REVIEW *of* INTERNATIONAL EXPERIENCE ON LOCAL SOLID WASTE MANAGEMENT PLANNING

"Developing Local Municipal Solid Waste Management Planning Guidelines" project

INTERNATIONAL EXPERIENCE

on

WASTE MANAGEMENT PLANNING

"Developing Local Municipal Solid Waste Management
Planning Guidelines and
Training Needs Assessment for Implementing Such Guidelines" project

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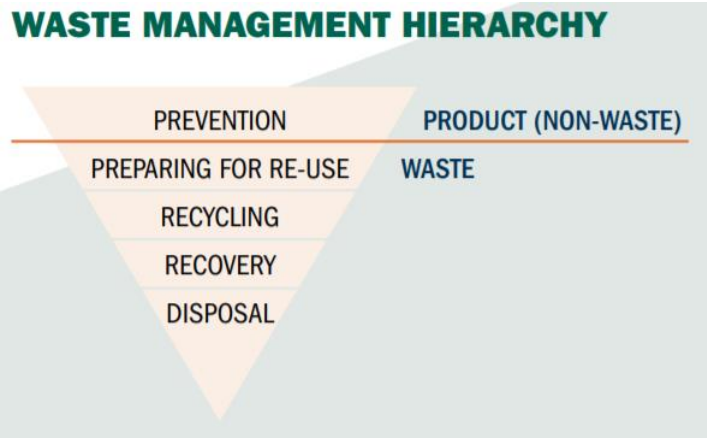
Project website: https://ace.aua.am/waste/planning_guidelines/

Contents

Introduction

The ‘sound material-cycle society’ policy principle adopted by Japan (2000) and the ‘waste hierarchy’ policy principle adopted by the EU (2008) have established an overarching vision for the waste sector, where the society consumes fewer natural resources and causes less environmental impact [1, 2]. These policies promote waste prevention, reuse, recycling, and recovery, in this order, over waste disposal.



It should be emphasized that market conditions initially did not support these policies per se. The contrary was true: disposing waste in a landfill generally is cheaper than recycling it or recovering energy from it. Thus, Japan and the EU had to enact regulations to foster a new sector environment and guide the development of market conditions in support of the new waste policies and make them implementable. These interventions were based on the perceived environmental benefits and the benefits to safeguard the planet’s finite virgin materials for future generations. The new sector environment was created through a combination of sophisticated legislation, economic instruments, and regulation. Taken together, these measures made disposal of untreated waste expensive or impossible in practice [1, 3, 4].

Gradually, landfilling of untreated waste has been prohibited, while new landfill development has been made purposely difficult. Economic instruments in support of the waste hierarchy include landfill taxes that increase the cost of disposal, ‘green tariffs’ for waste-derived products, fiscal relief, and so forth. Consequently, in the past fifteen years in the EU and Japan, both a steady decrease in landfilling and an increase in recycling and recovery have taken place. The combination of regulatory instruments and economic incentives has also caused a spike in research and development, and investments in new and more efficient waste treatment technologies [1, 2].

This last aspect is usually underestimated and sometimes poorly understood in countries at the beginning of the transformation of their waste sectors. The tendency is to adopt or copy approaches that are working in high-income countries with the expectation that they would work everywhere. However, this shift from disposal to reduction, treatment, and recycling results in (much) higher costs that are often poorly considered in countries that want to embark on this type of development [2].

Actors in the waste sector follow market rules and chose the lowest cost option to fulfill their responsibilities. This means that if waste treatment were costlier, it would not be chosen by the waste actors, unless they were required to do so by regulation or if treatment was made financially attractive due to, for example, landfill taxes. Going forward, the EU intends to deepen its efforts and achieve ‘circular economy’. Under this concept, in order to reduce both the total impact on the environment and resource use, products are to be used in the most efficient way possible. ‘Circular economy’ is therefore an expression of an economic model that highlights business opportunities with circular loops rather than linear processes [2].

Consequently, a proposal to increase the recycling rate among EU members is currently under review and it is expected that the earlier target for recycling of 50% of municipal waste by 2020 will be replaced by a higher target of 65% by 2030 along with a binding landfill target of maximum 10% of municipal waste [2].

