Highlights

ASIA

Waste Management OUTLOOK

SUMMARY FOR DECISION-MAKERS

UN environment

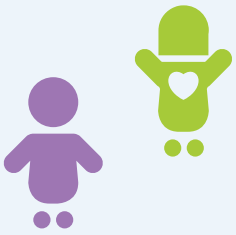
AIT Asian Institute of Technology

ISWA International Solid Waste Association

The Asia Waste Management Outlook (AWMO), which is regional in nature, is developed to complement the Global Waste Management Outlook (GWMO). This regional outlook provides an overview of the current status, the current thinking on "state of the art" topics, case studies, and the future of waste management in Asia over the medium term; challenges and opportunities, described through case studies; and recommendations based on technical, strategic, economic, and communication perspectives. AIT RRC.AP is the programme coordinator of this AWMO. The AWMO is developed with the support and guidance of UN Environment, the quality assurance by the Steering Committees and the consultations with regional stakeholders and contributions of countries. Recognizing the challenges and opportunities, recommendations have been made over medium term based on strategic, technical, economic and institutional perspectives.

FACTS

Over **4.45 Billion** people in 2016 in Asia[1]



Total urban population is **48.1 per cent**, equivalent to over 2 billion people (2016)[2]

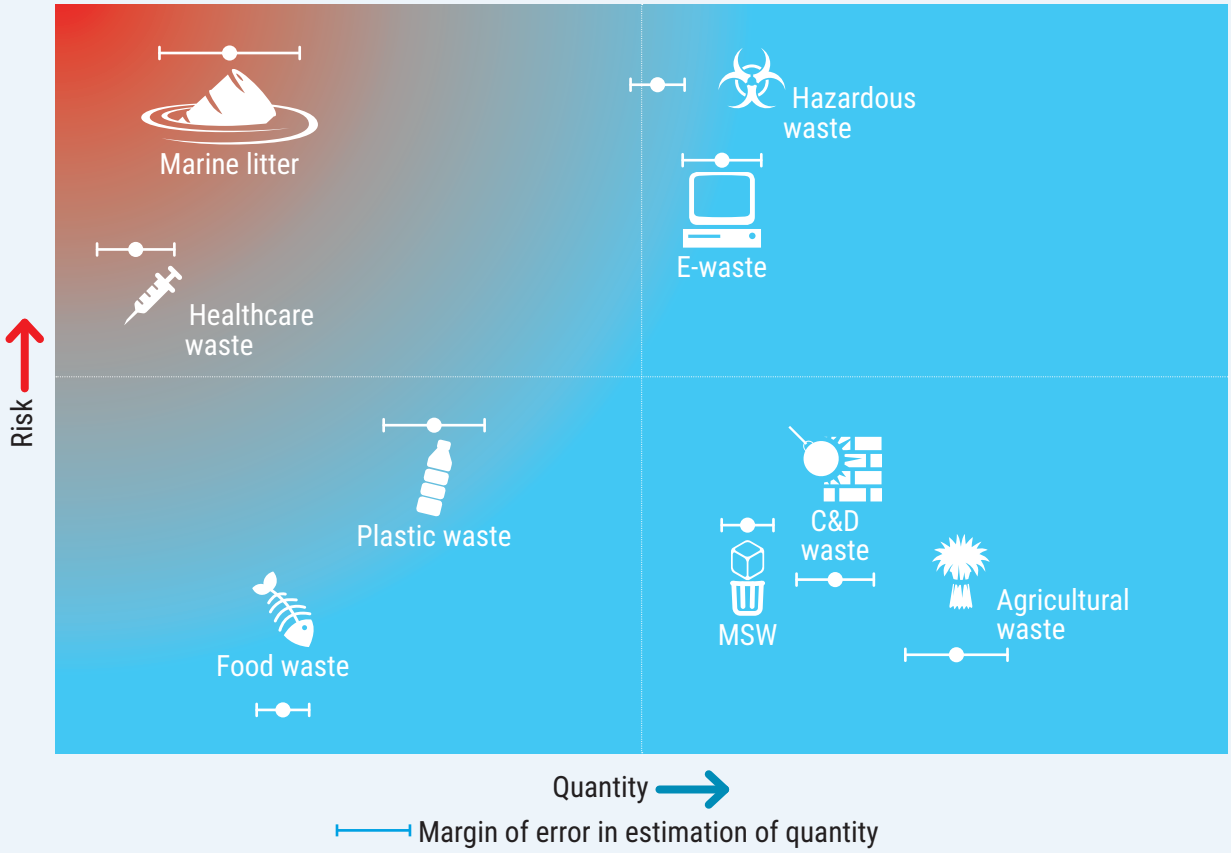
Asian cities to generate **1.8 billion tonnes** of waste in year 2025 (compared to 0.28 billion tonnes in 2012)[3]

