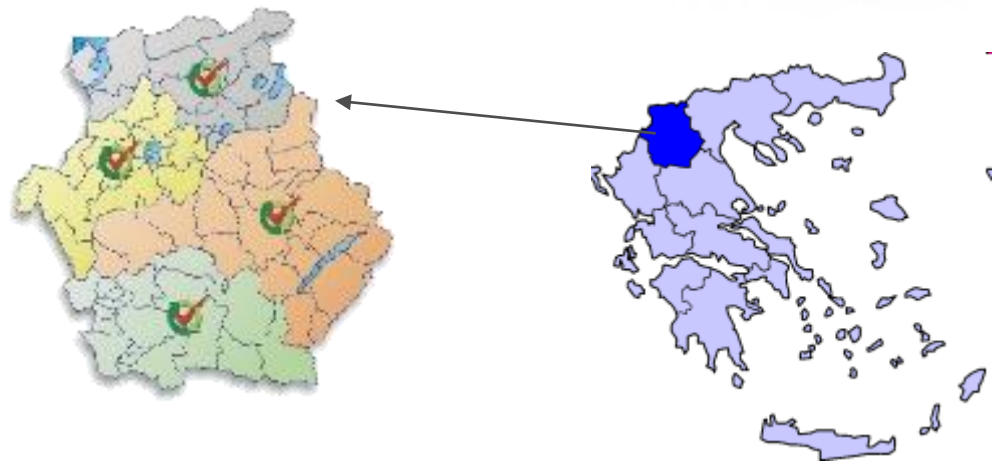


The regional

INTEGRATED **W**ASTE **M**ANAGEMENT **S**YSTEM

of Western Macedonia



Katerina Giannakoula
Environmentalist



■ Responsible body
for Waste Management: **DIADYMA SA**

■ Company was founded in 1998

■ Shareholders: Municipalities of Grevena, Kastoria,
Florina,
Kozani, Eordaia, Amyntaio,
Orestida, Servia and Velvendou,
Nestorio, Prespes, Voio, Deskati



The regional

**INTEGRATED
WASTE
MANAGEMENT
SYSTEM**

of Western Macedonia



Main activities:

- **Mechanical Collection**
- **Transferring of waste**
- **Recycling**
- **Mechanical Treatment and Recovery**
- **Sanitary Landfilling**

WASTE TRANSFERRING SYSTEM

■ The IWMS of W. Macedonia includes the Central Facilities of Integrated Waste Management which is supplied by 10 Local Waste Management Facilities (LWMF).

■ Mixed waste is being transported and also recyclable materials, to serve the needs of the local collection system.

■ That integrated system serves the needs of 12 municipalities of W. Macedonia and 300.000 residents.



The Central Facilities of Integrated Waste Management



- (1) The Landfill's 2 cells (the third cell is under construction)
- (2) The leachate monitoring system
- (3) The biogas monitoring system
- (4) The recycling center
- (5) Other facilities (administration building, maintenance building etc)

Each year the Central Waste Management Facility of W. Macedonia...

■ receives 100.000 tones of urban waste

■ composition

	2011
Organics	46%
Paper	20%
Plastic	14%
Metals	3%
Glass	2%
Leather and wood	5%
Non classified	10%
Total	100,0%

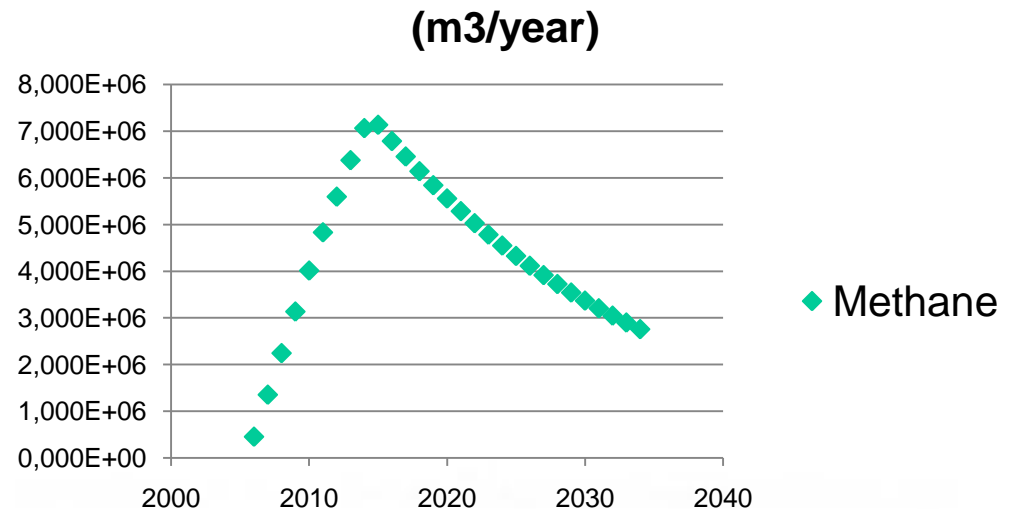


Biogas Potential from DIADYMA

For estimating emission rates of landfill gas we use **LandGEM (Landfill Gas Emissions) Model**.

