



Bio-Waste - Need for EU-Legislation?

Brussels, 9 - 10 June 2009

Miguel Brandão




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*Bio-Waste Treatment: Potential and Difficulties
- an environmental life cycle approach*

*Miguel Brandão, Rana Pant, David W. Pennington, Marc-Andree Wolf,
Kirana Chomkham Sri, Ugo Pretato, Malgorzata Goralczy, (waste)*

<http://ies.jrc.ec.europa.eu/>
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European Commission

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“...to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of European Union policies ... independent of special interests, whether private or national.”



European Union Member States

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Outline


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- **Introduction**
 - Life Cycle Thinking (LCT) and Assessment (LCA)
 - Policy Context
- **Application of Life Cycle Thinking to Bio-Waste Management**
- **Potential and Challenges**

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What are the Environmental Impacts and Resources Consumed of our Goods and Services?

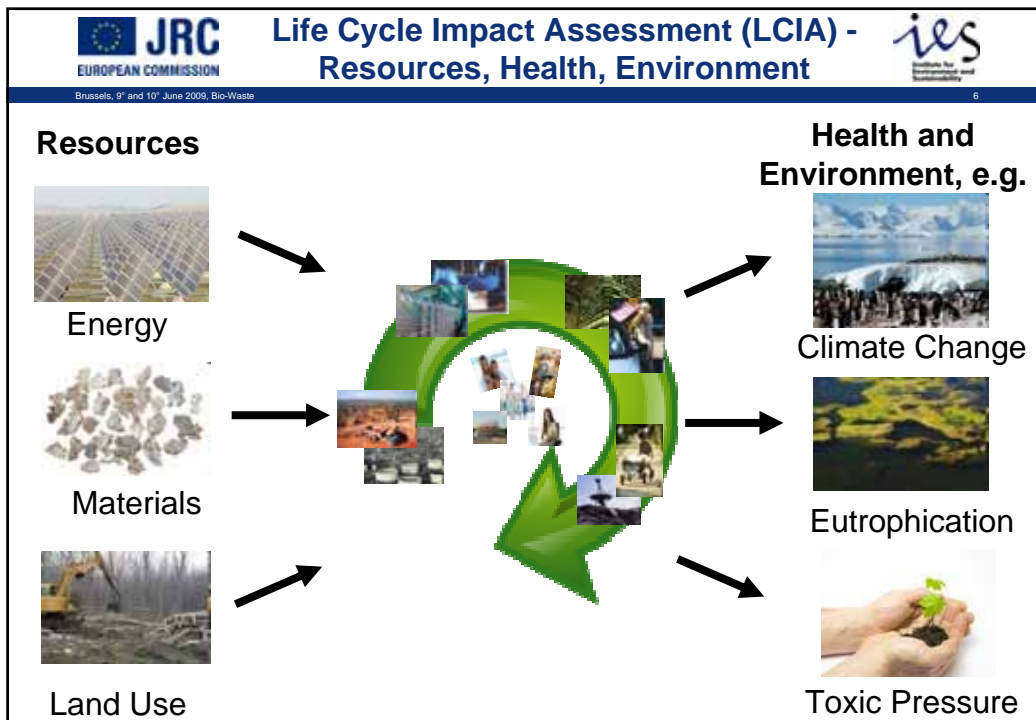
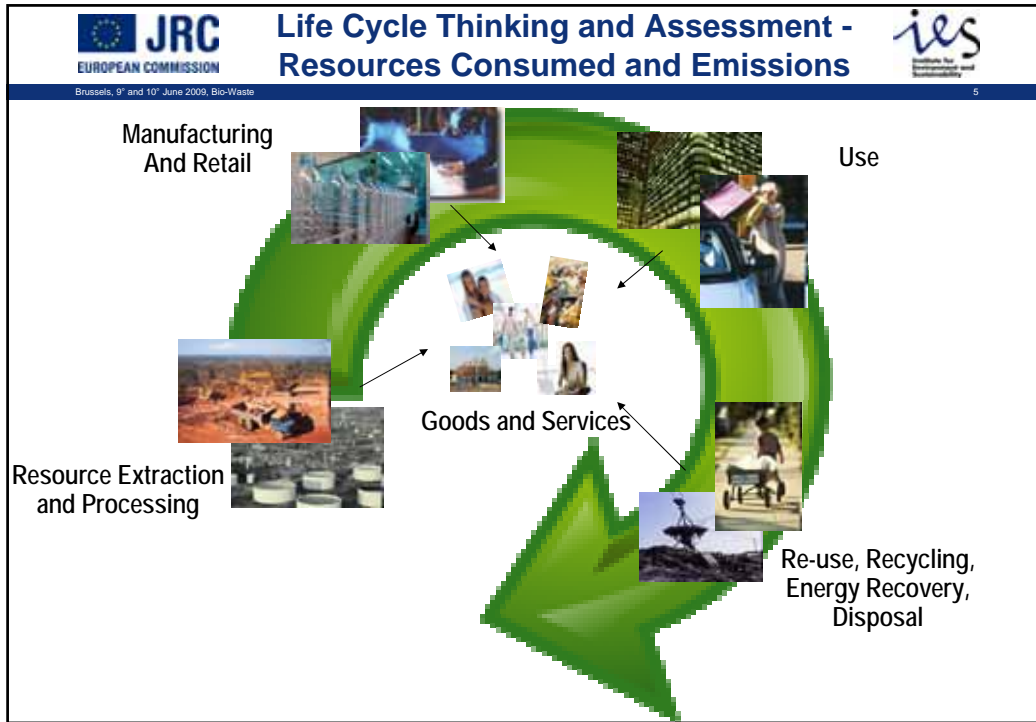
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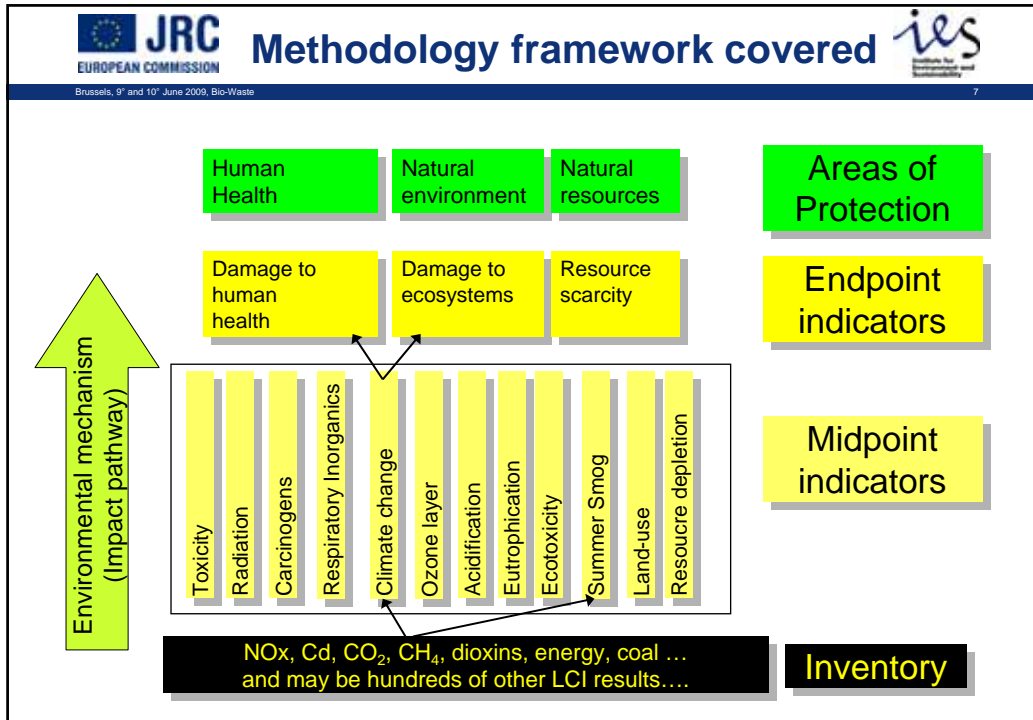


