



Republic of Albania
Ministry of Environment,
Forest & Water
Administration



United Nations
Development Programme

KEY SOURCE ANALYSIS FROM WASTE

ALBANIA

1. Key sources of regional significance: Solid Waste

1.1 Waste Background

Albania is going through economic transition period. The environmental protection is not yet considered as a priority. The waste management sector needs more investments, but there is a lack of financial resources in the country. During this transition period, Albanian society is continuously looking for economic growth, which from the other side is related to a greater consuming of natural resources. The last one seems to be inefficiently used, generating bigger quantity of wastes. For that reason this sector is mainly developed in a non-environmental-friendly manner.

The solid wastes are disposed off through open dumping sites in Albania. Separate collection system already does not exist. The volume of urban solid waste is increasing day by day with severe repercussions on the environment. There are three main factors influencing in the aggravating of solid waste problem in the country:

- Population growth of about 1-2 % annually,
- Rising of the life's standards and,
- Consumption mentality.

Actually the waste management technologies are not modern ones. The system needs to be totally reorganized. Albania needs to develop an integrated waste management approach in the long-term, which means that waste prevention, waste minimization, separation, recycling and reuse are very important steps to be encouraged.

Regarding the municipal solid waste, the collection and transport services are usually done by private companies, while final disposal is managed by the municipalities. Still the amount of solid waste generated in Albania is relatively less, compared to the quantity produced in developed countries. From the other hand, analysis of the composition of urban solid waste all over the country shows a high percentage of organic matter, which unfortunately is not yet recycled through the composting technologies.

Disposal and treatment of solid wastes can produce emissions of the greenhouse gases, the most important one being methane (CH₄). However, the present disposal method of solid waste in Albania (open dumps), generates less methane compared to the landfill.

1.2 Waste Activity Data

There are two different sources of data collection regarding solid waste sector:

- a. The main and a continuous source of information is that gained by the municipalities. Very often this information is based on the calculations due to the lack of waste weighting before their discharging;
- b. Another source of information is coming by the different surveys already performed in the framework of the National Waste Management Plan developed for the country.

From the analysis performed under the First National Communication for the Waste Sector and for the year 1994, the main figure related with the Activity Data is the number of the urban population as given in the following table 1.1 (taken from IPCC excel file).

Table 1.1: The amount of MSD disposed off in Solid Waste Disposal Sites

MODULE		WASTE		
SUBMODULE		QUANTITY OF MSW DISPOSED OF IN SOLID WASTE DISPOSAL SITES USING COUNTRY DATA		
WORKSHEET		6-1A (SUPPLEMENTAL)		
SHEET		1 OF 1		
COUNTRY		ALBANIA		
YEAR		1994		
A	B	C	D	E
Population whose Waste goes to SWDSs (Urban or Total) (persons)	MSW Generation Rate (kg/capita/day)	Annual Amount of MSW Generated (Gg MSW)	Fraction of MSW Disposed to SWDSs (Urban or Total)	Total Annual MSW Disposed to SWDSs (Gg MSW)
		$C = (A \times B \times 365) / 1\,000\,000$		$E = (C \times D)$
1322967	0.96	463.57	0.71	329.13

The figure used for urban population was 1,322,967. In order to figure out the proper value, the following analysis is done: based on the performed registrations, the time series of 1985-1990 exist for rural, urban and total Albanian population, as shown in the figure 3.1. Based on these time series, the respective correlations are found. Based on them and assuming a normal situation we could calculate the respective figures for urban population, rural population and total population for Albania for the year 1994, as given in fig. 1.1 below:

