Overview of the Waste Management Situation and Planning in Greece

Efstratios Kalogirou, Dr. Chemical Engineer – Vice Chair Global WTERT Council, Columbia University, New York, USA

Antonios Sakalis, Environmental Scientist MsC – National Technical University of Athens, Athens, Greece

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Presentation outline

- Waste management in Greece
- Recycling and special waste streams
- Waste-to-Energy and planning
- The case of Attica
- The Hellinikon opportunity
- Conclusions

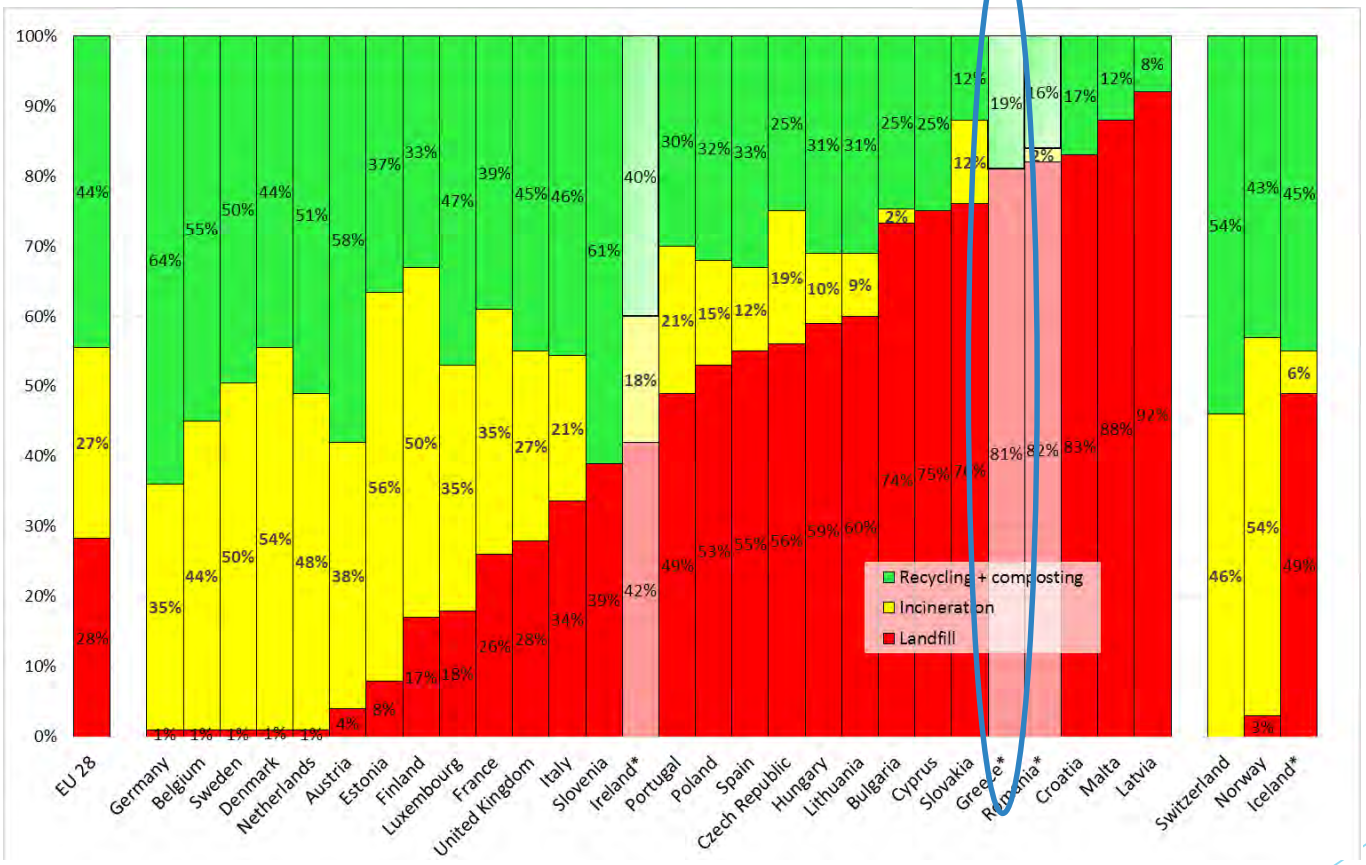
Waste management in Greece

- MSW collection and transportation by public sector
- Major sanitary landfills
  - However there are still 50 illegal active dumpsites and another 100 in restoration process
- MBT plants
  - 5 Mechanical Biological Treatment plants (Athens, Chania, Heraklio, Cefalonia, Kalamata*)
  - Another 2 in tender phase (Peloponnese, Kozani) and 5 in planning phase
