Waste Landfilling in Greece

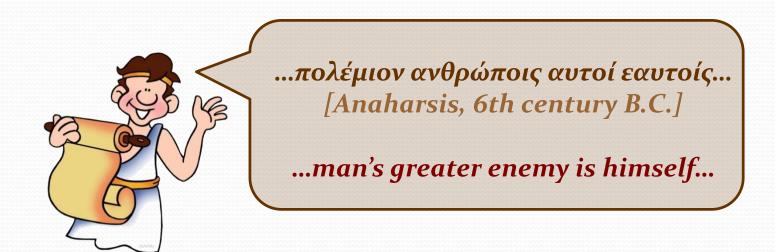
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Outline

- EU statistics on waste management in Greece
- Waste management reality in Greece
- Current problems
- The case study of Amari landfill



EU statistics say...

Municipal waste generated, 2017 (kg per capita)

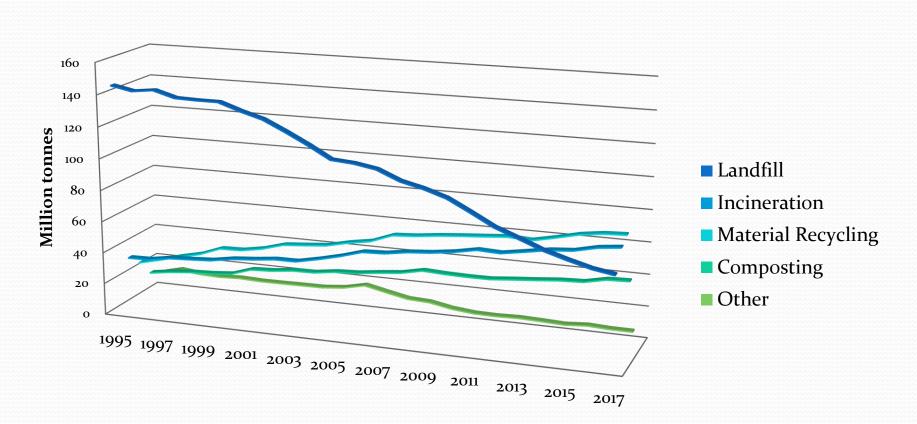


	1005	2005	2010	2015
	1997	2005	2010	2017
EU-27	470	515	504	486
EU-28	473	517	505	486
Greece	303	442	532	504

75,5 % increase ~5 % decrease

EU statistics say...

Municipal waste landfilled, incinerated, recycled and composted (EU-28)



EU statistics say...



Municipal waste recycling* rate





199720102017

20,5 % 38,3% 46,4% 9,2 % 17,1% \(\rightarrow 18,9\)%

Far from the 2020 target of 50 % recycling

^{*} Including composting and digestion

EU says...

14 Member States have been identified as at risk of missing the 2020 target of 50% preparation for re-use / recycling of municipal waste

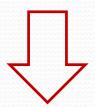
Greece's poor performance is due to:

- the absence of the infrastructure needed for source separation of recyclables
- the general public's low level of awareness
- a lack of financial incentives
- the absence of relevant economic instruments, e.g. landfill tax

Greek reality...

Landfilling rules ...

The easiest and cheapest way to manage waste



- Combination with recycling / composting / energy recovery
- Move towards proper sanitary landfilling





Greek reality...

Landfilling problems ...

- ✓ Improper operation / use beyond scheduled lifetime
- ✓ Great difficulty in finding proper available sites
- ✓ Wide disapproval by citizens NIMBY* syndrome





- 2005
- Conviction by the EU for having more than 3,000 uncontrolled waste landfills
- Deadline for closure and restoration: 2008

- **2013**
- New citation for still having around 400 uncontrolled waste landfills





- **2**014
- Conviction for still having around 300 uncontrolled waste landfills
- Fine of 14,500,000 €/ 6 months

- **2015**
- 70 uncontrolled waste
 landfills still operate, while
 174 others have closed but
 not been restored yet





- **2018**
- 14 uncontrolled waste landfills still operate
- 24 have not been restored yet
- There are missing data for 19 uncontrolled waste landfills, that are therefore considered

FINE 40.000 € / 6 months / per operating site





• We managed to:



CLOSE 2,967 sites in 13 years → ~ 228 sites / year

RESTORE 2,943 sites in 13 years → ~ 226 sites / year

- Having paid fines of : 104.000.000 €
- Under economic crisis



Current trend...