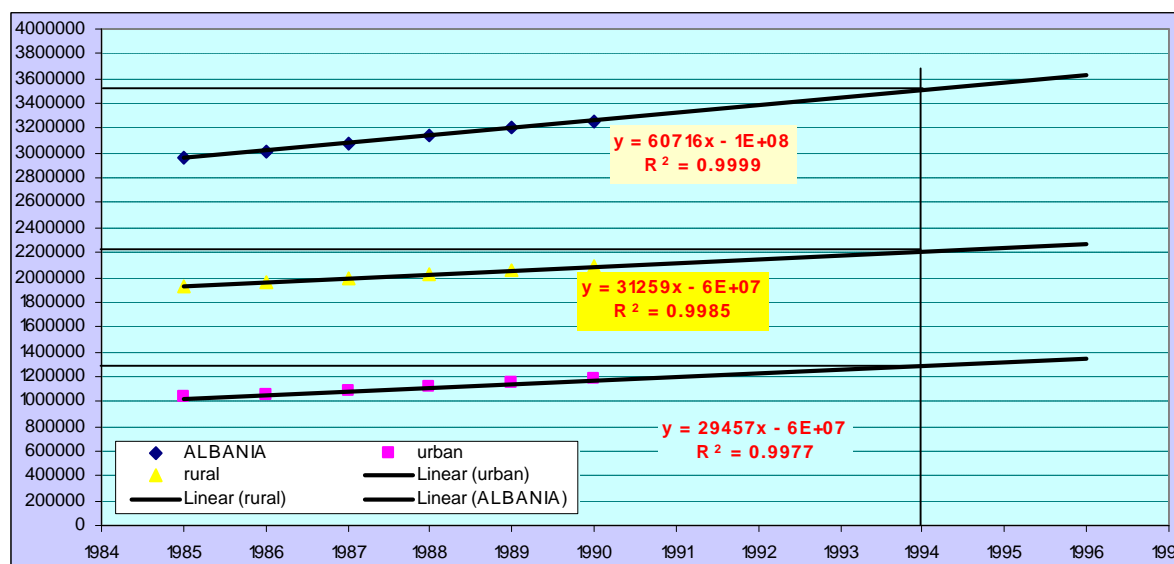


Figure 1.1.: Urban and Rural Albanian population according registration: Census 1990

From the other hand, the emigration of the population outside the country and the migratory movement inside the country was rather disorderly and substantially uncontrolled during the years 1991-1994. All these factors imply a lack of precise demographic data as for the residents of the different towns. To this point, a correction of the figure for urban population (1,205,876) is needed.

During the years 1990-2000, the Census Registration of the population is missing, while it has started to be done regularly from the year 2001 up to now. The time series for the period (2001 – 2004) are shown in fig. 1.2. The correlation founded is ($y=14355X-3E+07$).

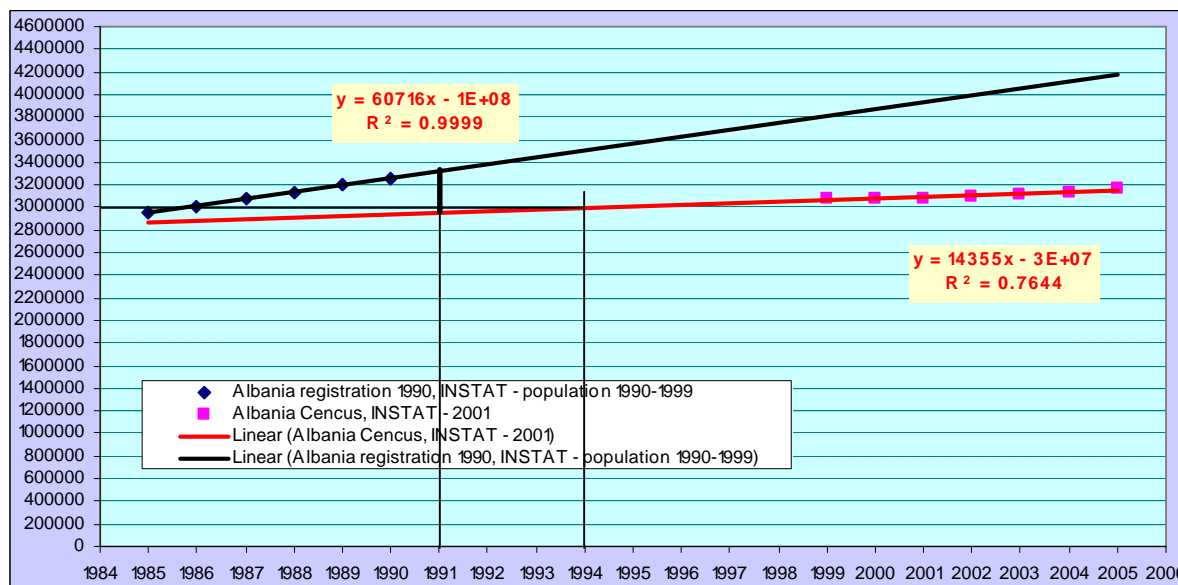


Figure 1. 2.: Albanian population according two registrations: Census 1990 and Census 2000

Considering the first correlation of the year 1990, the number of the population for the year 2005 should have been 4,200,000 inhabitants. While, considering the Census 2004, the number of population for the year 2005 results to be 3,173,701. So, there is a difference of about 1,000,000 inhabitants, explained with the emigration phenomena. Since the second correlation seems to predict better the reality of the Albanian population ($y=14355x-3E+07$), we have just use it and found out the figure for the total population of Albania for the year 1994: 2,980,000. In order to find the division of population between urban and rural for the year 1994, let us analyze two following figures 1.3 and 1.4.

