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TURKISH NATIONAL STUDY: KEY FACTORS AND DEMANDS IN TURKEY

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WEIGHT of the WASTE SECTOR

- The population of Turkey, as of 2009, is about 73 million
- 75% lives in urban areas
- 25 % lives in rural areas
- Urban population increased about 15 % (from 60 to 75 %) over the last 15 years.
- Population density is 94 persons per km2

- Turkish population has quite different regional, socioeconomic, cultural, and therefore consumption and waste generation characteristics.
- Rapid urbanization and population growth in parallel with technological developments and industrialization is influencing the solid waste generation in Turkey.

WEIGHT of the WASTE SECTOR

Municipal waste generation

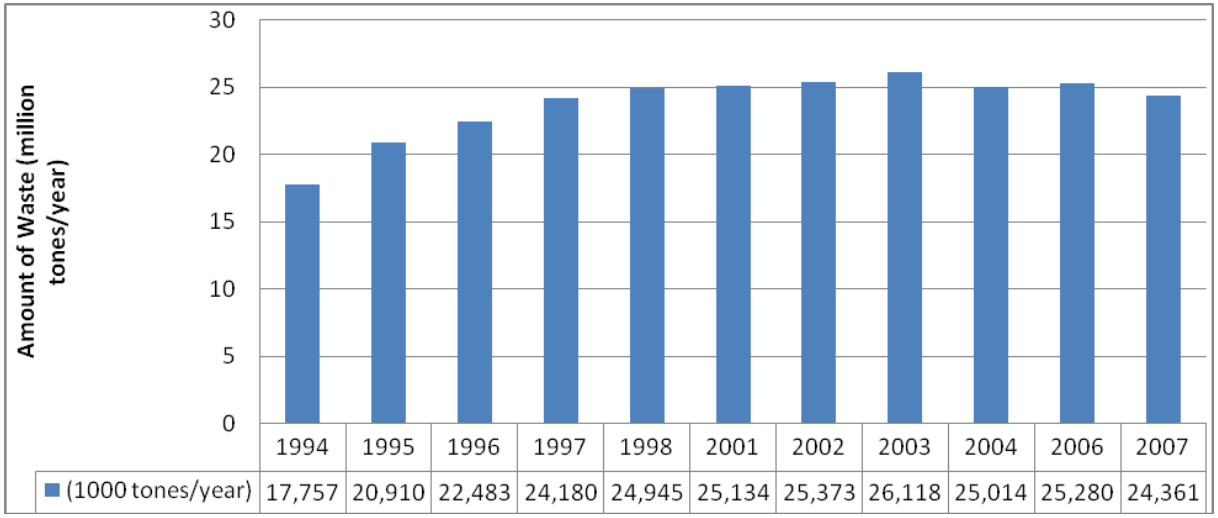
In general, solid wastes can be classified under five major categories as

- hazardous wastes,
- municipal wastes,
- medical and special wastes,
- packing wastes, and
- mining and nonhazardous industrial wastes;

Under such categorization, wastes from households are defined as MSW. Small enterprise/commercial and institutional wastes are also included in the MSW.