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JRC EUROPEAN COMMISSION **Necessity of Life Cycle Thinking in Policy and Business** ies

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Necessity of Life Cycle Thinking in Policy and Business

Avoid shifting-of-burdens:

- from one stage to another in product life-cycles
- among countries, to/from outside EU
- across different environmental and health impacts and resources use
- from one generation to the next

Fair basis for comparisons:

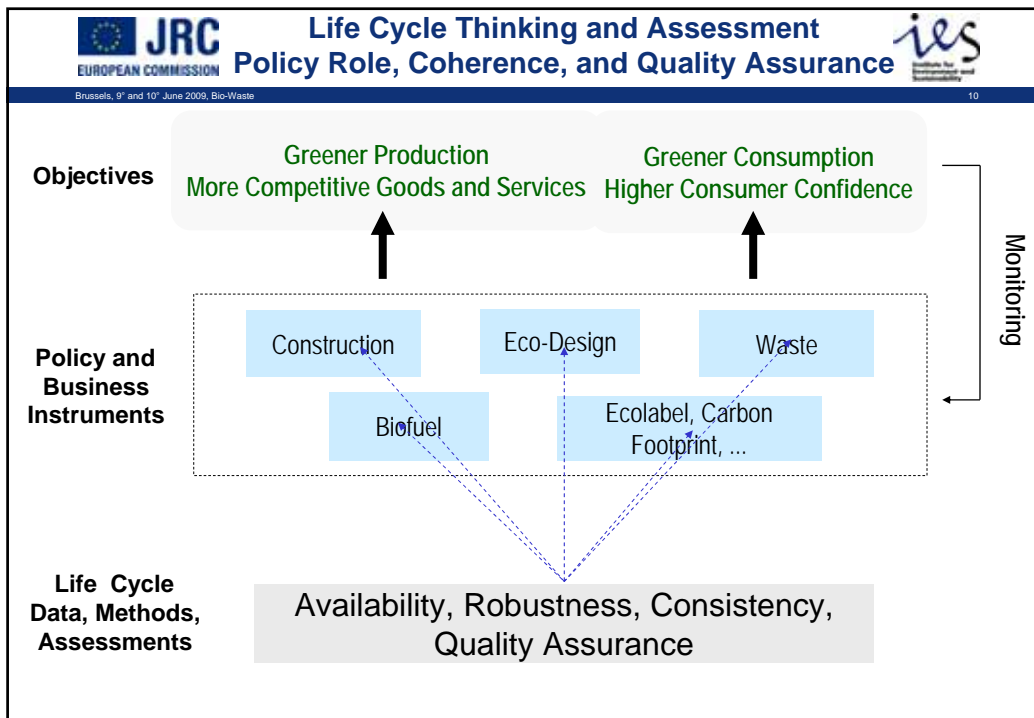
- scope of assessments (stages, impacts, ...)
- same functionality (quality of service, durability, ...)

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Community Level Response:

Integrated Product Policy Communication (IPP), 2003:
“LCA is the best framework for assessing the potential environmental impacts of products, but the debate is ongoing about good practice”


Sustainable Consumption and Production Action Plan, 2008:
“To implement this policy, consistent and reliable data and methods are required to assess the overall environmental performance of products ...”




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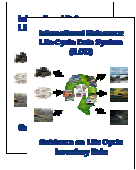
European Platform on Life Cycle Assessment



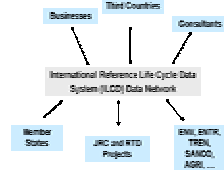
European Reference Life Cycle Database (ELCD)



Handbook



Data Network




International Reference Life Cycle Data System (ILCD)