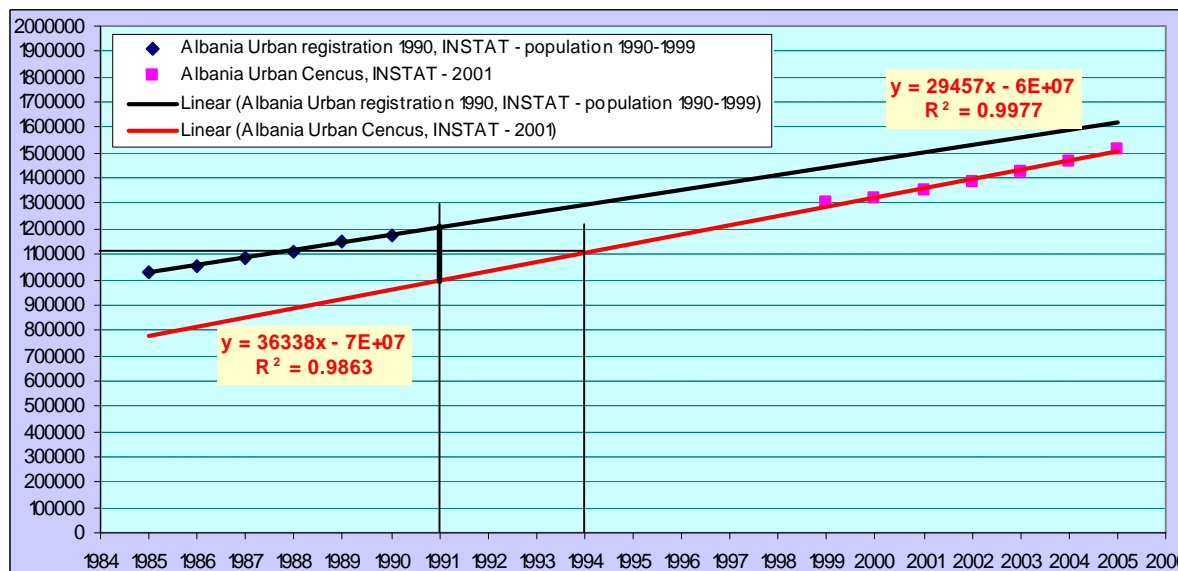


Figure 1.3: Urban Albanian population according two registrations: Census 1990 and Census 2000

We have used the above correlation ($y=29457 \cdot X-6E+07$) to find the precise value for the urban Albanian population: 1,120,588.

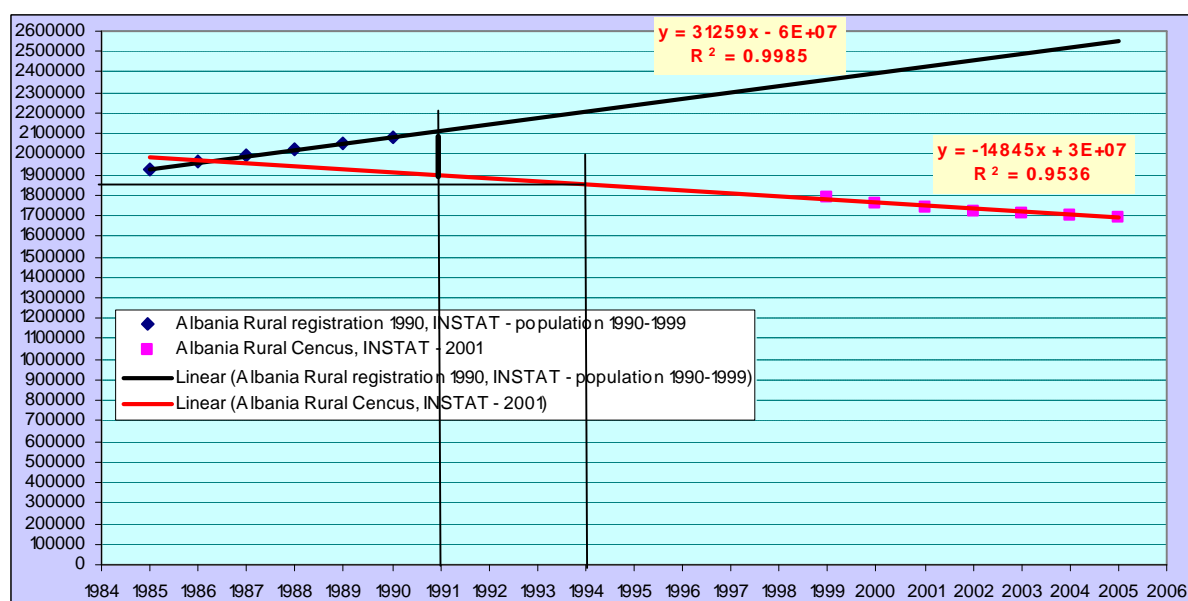


Figure 1.4.: Rural Albanian population according two registrations: Cencus 1990 and Cencus 2000

The other correlation ($y = -14845 \cdot X + 3E+07$) served us to precise the figure for the rural Albanian population: 1,860,000.