PPP



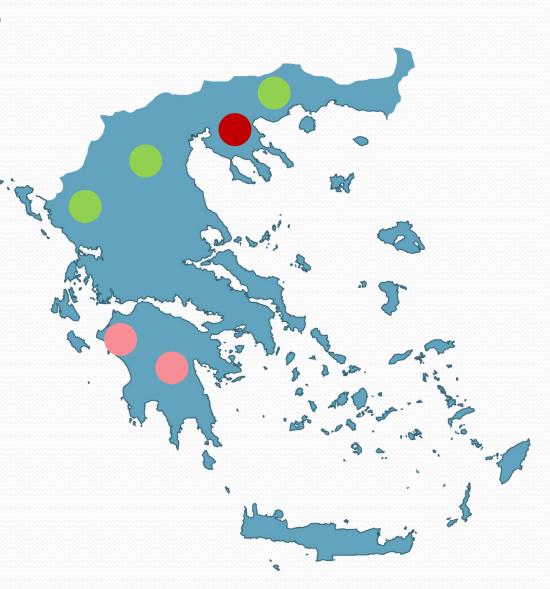
long term contracts between private and public sector entities, aiming at implementing projects and delivering service

- The ownership of the property remains in the Public, which also maintains a strong supervisory and regulatory role.
- The expertise and efficiency of the private sector is utilized.
- Consists an important tool to stimulate economic growth, leveraging private funds in development projects.

Current trend...

PPP

- In operation
- Under construction
- Approved



Current trend...

PPP → IPIROS

- 52.5 million euros (60% public)
- 105,000 tn waste / year

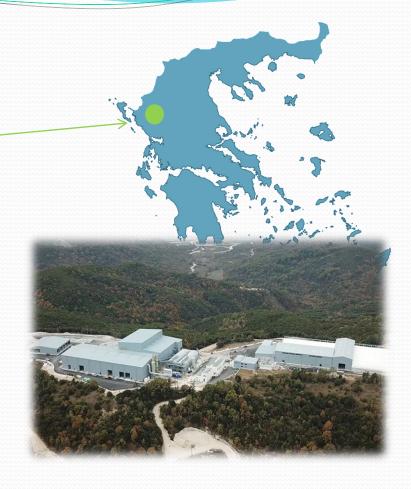


17.000 tn recycled
10,800 kWh of green energy
12,000 tn CO₂ saved





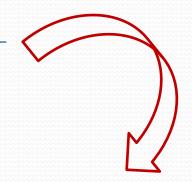
80,000 tn / year will be provided at minimum by the state 1 € will be the price of the whole facility / rights at the end of the 25 year period



Current problems

Ionian Islands

- Corfu
- Paxi
- Lefkada
- Ithaki
- Kefalonia
- Zakinthos
- Kithira





- 637,5 kg/capita
- ✓ Area: 2,306 km² (1,75%)
- ✓ Permanent population: 207,855 (1,92%)
- ✓ Municipal waste production: ~132,500 tn/yr

Current problems

Ionian Islands

Corfu

- an oversaturated landfill, without proper specifications, that needs to be closed and restored

 a new landfill, but not operating, due to protests, landfill

- a materials recovery facility

Fire from protesters at the new landfill, Corfu





Ionian Islands

Lefkada

- a saturated landfill, that needs to be closed and restored
- waste need to be transferred to the mainland

Saturated landfill, Lefkada

Current problems

Ionian Islands

Kefalonia

- an operating landfill for residues
- a recycling and composting plant



Recycling & Composting Plant, Kefalonia



Current problems

Ionian Islands

Zakinthos -

- an oversaturated landfill, that was closed, but later reused
- a materials recovery facility
- Kefalonia refuses to accept waste from Zakinthos





Causes & particularities

#1 - Geography



- Lack of funds and infrastructure
- Important seasonal variation of population
- Climate
- Limited space
- Energy and water supply problems
- Limited and not regular transportation opportunities to the mainland
- High transport cost

First operated in 1997. Since 2007 and after two extensions, it serves a population of 85.600 capitals, accepting annually around 47.000 tn of municipal waste.

