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Technical Assistance for Developed Analytical Basis for Formulating Strategies and Actions towards Low Carbon Development
Düşük Karbonlu Kalkınma için Çözümsel Tabanlı Strateji ve Eylem Geliştirilmesi
Teknik Yardım Projesi TR2013/0327.05.01-01/001



2.6. Contribution to Analysis of Barriers and Opportunities in Waste Sector

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GHGs caused by Waste Sector

- Turkey's total GHGs emissions in 2015 was 475 Mton of CO₂ equivalent (**3.5 % - 17 Mton CO₂-eq caused by waste sector**). From that 88 % from methane (CH₄) and 84 % of this methane is from landfills , the rest from wastewater treatment
- The major GHG emissions from the waste sector are landfill methane (CH₄) and, secondarily, wastewater CH₄ and nitrous oxide (N₂O).





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The Climate Coin is with 2 sides....

- Climate Mitigation **AND** Climate Adaptation

Climate Mitigation is reducing GHGs emissions to the global atmosphere
.....is protecting the climate from us

Climate Adaptation is protecting us from inevitable changes to climate
.....is protecting us from the changing climate
..... Is necessary to manage the unavoidable and to avoid the unmanageable





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Mitigation

The waste sector is in a unique position to move from being a not big source of GHGs emissions to becoming a major sever of emissions .

The prevention and recovery of wastes avoids emissions in all other sectors (like tourism, agriculture, transport, energy, etc...).

Every waste management practice generates GHGs both:

- **Directly (emissions from waste processing itself),** and
- **Indirectly** (through energy consumption).

The climate benefits of waste practices result from avoided landfill emissions, reduced raw material extraction and manufacturing, recovered materials and energy replacing virgin materials and fossil fuel energy sources, carbon bound in soil through compost application, and carbon storage due to recalcitrant materials in landfills.

These is general global consensus that climate benefits of waste avoidance and recycling far outweigh the benefits from any waste treatment technology, even where energy is recovered during the process.





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Status of Waste in Turkey

- The annual generation of municipal waste, mainly from households but including similar wastes from such sources as commerce, offices and public institutions in Turkey has reached 395 kg per person in 2016 (TUIK).
- This is significantly lower than the EU's generation rate of 480 kg in the same year (EUROSTAT) but much higher than Turkey's own generation rate in 1994 (308 kg/person).
- 28 432 313 tonnes out of 31 583 553 tonnes collected municipal waste was sent to sanitary landfills or waste dump sites according to 2016 TUIK data.
- According to 2014 data, 2.4 million tonnes of packaging waste was collected out of 4.2 million tonnes generated. 1.8 million tonnes (NWMAP, 2016) of this amount is from municipal packaging waste which would be sent to landfills if not collected separately. Generated amount of packaging waste is assumed as equal to the amount of packaging put on the market in the same year due to short market life of packaging.
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Mitigation

- Prevention and Reduction (for example: reduction of biodegradable waste to landfill) – direct
- Source separation and dual collection – indirect
- Route optimization of waste collection – indirect
- Recycling , use of recycled material for manufacturing – indirect
- Landfill gas collection – direct
- Biological recovery of municipal waste (composting and biomethanisation) – direct
- WtE by gas to energy or waste incineration; displacing fossil fuels – indirect





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Mitigation – Barriers and Opportunities

Political & Legislative Barriers

- Lack of policy and economic instruments on waste management in Turkey: Landfill taxes, bans, Pay as you throw (PAYT schemes) . In the EU, countries which have 30 EUR/ton or more landfill tax achieved good results.
- Reluctance of local governments to waste management: transfer to private sector, not in my backyard.
- Weak monitoring and auditing on implementation of laws and regulations for waste management: While collection and transportation of waste is done to a large extent, the great majority of solid waste (particularly biodegradable waste and recyclable packaging waste) in the country is still not managed in accordance with the laws and regulations and ended up in landfills or lost in informal economy.

Opportunities

- Successful transposition of waste part of EC *acquis* into national legislation.