LARGEST WASTE GENERATING CONTINENT

1 United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) (2016). Population dynamics. Available from: http://www.unescap.org/our-work/social-development/population-dynamics/about (accessed 17 May 2017).
2 http://www.worldometers.info/world-population/population-by-region/
3 Hoornweg, D., and Bhada-Tata (2012). What a Waste: A Global Review of Solid Waste Management. Urban Development Series – Knowledge Papers No. 15. Washington, DC: World Bank. Available from: https://goo.gl/7MD9kh (accessed 24 January 2017).

Waste Generation

- Waste-related data is incomplete, not up to date and not reliable in many countries of Asia.
- At the national levels, social, economic and demographic factors are significant in determining the waste generation, as well as, the volume.
- Waste streams such as e-waste, construction and demolition (C&D) waste, food waste, healthcare waste and micro-plastic are the key concerns.
- End of life vehicle (ELV) waste is a stream of rising concern and needs to be addressed on a priority basis.
- There is a significant potential to reduce wastes, reuse and recycle (3Rs) to realize economic gains, achieve higher productivity and resource security, generate employment and reduce risks to humans and ecosystems.
- Focus on reducing waste at the source and practicing of the 3Rs should be the strategy for achieving sustainable waste management in Asia.
- Healthcare waste generation per bed in hospitals is on average about 0.5 kg of hazardous waste per bed per day; while low-income countries generate on average about 0.2 kg.[4]
- In the ASEAN region, it is estimated that about 2.4 million motor vehicles will be discarded in 2020.[5]
- Plastics are the most prevalent form of debris and consistently comprise 60 to 80 per cent of total debris recorded in marine debris surveys.[6]



Relative risks and quantities estimated for key waste streams in Asia

Source: Prepared by Environmental Management Centre LLP

It may be observed that waste streams such as MSW, C&D and agricultural waste dominate in terms of mass. However, they are relatively low intensity/risks as compared to hazardous waste and e-wastes which are high intensity/risk waste streams. Waste streams, such as healthcare waste and marine litter are of concern particularly to humans and marine life despite the relatively less volume generated in comparison. Food and plastic wastes are waste streams of moderate-to-high concern given their relative quantities and associated intensity/risks. The figure illustrates more of a semi-quantitative or qualitative depiction efforts should be made by each country in Asia to prepare such "waste intensity maps" for a more focused understanding of various types of waste generation.

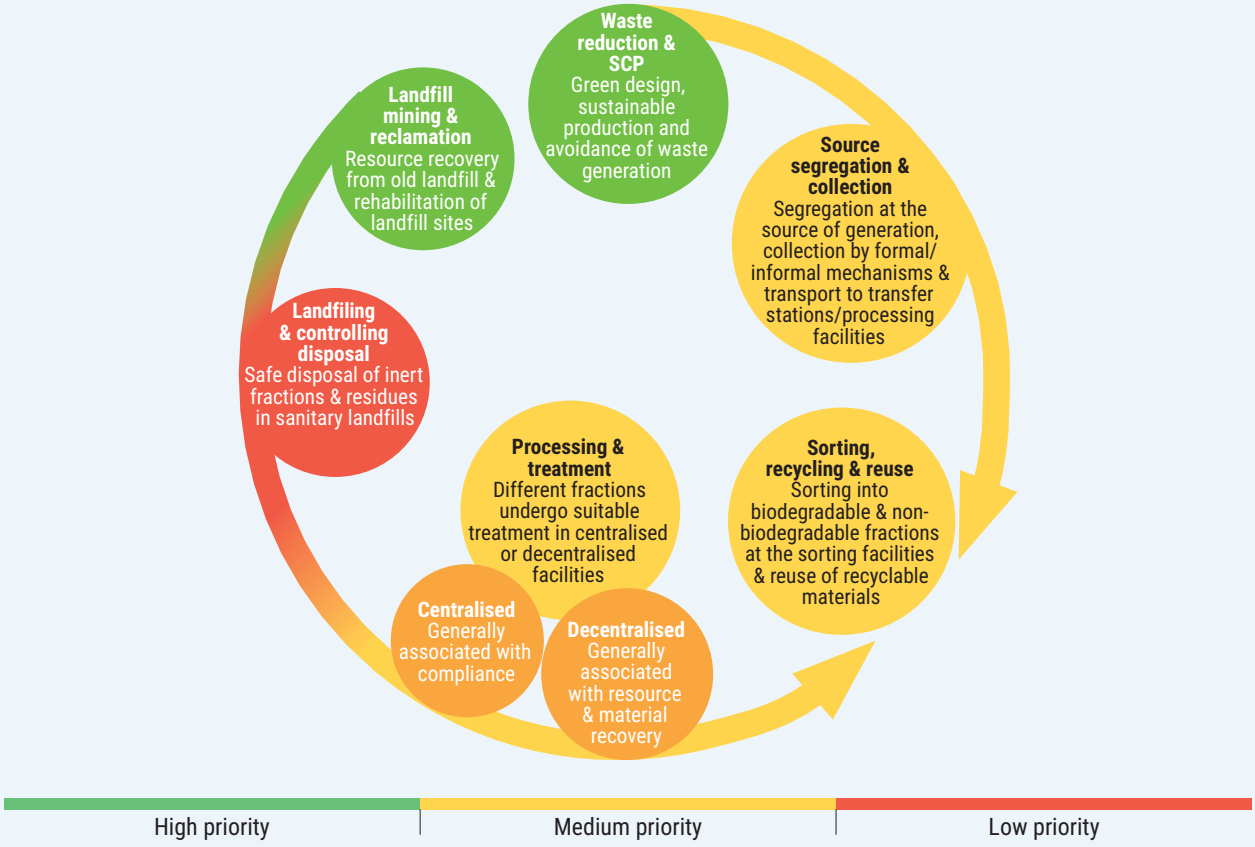
4 WHO (World Health Organization) (2015). Status of Health-care Waste Management in Selected Countries of the Western Pacific Region. Geneva. Available from: http://apps.who.int/iris/bitstream/10665/208230/1/9789290617228_eng.pdf (accessed 8 February 2017).