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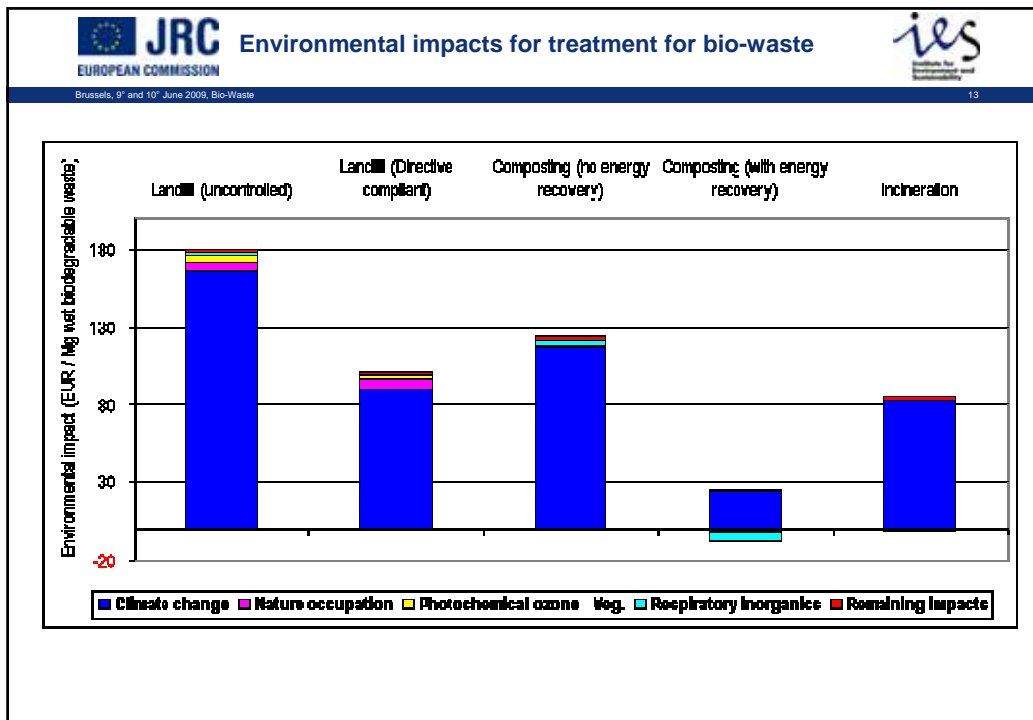
Guidance Documents and Pilot Studies – Waste Example



Policy Background Documents:

- Waste Framework Directive, 2008
- Thematic Strategy on the Prevention and Recycling of Waste, 2006





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Waste Framework Directive: Life Cycle Thinking Guidance Documents (incl. biowaste, in preparation)


- Complement waste hierarchy
- Help Member States identify environmentally best options for management of waste in various countries and regions
- Support local, regional, and national authorities in waste management planning and policy making

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Pilot Studies – Bio-Waste Example

JRC Scientific and Technical Reports
Inventory of Existing Studies Applying Life Cycle Thinking to Biowaste Management
Analysis of Energy Balances and the Life Cycle Approach to Biowaste Management