WEIGHT of the WASTE SECTOR

Municipal waste generation

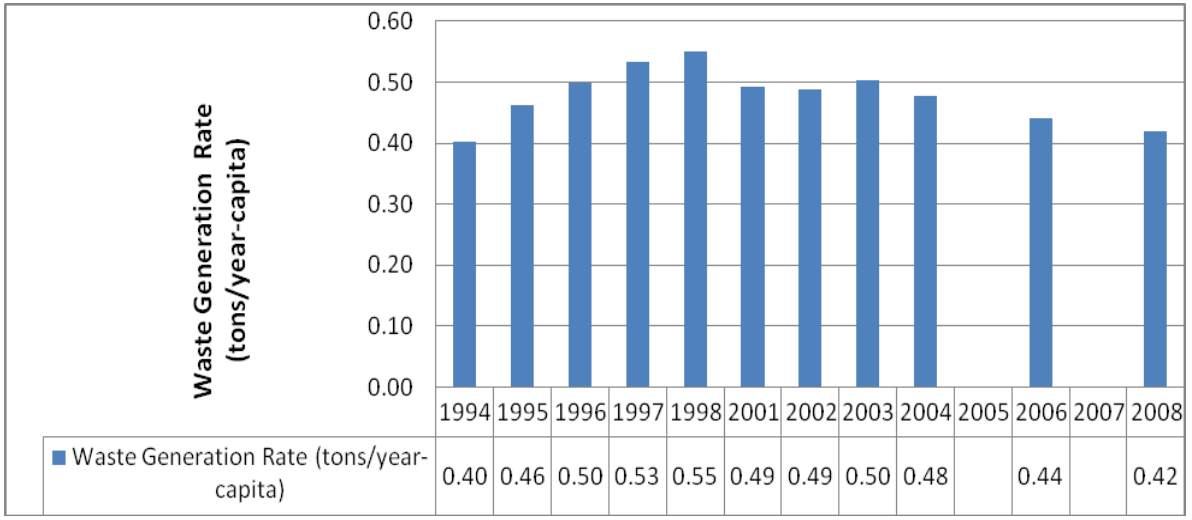


Amounts of Municipal Solid Waste Collected

- a general increasing trend over the years,
- tends to stabilize around 25 million tons after 2000s.

- an increasing trend, ranging b/w 0.402-0.551 tons/year-capita in 1990s
- a decreasing trend over 2000s from 0.493 to 0.420 tons/year-capita.

The average municipal waste generation rate, tons/capita.yr



WEIGHT of the WASTE SECTOR

Municipal waste composition

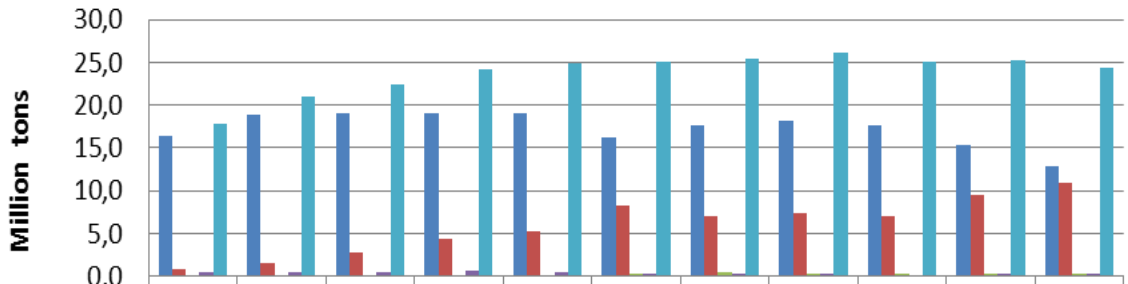
Summary of available data on municipal solid waste composition in Turkey

Component (%)	Source of Data				
	TurkStat (1993)	Kirkitsos et al. (2000)	Metin et al. (2003)	MoEF (2006a)	Turan et al. (2009)
Organics	69	49	54	53	40-65
Recyclables	14	30	31	25	15-44
Paper&Board	-	12	14	16	7-18
Plastics	-	8	10	2	5-14
Metals	-	4	3	1	1-6
Glass	-	6	4	6	2-6
Ash and slag	17	12	-	-	-
Others	-	9	15	22	7-24

- decrease is observed in the organics content from 69 % to nearly 50-55 % range,
- increase in the fraction of recyclables from 14 % to about 25-30 % range.

WEIGHT of the WASTE SECTOR

Municipal waste management



	1994	1995	1996	1997	1998	2001	2002	2003	2004	2006	2007
Open Dumping	16,3	18,9	19,0	19,0	19,1	16,3	17,7	18,1	17,6	15,4	12,9
Sanitary Landfilling	0,8	1,4	2,8	4,4	5,3	8,3	7,0	7,4	7,0	9,4	10,9
Composting	0,2	0,2	0,2	0,2	0,2	0,2	0,4	0,3	0,4	0,3	0,3
Open Incineration	0,4	0,4	0,4	0,6	0,4	0,3	0,2	0,3	0,1	0,2	0,2
Total	17,8	20,9	22,5	24,2	24,9	25,1	25,4	26,1	25,0	25,3	24,4