Similar efforts are underway in Japan; the country currently incinerates 80% of its waste in more than eleven hundred incinerators, but significant efforts to increase recycling and reuse and decrease incineration are underway. As such, implementing the ‘sound material-cycle society,’ the ‘waste hierarchy,’ and the ‘circular economy’ policies bring important economic and environmental benefits. At the same time, they increase the financial cost of the sector. The World Bank’s What a Waste publication3 reports that the financial cost of recycling and incineration is high often exceeding USD 100 per ton. In the EU, where the cost allocation follows the principle of “polluter pays” along with the principles of “affordability” and “sustainability” (see Box 2), households pay on average USD 260-350 per year for waste service. In Japan, the cost of the waste system is

estimated at approximately USD 500/ton and is financed through a combination of property taxes, subsidies, and more recently - waste fees. In general, the populations in most of the EU member states and Japan have developed an appreciation for resource conservation, embraced the waste hierarchy policy, and accepted its cost.

The experience of low- and middle-income countries that have replicated individual sector solutions, such as recycling or waste incineration, from higher-income countries confirms that these are not profit-generating activities5 . In addition, success requires an adequate enabling environment comprising legal, regulatory, and economic instruments as well as sufficient financing, staff capacity, and public environmental awareness - all the prerequisites that were necessary for the successful implementation of the waste hierarchy in the EU and Japan. It is therefore questionable if individual solutions and technologies can simply be copied successfully. Doing so may result in 'lost' investment, facilities operating under capacity, at a loss, or even standing idle, or other unintended consequences such as an increase in illegal dumping. Low- and middle-income countries' replication of high-income country policies may also result in costs exceeding the level of affordability, thus increasing the risks of failure. The experience of the EU and Japan indicates that, in addition to the availability of financing, substantial time and effort are required to establish a well-functioning waste management system. Progress was achieved over a period over decades, which included considerable efforts engaging the public and securing its participation in source separation. Essentially, a social contract has been reached between people, industries, and the public sector to cooperate and sustain their environment as a shared public good.

According to Sensoneo (https://sensoneo.com/sensoneo-global-waste-index-2019/) South Korea has the highest resource recovery and waste management with runner up top five including Sweden, Germany, Netherland, Switzerland, Belgium and Japan.

Some other countries like Czech Republic, Poland and Denmark fall slightly behind and have been experiencing significant improvement of waste management systems over the past decade or so.

Some other countries such as Bosnia are showing signs of improvement in their waste management system and are on the path of moving into upper ranks of waste management and resource recovery.

There are other countries, particularly in Europe that are still struggling to move from a minimal waste management system typically comprising of waste collection and mostly uncontrolled disposal such as Macedonia and Latvia.

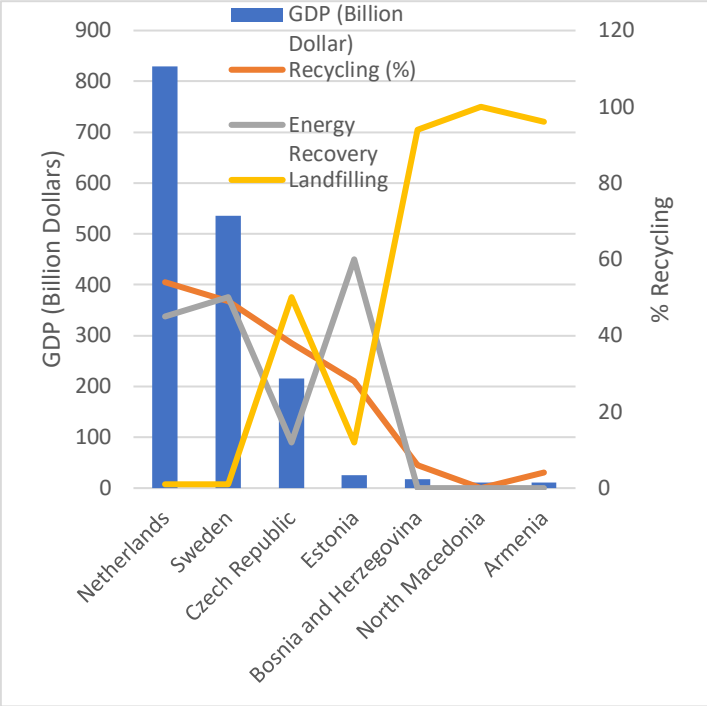
For the purpose of this conclusive review aimed at providing lessons learned from the journey of other countries towards resource recovery and sustainable waste management systems, the following countries are selected for the review:

- Category 1; Countries with basic Waste Management Systems
    - Macedonia
    - Estonia
- Category 2; Countries in transition to more sustainable Waste Management System
    - Czech Republic
    - Bosnia and Herzegovina
- Category 3: Countries with the highest rate of Resource Recovery
    - Sweden
    - Netherlands

Key Findings

Reviewing the waste management transforming journey of various countries particularly in Europe indicates a shift from a waste management approach to a resource recovery one. Success stories such as Czech Republic and in transition situation of countries like Estonia reveals the fact that while public awareness (including awareness of the governing parties) is a key to a successful waste management system development, degree of economic development, working structure for waste management, legislation and least but not least; financial resources are the main ingredients of waste management development.