5 Chaturvedi, A., and others (2012). The Story of a Dying Car in India: Understanding the Economic and Materials Flow of End-of-Life Vehicles. New Delhi: Chintan Environmental Research and Action Group and Deutsche Gesellschaft für Internationale Zusammenarbeit. Available from: http://www.chintan-india.org/documents/research_and_reports/ELV-Report.pdf (accessed 24 January 2017)

6 UNEP (United Nations Environment Programme) and GRID-Arendal (2016). Marine Litter Vital Graphics. Nairobi and Arendal. Available from: http://staging.unep.org/docs/MarineLitter.pdf (accessed 24 January 2017).

Waste Management

- Waste management hierarchy should begin with reduce, while disposal should be the last option.
- Green products and green public procurement play a major role in material and waste reduction and lower health- and safety-related risks across the life cycle. These strategies also lead to innovation.
- Waste segregation is important for successful resource recovery.
- Legislation to regulate segregation practices exist in most Asian countries.
- The informal sector plays a huge role in the segregation of recyclables in most Asian countries.
- Materials recovery facilities play a key role in integrated solid waste management, providing a safe environment for waste pickers to work, encouraging communities to recycle and reducing the amount of waste sent to landfills.
- Waste collection is another factor that determines the efficiency of a waste management system. Community-initiated waste collection schemes have been successful in several countries.
- The secondary materials industry in Asia is growing rapidly…. the growth of this industry is important because it acts as an alternative to the use of virgin materials, thereby improving resource security and reducing GHG emissions.
- Practice of ISWM with 3Rs and zero waste commitment are steps towards building a circular economy framework. Asian countries should take efforts in this direction.