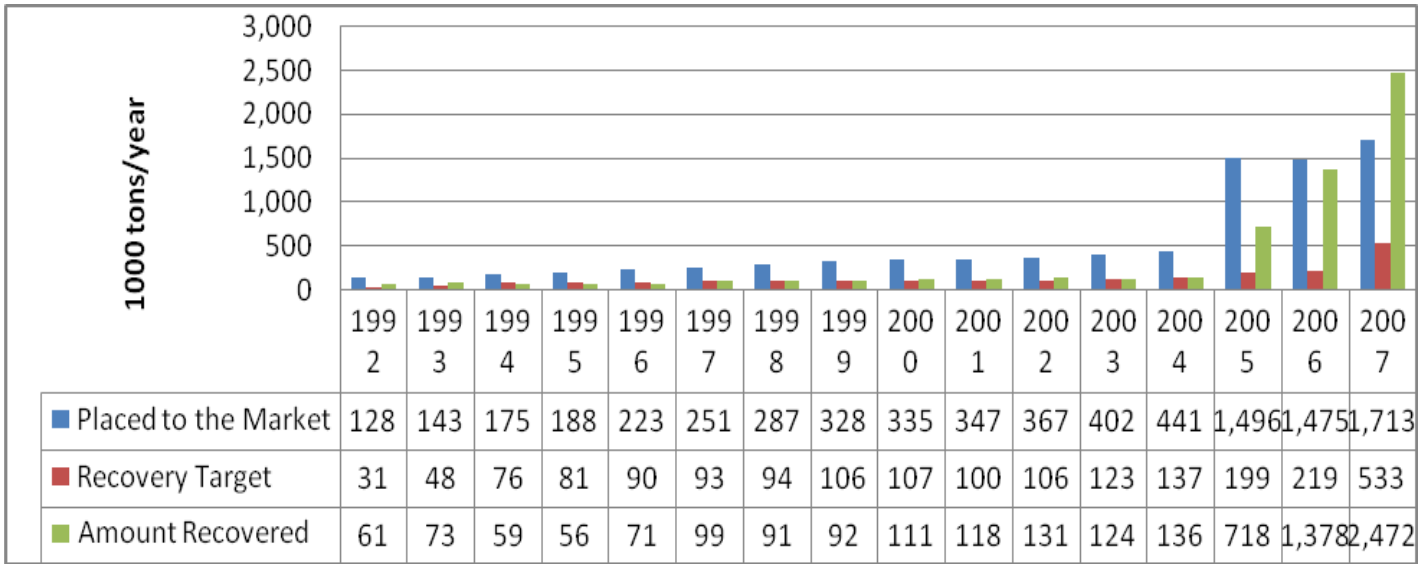
- nearly 27,5000 tons, (55 %) of the medical waste buried at uncontrolled landfill sites,
- 12,500 tons (25 %) sanitary landfilled, and
- the rest was (10,000 tons, 20 %) incinerated.

Amounts of MSW by Disposal and Treatment Methods

- open dumping decreased from about 16 million tons to 13 million tons
- sanitary landfilling significantly increased from nearly 1 million to 11 million tons
- recycling increased from 0.061 to 2.5 million tons
- composting and open incineration limited to very small amounts

WEIGHT of the WASTE SECTOR

Municipal waste management



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Placed to the Market	128	143	175	188	223	251	287	328	335	347	367	402	441	1,496	1,475	1,713
Recovery Target	31	48	76	81	90	93	94	106	107	100	106	123	137	199	219	533
Amount Recovered	61	73	59	56	71	99	91	92	111	118	131	124	136	718	1,378	2,472

Amounts of Packing Wastes Placed to the Market, Recovered and Recovery Targets

- the amount of packaging waste placed into the market and recovered increased steadily between 1992 and 2004.
- a sudden jump was observed in 2005 in the wake of the new packaging and packaging waste control regulation
- packaging waste recycle in Turkey is usually remained above 30 % after 2005.

