



# **Sustainable Recovery and Recirculation of Nutrients - CIRCUNUTS**

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*EU SBSR 2nd Meeting of the Steering Committee of Priority  
Area Nutri 14.5.2013 Warsaw*

# MTT – A strong contributor in the food system

- MTT Agrifood Research Finland is a leading research institute in Finland developing sustainability and competitiveness of the food system.
  - From farm to fork and fork to farm
- 15 offices; headquarters in Jokioinen
- about 700 experts
  - 320 academic
- Turnover 55 Meur
  - 20 Meur competitive





# Focus of research in MTT

- Utilisation of manure energy and nutrients
- Utilisation of biodegradable waste and sideproducts of the food system and the society
  - Safe and easy-to-use nutrients for agriculture
  - Renewable energy
  - Cleaner environment - better economy
  - Regulatory barriers and incentives
- Co-operation with industries in food, energy and waste sectors



# Sustainable recycling of nutrients - background

- Organic materials in our society contain plenty of energy, phosphorus, nitrogen, and other valuable nutrients and substances.
- These materials tend to concentrate spatially, around intensive animal production areas in the form of manure, and in human societies around municipal wastewater treatment plants, biogas plants and dumps.
- These nutrient-rich spots create environmental risk. Historically, several steps have been taken to deal with the problem, especially with regard to sewage sludge

# Sustainable recycling of nutrients - background

- **Phase 1:** Lead it away. Water brings it away, but around Baltic Sea, this phase has created severe environmental problems during the 20th century and until today.
- **Phase 2:** Clean it. Waste water treatment plants have been built since 70:ies and this task force will be finalised in municipalities around the BSR in the coming years. Thus, water is protected as direct eutrophication is halted. However, nutrients are poorly utilised or dumped.
- **Phase 3:** Circulate and productize it. This is the next step to be taken in the coming years: instead of "cleaning and disposing", valuable nutrients should be recovered and returned to the food system.

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# Recyclable nutrient resources from different raw materials in Finland



Anon 2011. Suomesta ravinteiden kierrätyksen mallimaa

Raw materials	P	N
Manure	72 %	78 %
Biowaste and side products from food and feed industry	14 %	14 %
Municipal biowaste	3 %	5 %
Municipal sludge	12 %	4 %
Total	100 %	100 %
Total, t/a	24 100	128 100

## Phase 2: Clean it - Disadvantages

- The advantage of this phase is that the environment is protected, as waste water is cleaned to a degree where it can be lead to a river or to a sea without risk of eutrophication.
- However, the valuable nutrients in the waste water are often removed from the wastewater with methods not allowing utilisation of the nutrients.
- Therefore, the resulting sludge is rich in nutrients, but these nutrients are practically useless as fertilizer, and these non-renewable resources are removed from the food cycle and scattered around the environment and thus, wasted.

# Phase 3: Circulate and productize

## - Challenges



- Instead of "cleaning and disposing" with the motivation to protect the environment, nutrients and organic material should be recovered and returned to the food system.
- As a result, environment will be protected as a "side effect".
- This step is technically possible, but requires **systemic change** in the business logic of waste and wastewater processing.
- In addition, it requires **technology development to ensure safety, efficacy and economy** of the products. Also, it requires **regulatory mainframe** to support the change and **development of public attitudes** for the use of waste-based fertilizer products.