Balanced Waste Management Hierarchy for Developing Nations in Asia

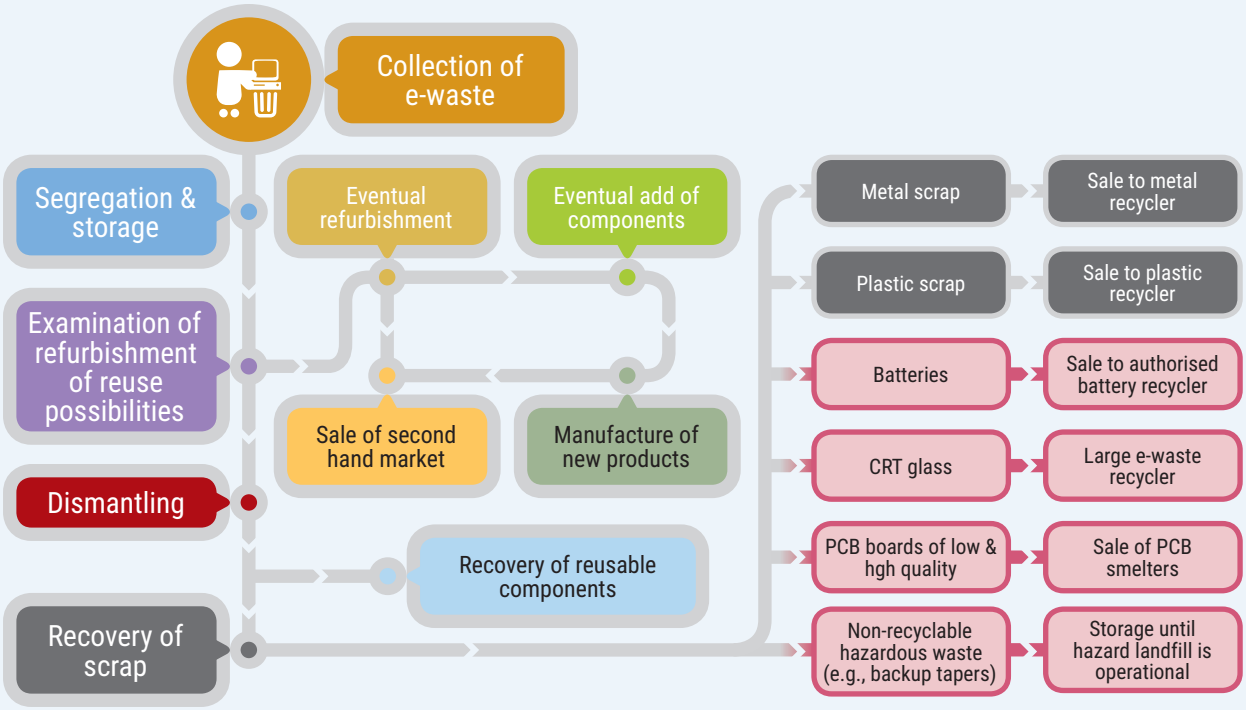
Source: Prepared by Environmental Management Centre LLP

The Figure presents a "balanced" waste management hierarchy in the context of Asia, particularly regarding developing nations. Most Asian countries suffer from the indiscriminate disposal of waste, resulting in economic and environmental consequences. Priority action must be given to remediate and rehabilitate the dumpsites and to build basic waste management infrastructure.

Waste reduction should also be a priority towards sustainable waste management. Segregation of waste at the source is critical to achieve waste reuse, recycling and recovery. It also helps to reduce collection and transportation costs. Waste processing and treatment are crucial within the holistic waste management hierarchy. It is important that this step be examined critically to identify all potential routes and options in handling waste. The circular economy promotes greater resource productivity with the objective of reducing waste and evading pollution through creative, innovative manufacturing strategies. It is, thus, a paradigm shift from the conventional linear economy that does not address the 3Rs.

Waste Collection

- Collection services have serious gaps.
- Collection rates in Asian cities are rather dismal.
- Strengthening of basic infrastructure—for waste collection, treatment and disposal is a topmost priority.



Technology Routes for MSW Treatment, Resource and Energy Recovery'

Source: ICRA Management Consulting Services Limited and The GOI ADB PPP Initiative (2011).
Note: RDF = refuse-derived fuel.

It is important that this step be examined critically to identify all potential routes and options in handling waste. Given that each type of waste requires different treatment and disposal options, there is a wide range of technologies adopted by Asian countries for waste processing.

Organic waste generally makes up the main fraction of the MSW stream in most Asian countries. Thus, the opportunities to reduce or divert the organic portion would result in a significant reduction in the total waste volume. Resource recovery can be achieved by various approaches. However, the efficiency of the technology selected is dependent on the characteristics and composition of the waste being processed.

The various technology options for MSW processing and treatment are given in the Figure above.

Landfills

- Open dumping of waste is the most common waste management approach (low- and middle-income countries)
- MSW disposed in landfills:
  - Eastern Asia - low income countries
  - Southeast Asia - middle income countries
  - South-central Asia - high income countries
- Seventeen out of the world's 50 largest dumpsites, are located in Asia.
  Most landfills are not scientifically operated with heaps of incoming untreated waste, creating dumpsites.
- Rehabilitation of dumpsites is crucial

Waste Economies and Financing

- It is important to highlight the wider and long-term economic, environmental and social benefits to bring out the importance and advantages of investing in the waste management infrastructure.
- It is also important to estimate and communicate the costs of inaction on waste management to decision makers, administrators and the politicians.
- The costs of managing solid waste compared to inaction is between 10 per cent and 35 per cent for a typical Asian city.[7]
- Options for waste collection systems depend considerably on local culture, the role played by the informal sector (i.e., waste pickers) and the ability and commitment of paying for collection services by the community.
- The choice of waste processing technology depends on the local context, such as availability of land, affordability or the per capita income and extent of funding by the government.
- Countries with high per capita incomes and limited availability of land, for instance, prefer incineration as the waste management option as opposed to landfilling.
- Levies, fines or taxes on the discharge of pollution are often not adequate to dissuade polluters and meet the requirements of waste-related on a consistent basis. Fees collected for collection services often fall short of operating expenditures.