A closer look at the waste management status in the context of a given country Gross Domestic Product (GDP) emphasizes the fact that substantial growth in waste management systems in terms of resource recovery, is directly impacted by the GDP. Among the six countries selected for this study, Estonia seems to be an exception, where despite the relatively low GDP compared to Sweden and the Netherlands, has a high rate of energy recovery from waste as well as recycling, leading to landfilling rate of about 20% of the total municipal solid waste (MSW). This highlights the importance and significance of developing a sound waste management strategy and plan through implementation of which, financial resources can be identified and allocated for resource recovery and minimizing the land disposal rate.



While countries such as Macedonia and Bosnia and Herzegovina are still struggling with transition from uncontrolled dumping of different types of wastes to development of sanitary (engineered) landfills, countries such as the Netherlands and Sweden had long ago (in mid 70s) had kick started their waste management plans, in line with the overall concept of sustainable development and resource recovery.

The key indicator in a waste management strategy is landfill diversion. However, even countries such as the Netherlands and Sweden that are currently enjoying less than 1% of waste landfilling, have transitioned from a 100% land disposal to high rates of recycling and energy recovery through incineration. The key to their success has been a starting point triggered by the public who became aware of the environmental and health impacts of land disposal of waste.

This in turn led to development of environmental and waste specific legislation which was essentially the cornerstone of current waste management directives of the European Union (EU). In fact, other EU countries are following suit, yet the main shortfall in some other EU countries remains to be economic constraints as well as waste specific institutional structure. As stated earlier, economically underdeveloped countries, often have ambitious goals of high landfill diversion rates. This has proven not only to be unsuccessful, it has also resulted in a stall when it comes to enhancing current uncontrolled dumping of waste and transition to sanitary landfills.

The starting point for development and implementation of a sustainable solid waste management however, for all countries remains to be awareness of the stakeholders, setting realistic goals based on which devising a realistic strategy and waste management plan (WMP) can be accomplished.

The following table and sections summarize the key steps and concepts undertaken by the selected countries and the lessons learned.

Historical Development of Waste Management System in selected countries

Netherlands (21)	Sweden (20)	Czech Republic (5, 6, 7, 8)	Estonia (11, 12)	Bosnia and Herzegovina (9, 10)	Macedonia (13, 14, 15, 16, 17, 18, 19)	Armenia
Early 80s; Integrated Waste Management Policy was established in 1990 and the concept of Circular Economy was developed and implemented in 2013.	**Mid 70s**; In 1975 the Swedish Government passed a bill "Recovery and Management of Waste" which resulted in State support for up to 50% of the capital cost of plants for the recovery or other utilization of domestic waste.	**Early 90s**; The initial legislative act in the field of waste was introduced back in 1991. It was a historically first codified text to provide a legislative framework for waste issues in CZ. In reaction to these processes the CZSO has started regular waste generation survey in 1992. At present the waste operation is regulated by the act on waste of 2001.	**Mid to Late 2000s**; From 2005 to 2014, the level of MSW generated in Estonia fell by 33%. Since 2008, separate collection systems are introduced in Estonia. Currently, 5 sanitary landfills meeting EU standards are under operation in Estonia, replacing 150 former, non-EU-conform landfill sites. While at least 74% of MSW treated was sent to landfills for disposal in 2005, that share fell to 7% in 2014. In the meantime, the share of waste incinerated with energy recovery reached 52%, and that of waste recycled and composted amounted to 29% and 5%, respectively	**2000**; Since 2000 the municipal waste management sector in BiH is under reform driven by the policy framework of the European Union (EU). In 2000, a countrywide Solid Waste Management (SWM) Strategy, funded by the European Union (EU) was the first 'think piece' on solid waste after the war. In 2002, the First Solid Waste Management Project (SWMP-1), supported by International Development Agency (IDA) funding of US$18 million, was launched to support the priority first phase (2002-2008) of the SWM strategy. The project financed the rehabilitation of existing disposal sites, established regional landfills, wild dump closures, collection infrastructure and support equipment and transfer stations. Successful project implementation led BH to seek additional IDA financing and in June 2005 the Bank approved an additional US$8 million credit to the country.	**Late 2000s**; While the 2008 Strategy for Waste Management for the period 2008–2020 is valid, the National Waste Management Plan for the period 2009–2015 has expired and a new national waste management plan for the period 2018–2024 is currently being prepared. Collection and transport of waste Only approximately 70% of the population is involved in the public municipal waste collection system, which is performed by the public enterprises. The recovery and recycling activities for municipal waste are very limited and without any organized approach. Landfills are operating without operational permits with only one exemption, without any of the techniques usually applied at landfills and without any regular monitoring with regard to impacts on the environment.	**2015**; Waste governance aspects are reflected in key national strategies and international agreements such as Republic of Armenia Government 2019 Program, Republic of Armenia Territorial Development Strategy for 2016-2025, Republic of Armenia Solid Waste Management Development Strategy for 2017-2036, Cleaner Production Concept, Comprehensive and Enhanced Partnership Agreement (CEPA)

