



This project is co-financed by the
European Union and the Republic of Turkey

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



Component 1. Stock taking and assessment of existing Climate Change strategies - Baseline Report (Waste)

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GHGs caused by Waste Sector

- Turkey's total GHG emissions in 2015 was 475 Mt of CO₂ equivalent (3.6 % , 16.9 Mt CO₂-eq caused by waste sector).
- Main sources of waste sector based GHG emissions are solid waste disposal and wastewater discharge and treatment. In 2015, “solid waste disposal” accounted for 73.8% and “wastewater discharge and treatment” accounted for 26.1% of the waste sector based GHG emissions.
- The major GHG emissions from the waste sector are landfill methane (CH₄) and, secondarily, wastewater CH₄ and nitrous oxide (N₂O).
- 88 % from methane (CH₄) and 84 % of this methane is from landfills.





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Status of Municipal 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.
- 83 sanitary landfills are existent at the end of 2016 (compared to 2 in 1994 and 32 in 2007) receiving 61.2% of the total municipal waste collected and serving 59 out of 81 provinces.





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Status of Municipal Waste in Turkey

- Supported by YEKDEM mechanism, landfill gas collection and electricity generation facilities have become popular particularly in the last 5 years. (200 MWe installed capacity and 1.5 million MWh annual production capacity including other biological recovery for energy facilities).
- There exists 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.
- Despite all these positive developments in waste management, there are still more than 800 dump sites (unmanaged landfills) in Turkey and about 29% of the municipal waste was disposed to these sites in 2016 .
- According to 2014 data, 2.4 million tonnes of packaging waste was collected out of 4.2 million tonnes generated. 1.8 million tonnes of this amount is from municipal packaging waste which would be sent to landfills if not collected separately.





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Mitigation – 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: Considerable amount 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. Implementation of source separation and dual collection (recyclables and organic) is weak. There is no or limited sanctions and penalties for incompatibility. Auditing is generally limited to heavy industries focusing on hazardous waste. Personnel of auditing authority is mainly assigned for licensing.
- Coordination of different ministries, governmental organisations and NGOs is needed. For example waste pickers problem cannot be solved without the inclusion of Ministry of Labour and Social Security.





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Mitigation – 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.
- Inadequate internal financing source for waste management: Revenue from environmental cleaning tax is EUR 10-20 /year compared to EUR 50-200 /year in the EU. For political reasons, municipalities are reluctant to start a separate waste management fee as their voters can be upset by this practice. Huge amount of municipality funds is allocated to waste collection in Turkey as collection period is at least once a day in most regions.
- Vulnerable secondary material market.
- Existence of waste pickers.





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Mitigation – 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. No regional data.
- Biological waste recovery capacity in Turkey is too low at a level around 1.5 million tonnes. 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.
- Low calorific value of municipal waste in Turkey (53% compared to 29% EU avg.).





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Mitigation – Opportunities

- Successful transposition of waste part of EC *acquis* into national legislation.
- Presence of NGOs and authorised institutions in the field of waste management in Turkey.
- 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.
- Long term leasing of the landfills.





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Mitigation – Opportunities

- External donor support, particularly from the European Union.
- 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). For ex: TurSEFF, NØW.
- Presence of secondary material market for various recyclables.
- Job creating potential of waste management particularly recycling.
- 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 – 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%.
- Compost as landfill cover: Using compost as landfill cover on closed landfills provides an excellent environment for the bacteria that oxidize CH₄.
- To become widespread 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 (Gasification and pyrolysis, later also plasma pyrolysis).





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Future

- Submitted on 30 September 2015, Intended National Determined Contribution (INDC) of Turkey includes below plans and policies to be implemented for waste sector:
 - Sending solid wastes to managed landfill sites;
 - Reuse, recycle and use of other processes to recover secondary raw materials to utilize as energy source or to remove wastes;
 - Recovering energy from waste by using processes such as material recycling of wastes, bio-drying, bio-methanisation, composting, advanced thermal processes or incineration;
 - Recovery of methane gas from landfill gas from managed and unmanaged landfill sites;
 - Utilization of industrial wastes as an alternative raw material or alternative fuel in other industrial sectors, through industrial symbiosis approach;
 - Conducting relevant studies to utilize wastes generated from breeding farms and poultry farms;
 - Rehabilitation of unmanaged waste sites and ensuring wastes to be deposited at managed landfill sites .





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Future

- National Waste Management and Action Plan (2016 – 2023)
 - Increase material recycling rate of municipal waste (mainly packaging) from 5.4 % in 2014 to 12 % in 2023;
 - Increase biological treatment recovery rate of municipal waste from 0.2% in 2014 to 4% in 2023;
 - Increase mechanical biological treatment recovery rate of municipal waste from 5.4 % in 2014 to 11% in 2023;
 - Increase thermal treatment recovery rate of municipal waste from 0.3 % in 2014 to 8 % in 2023;
 - Decrease landfilling rate of municipal waste from 88.7 % in 2014 to 65 % in 2023.
- Wastewater Treatment Action Plan (2015 - 2023)
 - 100% of the municipal population served by the wastewater treatment and sewerage system until the end of 2023; (WWTP 75%, sewerage 89.7% in 2016)
 - Construction and commissioning of 1418 new wastewater treatment plants until 2023.





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Future

- 10th National Development Plan (2014- 2018)
 - Ratio of municipal population served with wastewater treatment plant to total municipal population is planned to be 85% until the end of 2018 ; (75% in 2016)
 - Ratio of municipal population benefiting from sanitary landfill is planned to be 80% until the end of 2018. (61.8% sanitary landfilling, 9.8 % recovery facilities in 2016)
- National Climate Change Strategy (2010 – 2023)
 - 104 sanitary landfill facilities will be constructed and 76% of municipal waste will be disposed at these facilities by the end of 2012. (83 landfills in 2016)
- National Climate Change Action Plan (2011 – 2023)
 - Reduce the quantity of biodegradable wastes sent to landfill sites, taking year 2005 as a basis, by 75% in weight till 2015, by 50% till 2018 and by 35% till 2025. (Target is from Regulation on Sanitary Landfill of Wastes (2010))





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Future

- In Turkish waste legislation, policies and strategy papers; there are no direct targets or obligation for GHG emissions mitigation. Below policies contribute to reduction:
 - reducing amounts of both solid waste and wastewater;
 - diverting waste away from landfills; increasing biological recovery of waste which replaces landfilling;
 - capturing or flaring methane from landfills and wastewater;
 - rehabilitation of old dumpsites;
 - better source separation and collection of municipal waste;
 - increasing the use of nitrogen removal technologies in wastewater treatment.
- Rough estimate: 12.8 Mt CO₂-eq caused by waste sector by 2023. %24 reduction compared to last data (16.9 Mt CO₂-eq from 2015).