- For sustainable waste management, the appropriate use of economic instruments and their enforcement is critical. Disposal charges and grants are the two most utilized options to mobilize funds within countries.
- Economic instruments that promote resource recovery are not widely adopted in Asia with those providing for extended producer responsibility (EPR)or product stewardship, the least adopted with the exception of material controls.
- Economic instruments that promote resource recovery are not widely adopted in Asia with those providing for EPR or product stewardship the least adopted with the exception of material controls.
- The informal sector plays a very significant part in making solid waste management sustainable. Financing should be available at the micro level to support the informal sector.
- Meaningful engagement with local communities is necessary to ensure sustainable waste management operations.
  - Community involvement helps in creating green jobs, bringing in ownership in the management of waste especially on a decentralized basis, and encouraging contributions in kind as well as in terms of financial resources, sometimes supported through CSR projects, especially those led by the private sector.
- To ensure public health, investments in all the three components—that is, solid waste management, sanitation and wastewater treatment—must be made. A holistic approach to waste management is necessary especially in the growing cities of Asia.

7 UNEP (2015). Global Waste Management Outlook. Osaka. Available from: http://web.unep.org/ietc/what-we-do/global-waste-management-outlook-gwmo (accessed 23 January 2017).

Solid Waste Management Development Recipients in Asia, 2012 (Million USD)

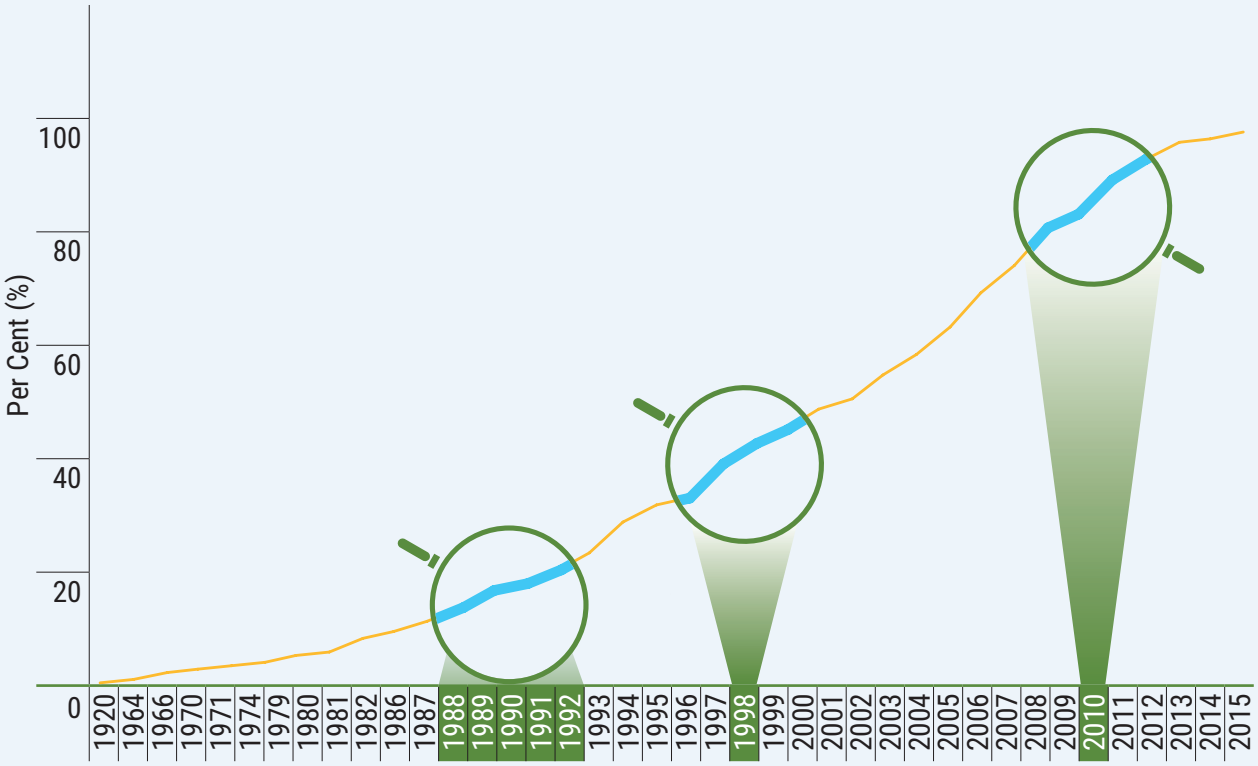
Source: Lerpiniere, Wilson, Velis, and others (2014). Review of International Development Co-operation in SWM

a. Received UISD 3M in the form of equity.
b. Received UISD 3M in the form of equity.
Note: DPR Korea = Democratic People's Republic of Korea