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Mitigation – Barriers and Opportunities

Institutional & human capacity

Barriers

- Insufficient human resource for complicated waste management projects: WtE projects involve sophisticated technologies which require skilled staff and regular maintenance.
- Inefficient use of donor funds
- Independent monitoring and auditing structure is lacking
- Technical staff capacity of municipalities

Opportunities

- Presence of NGOs and authorised institutions in the field of waste management in Turkey





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Mitigation – Barriers and Opportunities

Economic & Financial Barriers

- Too little environmental tax: Revenue from environmental cleaning tax is EUR 10-20 /year compared to EUR 50-200 /year in the EU.
- Income from energy sales does not cover Waste to Energy (WtE) costs: Not always, need feasibility.
- Inadequate internal financing source for waste management
- Vulnerable secondary material market

Opportunities

- Multiple income opportunity for integrated waste management in Turkey:
 - sales of electricity at the guaranteed feed-in-tariff of 13.3 US\$ cent / kWh to the National Grid (YEKDEM)
 - gate fees for non-municipal waste
 - sales of the resulting heat/steam to neighbour commercial buildings, schools, governmental institutions etc.
 - sales of the recycled waste won back as raw material such as packaging waste and non-recycled waste used as refuse derived fuel by companies from the heavy industry such as cement industry
 - sales of the generated carbon credits in the global voluntary carbon market



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Mitigation – Barriers and Opportunities

Opportunities-cont.

- Long term leasing of the landfills
- External donor support, particularly from the European Union and the UN
- Loans provided by international financial institutions: World Bank, the European Investment Bank (EIB), European Bank for Reconstruction and Development (EBRD), International Finance Corporation (IFC), or within the framework of inter-governmental agreements such as the German Investment and Development Bank (KfW) or Japan Bank for International Cooperation (JBIC).
 - TurSEFF: Turkey Sustainable Energy Financing Facility, In 2017, a new phase of TurSEFF was launched by the EBRD, expanding the scope to: Water efficiency, efficiency in the use of material and waste minimisation investments.
 - NØW: The European Bank for Reconstruction and Development (EBRD)'s Near Zero Waste - NØW programme is a strategic initiative to promote waste minimisation and pollution prevention projects in various sectors of the economy in Turkey.
- Presence of secondary material market for various recyclables:





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Mitigation – Barriers and Opportunities

Social Barriers

- Perception of the waste sector
- Existence of waste pickers

Opportunities

- Job creating potential of waste management particularly recycling: The employment opportunities in the recycling sector include low-skilled work in particular, but also include medium and high-skilled jobs, ranging from collection, materials handling and processing to manufacturing products. 45% in employment in the EU (Between 2000- 2007)
- Awareness raising on reducing food waste: Around 90 million tonnes of food waste are generated in the EU each year. 53% of this amount comes from households .





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Mitigation – Barriers and Opportunities

Technological Barriers

- Inadequate waste data: Collected waste data is not generally long term and not robust enough to use for project evaluation and investment feasibility studies.
- Lack of R&D funding special to waste management
- Biological waste recovery capacity in Turkey is too low at a level around 1.5 million tonnes (NWMAP, 2016): There are 8 biological waste recovery facilities (6 composting , 2 biomethanisation) for source-segregated municipal waste; 6 mechanical and biological treatment facilities (1 composting, 4 biomethanisation, 1 biodrying) for mixed municipal waste and 1 co-incineration plant for mixed municipal waste. These biological recovery facilities are established in only 12 cities out of 81 cities of Turkey. Besides, 22 cities do not have sanitary landfills and are still depending on uncontrolled dump sites.
- Drawbacks of landfill gas capturing projects: Theoretical gas production and the real capturing of gas do not coincide.





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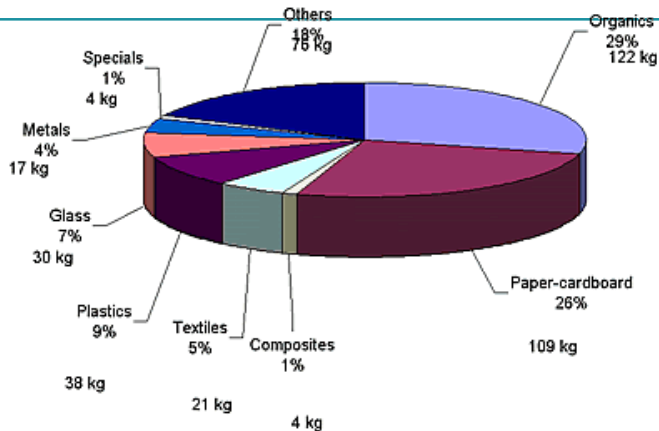


