

The Use of Bio-Waste for Biomethane Production in European Cities



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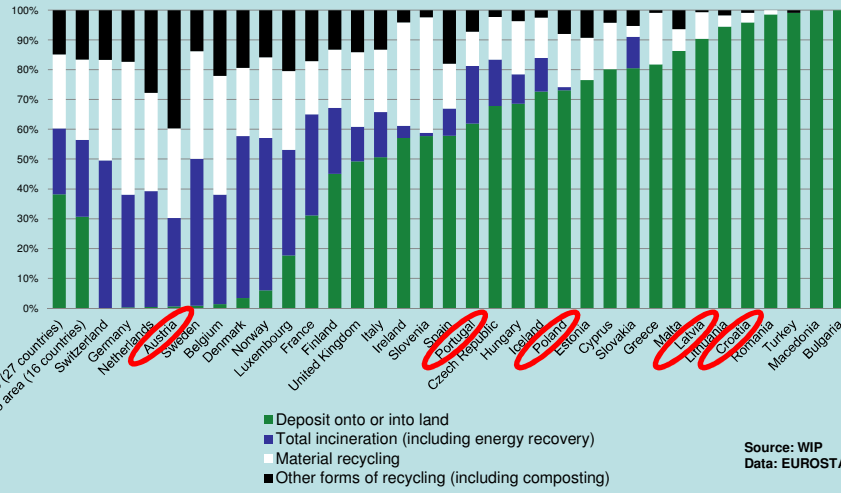
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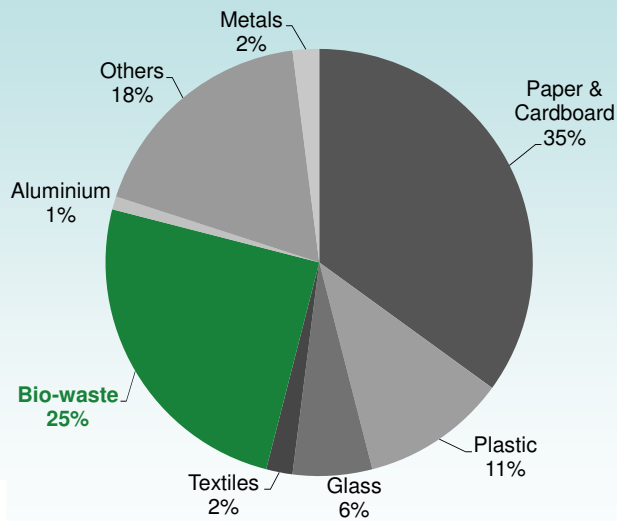
- **Bio-waste in Europe**
- The EU Mandate for Bio-waste Digestion
- Options for Bio-waste Treatment
- The UrbanBiogas Project
- 5 Target cities
- Conclusion



Treatment of municipal waste in Europe in 2010



Typical composition of MSW



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European Legislation on Waste

- **Landfill Directive** 1999/31/EC
→ obliging MS to reduce by 2016 landfilled biodegradable waste to 35% of 1995 levels
- **Waste Framework Directive (WFD)** 2008/98/EC
→ Waste hierarchy
→ Article 22 on bio-waste asks MS to encourage the separate collection of bio-waste with a view to the composting and digestion of bio-waste
- **Green Paper** of the EC (2008) on the management of bio-waste
→ explores options for the further management of bio-waste
- **Bio-waste Directive** call of the European Parliament
→ compulsory separate collection and recycling of bio-waste should be core of the legislation
→ Standards for digestate
→ The call failed!

European Legislation on RE and others

- **Renewable Energy Directive 2009/28/EC**
 - common framework for the promotion of energy from renewable sources
 - High GHG reduction potential for biomethane as transport fuel:
 - (a) Typical greenhouse gas emission saving: 80%
 - (b) Default greenhouse gas emission saving: **73%**
- **Other relevant legislation:**
 - Nitrates Directive 91/676/EEC
 - Regulation on Animal by-products EC 1774/2002
 - Water Framework Directive 2000/60/EC
 - etc. ...

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Treatment Methods for Bio-waste



Landfill

- Reduction necessary to comply with Directive 2006/12/EC
- Landfill gas could be energetically used, but energy output is low
- No use of nutrients is possible



Incineration Plant

- + Energetic use
- "waste heat" is often un-used
- No use of nutrients is possible
- High investment costs and other barriers for new plants
- Long transport ways due to centralised plants

Household Composting

- + Common practice in many cases
- + High-value end-product: closed nutrient cycle
- + No sophisticated logistics needed
- No energetic output
- Not all waste is suitable for private composts
- Not possible in urban areas

Industrial Composting

- + Common practice in many cases
- + High-value end-product: closed nutrient cycle
- No energetic output

Anaerobic Digestion

- + High energetic output**
- + High-value end-product: closed nutrient cycle**
- + Opportunity to produce transport fuels**
- Still needs non-technical support**

