Australians to achieve waste management reform. It is guided by the concept of zero waste which challenges 'end-of-pipe' solutions and shifts focus to encouraging the cyclical use of materials in our economy.

South Australia's Strategic Plan includes a target to 'reduce waste to landfill by 35% by 2020'. Zero Waste SA is the key to achieving that goal and has outlined how we as a community can continue driving waste reduction and other targets in the *Waste Strategy 2011-2015*.

Zero Waste SA is established by the *Zero Waste SA Act 2004*. The Zero Waste SA Act also establishes a dedicated fund, the Waste to Resources Fund, which Zero Waste SA applies to achieve its objectives. The fund is made up, primarily, of 50% of the levy paid by waste depot licence holders under Section 113 of the *Environment Protection Act 1993*. The levy is collected by the Environment Protection Authority and the appropriate proportion is transferred to the Waste to Resources Fund. Zero Waste SA

The establishment of Zero Waste SA has been a catalyst to drive strategic advances in waste management by providing research and education programs and targeted grants funding – all developed and delivered in close partnership with the Local Government Association of South Australia, Waste Management Association of Australia (SA Branch) and KESAB *environmental solutions*.

A key factor in Zero Waste SA's success is its management philosophy which seeks to maximise benefits and efficiencies by addressing all aspects of the waste management and resource recovery process in partnership with key stakeholders.

This approach, which takes into account source generation, waste minimisation, collection services and transport issues, as well as recovery, recycling, reuse, reprocessing, treatment and disposal options, enables consideration of the 'big picture' implications and any resultant changes on the entire waste/recycling process loop.

Zero Waste SA's long-term approach to waste management – moving from disposal and recycling to reduction and avoidance – has also resulted in some groundbreaking achievements, with more on the way.

- Australia's first ban on checkout-style plastic bags.
- The most comprehensive pilot of household kitchen food scrap recycling undertaken in Australia.
- The Zero Waste SA Centre for Sustainable Design and Behavior, a partnership with the University of South Australia undertaking world-leading research into consumption and disposal behaviours, waste generation, materials use, design and market development.
- Regional waste planning and infrastructure improvements.
- New ventures for e-waste, composting, demolition and building material recycling, waste to energy, recycling services to industry and plastics recycling.
- Partnerships with the Business Sustainability Alliance – an alliance of government agencies – to assist business and industry with sustainability.

Further information:

www.greenindustries.sa.gov.au

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