International funds provided to Asian countries in 2012 for solid waste management amounted to USD 1.45 billion spread among 20 of the 25 countries covered in this Outlook.

Waste Governance

- Most Asian countries have clearly defined responsibilities for waste management and recognize the importance of national and local governments working together.
- Adoption of policies and regulatory frameworks need to be coupled with implementation and enforcement. The step from legislation to enforcement is still a major issue for many Asian countries.
- About half the countries have monitoring or reporting requirements, or both, but very few have auditing, inspection or oversight provisions.
- The focus in many Asian countries is still on achieving adequate disposal, but a third of Asian countries legislatively encourage job creation through the application of measures that are higher up the waste management hierarchy.
- EPR or product stewardship provisions are only found in 3 of the 25 Asian countries surveyed. The adoption of a circular economy in legislation is only mentioned in the more developed countries in Asia.
- Economic tools are starting to play a stronger role in Asian countries with the most widely applied ones being waste disposal charges and grants from mainly national or sometimes local governments. Economic instruments focusing on the polluter pays philosophy are more evident in developed Asian countries.
- Waste management plans should ideally address multiple media, such as solid, liquid and gaseous emissions, following a holistic strategy. Integration of legislation to provide a holistic waste management approach is occurring gradually but many of the basic elements to enable the links are already present.
- Transboundary waste movement and managing hazardous wastes is covered by about two-thirds of the Asian countries.
- Reform in waste legislation is often a response to national or international events or to disasters and not always on a proactive basis. National waste-related policies should be reviewed for their effectiveness and should be adapted responding to the feedback received as well as capturing regional or global trends.
- Most countries have informational activities to educate the population or provide information for policy-makers. These activities however need to be strengthened.