WEIGHT of the WASTE SECTOR

Municipal waste management

The number and capacity of recycling, sorting, composting, incineration and sanitary landfills Facilities

Number of Facilities												
	1994	**1995**	**1996**	**1997**	**1998**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Recycling	0	0	0	0	0	0	0	13	14	19	38	56
Sorting	0	0	0	0	0	0	0	15	23	31	69	81
Composting	2	2	2	2	2	3	4	5	5	-	4	4
Incineration	0	1	1	2	2	3	3	3	3	-	3	3
Sanitary Landfill	2	6	6	8	8	12	12	15	16	-	22	37
Capacity of Facilities (thousand tons/year)												
	1994	**1995**	**1996**	**1997**	**1998**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Recycling	0	0	0	0	0	0	0	695	748	1015	2030	2992
Composting	245	245	245	245	245	299	664	667	667	-	605	551
Incineration	0	9	9	44	44	44	44	44	44	-	44	44
Sanitary Landfill[a]	77	203	203	217	217	261	277	278	278	-	377	391

([a]Units: million tons)

WEIGHT of the WASTE SECTOR

Municipal waste coverage

- The percentage of total population receiving solid waste services (which at a minimum includes waste collection and transport services) increased from 71 % in 1994 to 82 % in 2007.
- Similarly, the percentage of urban population served by waste collection system increased from 85 % in 1994 to 93 % in 2007
- The percent of rural population served by waste collection system decreased from 28 % to 23 % over the same period.
- Overall this equates to a nation-wide coverage of 75%.
- As of 2007, 7 % of total urban population has been covered by the program of separate collection of the recyclable materials at the source.

NATIONAL PRODUCTION STATISTICS

Results of material flow analysis

- Trade and production statistics for selected 31 categories of product and commodities are compiled for seven years (2000 through 2002 and 2005 through 2008).
- Using these statistics “net domestic consumption, NDC” of product and commodities are calculated by the following formula;

$$NDC = Import – Export + Production$$

- In order to relate the NDC values for production of municipal waste, a conversion factor assigned to each category of product and commodity reflecting the nature of it in terms of possible waste components produced, such as paper and board, glass, metal, plastic, composite, textile etc.

NATIONAL PRODUCTION STATISTICS

Results of material flow analysis

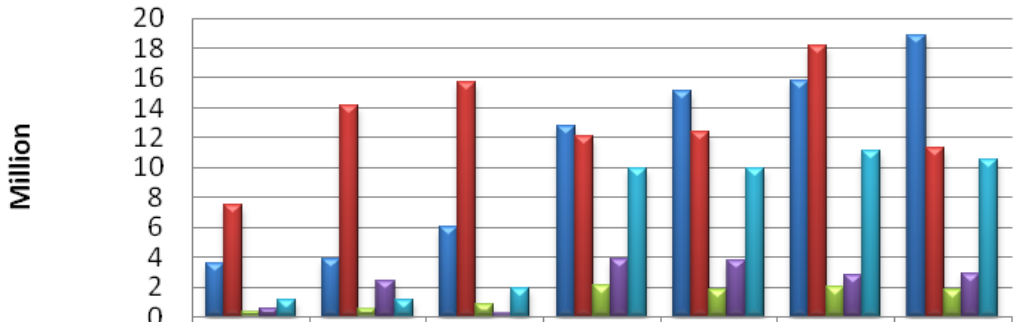
The selected thirty-one categories of products and commodities are grouped under five broad classes:

- food and beverages (F&B),
- electric electronic equipment (EEE),
- cosmetic and care products (C&CP),
- newsprint (NP), and
- others.

For each broad class of product and commodities listed above, NDC values are calculated to analyze the trends in their consumptions.

NATIONAL PRODUCTION STATISTICS

Results of material flow analysis



	2000	2001	2002	2005	2006	2007	2008
F&B (tons)	3.59	3.86	6.03	12.79	15.09	15.77	18.87
EEE (unit)	7.44	14.10	15.73	12.04	12.33	18.14	11.29
C&CP (tons)	0.31	0.52	0.81	2.07	1.83	1.99	1.80
NP (tons)	0.54	2.41	0.25	3.85	3.76	2.83	2.84
Others (tons)	1.13	1.08	1.85	9.89	9.93	11.12	10.52

- F&B consumption, being the largest, show about 3 folds increase over the years from 3.6 million tons in 2000 to 18.9 million tons in 2008.
- The other classes, however, exhibit a mild fluctuation from year to year over the same period.
- Following F&B, the EEE has the second rank in terms of the consumption amount, which ranges between 7.4 and 18.1 million units from 2000 to 2008.