Another important factor to be discussed is related with the fact that some small towns are considered as rural areas during the calculations for GHG emissions from the waste category under the inventory of 1994. This consideration has come from the administrative division of Albania. To our opinion, these big villages (small town) should be considered as small town at least from the waste management point of view. Having this in mind, the third step was to divide this category of small towns and to include them in urban population as shown in the table 1.2.

Districts	Administrative division, 1994		pure urban	rural		total urban
	Urban	rural		small towns	pure rural	
Berat	39320	86143	27524	5169	80974	32693
Bulqize	8632	34308	8632	0	34308	8632
Delvine	3616	6933	3616	0	6933	3616
Devoll	5836	29110	5836	0	29110	5836
Diber	12179	74940	12179	2248	72692	14428
Durres	98426	71549	78741	5724	65825	84465
Elbasan	83767	132951	83767	7977	124974	91744
Fier	65758	128874	65758	6444	122430	72202
Gramsh	9027	26274	9027	0	26274	9027
Gjirokaster	19762	34400	17786	2064	32336	19850
Has	2773	17301	2773	0	17301	2773
Kavaje	24356	52188	14614	3131	49056	17745
Kolonje	6464	10071	6464	0	10071	6464
Korce	50852	87917	50852	4396	83522	55248
Kruje	16760	46732	16760	2804	43928	19564
Kucove	15595	18182	15595	0	18182	15595
Kukes	14376	49297	14376	2958	46339	17334
Kurbin	20254	32274	20254	0	32274	20254
Lezhe	14363	53647	14363	2146	51501	16509
Librazhd	9925	63484	9925	2031	61452	11957
Lushnje	33034	110326	33034	2207	108120	35241

Malesi e Madhe	3515	34021	3515	0	34021	3515
Mallakaster	7896	31967	7896	0	31967	7896
Mat	12029	49897	12029	2046	47851	14074
Mirdite	7954	28956	7954	0	28956	7954
Peqin	6240	26723	6240	0	26723	6240
Permet	8500	16621	8500	2161	14460	10661
Pogradec	20543	48973	20543	2449	46524	22991
Puke	5216	29556	5216	0	29556	5216
Sarande	12534	21529	12534	0	21529	12534
Skrapar	11408	17310	11408	0	17310	11408
Shkoder	74202	103730	59361	4149	99581	63511
Tepelene	9749	22011	9749	0	22011	9749
Tirana	305264	175720	305264	2636	173085	307900
Tropoje	6475	21479	6475	0	21479	6475
Vlore	73398	64605	66058	3230	61375	69288
Albania	1120000	1860000	1054620	65969	1794031	1120588

The new found figures will then replace the ones of the IPCC excel file for the year 1994.

The second important indicator to be checked is the average daily waste generation as per different cities of Albania and Albania as a whole.

1.3 Waste Generation

According to the data we have, the specific solid waste generated per capita in Albania has been round 0,4-0,5 kg/day (0.4 for small cities and 0.5 for big cities) for the years up to 1990. After the 1990's political and economic changes, the specific waste generated per person has increased significantly. However, due to the lack of weighting machines in the final disposal sites, the figures for the waste generated are based on the number of the trucks going there and their capacity. The content of organic matter is high, changing slightly per different cities, in the range of 30-50 % of the total generated wastes. This is a characteristic feature of urban solid waste in our country.

Almost all the municipalities has organized a regular collection and transport system of the municipal solid waste to the final disposal sites (open dump sites), while in the communes of the country these services do not exist.

About 520,000 ton of generated urban solid wastes have been reported for the year 1998. The five major cities, Tirana, Durres, Vlora, Shkodra and Elbasan contribute to around 44% of the total urban solid wastes, while only Tirana, the capital, contributes with about 116,000 ton, or 22 % of the total amount generated within the country. The source of the following data is the National Waste Management Plan of Albania, which has been developed by the national Environment Agency in 1999.

No	City	Population	Daily production (ton)	Yearly production (ton)	Specific production (kg/capita)
1	Tirana	400,000	394.80	144,102	0.987
2	Durres	120,000	115.44	42,136	0.962
3	Vlore	110,000	105.82	38,624	0.962
4	Shkoder	110,000	100.53	36,693	0.914

5	Elbasan	110,000	100.10	36,537	0.910
6	Fier	80,000	76.72	28,003	0.959
7	Korce	75,000	68.33	24,939	0.911
8	Lezhe	16,998	13.84	5,050	0.814
9	Pogradec	33,000	26.80	9,781	0.812
10	Skrapar	12,689	9.29	3,390	0.732
10-cities		1,067,687		369,254	0.948

Table 1.4.: Urban Waste Generation for 1997

Nr.	Cities	Present	Daily production of waste (ton/day)	Yearly production of waste	Specific production (kg/capita)
1	Tirana	480,000	484.80	176,952	1.010
2	Durres	124,000	120.03	43,812	0.968
3	Vlore	99,000	95.63	34,906	0.966
4	Shkoder	93,739	86.90	31,717	0.927
5	Elbasan	105,101	97.22	35,485	0.925
6	Fier	82,300	79.58	29,048	0.967
7	Korce	76,589	70.92	25,886	0.926
8	Lezhe	16,592	14.00	5,111	0.844
9	Pogradec	28,060	23.99	8,757	0.855
10	Skrapar	12,890	9.64	3,519	0.748
10-cities		1,118,271		391,675	0.960