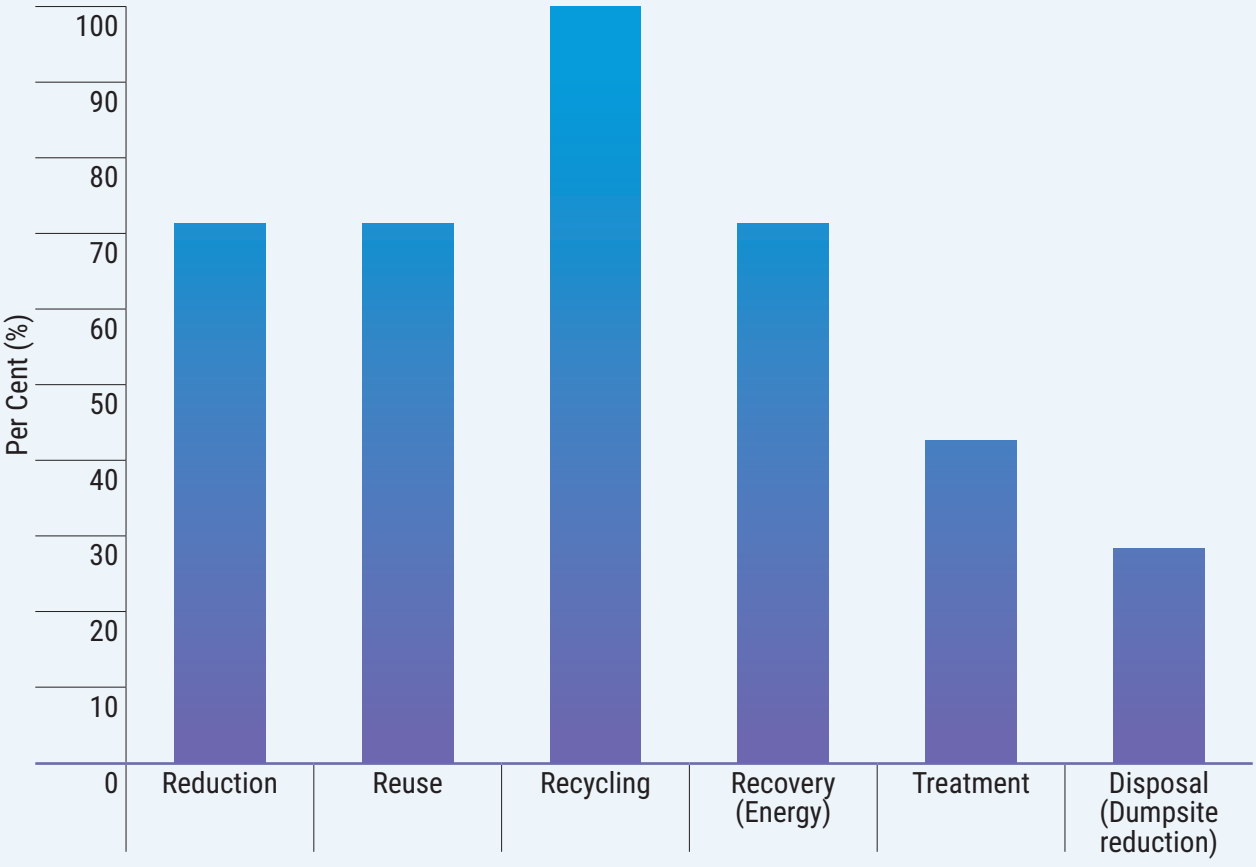


Legislative Tools Enacted Each Year in Asian Countries, 1920-2015

From the Figure, it can be seen that peaks in the number of legislative tools occurred in 1988–1992, 1997–1999 and 2007–2011.

Waste & Resource Management Indicators

- Environmental indicators need to be relevant for policymakers, understandable by users, analytically sound and easily measurable.
- Comparability of indicators between countries is difficult owing to differing definitions of data and the structure of indicators. There is a need to establish a common and agreed-upon set of indicators with uniform definitions of data.
- Less than half the Asian countries have basic data on municipal waste generated, and one-sixth have data from higher up the waste management hierarchy.
- Resource management indicators show that Asian countries have significantly increased their efficiency over the past half century, but show they are particularly vulnerable to international fossil fuel policies.
- Integrating waste management and resource management indicators can provide an overall efficiency of circular economy for a country.
- Indicators for circular economy activities will require an even greater level of sophistication and data requirements covering all three media.
- Asia holds the potential to be the largest market for secondary materials.