- The higher NDC amounts of F&B and EEE correlates well with the high shares of F&B and household goods consumption expenditures (27 % and 6 %, respectively) in the total household consumption expenditures.

NATIONAL PRODUCTION STATISTICS

Results of material flow analysis

Waste potential in terms of waste components (in tons and units) for broad classes of product and commodity categories.

Wate Comp.	F&B	EEE	C&CP	NP	Others	Total
PKG_PLASTIC	22,352,041	8,666	6,268,866	0	16,471,417	45,100,991
PKG_ELA_COMP	6,022,400	0	0	0	0	6,022,400
PKG_METALS	19,679,389	0	10,310	0	2,083,955	21,773,655
PKG_GLASS	7,681,557	0	30,931	0	0	7,712,488
PKG_PAPER_BOARD	19,720,026	17,852	0	0	17,281,463	37,019,342
PKG_OTHER_COMPO	518,682	0	0	0	0	518,682
JRL_PAPER	0	0	0	16,469,026	9,695,298	26,164,324
SANIT_TEXT	0	0	3,022,497	0	0	3,022,497
DEEE (units)	0	64,549,383	0	0	0	64,549,383
Total (tons)	75,974,096	26,518	9,332,604	16,469,026	45,532,134	147,334,378

- F&B class produces the largest amounts of total waste, as well as packaging waste components of PLASTIC, METALS, and PAPER_BOARD, GLASS and ELA_COMP.
- Newsprint (NP) class, on the other hand, produces the largest amount of JRL_PAPER waste components.

DISCUSSIONS OF URBAN WASTE MANAGEMENT

Demand and supply of waste collection and treatment

Population and waste projections for Turkey between 2015 and 2025.

Year	**2015**	2016	2017	2018	2019	**2020**	2021	2022	2023	2024	**2025**
Population (x1000)	76 598	77 358	78 101	78825	79 546	80 257	80 954	81 635	82 293	82 933	83 566
WGR[a] (ton/ capita/year)	0.471	0.482	0.496	0.507	0.522	0.533	0.551	0.566	0.580	0.599	0.617
Waste generated (10^6 tons)	36.08	37.29	38.74	39.96	41.52	42.78	44.61	46.21	47.73	49.68	51.56
Recoverable waste (%)	66.7	66.5	66.3	66.2	66.1	65.8	65.6	65.4	65.4	65.4	65.7
Compostable waste (%)	23.9	23.4	22.9	22.5	22.1	21.6	21.1	20.6	20.3	20.0	19.8
Recylable waste (%)	42.8	43.1	43.4	43.7	44.0	44.2	44.5	44.8	45.1	45.4	45.9
Recoverable waste (10^6 tons)	24.07	24.80	25.68	26.45	27.45	28.15	29.26	30.22	31.22	32.49	33.87
Recyclable Waste Reduction (10^6 tons)	7.41	7.71	8.07	8.38	8.77	11.35	11.91	12.42	12.92	13.53	14.20
Compostable Waste Reduction (10^6 tons)	3.45	3.49	3.55	3.60	3.67	6.01	6.12	6.19	6.30	6.46	6.64

DISCUSSIONS OF URBAN WASTE MANAGEMENT

Demand and supply of waste collection and treatment

Regarding the future implementation of waste prevention policies, two of the important policies would be important:

- the quota applications, set by both the national and EU waste directives, for recycle and recovery of packaging wastes
- the quota applications for the organic waste that can be disposed of in sanitary landfills.

According to PWCR the annual quota for recovery rates of recyclable materials was set as 37, 48 and 60 % at a minimum for 2010, 2015, and 2020 and later years, respectively.