LandGEM designed by US EPA Environmental Protection Agency as an automated estimation tool that can be used to estimate emission rates for total landfill gas such as,

- ✓ methane,
- ✓ carbon dioxide,
- ✓ Non methane organic compounds,
- ✓ individual air pollutants



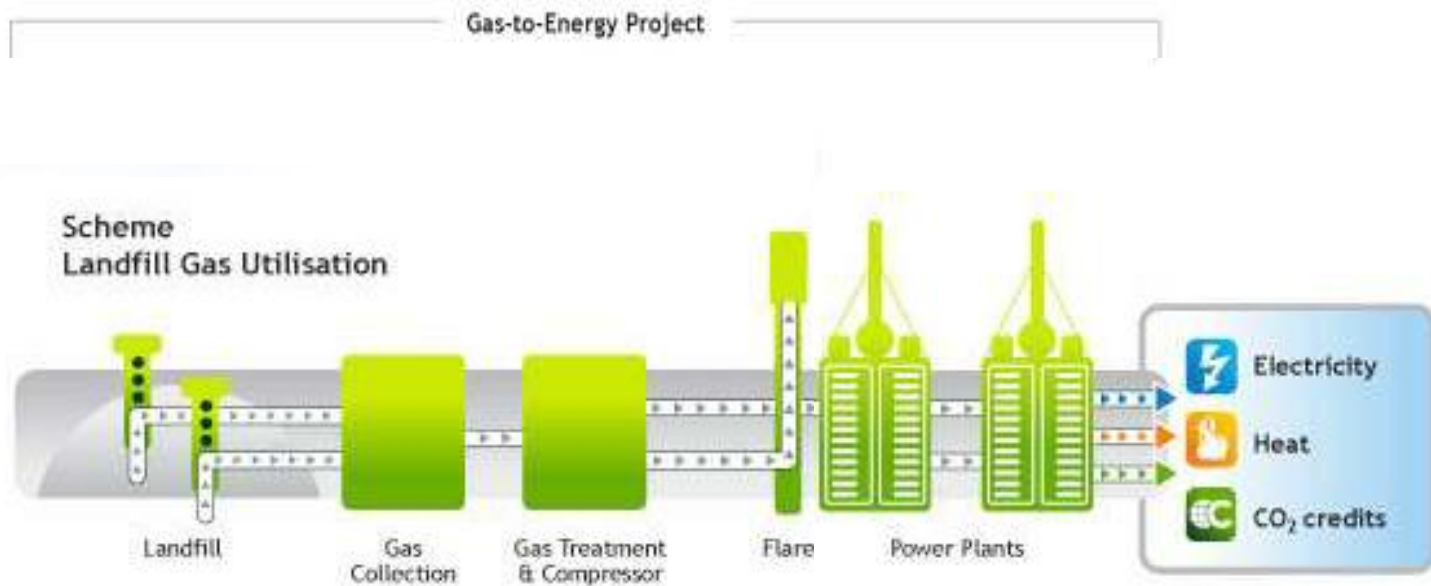
Biogas Potential from DIADYMA

**Production of
biogas from landfill
cells A & B**

Recovery rate: 70%

Year	Biogas Production (m3/hr)	Extracting biogas (m3/hr)
2015	1.365	955
2016	1.311	918
2017	1.260	882
2018	1.210	847
2019	1.163	814
2020	1.117	782
2021	1.073	751
2022	1.031	722
2023	991	694
2024	952	666
2025	915	640
2026	879	615
2027	844	591
2028	811	568
2029	780	546
2030	749	524
2031	720	504
2032	691	484
2033	664	465
2034	638	447

Biogas Plan



Electric Potential from DIADYMA

Production of Electric Energy from landfill cells A & B

Year		Theoretical Electric Energy- Potential (kW)	Real Electric Energy- Potential (kW)	Electric Energy- (kWh/yr)
1o	2015	4.909	1.571	12.315.688
2o	2016	4.717	1.509	11.832.783
3o	2017	4.532	1.450	11.368.813
4o	2018	4.354	1.393	10.923.036
5o	2019	4.183	1.339	10.494.737
6o	2020	4.019	1.286	10.083.233
7o	2021	3.862	1.236	9.687.864
8o	2022	3.710	1.187	9.307.997
9o	2023	3.565	1.141	8.943.025
10o	2024	3.425	1.096	8.592.364
11o	2025	3.291	1.053	8.255.453
12o	2026	3.162	1.012	7.931.752
13o	2027	3.038	972	7.620.743
14o	2028	2.918	934	7.321.930
15o	2029	2.804	897	7.034.833
16o	2030	2.694	862	6.758.993
17o	2031	2.588	828	6.493.969
18o	2032	2.487	796	6.239.337
19o	2033	2.389	765	5.994.689
20o	2034	2.296	735	5.759.634

FINANCE MODEL

	1 st year	10 th year
Capital Costs	€	€
Gas Collection System	250.000	0
Net Power Generation Plant	250.000	0
Equipment	1.600.000	800.000
Operating Costs	€ /per year	€ /per year
Personel	100.000	110.000
Insurance	22.000	22.000
Gas System Maintenance	85.000	80.000
Miscellaneous Costs	13.000	15.000
Tax	200.000	130.000
Revenue	€ / year	€ / year
Electricity	1.500.000	1.000.000



Licensing Procedure

Electricity Generation License

Preliminary terms and conditions for granting access to the Grid

Approval of Environmental Conditions and installation and operation licenses

Connection offer

Approval of Environmental Conditions

Installation license

Operation license

The regional

**INTEGRATED
WASTE
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Thank you for your attention