- MRF plants
  - 27 active (2 in Attica Region, smaller in many Regional Units around Greece)
  - Planning to double them (Around 50 small MRFs' in 2020 – one per Regional Unit)

Waste management statistics in Greece

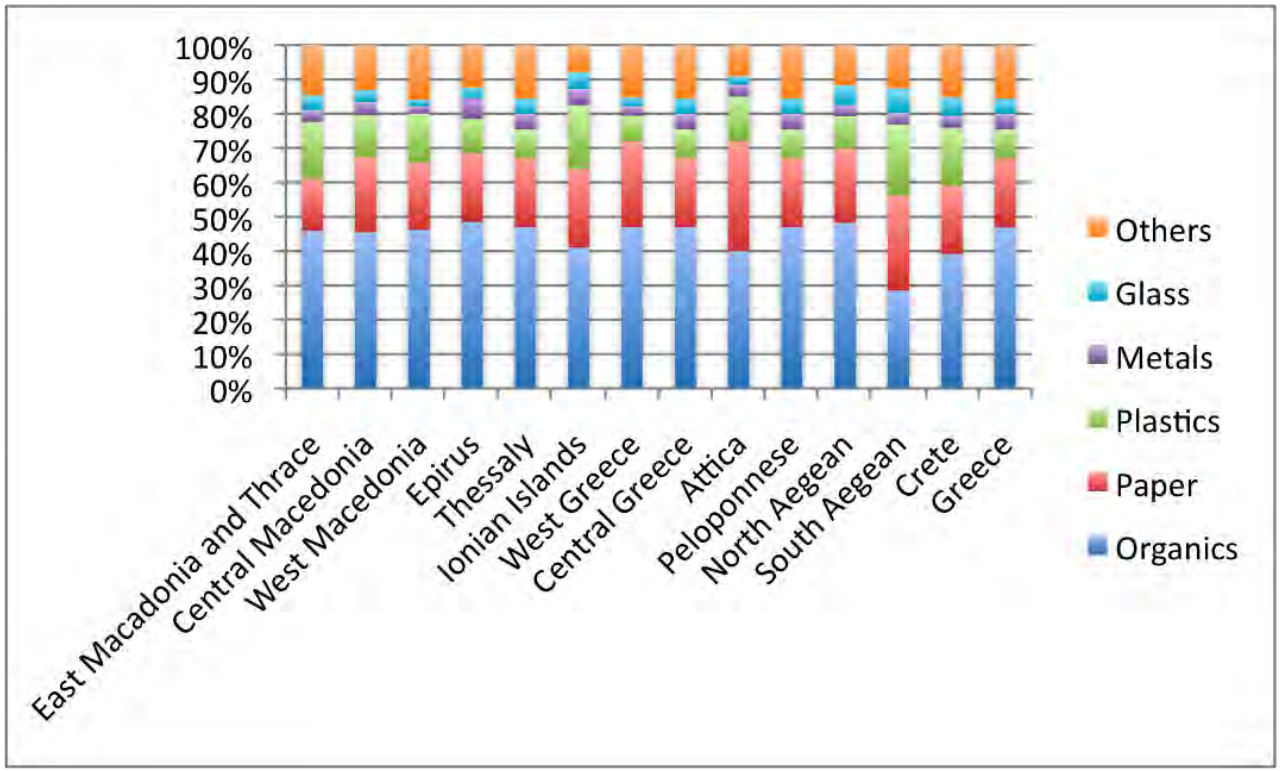
- The MSW generation in Greece in 2001 was 4,529,585 tons, and it developed to 5,006,435 tons in 2011. A change from 416 to 457 kg per capita.
- During the financial crisis, a 20% decrease in MSW generation is estimated.
- Focusing on the Attica region, the MSW generation reaches the quantity of 6,000 tons daily, which equals to 2.0 million tons of MSW per annum.
- MSW management in 2014 for Greece is shown in the next slide. Main treatment method is the landfill with 81% of the total quantities. 19% of the total quantities is recycling and composting. In the following slide the statistics by Eurostat for the waste management across Europe on 2014 are presented.