Waste Management Policy and Strategy in selected countries

Netherlands (21)	Sweden (20)	Czech Republic (5, 6, 7, 8)	Estonia (11, 12)	Bosnia and Herzegovina (9, 10)	Macedonia (13, 14, 15, 16, 17, 18, 19)	Armenia
Waste policy goals in the Netherlands are: • Zero landfill • Restrictive use of W to Energy • Increase and maximize recycling The main 5 elements of Netherland's waste management strategy are: • Order of preference for waste management (waste hierarchy) • Stringent waste treatment standards • Planning on national level • Producer responsibility • Use of various (economic) instruments to stimulate prevention and recycling The Netherland's continuous strategy revolves around the following: • Creating economic incentives • Working with frontrunners • Removal of counterproductive (legal) restraints and impediments	In line with the overall European waste management policy of "virtually eliminating landfilling", Sweden, in early 2000s, evaluated and developed its waste management policy based on economic, environmental and social drivers. Main strategies: • Climate tax on waste incineration • Including waste in green certification system for electricity production • Compulsory recycling of recyclable materials • Weight-based taxes on waste collection and incineration	Waste management policy of the Czech Republic is based on the general principles applied in waste management: • extended producer responsibility, • polluter pays principle Strategy: • prevention and reduction of specific waste production, • minimizing of adverse effects of waste generation and waste management on human health and the environment, • sustainable development of the society and moving closer towards the European "recycling society", • maximum utilization of waste as a substitute for primary sources and • the transition to the circular economy.	Since 2005, Estonia has gone through three cycles of waste management plans, which provide overall policy direction. Policy • Halt the increase in the generation of municipal solid waste per capita (by 2006). • Halt the increase in the generation of packaging waste (by 2006). • Increase the reuse of sewage sludge in agriculture and degraded land. Estonia's Environmental Strategy 2030, released in 2007, calls for a reduction of total waste to landfills by 30% by 2030	Overall waste management policy and strategy emphasizes the sustainable development principle in waste management and compliance with the waste management hierarchy leading with waste prevention as the priority.	The general waste management policy with intention to overcome the current situation and to establish a sustainable waste management system was formed in the Law on Environment, in the National Environmental Programmes (NEAP 1996/2007), and in particular in the Law on Waste Management. However, the present national policy setting, and legislation are insufficient in a number of areas to comply with the requirements of the waste sector. The Strategy determines the fundamental directions of waste management for the period of 12 years. The Strategy promotes the transposition of EU waste legislation and implementation of the EU standards and principles for all types of waste.	The country's strategic development framework "Armenia Transformation Strategy 2050" presented by RA Government in July 2019 sets Strategic Mega-Goals,9 some of which have direct links to waste governance. the 2013 Strategy Report, Road-map and Long-term Investment Project in Solid Waste Management in Armenia developed by the Asian Development Bank where the approaches and solutions suggested in the report informed the 2017-2036 Municipal Solid Waste Management System Development Strategy developed by the MTAI. The later, however, focused mainly on improving the waste collection, transportation, and disposal capacities in the country, while setting quite weak targets for waste sorting and recovery (by 2016 users will sort up to 20% of the generated waste).