Table 1.5.: Urban Waste Generation for 1998

Nr.	Cities	Present	Daily production of waste (ton/day)	Yearly production of waste	Specific production (kg/capita)
1	Tirana	500,000	511.00	186,515	1.022
2	Durres	127,000	123.32	45,011	0.971
3	Vlore	101,000	98.07	35,796	0.971
4	Shkoder	96,739	91.13	33,262	0.942
5	Elbasan	108,101	102.05	37,247	0.944
6	Fier	89,300	86.80	31,682	0.972
7	Korce	79,589	75.05	27,394	0.943
8	Lezhe	18,592	16.10	5,877	0.866
9	Pogradec	31,060	26.93	9,829	0.867
10	Skrapar	13,290	10.21	3,725	0.768
10-cities		1,164,671		412,612	0.971

From the above tables, the average specific waste daily production for the period 1996 – 1998 is 0.96 kg/day-capita. This figure is then used in the module 6 of IPCC to calculate GHG emission from Waste Sector for the year 1994, while the calculations were done during the year 2000.

Since in the above tables, the figures of the population are not correct, by substituting them with those found in section 1.2, we can recalculate the average specific waste daily production as shown in the following tables 1.6, 1.7 and 1.8.

No	City	Population	Daily production (ton)	Yearly production (ton)	Specific production (kg/capita)
1	Tirana	348956	394.80	144,102	1.131
2	Durres	116539	115.44	42,136	0.991
3	Vlore	85867	105.82	38,624	1.232
4	Shkoder	89766	100.53	36,693	1.120
5	Elbasan	104949	100.10	36,537	0.954
6	Fier	84347	76.72	28,003	0.910
7	Korce	65167	68.33	24,939	1.048
8	Lezhe	18317	13.84	5,050	0.755
9	Pogradec	25578	26.80	9,781	1.048
10	Skrapar	12844	9.29	3,390	0.723
10-cities		952,331		369,254	1.062

Nr.	Cities	Present	Daily production of waste (ton/day)	Yearly production of waste	Specific production (kg/capita)
1	Tirana	352427	484.80	176,952	1.376
2	Durres	117606	120.03	43,812	1.021
3	Vlore	86675	95.63	34,906	1.103
4	Shkoder	90545	86.90	31,717	0.960
5	Elbasan	105781	97.22	35,485	0.919
6	Fier	84974	79.58	29,048	0.937
7	Korce	65653	70.92	25,886	1.080
8	Lezhe	18455	14.00	5,111	0.759
9	Pogradec	25784	23.99	8,757	0.930
10	Skrapar	12976	9.64	3,519	0.743
10-cities		960,877		391,675	1.117

Nr.	Cities	Present	Daily production of waste (ton/day)	Yearly production of waste	Specific production (kg/day capita)
1	Tirana	355898	511.00	186,515	1.436
2	Durres	118672	123.32	45,011	1.039
3	Vlore	87484	98.07	35,796	1.121
4	Shkoder	91324	91.13	33,262	0.998
5	Elbasan	106612	102.05	37,247	0.957
6	Fier	85602	86.80	31,682	1.014
7	Korce	66138	75.05	27,394	1.135

8	Lezhe	18594	16.10	5,877	0.866
9	Pogradec	25990	26.93	9,829	1.036
10	Skrapar	13109	10.21	3,725	0.779
10-cities		969,422		412,612	1.166

Considering the above calculation we have formed table 1.9.

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Tirana	0.500						1.131	1.376	1.436
Durres	0.480						0.991	1.021	1.039
Vlore	0.480						1.232	1.103	1.121
Shkoder	0.470						1.120	0.960	0.998
Elbasan	0.470						0.954	0.919	0.957
Fier	0.480						0.910	0.937	1.014
Korce	0.470						1.048	1.080	1.135
Lezhe	0.420						0.755	0.759	0.866
Pogradec	0.420						1.048	0.930	1.036
Skrapar	0.400						0.723	0.743	0.779
Albania	0.469						1.062	1.117	1.166

Based on the time series for the years 1990, 1996, 1997 and 1998, the following correlations for each city are founded (shown in the figures 1.5-1.16).

