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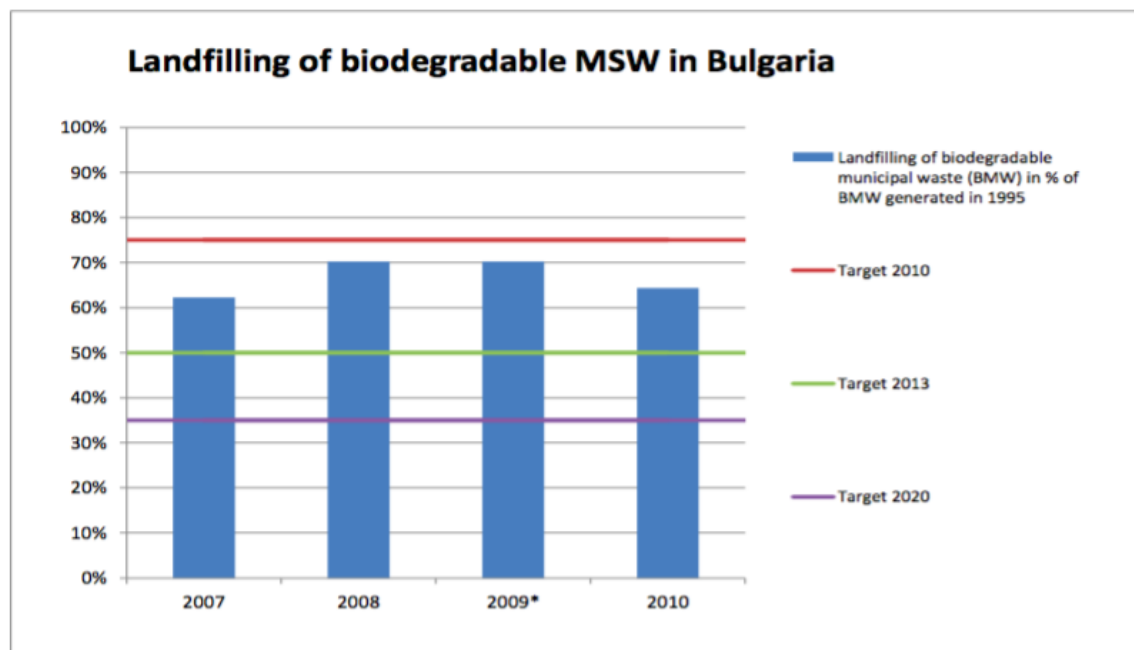
Perpetuum Mobile Albena: Co-digestion of kitchen and agricultural waste

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BAMEE

Webinar, Biogas from organic wastes, 15 May 2020

Bulgaria – bio-waste treatment

- **50-60% of municipal solid waste is biodegradable municipal waste**
- **In 1995: 2.24 million tons**
- **In 2007: 1,4 million tons (62% of 1995 value)**



Bio-waste landfill diversion targets:

- **2010: 75%**
- **2013: 50%**
- **2020: 35%**

Source: EC, 2012 and Bulgaria, 2012. *The figure for 2009 is estimated by Copenhagen Resource Institute (CRI). The target dates take account of Bulgaria's 4 year derogation period.

Bulgaria - targets achieved!

- **2020 target of 35% achieved in 2016**
- **OP 2007-2013**
 - 18 composting plants
 - 1 anaerobic digestion plant
- **OP 2014-2020**
 - 35 composting plants
 - 3 anaerobic digestion plants
 - 19 plant for preliminary treatment

Year	Landfiled t/y	Permitted for landfilling t/y
2013	929 968	1 123 750
2014	648 335	
2015	928 000	
2016	691 500	
2020	373 263	786 625

The Black Sea Resort Albena

- Located 30km from Varna and 12km from Balchik
- 43 hotels with a total of 20,000 beds
- Green Oscar for contribution to environment
- Investment in energy efficiency, renewable energy, recycling and waste reduction
- In Eco Agro complex, production of own fresh food, including beef from cattle farm and organic wine