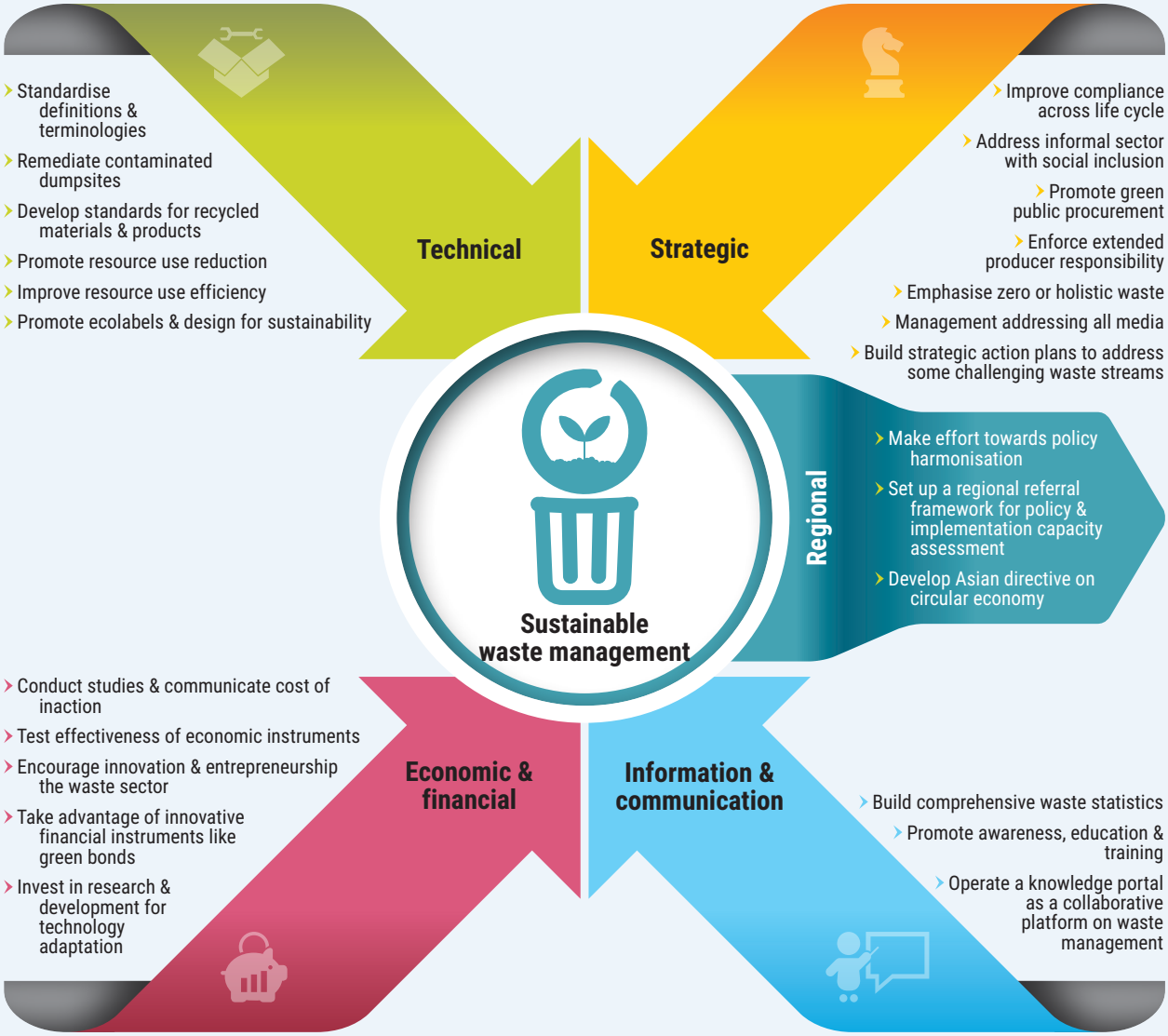


Share of Selected Asian Countries with Waste Management Hierarchy Indicators in Environment Plans

Source: Hotta, Y., and others (2016). Developing 3R policy indicators for Asia and the Pacific region: Experience from Regional 3R Forum in Asia and the Pacific. Journal of Material Cycles and Waste Management, vol. 18, No. 1.

Figure above shows that while there is a significant activity to reduce and eliminate dumpsites, there are also signals to move further up the waste management hierarchy, with a high proportion of countries working on reducing and reusing waste materials.

Way Forward



- Build more reliable, comprehensive waste-related statistics because paucity of data affects system design, technology selection, estimation of investment needs and assessment of policy performance.
  - Standardize definitions of waste streams and waste-related terminologies to track progress and make comparisons.
  - Improve compliance on waste-related regulations across product life cycles through strict enforcement and monitoring.
  - Conduct studies and communicate the “costs of inaction” to realize the health, environmental and social impacts of indiscriminate waste disposal.
  - Remediate contaminated dumpsites and the surrounding environment.
  - Test the effectiveness of economic instruments for effective and sustainable waste management (i.e., to improve compliance as well as promote conversion of waste to resources).
  - Promote reduction in resource use and improve resource use efficiency.
- Control consumerism and consumption patterns
- Promote collaborative consumption and shared economy among stakeholders, especially with those who cannot afford assets on their own or do not have access
- Design products and services with sustainability as a focus and minimize consumption of natural resources and waste generation across the product’s life cycle
- Promote eco-labels and the practice of green products
- Encourage and enforce EPR
- Develop codes of practice and quality standards for recycled materials
- Promote green public procurement

- The informal sector is an important stakeholder in waste collection and processing and integrating them with the formal sector is key.
- Promote investments in the waste management sector by:

❄ Encouraging entrepreneurship and innovative business models

❄ Taking advantage of innovative financial instruments like green bonds

- o Promote awareness, education and training for knowledge generation and capacity building

❄ Raise awareness by launching Public campaigns and offering Educational programmes for school- and university-age youth

❄ Training and skill development programmes, especially on 3Rs

- Invest in research and development for technology adaptation.
- Build strategic action plans to address challenging waste streams, such as marine litter, mining and disaster waste.
- Develop and operate a knowledge portal as a comprehensive dynamic collaborative platform on waste management to meet the needs of a wide range of stakeholders.
- Emphasize holistic or zero waste management addressing waste in all three media (solid, liquid and air).
- Develop a referral framework assessment of policy equivalence, implementation and tracking of progress to guide national governments to set targets and make continuous improvements.
- Consider development of an Asian directive on circular economy to guide the national governments.

COORDINATION

is needed between ministries at the national level to ensure that the actions recommended are implemented in synergy and in an optimal manner

It is hoped that the AWMO will help policy makers and regulators to guide in this direction.

The creation of a NETWORK APPROACH, connecting cities at the country level as well as across the region, is an important endeavor that merits the exchange of knowledge and sharing of best practices.

HARMONIZATION

between national policies is essential to address important waste streams such as e-waste, as waste is transported across the Asian region through the trade flows.

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