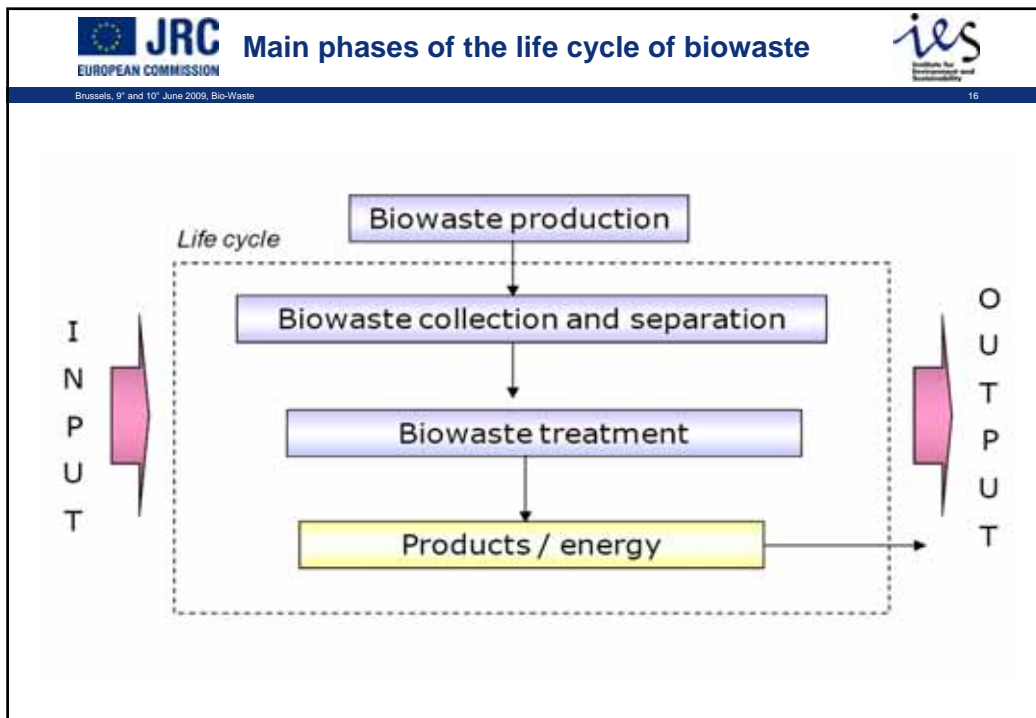


LCA of Biowaste

- Introduction
- Biowaste generation
- Biowaste collection
- Biowaste treatment
- Recycling and recovery of energy
- Local and regional differences
- Discussion



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Composition of biowaste



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- **Waste fractions:**
 - Municipal Solid Waste
 - Kitchen, food and garden waste
 - “Green fraction”



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Biowaste collection







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- **Overview of collection methods**
 - Separate collection
 - Mixed collection
 - Integral collection
- **Set of selected local factors**
 - Transportation means
 - Frequency of collection per waste fraction
 - Distance to waste transfer station



 JRC EUROPEAN COMMISSION		Biowaste Treatment			
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Treatment methods	Further characterisation				
Landfill	With or without methane recovery, legal and illegal dumping				
Composting	Open and closed types, central and home composting				
Incineration	With and without energy/heat recovery, efficiency of the recovery				
Anaerobic digestion	Pre- and after-treatment of organic matter				
Gasification	Based on garden waste				

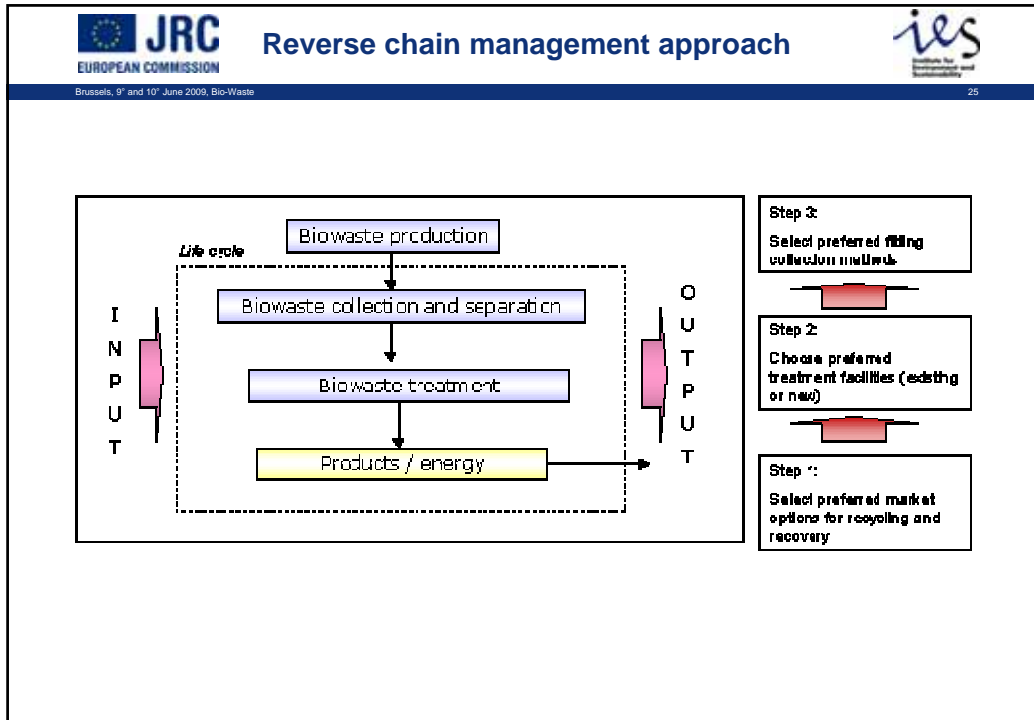
 JRC EUROPEAN COMMISSION		Biowaste Treatment (2)			
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Local factors					
Energy recovery and recycling efficiency					
Waste composition / contamination					
Availability of treatment facilities					
Distance from storage to treatment facility					
Transportation means (truck, train, inland vessel)					