Waste Management Legislation in selected countries

Netherlands (21)	Sweden (20)	Czech Republic (5, 6, 7, 8)	Estonia (11, 12)	Bosnia and Herzegovina (9, 10)	Macedonia (13, 14, 15, 16, 17, 18, 19)	Armenia

Waste management operations, (including the collection, transport, reuse, disposal, supervision and aftercare); Permit or registration required under the Waste Directive (75/442/EEC) or the Hazardous Waste Directive (91/689/EEC).	Conservation of resources in the 1970s A government bill in 1975 established the principle that responsibility for resource-efficient and sustainable waste management rested with the waste producer. The Waste Bill 1990, pointed out that the importance of waste as a growing environmental problem was greater than its importance as a resource. The right of municipalities to assume responsibility for non-hazardous commercial and industrial waste was ended as from 2000. A law on landfill tax was enacted in 1999. Wide-ranging EU regulations governing landfill were adopted in 1999. Waste Incineration Directive was adopted in 2000.	The initial legislative act in the field of waste was introduced back in 1991. At present the waste operation is regulated by the act on waste of 2001. The new act introduced number of updated and totally new definitions, principles, institutes and processes. Today the Czech legislative framework in the field of waste is compatible with waste management laws and regulations of the EU.	2004 Waste Act is the central piece of legislation governing waste management. It specifies obligations for the main actors in waste management, establishes procedures for waste permits and includes provisions for fines and other penalties. It also establishes EPR for specific waste streams and provides a legal framework for the establishment of producer responsibility organizations. This act, moreover, transposes the EU Waste Framework Directive (2008/98/EC) and its principles. This includes the "proximity principle" (recovery and disposal of mixed municipal waste should occur as close as possible to the source) and the "waste hierarchy" (priority to prevention, then reuse, recycling, other recovery and disposal). Landfills are governed by the Waste Act and a 2004 Regulation of the Minister of Environment, which transpose the EU's Landfill Directive (1999/31/EC).	• Law on Waste Management in the Republic of Srpska (Official Gazette of RS, no. 113/13 and 106/15), • Law on Waste Management in the Federation of BiH (Official Gazette of FBiH, no. 33/03, 72/09, 92/17), • Law on Waste Management in BD (Official Gazette of BD, no. 72/09, 25/04, 1/05, 19/07, 2/08 and 9/09), • set of entity bylaws that regulate different aspects including waste categories with lists, permitting for small-scale activities on waste management, extended producers responsibility (EPR), transboundary movement of waste, etc. Legislation on the shipment of waste is harmonized with the Basel Convention. Further efforts are needed on alignment with EU waste acquis provisions.	• 2004 Law on Waste Management • 2005 Law on Environment • 2007 National Strategy for Environmental Approximation, Waste Sector • 2009 Law on Packaging and Packaging Waste Management • 2010 Law on Batteries and Accumulators and Waste Batteries and Accumulators • 2012 Law on Management of Electrical and Electronic Equipment and Waste • Electrical and Electronic Equipment • National Waste Management Strategy 2008-2020 • National Waste Management Plan 2009-2015	In the area of waste management, the Republic of Armenia Law on Waste defines the competences of the Government of Armenia, the state authorities in the sectors of nature protection, health, territorial administration, as well as those of the local self-government (RA Law on Waste, articles 7, 8, 9, 10 and 11 respectively). The Law on Waste regulates the collection, transport, storage, treatment, disposal, and reduction of volumes of wastes, as well as the legal and economic frameworks for preventing the negative effects of wastes on public health and the environment. The law defines the state policy in waste management, as well as the procedures for the standardization, accounting, and profiling of waste. More than 40 sub-legislative acts have been adopted to ensure the enforcement of the Law on Waste.

Waste Management Institutional Setting in selected countries

Netherlands (21)	Sweden (20)	Czech Republic (5, 6, 7, 8)	Estonia (11, 12)	Bosnia and Herzegovina (9, 10)	Macedonia (13, 14, 15, 16, 17, 18, 19)	Armenia