# Links to other (BSR)-projects

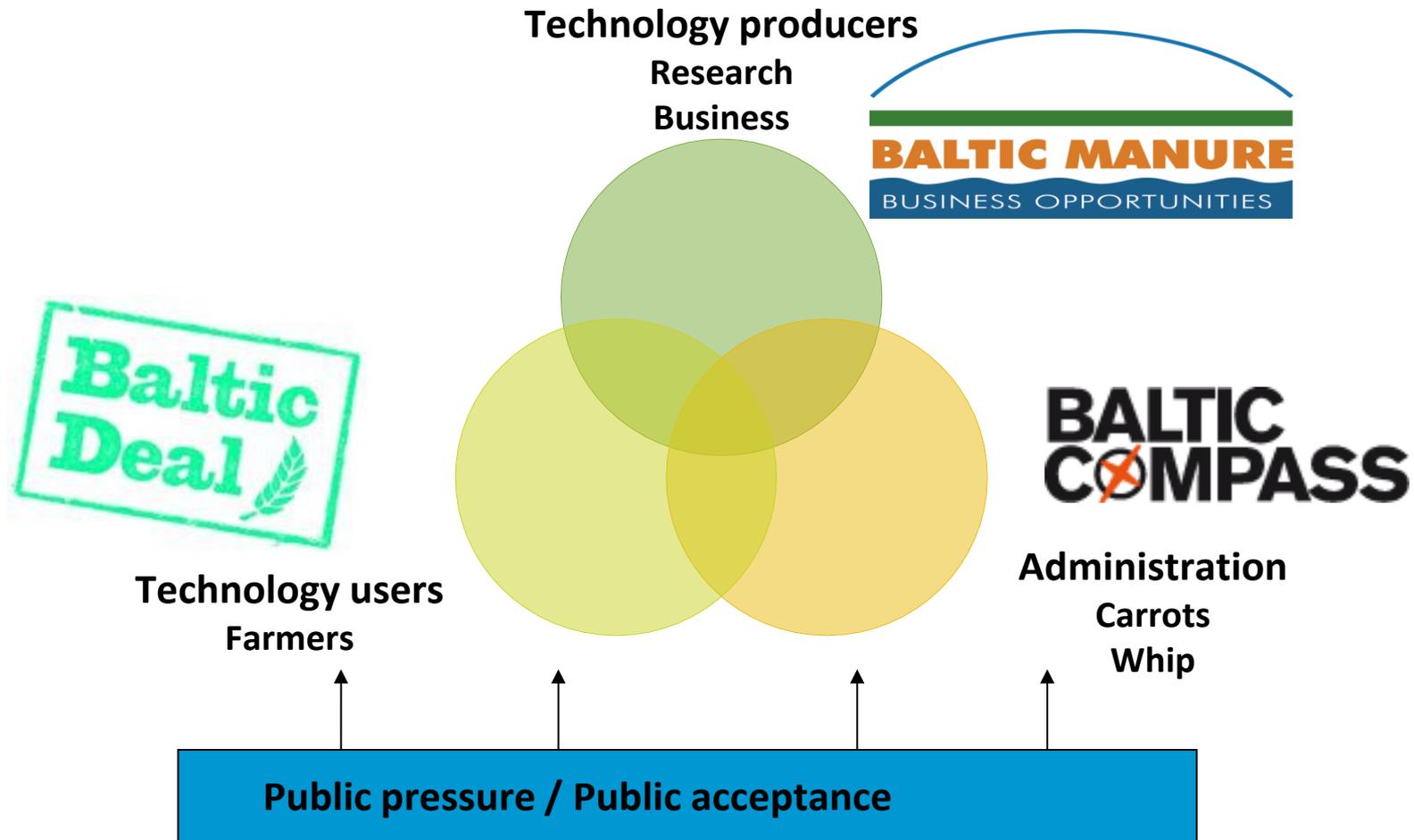
- Baltic Impulse: Umbrella project of the Water-oriented projects supported by the BSR-Programme
- Agri-Environmental cluster
  - Baltic Deal
  - Baltic Compass
  - Baltic Manure
  - BERAS
- Central Baltic Programme
  - W-fuel (from Waste to Traffic Fuel)
- EUSBSR – Priority 9 Flagship "Phosphorus Recycling" (not financed)

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***Welcome to the “Greener  
Agriculture for a Bluer Baltic  
Sea Conference in Helsinki 27.-  
28. August 2013!***

# BSR-project cluster for agriculture and environment





# Baltic Manure

Baltic Forum for Innovative Technologies for Sustainable Manure Management  
or the other story of

# BATMAN

# Baltic Forum for Innovative Technologies for Sustainable Manure Management

## Baltic MANURE

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# Baltic MANURE (BatMan) Project

- **Baltic MANURE is a Flagship project in the Action Plan of the EU Strategy for the Baltic Sea Region adopted by member states in 2009**
- **The project is financed by the European Union's Baltic Sea Region Programme 2007-2013**