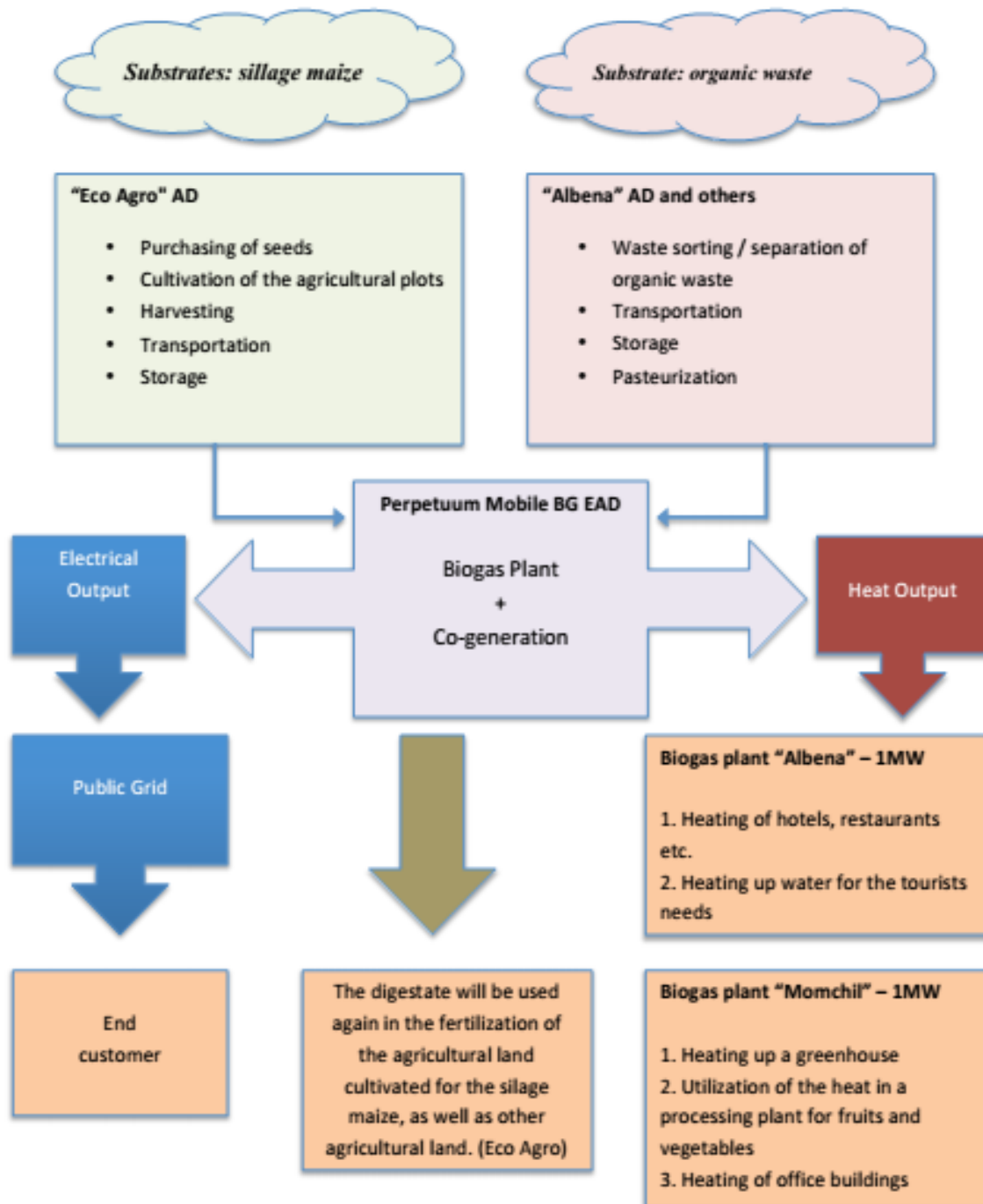


The Perpetuum Mobile plant



The Perpetuum Mobile plant

- **The Albena daughter company “Perpetuum mobile BG” AD operates the biogas plant**
- **Construction of anaerobic digester for agricultural and kitchen wastes from Albena Resort in 2012**
- **New installation currently under construction**
- **Co-generation of electricity and heat from biomass**
 - Heat (1MWh) is used for a greenhouse (and district heating)
 - Digested materials used as liquid fertilizer on agricultural fields of the company and parks & gardens of the resort
 - Electricity production (1MWe) directly to the grid



Key challenges

- **At the beginning, problems using kitchen waste and started using just agricultural residues**
- **Team improves technical processes to use both types of waste but still mainly agricultural**
- **The bacterial flora is very sensible to many external factors: temperature and pH**
- **Process, speed and results depend also on size of the input organic materials, length of stay, good contact of organic material and bacteria**
- **For the better digestion, the inlet material is screened; flotation method is used to separate fats.**

Economics

Co-generation and biogas plant						
Installed Power Capacity		Total Installed Power	Revenues/Savings			
Electricity	Heat		Project Revenues		Energy Savings	
kWel	kWth	kW	(MWh/yr.)	(EUR/yr.)	(MWh/yr.)	(EUR/yr.)
1000	1000	2000	5200	664679	3333	312500

Total Project Cost	Financial Indicators			Emissions reduction
(EUR)	NPV (EUR)	IRR (%)	Pay-back (yr.)	CO2 (t/yr.)
4000000	4800000	9.0	8.0	310

Biogas projects in Bulgaria

Sofia biogas & compost plant Han Bogrov



Ruse – total value BGN
34,841,674.21 with VAT,

- BGN 25,995,954.18 grants provided by the EU and national funds.
- BGN 8,845,720.03 are own contribution, from the municipalities - members of the RWMS - Ruse. Ivanovo, Slivo Pole, Tutrakan and Vetovo.

Burgas biogas & composting plant

Source separated bio-waste in Burgas region incl. municipalities Burgas, Nesebar, Pomorie.

- 8 bioreactors
- AD for 30652 t/a
- Compost installation
- CHP

Blagoevgrad biogas plant

- 46,500 t/a household waste
- 15,800 t/a treated in biogas reactor
- 5,800 t/a compost





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Thank you!