Dutch municipalities have a legal obligation to provide a waste-collection infrastructure for municipal waste, but they are free to choose whether to carry out this task themselves or to contract out waste collection to outside firms (private or municipality-owned). 37 percent represent contracting out waste collection to a private firm and 21 percent to a municipality-owned firm. It should be noted that a municipality-owned firm operates under commercial law, whereas the shares are publicly owned by municipalities. A third group (16 percent) represent collection via a municipal service in cooperation with neighboring municipalities.	Under the Swedish Environmental Code, each municipality is responsible for ensuring that household waste within the municipality is transported and recycled or disposed of. Every municipality is required by law to have its own waste and sanitation ordinance which consists of a waste plan and regulations for waste management. Municipalities can collaborate and draw up common regional waste plans. The municipalities are working at increasing rates to promote the prevention and reuse of waste. Preparation for reuse of household waste is also part of the municipal responsibility.	Municipalities are the producers of municipal waste and have the direct responsibility for the physical management of waste on their territory. Municipalities with extended competency ("MEC"), are responsible for the performance of the state administration, in the area of waste management. Regional governments are obliged by law to commission and approve in the form of an obligatory ordinance their management plans. Regional administrations, are responsible for the performance of the state administration, exercise the powers conferred by the State in the area of waste management. Ministry of Environment is the central government administration authority in the field of waste management.	Estonia's Ministry of the Environment (MoE) is the central institution responsible for the policy and regulatory framework for waste management. Municipal governments organize municipal solid waste collection, transport and treatment in their territories. Municipalities contract waste collection and transport to private companies and oversee their operations. Municipalities prepare waste management plans, either individually or in collaboration with neighbors. The Environmental Investment Centre (EIC) uses revenue from environmental taxes to fund investment projects, including waste management. The Environmental Inspectorate enforces of waste legislation, reviewing documents from waste handlers and inspecting waste facilities and waste shipments.	Operating and procuring waste management services, collection of fees and selecting sites for waste management facilities is conducted by the municipalities and cantonal entities, development of laws and regulations, issuing permits and preparing waste management plans and strategies are the responsibility of Entities (FB&H, RS and BD) as well as cantonal bodies and municipalities.	Tasks and responsibilities on the waste management field are in practice split among several institutions in the country, where certain overlapping can be observed among governmental institutions as well as between governmental and municipal institutions. Preparation, adoption and implementation of the main primary and secondary legislation shall be carried out jointly /in cooperation / through consultations /in agreement with other ministries, authorities, municipalities, production/service sector and other stakeholders, but it seems there is certain confusion over role and competency as well as a lack of communications and co-ordination.	The main actors are state governing authorities, territorial administration authorities, and local self-governmental bodies. The policy development of the sector is led by the RA Government, while the Ministry of Territorial Administration and Infrastructure, the Ministry of Environment, and the Ministry of Health, as well as the regional level territorial administration authorities participate in waste related policy development. The mentioned three ministries develop national programs and plans and ensure their implementation. The territorial administration authorities and the local self-governmental bodies (LSGBs) carry out the implementation of the policies and national programs and plans on regional and local level. The LSGBs are responsible for provision of municipal waste collection and disposal and sanitary cleaning services in communities.

Waste Management Financial Setting in selected countries

Netherlands (21)	**Sweden (20)**	**Czech Republic (5, 6, 7, 8)**	**Estonia (11, 12)**	**Bosnia and Herzegovina (9, 10)**	**Macedonia (13, 14, 15, 16, 17, 18, 19)**	**Armenia**
Polluter Pays Principle. The way citizens pay	Various taxation on landfilling and waste	• Fees for depositing	The waste disposal tax is paid together	Financing is the backbone of solid waste	Macedonia has identified the key features of	• Low waste management fee