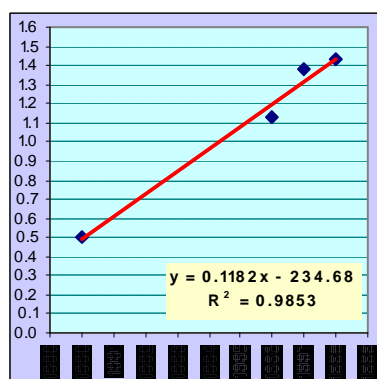


Figure 1. 5.: Waste generation for capita in Tirana City [kg/ day-capita]

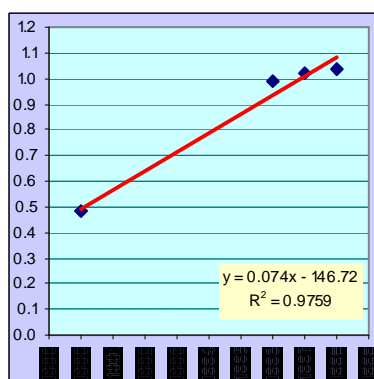


Figure1. 6.: Waste generation for capita in Durres City [kg/ day-capita]

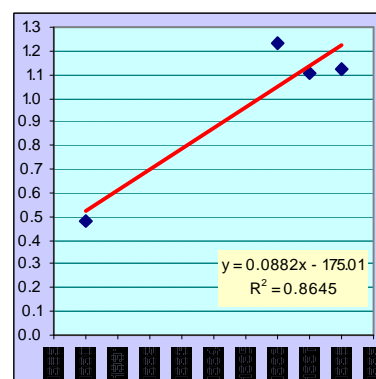


Figure 1.7.: Waste generation for capita in Vlora City [kg/ day-capita]

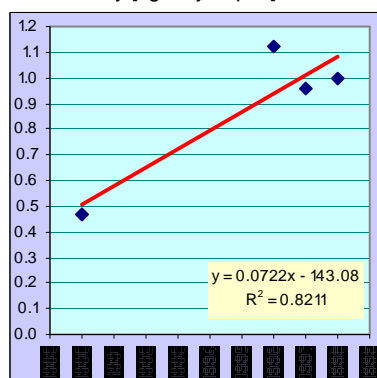


Figure1.8.: Waste generation for capita in Shkodra City [kg/ day-capita]

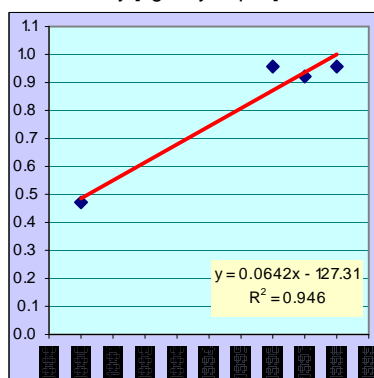


Figure 1.9.: Waste generation for capita in Elbasan City [kg/ day-capita]

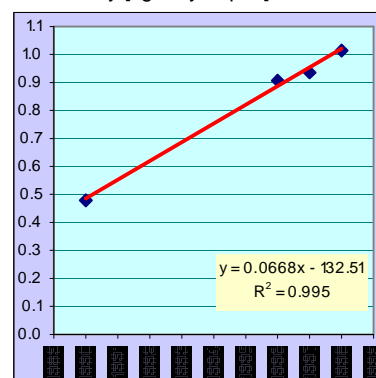


Figure 1.10.: Waste generation for capita in Fier City [kg/ day-capita]

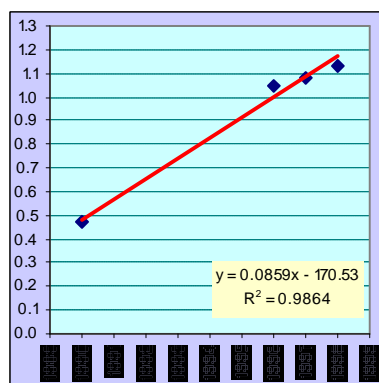


Figure 1.11.: Waste generation for capita in Korçe City [kg/ day-capita]

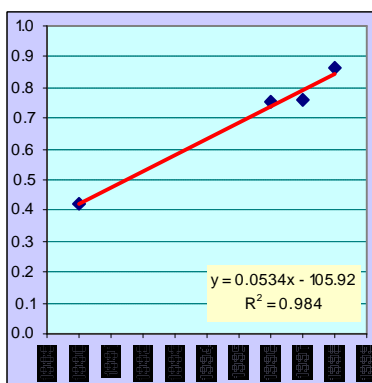


Figure 1.12.: Waste generation for capita in Lezhe City [kg/ day-capita]

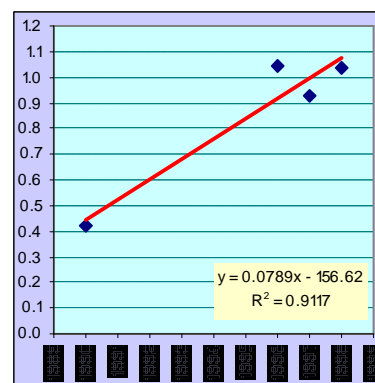


Figure 1.13.: Waste generation for capita in Pogradec City [kg/ day-capita]