Waste management statistics in Greece



Waste management in Europe in 2014 (Source: Eurostat, 2016)

Waste management statistics in Greece



Composition of Greek MSW (Source: Hellenic National Waste Planning, 2015)

Resource efficiency and the European Union

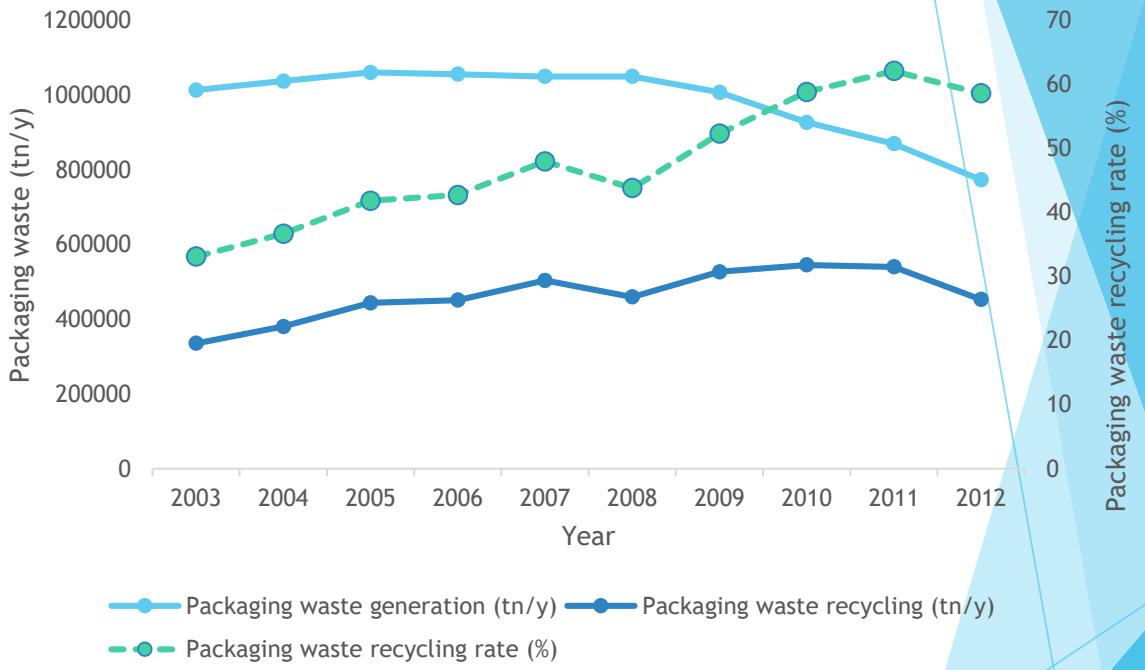
- Great challenge: creating jobs in conjunction with welfare for citizens
- Vision: The creation in 2050 of an economy that respects resource constraints and at the same time increases the financial prosperity
- This will be a reality by the interdependence of human wellbeing, ecosystems and economy

Packaging waste

- One of the most important material flows (40% of MSW in the EU)
- Its composition consists mainly of paper and cardboard, followed by plastic, glass, metal and wood
- Collection in Greece is present through the “blue bin system” (mixed recyclables collection) from three alternative collection systems and an individual (supermarkets union)
- No separate collection of recyclable products. A few efforts in municipalities with good financial state
- Greece lags behind the EU's objectives in the glass and metal collection, but the general situation is (just) sufficient

Packaging waste

Packaging waste generation (tn)		Packaging waste recycling (tn)		Packaging waste recycling rate (%)
2003	1,014,000	2003	336,000	33.14
2004	1,038,000	2004	381,000	36.71
2005	1,061,005	2005	444,000	41.85
2006	1,056,000	2006	451,500	42.76
2007	1,050,000	2007	504,000	48.00
2008	1,050,000	2008	460,163	43.83
2009	1,008,000	2009	527,400	52.32
2010	927,400	2010	545,634	58.83
2011	870,420	2011	540,630	62.11
2012	773,370	2012	453,260	58.61