for waste collection differs by municipality. Most Dutch municipalities still use a fixed fee per year. However, in several municipalities, the introduction of unit- based pricing of (unsorted) waste has been an important measure in increasing the collection of compostable waste and recyclables and in reducing the amount of environmentally unfriendly unsorted waste as well. While marginal costs are zero for citizens with a yearly flat fee, with unit- based pricing citizens have an incentive to reduce waste as there is now a marginal price. As prices are generally much higher for unsorted waste, citizens with unit- based pricing also have an incentive to invest more in sorting waste. By 2010, 36 percent of all Dutch municipalities had implemented such a system.	incineration, in addition to weight-based collection fees contribute to the waste management costs. Local Investment Programmes (LIP) qualified for government grants averaging approximately 30 per cent of the investment. These grants were awarded between 1998 and 2001. It is estimated that the amount of waste put into landfill was reduced by 370,000 tonnes as a result of investment grants to improve waste management.	waste in a landfill • The financial reserve for rehabilitation, restoration, and follow-up care after landfill closure pursuant to the Waste Act • Extended producer economical responsibility • Financial collateral and insurance of the first phase of landfill operation pursuant to the Waste Act • Payments for the operation of municipal waste management system • Support from the state budget (primarily the collection and transport of waste) • Expenditures from local budgets (primarily for the collection and transportation of municipal waste) • Support from EU programmes and funds • Other subsidies and grants provided by other ministries	with landfill operators' gate (service) fee for non-hazardous waste. In 2005, Estonia's government started to increase the national waste disposal tax, which previously had been at very low levels. In 2006, the tax for MSW was set at EUR 7.30 per tonne and rose to reach almost EUR 30 per tonne in 2015. Municipalities receive 75% of the revenues from the waste disposal tax; in the past, this provided a key source of funding for waste collection and management. The tax provided an incentive for investments in MBT plants and incineration, which meant the amount of waste sent to landfills decreased by 95% over 2000-14.	management. However, no reliable information is available on the cost/ton as • quantities are estimated due to lack of truck weighing scales; • costs inside the Municipal Department of Communal Utilities are often not clearly allocated per activity and • costs inside the waste collection company are often not strictly separated from other services such as street cleaning. The current cost calculation system is not reflecting the actual situation due to poor cost accounting practices.	financial setting of the waste management system, however, currently the system suffers from lack of a concrete institutional structure which leads to lack of specific financial accounting system for waste management.	insufficient for full cost-recovery • Inadequately low environmental tax for landfilling unsorted municipal solid waste • Poor costing of waste management operations • Polluter pays principle tools are not fully enabled for full cost recovery • Lost value from recyclables due to lack of knowledge and basic capacity

Concluding Remarks

A comprehensive review of waste management system in countries in two ends of waste management spectrum revealed the key ingredients of success in countries such as Netherlands and Sweden and key shortfalls and bottlenecks in countries struggling to get the waste management system right such as Macedonia and Armenia.

Countries such as Czech Republic and Estonia, are examples of countries truly in transition towards a sustainable waste management system. Historically, the starting point of a currently successful waste management system in countries like Netherland and Sweden, has been environmental awareness long before other countries realized the environmental adverse impacts of waste mismanagement or lack of waste management system. This led to developing strategic goals which were materialized through sound legislative, institutional and financial structures.

As indicated earlier in this report, GDP directly correlates with the rate of "resource recovery" which is the ultimate goal of waste management systems. The dramatic different in GDP among the countries reviewed in this report, clearly indicates that, realistic goals corresponding to the economic development status of a given country are key to the "gradual" and long term success of a waste management plan.

Another lesson learned from the journey countries such as Czech Republic and Estonia have been going through, is the adaptation of EU legislative structure and waste management directives. A sound waste management accounting system, institutional structure and financial sourcing can be achieved through clear legislative structure.

Waste governance starts from the strategic goals and guiding principles. There is no short term fix or a silver bullet to develop sustainable waste management system in developing countries where economic challenges practically hinder long term planning. However, moving through the phases of development in a long term perspective is the key to a successful waste management and resource recovery system.

Landfill diversion is certainly the ultimate indicator of resource recovery, but it has to be realistically set as a goal. With hundreds of uncontrolled and even unregistered waste dumpsites in the country, setting ambitious goals of drastically increasing recycling and landfill diversion rates in short to midterm, may in fact offset the actual targets by years.

Priority in the midterm is to be given to rehabilitation of uncontrolled waste dumps and construction of new sanitary landfills, with adequate capacity corresponding to the timelines set for a sustainable resource recovery through development of a working legislative, institutional, financial and accounting system.

Securing financial resources through the government and external support in form of loans and grants can be set as short to mid-term objectives based on which further development of the system can be achieved.

Extended Producer Responsibility (EPR) and Polluter Pays Principle (PPP) are key to sustainable development of a waste management system. However, taking into consideration the economic challenges of the producers, vast majority of which are general public, a gradual shift initiated through incentives towards an economically viable and sustainable tariff structure is inevitable.

Key considerations in various aspects of developing a sustainable waste management system are presented as follows, partly adopted from United Nations Environment Programme, 2015, Global Waste Management Outlook.

GENERAL ADVICE

- Need strong leadership and courage. Political commitment makes a huge difference.
- Solutions need to be adapted to local conditions – no 'one size fits all'.
- Formulate explicit and clear goals; plan how to achieve them. Formulate goals carefully – the goals express the very purpose of the system, and thus determine its elements and the way they interact.
- It usually works more easily if social consensus exists among stakeholders about waste issues and waste management principles and goals.