Mitigation – Barriers and Opportunities

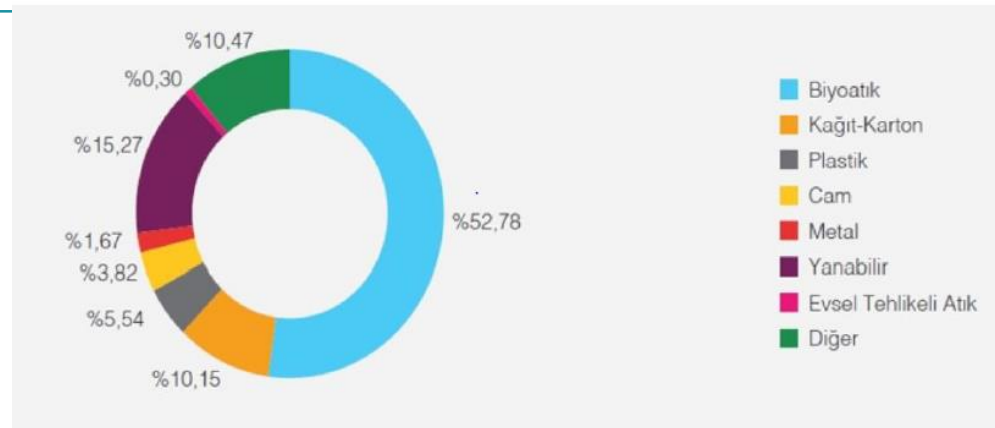
Barriers-cont.

- Low calorific value of municipal waste in Turkey: Incineration and industrial co-combustion for waste to energy provide significant renewable energy benefits and fossil fuel offsets. However, calorific value and humidity of mixed municipal waste is important.

EU



Turkey





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Mitigation – Barriers and Opportunities

Opportunities

- Increasing thermal substitution rate with co-processing: the average substitution rate across the EU amounts to about 39%. In Turkey, the thermal substitution rate is around 3%.
- Biomass pyrolysis/gasification: Gasification and pyrolysis, later also plasma pyrolysis, were considered a technically and financially viable alternative to waste incineration and were labelled with the quality of being a non-pollution technology, compared to incineration.
- Compost as landfill cover: Using compost as landfill cover on closed landfills provides an excellent environment for the bacteria that oxidize CH₄.
- Streamlining potential of existent technologies: Various waste management technologies such as mechanical biological treatment, biomethanisation for solid waste and wastewater sludge, biodrying and composting have been already introduced in Turkey. There is lower cost of early mover externalities and adaptation period for streamlining these technologies compared to totally new technologies.





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Adaptation - approach

- The term adaptation applies to measures taken to prepare for expected changes in climate (**needs to assess vulnerability to the current climate and to future climate change**) in order to moderate the harm from negative impacts and exploit beneficial opportunities.
- Speaking for waste management, the adaptation challenge is underestimated compared to the great importance that has been given to climate change mitigation issues (very few measures and policies have been arrived dedicated to adaptation and waste management). **Our approach is that for Turkey it is the importance of adapting the current and future waste management to climate change**, i.e. to Integrate of Climate Change Adaptation into the Waste Management Sector (**apply climate change adaptation vulnerability and risk assessment in waste projects**)





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For Turkey it is the importance of adapting the current and future waste management to climate change

It deserves more attention by urban planners and decision makers:

- **it seems that extreme weather events will become a rule** (and not an exception, as it is now) for designing waste management systems in certain areas,
- **it seems that the most vulnerable waste management systems (the collection systems, landfills ...wind) are the ones that happened to be in growing and transition megacities (Istanbul is among Europe's 'Big Four' megacities, and big cities Ankara and Izmir)**
- **old landfills, even if they are closed possess a serious risk, especially if they are located into floodplains.** New and active landfills are by far the most vulnerable part of the waste management chain and their potential for environmental damage is really high, especially in the case of erosion and shore erosion (flood create landfill and dumpsite erosion) or oversaturation **Black Sea and SE Anatolia regions**
- **Extreme events can damage waste management infrastructure and facilities giving rise to “disaster waste”, an increased risk of environmental contamination, and potentially adverse human health impacts; Contaminated site management** will become more difficult due to the increased incidence of flooding and other climate impacts that threaten the effectiveness of cleanup efforts; the safe and timely management of *disaster debris* are an essential but often overlooked component of an emergency response or disaster incident.





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Summary of adaptation issues for the waste sector – for *highly vulnerability* to climate change waste options.

Waste practices	Vulnerability to climate change	Adaptation implications & strategies to minimize emissions	Comments
Uncontrolled disposal (open dumping & burning)	Highly vulnerable Detrimental effects: warmer temp. promote pathogen growth and disease vectors	Exacerbates adaptation problems Recommend implementation of more controlled disposal and recycling practices	Landfills
Wastewater control and treatment (aerobic or anaerobic)	Highly vulnerable Detrimental effects in absence of wastewater control and treatment: Warmer temperatures promote pathogen growth and poor public health	Large adaptation implications High potential for reducing uncontrolled GHG emissions Residuals (bio-solids) from aerobic treatment may be anaerobically digested	Wide range of available technologies to collect, treat, recycle and re-use wastewater Wide range of costs CH ₄ from anaerobic processes replaces fossil fuels for process heat or electrical generation Need to design and operate to minimize N ₂ O and CH ₄ emissions during transport and treatment