**Lead Partner: MTT Agrifood Research Finland**

**Total budget: 3.7 million €**

**18 partners from 8 countries (+ Russia associated)**

**Duration 2010 - 2013**



Part-financed by the European Union  
(European Regional Development Fund and  
European Neighbourhood and Partnership Instrument)



# Baltic MANURE - Partners

1. **MTT Agrifood Research Finland (Lead) (FI)**
2. **Finnish Environment Institute (FI)**
3. **Agro Business Park A/S, Innovation Centre for Bioenergy and Environmental Technology (DK)**
4. **Aarhus University, DK**
5. **University of Southern Denmark, DK**
6. **JTI - Swedish Institute for Agricultural and Environmental Engineering (SE)**
7. **Julius Kühn-Institut, Federal Research Centre for Cultivated Plants (JKI) (DE)**
8. **Estonian University of Life Sciences (ES)**
9. **University of Rostock (DE)**
10. **Green Federation GAJA (PI)**
11. **University of Helsinki, Department of Agrotechnology (FI)**
12. **University of Gdansk, Pomeranian Center for Environmental Research & Technology (PL)**
13. **Latvia Agricultural University (LV)**
14. **Lithuanian Research Centre for Agriculture and Forestry (LT)**
15. **Innovation and Education Centre Hohen Luckow IBZ, German Biogas Association Mecklenburg-Vorpommern (DE)**
16. **LTC AB/Enterprise Europe Network (SE)**
17. **Turku Science Park Ltd (FI)**
18. **Estonian Research Institute of Agriculture (EE)**

# W-Fuel project

- Project belongs to the Central Baltic INTERREG IV A Programme 2007-2013
  - to the Southern Finland - Estonia Sub-programme
- Lead Partner: MTT
- Partners: TUT Tallinn University of Technology, SEI-T Stocholm Environment Institute, HSY Helsinki Region Environmental Services Authority
- Additional Partners:
  - Ministry of Environment, Tallinn Environment Board, Lääne-Viru County Government, OÜ Mõnus Minek SEES, AS Terts, Baltic Biogas OÜ
  - Turun seudun jätehuolto Oy, Kymen Vesi Oy, Kymenlaakson Jäte Oy, Rouskis Oy, Liikelaitos Salon Vesi, Finnish Biogas Assosiation
- Duration: 1.9.2009 – 31.04.2012



CENTRAL BALTIC  
INTERREG IV A  
PROGRAMME  
2007-2013



EUROPEAN UNION  
EUROPEAN REGIONAL DEVELOPMENT FUND  
**INVESTING IN YOUR FUTURE**

# The new project

- Builds on the networks and knowledge generated in the previous projects
- Combines resources such as
  - Manure
  - Food and feed industry waste
  - Municipal sludge
  - Municipal biowaste
- Brings the nutrients from several sources into same portfolio



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# Project objective

- The project will identify and analyze available technologies suitable to converse organic nutrient rich raw material into transportable, manageable and safe fertilizer products, which are comparable to commonly used inorganic fertilizers.
- The project will support the systemic change of the business logic of waste and wastewater processing industries.
- The project produces guidelines for necessary supportive policy actions and
- Organises dissemination to promote development of public attitudes for the use of waste-based fertilizers.

# Project tasks

- Mapping of different raw materials (agricultural, municipal, industrial) according to their nutrient content and content of hazardous substances
- Mapping of technologies suitable for processing the materials with regard to
  - de-activation or removal of harmful substances (thermal, chemical...)
  - improvement of their nutritional value and physico-chemical properties
  - cost effective transportation
  - environmentally safe application
- Testing and improving emerging technologies
- Economic and environmental assessment
- Recommendations on suitable technologies and practices
- Recommendations for necessary policy actions to promote adoption of new technologies
- Dissemination

# Main outputs

- Full scale action plan for harnessing latest technologies on nutrient recycling
- Database on different nutrient rich organic waste materials /by-products (agricultural, municipal, industrial) with regard to their nutritional value and contents of hazardous substances
- Demonstration of the whole production chain of recycled fertilizer products from raw material to field application
- Analysis of novel technologies with regard to improved nutritional value of the end-products, technological feasibility and chemical/biological safety in fertilizer use
- Guidelines for adoption of new processing technologies and utilization of the organic fertilizer products
- Analysis of economic feasibility of chosen technologies and policy recommendations to promote their adaptation

# Partnership

- Research expertise in
  - Waste and wastewater treatment technologies
  - Harmful substances and their elimination
  - Nutrient recovery and productization
  - Agricultural use; plant nutrition, soil condition, safety
  - LCA-analysis
  - Policy analysis
  - Business models
- Technology transfer
  - Enterprise Europe Network
  - Advisory centres
- Network of companies
  - UBC assistance?