- Start from where you are – understand your baseline – build on what already exists – build gradually and work towards each ultimate goal as a series of steps.
- Reconfirm the waste prevention principle, and confirm the role of all waste generators, including the public.
- Need long-term thinking and good strategic planning. Investment requires 'regulatory certainty' – decisions should not be subject to change after each election.
- The reasons for relative success are often primarily social, cultural and political, rather than technical or even economic.
- Invest in information, dialogue, education, communication, collaboration.

PROACTIVE POLICIES AND SOUND INSTITUTIONS

- Experience has shown that effective waste management systems combine multiple types of policy instruments – direct regulation, economic and social instruments – in a coherent and balanced mix.
- Introduce framework legislation, to allow for regulations to be implemented in stages, with progressively more stringent standards, to allow the actors in the system to develop expertise and raise necessary financial resources.
- Effective enforcement, by a strong, independent and well-resourced regulator, with sufficient authority to enforce the regulations in a consistent and effective manner, is critical to create a 'level playing field' for proper waste management. There need to be penalties in place for non-compliance.
- The policy and institutional system needs to evolve within, and for, the local situation and get rooted, supported and 'owned' under the local circumstances. This is a long-haul learning process, which takes time, effort and commitment, and it requires developing resources, expertise and capacities.
- The passing of stable legislation that allows businesses and local governments to plan their operations and investment ahead will increase the effectiveness of the system. While being stable, such legislation also needs to be flexible enough to accommodate future changes.
- Take charge of technology selection as a matter of governance, not as a matter of technical management. Technological solutions need to support the goals and match the local situation, needs and capacities. Take time to learn about the function and purpose of various technologies, rather than just their features, and study their track record, performance and real costs.
- As a rule of thumb: If a solution looks too good to be true, it probably is

RESPONSIBILITIES AND PARTNERSHIPS

- Build citizen and stakeholder engagement into policy-making processes. Communicate, facilitate involvement, engage with the actors in the system. Spend time on consulting all affected stakeholders, private or public. Make sure that those who are key to the success of the system are on board. Ensure that all parties know what is required of them – facilitate required changes in behavior.
- Establish mutually beneficial partnerships to deliver effective and sustainable waste management services. The type of partnership should be selected and tailor-made to suit local conditions, including both public and private sectors as appropriate. Ensure the inclusion of the community and informal sectors within an integrated waste and resource management system in the city.
- Future waste management transcends both party political lines and health and environment issues – develop a collegiate approach across political parties and with other relevant sectors and ministries.

AFFORDABLE AND COST-EFFECTIVE WASTE MANAGEMENT

- Work on and communicate about the economic dimension of waste problems, strategies and actions (policy).

- Affordability is a significant constraint on municipal solid waste management services in lower income countries. Short-term solutions must be financially sustainable. **Tailor ambitions to what is affordable**.
- Understand your costs and revenues. **More transparency, more consistent accounting procedures and better benchmarking** allow tighter financial management with better control over technical inefficiencies and fraud.
- Aim to gradually increase cost recovery. Begin by making a direct charge where there is a clear demand for the service and a tangible benefit to the service user (e.g. primary waste collection). Ensure support is available to those who cannot afford to pay.
- Ensure disposal is priced – implement the 'polluter pays principle' and provide an incentive to reduce, reuse and recycle (the 3Rs)
- There is no 'right' or 'wrong' financing model – each local situation requires a tailor-made solution. Select a model which is transparent and fits with the local custom and tradition, and select a service that fits customer needs.
- Consider extended producer responsibility (EPR) as a means to transfer at least some of the costs of managing end-of-life products in municipal solid waste from the municipality to the producers and other stakeholders in the supply chain who put the products on the market.
- Consider potential investment opportunities from private players in markets for secondary products and energy and the potential financial benefits of co-management of specific municipal waste streams with other material or waste streams.

EFFECTIVE MANAGEMENT INFORMATION SYSTEMS (THE 'DATA REVOLUTION')

- Aim to develop fit-for-purpose data collection and management information systems, to allow performance monitoring and sound strategic planning.
- Take advantage of investment in new waste management services and facilities to institute routine collection of the data needed to monitor and further develop waste management services.
- Utilize the newly available performance indicators for municipal solid waste management to benchmark the city's performance, highlight areas for improvement and monitor improvements over time.

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