Similarly, according to the national solid waste master plan, by 2015 roughly about 40 % and by 2020 roughly about 65 of the generated organic waste that could potentially go to landfills should be diverted away from landfills, and need to be treated by composting.

DISCUSSIONS OF URBAN WASTE MANAGEMENT

Trends in urban waste generation

Current and future waste generation intensity and composition for Turkey

Year	**2010**	**2015**	**2020**	**2025**
WGR (tons/capita.year)	0.420	0.471	0.533	0.617
Composition (%)				
Organics	38.4	35.9	33.7	31.4
Recyclables	41.2	42.8	44.2	45.9
Paper&Board	*21.3*	*22.6*	*23.8*	*24.9*
Plastic	*12.5*	*12.8*	*13.1*	*13.2*
Metal	*3.2*	*3.2*	*3.2*	*3.3*
Glass	*4.2*	*4.2*	*4.1*	*4.1*
Others	20.4	21.3	22.1	22.7

- The average waste generation rate increases by 12 and 47 % in 2015 and 2025 compared to the current situation; the increase is 31 % from 215 to 2025.
- With respect to waste composition, organics content decreases by 7 % in 2015 and 18 % in 2025 compared to current composition.
- Recyclable content, however, increases more or less proportional to the decrease in organics content.

DISCUSSIONS OF URBAN WASTE MANAGEMENT

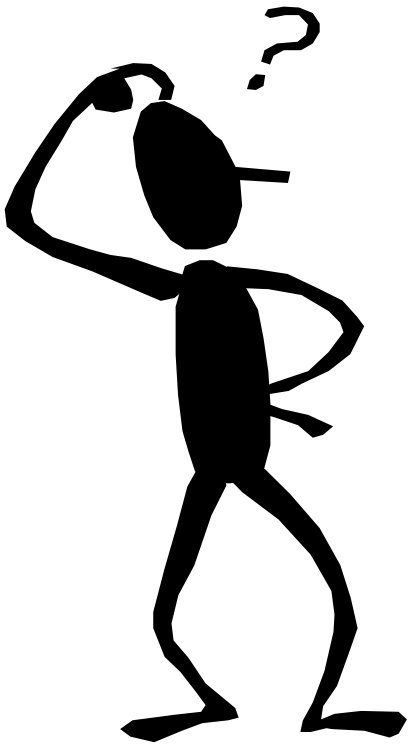
Trends in urban waste generation

Waste Indicator	Years		
	Current	2015	2025
Population (million)	71.5	76.6	83 566
Population receiving waste collection services (%)	81	85	95
Municipal population receiving waste collection services (%)	93	95	100
Solid Waste Disposal Indicators			
Number of sanitary landfills	37	50	116
Capacity of sanitary landfills (million tons)	391	630	696
Amount of waste disposed of in landfills (million tons/yr)	10.9	18.04	36.09
Number of compost facilities	4	13	34
Capacity of compost facilities (million tons)	0.551	1.174	2.920
Amount of waste composted (million tons/yr)	0.276	1.725	4.645
Number of recycling facility	56	138	265
Capacity of recycling facilities (million tons)	3.00	4.41	6.79
Amount of waste recycled (million tons/yr)	2.5	7.41	14.20
Number of incineration facility (medical waste)	3	3	3
Capacity of medical waste incineration facilities (million tons)	0.044	0.044	0.044
Amount of incinerated medical waste (million tons/yr)	0.017	0.022	0.039
Number of sterilization facility (medical waste)	0	12	43
Capacity of sterilization facilities (million tons)	0.0	0.051	0.091
Amount of sterilized medical waste (million tons/yr)	0.0	0.051	0.142
Number of incineration facility (industrial and haz. waste)	3	7	7
Capacity of industrial waste incineration facilities (million tons/yr)	0.060	0.135	0.410

Current and future waste generation, disposal and treatment indicators

- Current capacity of sanitary landfills should be increased by 60 % and 78 % in 2015 and 2025, respectively.
- Required increase in capacity of composting facilities, over the same time period, are 1.2 and 2.9 million tons, respectively.
- The needed recyclable waste recovery capacities for the respective years are 4.4 and 6.8 million tons.

QUESTIONS??



THANKS!!