Packaging waste generation and recycling in Greece (Source: Eurostat, 2014)

Waste electric and electronic equipment (WEEE)

- Increasing quantities of EEE in the recent years
- Need for materials recovery (part of which belongs to hazardous waste fraction)
- Modern legislation classifies WEEE in ten categories with different collection, recovery and recycling procedures
- Two alternative collection systems currently operating in Greece
- The country achieves the goal, but there is need to increase recovery because of increased targets in the forthcoming years

Waste electric and electronic equipment (WEEE)

Category	Recovery		Reuse - Recycling	
	Weight (tn)	Rate (%)	Weight (tn)	Rate (%)
1. Large household appliances	28,559	88.07	28,559	88.07
2. Small household appliances	1,766	81.66	1,766	81.66
3. IT and telecommunications equipment	7,475	94.66	7,475	94.66
4. Consumer equipment	7,033	87.06	7,033	87.06
5. Lighting equipment (except 5.a)	180	84.98	180	84.98
5.a. Lamps	N/a	N/a	65	93.11
6. Electrical and electronic tools	59	93.72	59	93.72
7. Toys, leisure and sports equipment	168	63.13	168	63.13
8. Medical devices	127	93.92	127	93.92
9. Monitoring and control instruments	46	91.76	46	91.76
10. Automatic dispensers	120	90.81	120	90.81
Total WEEE	45,533	88.44	45,598	88.31

Total WEEE recovered, reused and recycled in Greece in 2012 (Source: Hellenic National Recycling Organization – Annual Report 2014)

Batteries and accumulators

- Categorization into two types: portable batteries and vehicles -industrial batteries
- One alternative collection system for portable batteries (AFIS) with fairly high collection results. Two systems for vehicle and industrial batteries

Batteries and accumulators

Year	Rate (%)
2009	31,6
2010	34,9
2011	32,8
2012	35,7

Batteries recycled in Greece (Source: Hellenic National Recycling Organization – Annual Report 2014)

Year	Total generation (tn)
2004	78,955
2006	43,060
2008	41,908
2010	45,845
2012	48,756

Accumulators generated in Greece in (Source: Eurostat, 2014)

End-of-live vehicles (ELV's)

- ELVs are dismantled and materials may be recovered and recycled
- After delivery of the vehicle in specific facilities, hazardous substances are removed by decontamination, casting, cutting and further recovery follow
- 121 facilities in Greece belonging to one system (EDOE). 100% of the population is covered.
- Steel and iron are the most important materials recovered. In 2013 the recovery and reuse reached 86%

End-of-live vehicles (ELV's)

Waste	Quantity (kg)	Rate (%)
Mineral Oil	294,691	0.38
Batteries	923,597	1.18
Tires	2,419,907	3.09
Freon Liquid	14,242	0.02
Radiator Liquid	188,448	0.24
Freon	2,051	0.00
Oil Filter	16,309	0.02
Brake Pads	4,517	0.01
Catalysts	160,176	0.20
Metals - Scrap	56,314,622	71.80
Dismantling Spare Parts	15,254,543	19.45
Crystals	300,187	0.38
Plastics	398,698	0.51
Other	2,141,209	2.72
Total ELVs depolluted	78,433,197	100.00

ELV's depolluted in Greece in 2012 (Source: Hellenic National Recycling Organization – Annual Report 2014)

Waste tires

- The system follows the principles of extended producer responsibility. All importers participating in the system
- The collection is possible from collection points (companies) in communication with the system (Eco-elastika)
- The tires are led towards energy recovery, or mechanical treatment to be granulated

Waste oil and lubricants

- They belong to the category of hazardous waste, and categorized according to the European Waste Catalog (if they are under hazardous waste)
- One collection system operates in Greece (ENDIALE). Covers the whole territory
- It is estimated that 60% of waste oils and lubricants are collected

Local planning – A fresh start?