 	
Biowaste Treatment (3)	
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Relevant composition parameters	In relation to:
Nitrogen (N), Phosphorous (P), Potassium (K)	Application as compost / fertiliser
Carbon (C)	Lower heating value and soil improver
N/C ratio of end product	Indication of maturity of compost
water	Lower heating value
Heavy metal content	Red flag indicator for applicability in agriculture

 				
Biowaste Treatment (4)				
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<ul style="list-style-type: none"> in the EU (2001) 				
Average as percentage of treated biowaste				
Composting	Anaerobic Digestion	Landfill	Incineration	MBT/ Landfill*
21,0 %	1,1 %	60,1 %	16,5 %	1,3 %
<ul style="list-style-type: none"> But highly variable: <ul style="list-style-type: none"> – Austria (56% biologically treated) – Cyprus, Estonia (100% landfilled) – Denmark (79% incinerated and 2% landfilled) – Hungary (0% biologically treated) – Ireland, Poland, Slovenia, UK (0% incinerated) 				

 		
Recycling and recovery of energy		
Selected treatment methods	Avoided products	Remaining waste streams
Landfill	Gas, electricity, heat (if methane is recovered)	Leachate
Composting	Peat, fertilisers	Waste from impurities to incineration
Incineration without energy recovery	Soil (for landfill cover)	Residue to final waste (landfill)
Incineration with energy recovery	Electricity, heat	Residue to final waste (landfill)
Anaerobic digestion	Electricity, heat, uncontaminated digested sludge to agriculture	Contaminated digested sludge to incineration
Gasification	Gas, electricity, heat	Residue to final waste (landfill)
Fuel production	Diesel, methanol, gas	Residue to final waste (landfill)

 		
General conclusion Preliminary concepts for possible guidelines		
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<ul style="list-style-type: none"> • Landfill of biodegradable waste should be avoided • Depends on waste composition. Different types of biowaste may require different treatment • Not one best option. More than one option is applicable. Best options for recycling biowaste are dependent on local factors <ul style="list-style-type: none"> – Climate zones – Need for soil improvement – Types and quantities of biowaste – Markets for recovered products – Institutional and legal framework – Political decisions • Environmental benefits are largely determined by recycling, energy recovery and avoided products • Use of high quality and consistent data in LCA is important 		



General conclusion (2)

The need for consistent and robust LCA guidance


- Assumptions
- Differences in inventory method
- Modelling
- Used LCA databases for background processes
- Used impact assessment methods

Method


The need for considering indirect effects

- Increased water retention capacity
- Improved management of agricultural pests and diseases
- Increased organic matter content
- Improved soil structure

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Outlook/Challenges


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- Guidelines for implementing Life Cycle Thinking into biowaste management
- Development of related demonstration tool for decision support
- Comprehensive decision support by
 - presenting several options
 - testing the sensitivity of results for different treatment options to local factors
 - not providing results/guidance limited to the most favourable treatment option

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Thank you!



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