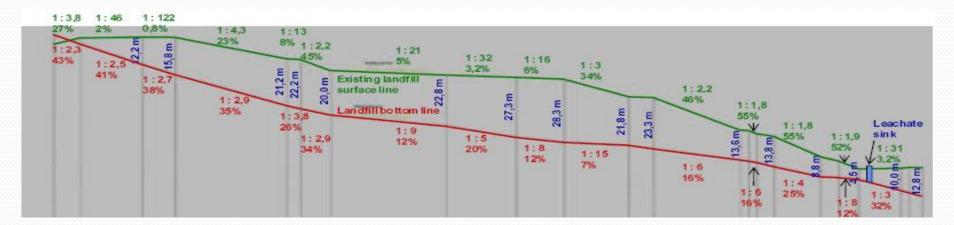


Serious problems

- Significant differentiation of the original design and inadequate handling of new data over time
- Lack of organized operating record and invasive improvement work during the its operation.
- Unable to cope with high volumes of rainfall. Improper drainage management.
- Drainage overflow and downstream reservoir overload.

Serious problems

- The bottom of A cell is characterized by the desired slope of 1:
 The downstream extension is characterized by a high degree of variation and steep slopes (red line).
- Corresponding high degree of variability is also the formation of the landfill surface (green line).

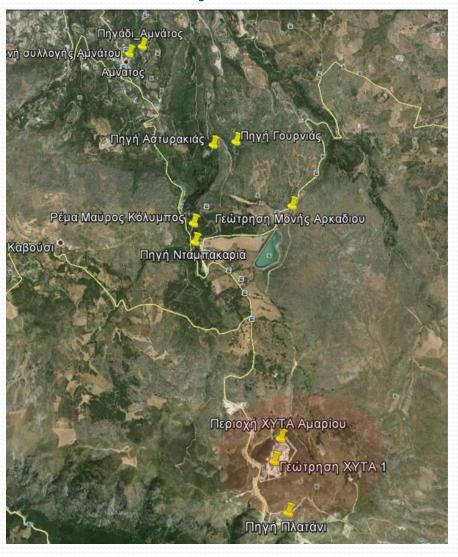




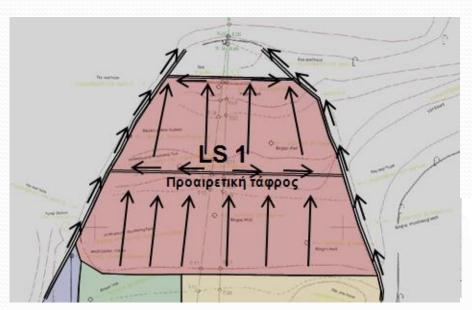






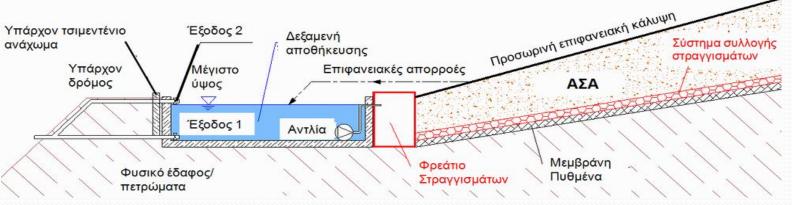


- 1 drilling out of 3 in the landfill zone
- 1 drilling in M. Arkadiou
- 7 surface points
- Distances > 3 km from landfill in most cases
- Incomplete groundwater quality control
- Limited landmarks in the landfill zone
- Need for further research and determination of hydrogeological picture



Installation of a temporary surface cover in the landfill paid areas and a rainwater collection tank at the landfill site.

Avoid overflows - Decrease in processing volume.





Waste Management

Always a problem



Always a wide field of research

Always a developing issue



...ουδέν κακόν ραδίως απόλλυται...

...no harm goes away easily...



THANK YOU FOR YOUR ATTENTION