- National Planning is a sad story as it gets revised every two years
- Regional Planning's (13 Regions) follow the same story
- Something fresh came from the last version of the National Planning.
  - Waste responsibilities are now a reality for the Regions (in the past the Ministry of Environment was responsible)
  - Municipalities have to recommend and implement local planning which includes waste generation reduction initiatives, recycling in 4 separate streams, and green spots (decentralized units for special waste management).
- We are way behind the targets of 2008/98/EC but something seems to be in the right direction

Waste-to-Energy and planning

- WTERT Greece has educated local policy makers and governmental authorities for the beneficial implementation of Waste to Energy as the global experience has shown

AIT WtE Seminar, 2012

The case of Attica

- In Attica region (capital of Greece) the daily production of Municipal Solid Waste (MSW) is estimated at 6000 tons. This means 2 million tons per year, from which 85 - 90% is deposited in one Sanitary Landfill
- The European Union Legislation for Sanitary Landfills (1999/31/EC), imposes the decrease of biodegradable waste which are deposit to sanitary landfills
- WtE methods of MSW represent almost the only integrated solution to such problems.
- The Greek legislation for the incineration of wastes is the Joint Ministry Decision 22912/1117/2005 & 36060/1155/E.103.2013 (in harmonization with the European Union directives for Incineration of Waste 2000/76/EC & 2010/75/EC)
- For the Attica Region, the Greek Waste-to-Energy Research and Technology Council “SYNERGIA” has suggested the following tree scenarios (Synergia 2009)

The case of Attica

Capacity (tpa)	400,000 tn MSW	700,000 tn MSW	700,000 tn MSW & 300,000 tn RDF
Lower Heating Value (MJ/kg)	9	9	10.8
Gross Power (MW)	32.93	57.63	98.73
Net Power (MW)	27.99	48.98	83.92
R1	0.6972	0.6972	0.6979
Net Electrical Energy (MWh/year)	223,929.08	391,875.90	671,387.41
Number of residents served	141,530	247,677	424,336

Scenarios examined for the case of Attica (Source: WTERT Greece, SYNERGIA, 2009)

The Hellenikon opportunity

- Hellinikon located 7 Km South of Athens was the International Airport of Athens for 60 years until 2001.
- After its closure a small part in the Northwest was redeveloped for venues of the 2004 Summer Olympic Games.
- Since 2012 investment plans took place and investors were attracted to develop the site commercially and also create a large municipal park (biggest in Europe).
- Since this investment is the first big one in Greece within the last 8 years (crisis period), the authors propose that scenarios like the three in the previous slide for Attica, could be taken into consideration for this large project development.
- Two excellent examples supporting the idea are the Maresme Integrated Waste Management Center and the Palm Beach Renewable Energy Facility.

The Hellenikon opportunity

Conclusions

- Packaging waste:
  - Need to meet the targets for glass and metals
  - Need for full coverage of the country with recycling systems
  - Need to tackle informal sector and use scavengers within the recycling system
- WEEE:
  - Modern legislation
  - Need for illegal trafficking reduction
  - Need to control taxing evasion phenomena by non-participants of the system
- Batteries and accumulators:
  - Satisfactory performance for portable batteries (AFIS system)
  - Problems in accumulators (batteries trafficking, export)

Conclusions

- ELV's:
  - Full coverage of the country with the system
  - New European legislation is needed
- Tires:
  - Need to increase recovery rates
  - New national legislation is expected in 2016 to establish standards and recovery targets
- Oils and lubricants
  - Need for new national legislation in 2016 to revise the collection and regeneration objectives
  - Need to fight against smuggling and tax evasion

Conclusions

- Gate fee and FIT are crucial to develop feasible WTE Projects, plus education of policy makers
- Green Metropolitan Capitals worldwide (Stockholm, Copenhagen, Hamburg, Paris, London , New York, Seoul, Tokyo) use a combination of recycling at the source and thermal treatment with energy recovery
- Waste to energy, in harmonic cooperation with the recycling of MSW at source, is considered to be the most efficient, dominant, integrated and proven technology for solving the municipal solid waste management and treatment problem of big cities.

WTERT

Waste-to-Energy Research & Technology Council

Thank you for your attention

Dr. Efstratios Kalogirou

Vice Chair GWC

web site: www.wtert.org

Antonios Sakalis

Environmental Scientist MsC

National Technical University of Athens,

Athens, Greece

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