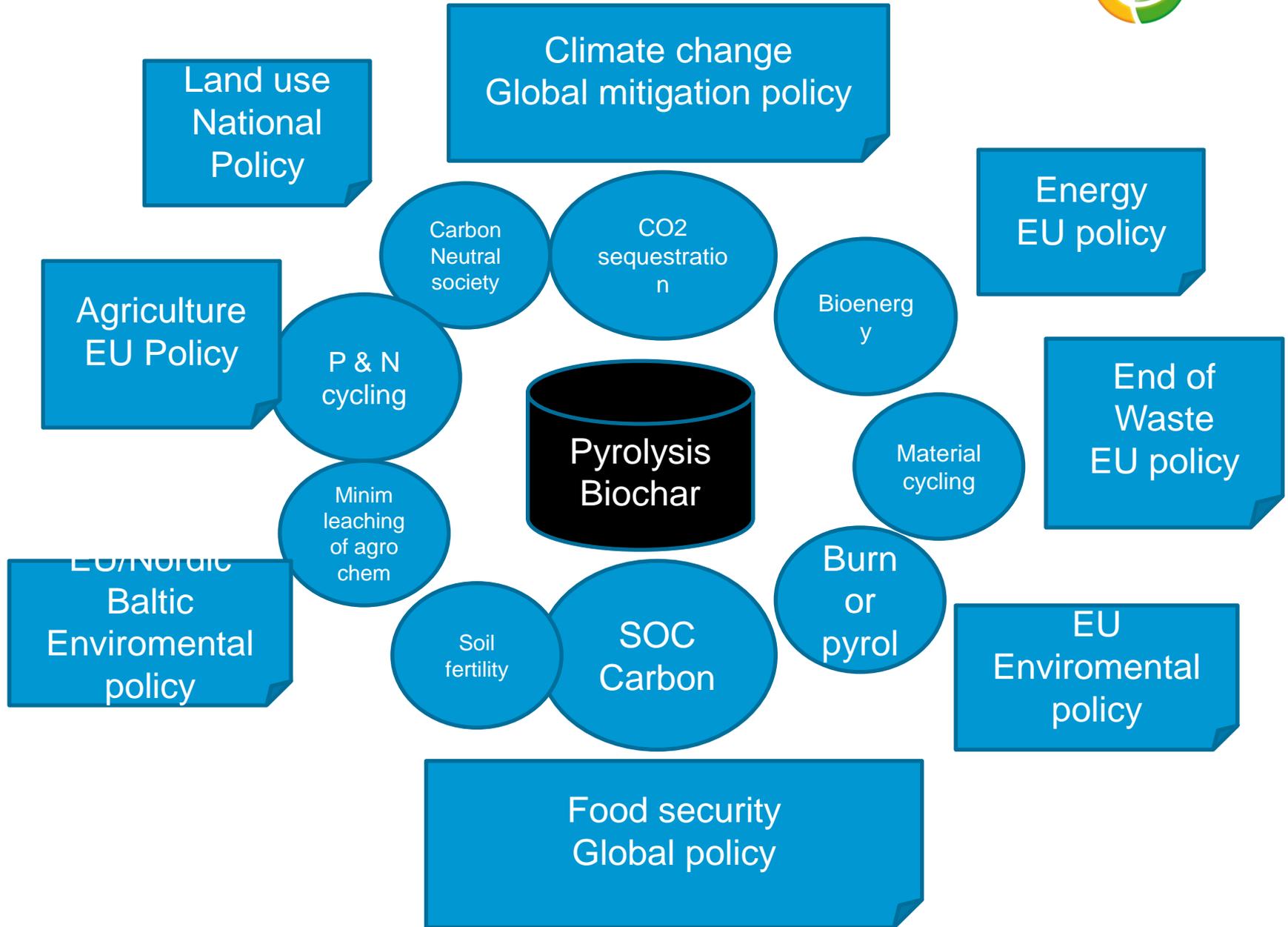
***Thank you!***

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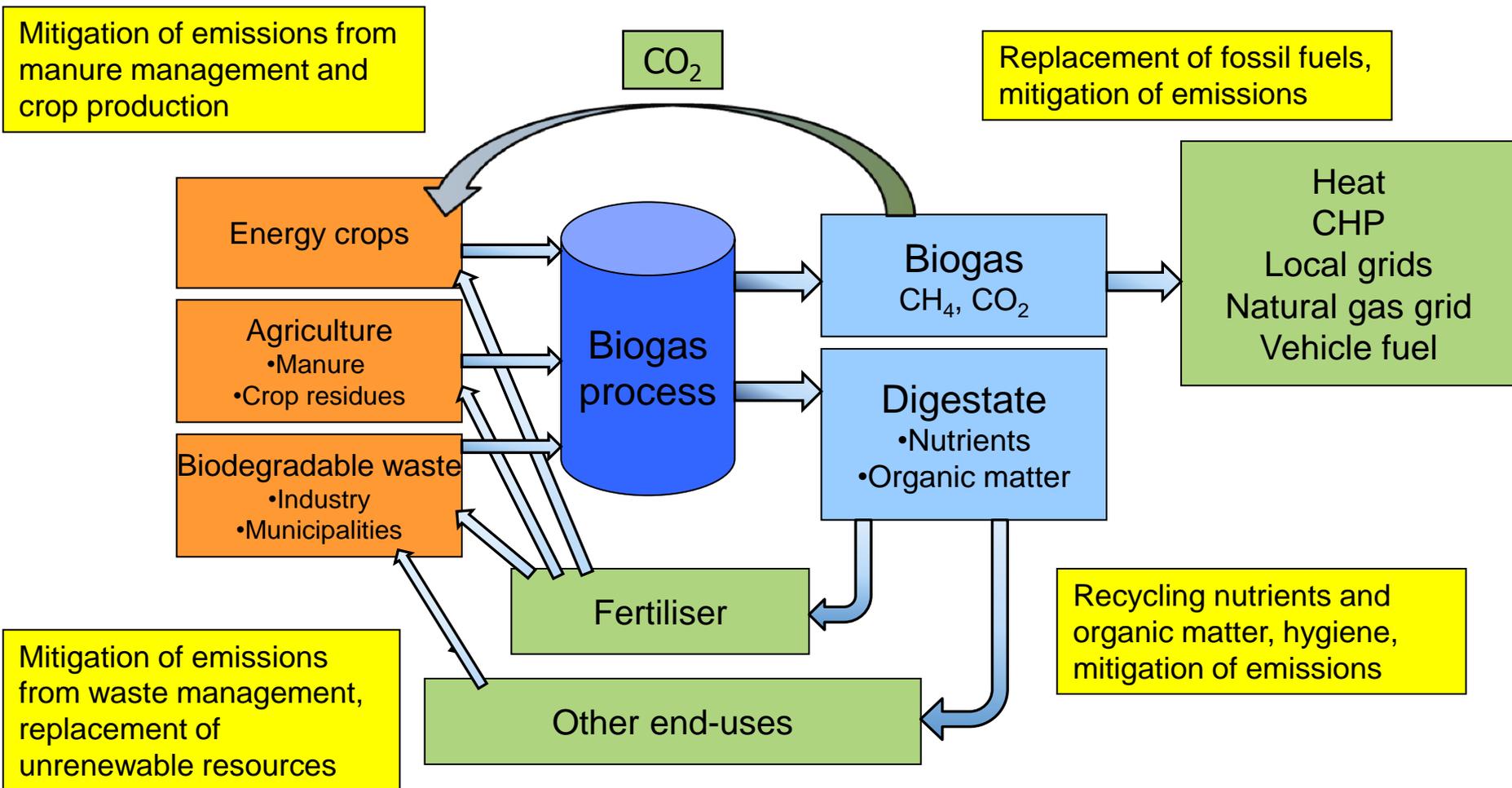
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# Biochar and policy frame – 1<sup>st</sup> trial



# Biogas process



# Focus of MTT biogas research