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Advantages of Bio-waste Digestion

- Production of high-quality fertilizer
- Substitution of fossil fertilizer
- Closure of nutrient cycles
- Renewable energy production
- Technology with high GHG emission savings in comparison to other bio-waste treatment technologies
- Production of transport fuel (biomethane) with high energy content
- Biomethane from bio-waste as transport fuel fulfils the GHG reduction mandates of the RED
- Smaller decentralized treatment plants allow short transport distances of bio-waste



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Challenges of Bio-waste Digestion

- Introduction of a separate collection system
- Raising public awareness about the need of separate collection and getting public acceptance
- Education of households in waste separation
- Reduce investment and operational costs for AD facilities
- Introducing policies which allow the introduction of a profitable separate waste collection system with adjacent AD process
- Creating a suitable market for the sale of digestate as fertilizer, substrate, or soil improver



„WtB“ Supply Chain

- Waste companies
- Consumers
- Municipalities

Waste Management

- Biogas plant operator

Biogas Production

- Biogas plant operator
- Gas utility
- Technology supplier

Biogas Upgrading
Biomethane Production

- Biogas plant operator
- Gas utility

Grid Injection

- Consumers
- Public transport sector
- Filling stations

Natural Gas
Substitute

Transport



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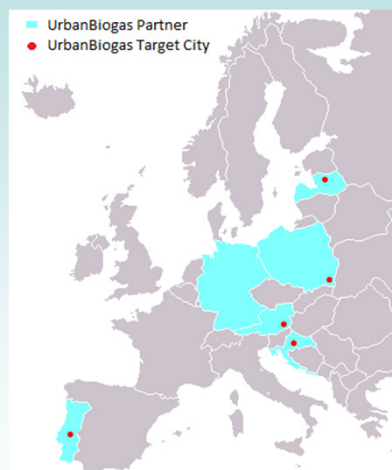
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Project Summary

- **Objective:**
to promote the use of organic urban waste for biogas production in 5 target cities in order to inject biomethane in the natural gas grid and to use it in transport.

→Development of WtB concepts in 5 EU Cities

- **Target cities:**
 - City of Zagreb (Croatia)
 - City of Graz (Austria)
 - Municipality of Abrantes (Portugal)
 - City of Rzeszów (Poland)
 - City of Valmiera (Latvia)



Project Partners

- **WIP – Renewable Energies**, Germany
- **Fraunhofer IWES Institute**, Germany
- **Energy Institute Hrvoje Požar**, Croatia
- **City of Zagreb (Zagrebački Holding)**, Croatia
- **Polish Biogas Association**, Poland
- **IrRADIARE**, Portugal
- **Municipality of Abrantes**, Portugal
- **EKODOMA**, Latvia
- **North Vidzeme Waste Management Company**, Latvia
- **Grazer EnergieAgentur**, Austria
- **Podkarpacka Energy Management Agency**, Poland



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Selected Activities and Outcomes

Main objective:

- **5 concepts** for the target cities on urban waste management, biogas and biomethane production and use
- **5 business agreements** for WtB projects in the target cities

Main activities:

- **90 Task Force meetings** in the 5 target cities to elaborate concepts
- **15 training courses** on urban waste management, biogas and biomethane production and use for city representatives
- **5 events for biogas plant companies** to promote their technologies
- **5 National expert consultation meetings** on the use of biomethane
- **9 WtB promotion events for other European Cities**



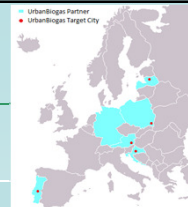
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Overview on the 5 Target Cities



City	Country	Current situation
Graz	Austria	- Most advanced city of UrbanBiogas - Plans exist since several years, but were stopped - UrbanBiogas tries to reactivate the plans
Zagreb	Croatia	- Only few bio-waste currently collected - The main challenge is currently the waste separation
Abrantes	Portugal	- No separate bio-waste collection - High interest of the Municipality
Valmiera	Latvia	- No separate bio-waste collection - Eventual prioritisation of mixed waste collection and subsequent bio-waste separation
Rzeszów	Poland	- No separate bio-waste collection - Waste management plan is currently finalised - Eventual prioritisation of incineration



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Conclusion

- Need for a bio-waste directive?
- The RED supports the use of bio-waste, especially in the transport sector
- Grid injection of biomethane is getting more important due to the problem of waste heat in conventional biogas plants
- WtB (Waste-to-Biomethane) is a promising approach to:
 - Produce renewable energy
 - Introduce a sustainable waste management system
 - Contribute to closed cycles
- Main problems are:
 - High costs of upgrading and injection
 - Lack of legislation in many countries
 - Lack of existing suitable waste management structures
 - Problems in legislation related to the use of digestate as fertilizer
- UrbanBiogas tries to initiate WtB projects in 5 European cities

Thank You!

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