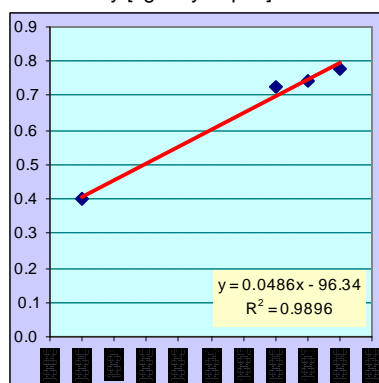


Figure 1.14.: Waste generation for capita in Skrapar City [kg/ day-capita]

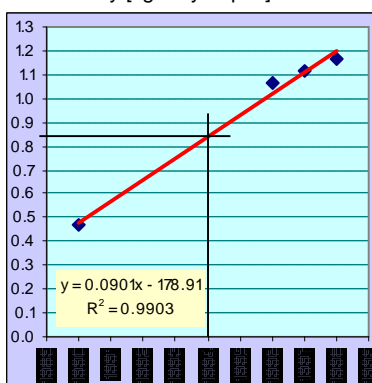


Figure 1.15.: Waste generation for capita in Albania [kg/ day-capita]

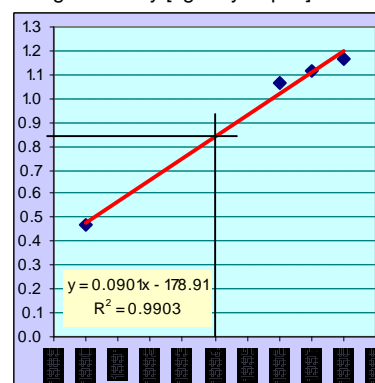


Figure 1.16.: Waste generation for capita in Albania [kg/day-capita]

Analysis of the above correlations gives us a very important conclusion: **specific waste daily production for year 1994 has been 0.8445 kg/day-capita instead of 0.96 kg/day-capita which was used in the module 6 of IPCC on the year 2000.**

Considering both corrected figures: number of urban population (1,205,876) and specific waste daily production (0.8445 kg/day-capita), we got now the possibility to find key source emission corrected by inserting them in Module 6 in the IPCC figures for the year 1994, as it is shown in the table 1.10.

Table 1.10.: The corrected results for the year 1994 (taken from IPCC excel file).

MODULE		WASTE		
SUBMODULE		QUANTITY OF MSW DISPOSED OF IN SOLID WASTE DISPOSAL SITES USING COUNTRY DATA		
WORKSHEET		6-1A (SUPPLEMENTAL)		
SHEET		1 OF 1		
COUNTRY		ALBANIA		
YEAR		1994		
A	B	C	D	E
Population whose Waste goes to SWDSs (Urban or Total) (persons)	MSW Generation Rate (kg/capita/day)	Annual Amount of MSW Generated (Gg MSW)	Fraction of MSW Disposed to SWDSs (Urban or Total)	Total Annual MSW Disposed to SWDSs (Gg MSW)
		C = (A x B x 365)/1 000 000		E = (C x D)
1205876	0.8445	371.70	0.71	263.91

Finally we have got the following results as shown in table 1.11:

Table 1.11: CH ₄ emissions from waste category		
	CH ₄ from Waste prepared on 2000 for the year 1994	CH ₄ from Waste prepared on 2005 for the year 1994
Gg/year for year 1994	13.9387	11.1765
Change between them, %	100%	80.18%

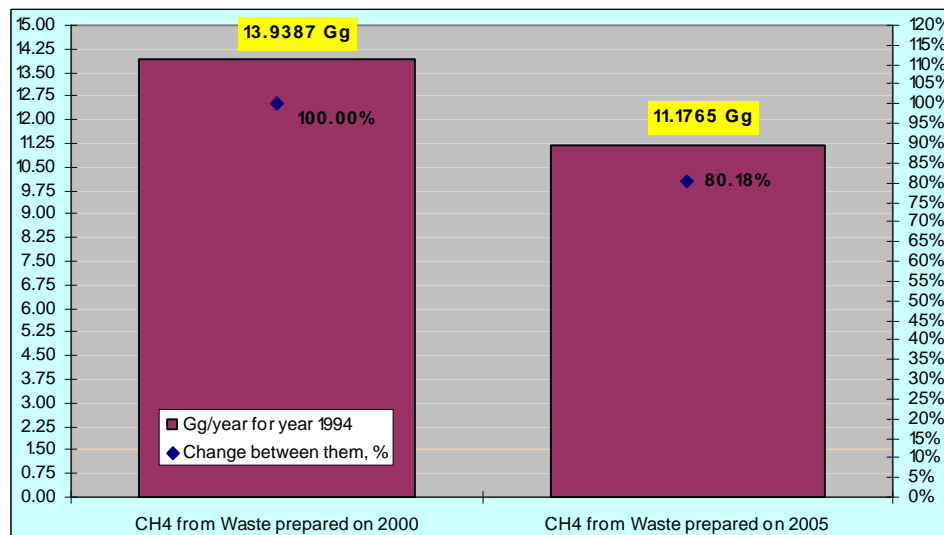


Figure 1.17.: CH₄ emissions from Waste

Table 1.12: N ₂ O emissions from waste category		
	N ₂ O from Waste prepared on 2000 for the year 1994	N ₂ O from Waste prepared on 2005 for the year 1994
Gg/year for year 1994	0.1517	0.1424
Change between them, %	100%	93.82%