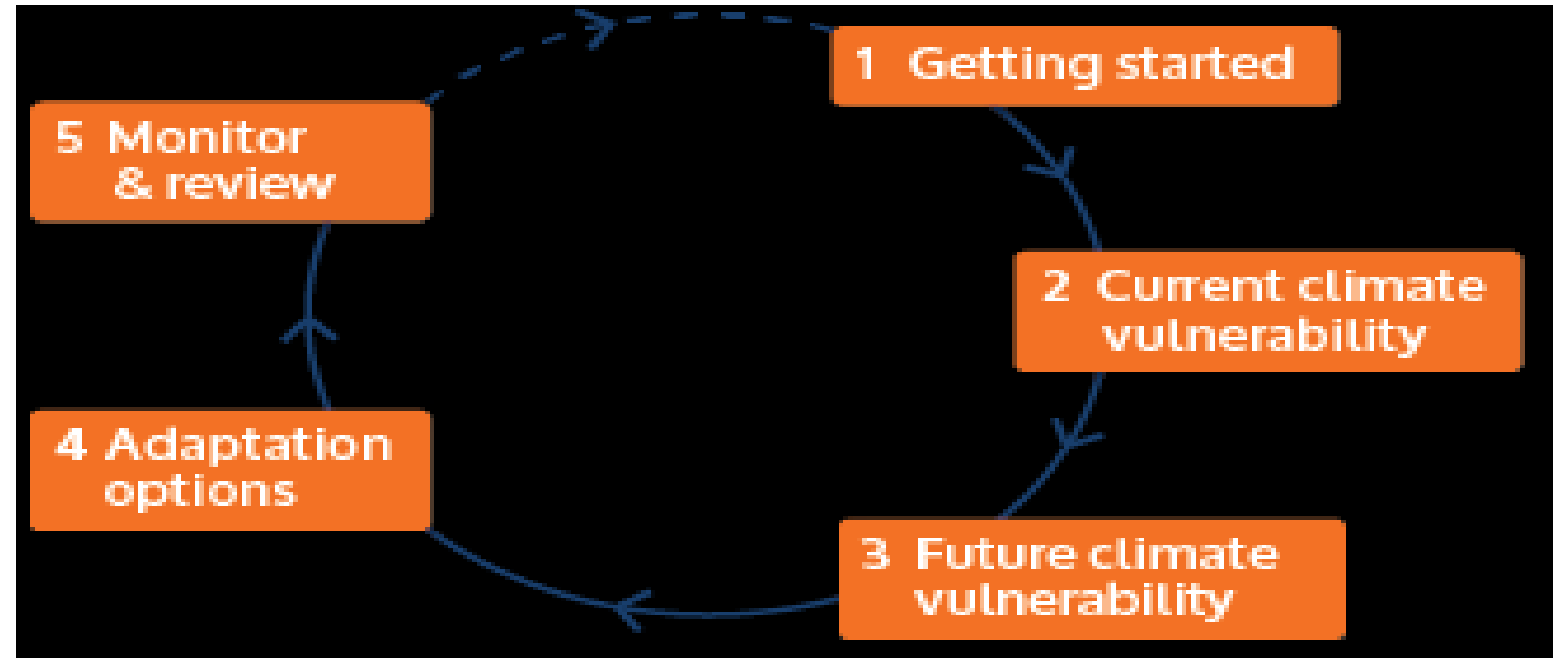


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Key steps in adapting to climate change: need to manage the risks of extreme events and disasters to advance





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Co-benefits approach for adaptation, mitigation and sustainable development

- Adaptation must be delivered locally (**vulnerability is site-specific**) and the results will be more or less immediate
- Appropriate risk assessment procedures should be developed for that purpose.
- Attention to adaptation strategies is the crucial link to demonstrate the importance of **mitigation** measures.

OTHER SECTORS ADAPTATION INCLUDE
APPROPRIATE WM OPTION



Consider indirect impacts caused by climate change, for instance, changes to the volumes and composition of the waste streams or potential implications for access to treatment/disposal facilities





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Contribution – Policy proposal in this step

- To give appropriate attention to Directive 2014/52/EU on EIA. Give to specific attention to the following topic: additional environmental issues (**climate change, disaster risk, etc**)
- **EIA on waste infrastructure EIA / SEA have to have “strong” Climate Change and disaster risk analysis (co-benefiting adaptation and mitigation measures to climate change, contributing to SG13, sustainable development)**





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Conclusion: listening stakeholders

On Waste and Mitigation B&O

On Waste Adaptation B&O