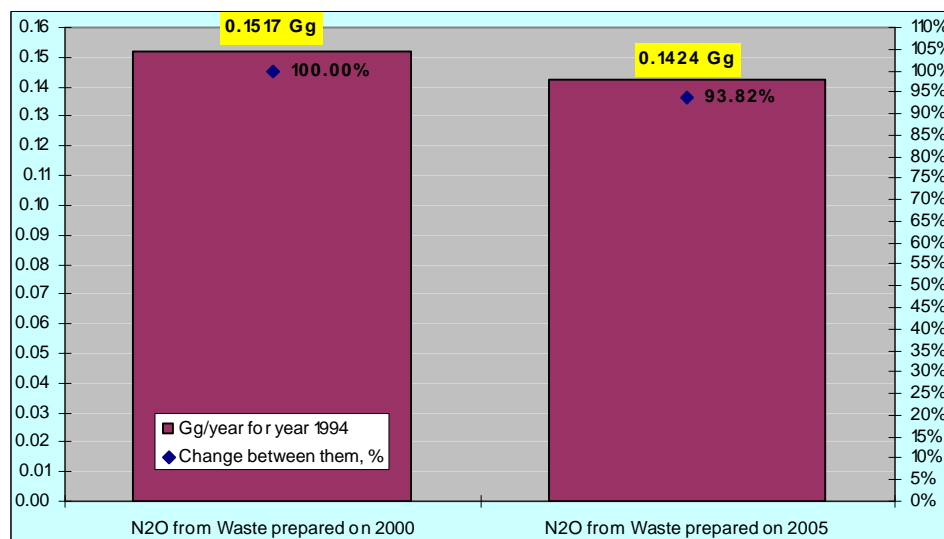


Figure 1.18.: N₂O emissions from Waste

Table 1.13: CO ₂ equivalent emissions from waste category		
	CO2 equivalent from Waste prepared on 2000 for the year 1994	CO2 equivalent from Waste prepared on 2005 for the year 1994
Gg/year for year 1994	340	279
Change between them, %	100%	82.07%

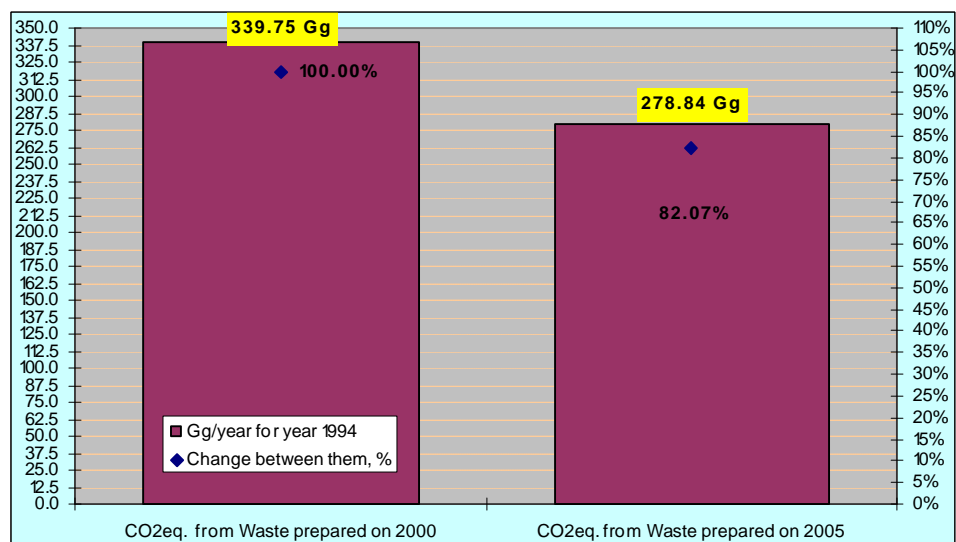


Figure 1.19.: CO₂ equivalent emissions from Waste

Final Conclusion of this analyze is: the CO₂ equivalent emissions from Waste Category calculated on the year 2000 for the year 1994 was 339.75 Gg , while the same figure calculated in the year 2005 (as part of Key Source Analyze) is 278.84 Gg or 17.93% lower.