FertiCovery

Workshop. Nutrient recovery & recycling technologies - State of play

From mapping to prioritisation

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19/02/2026

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Welcome and introduction to the workshop.

What we ask from you?

Validate the proposed assessment indicators

Identify possible gaps

Capture stakeholder priorities

How your input will be used?

Framework refinement

Rate the importance of each indicator

Defines relative weights of each category in the MCDA

Strengthen the MCDA framework

From Mapping to Prioritisation. General overview

Long list — **Over 150 technologies** were identify in the previous step

Long list structuration — Long list technologies were grouped by type of process in order to get a easy scoring groups: **Biological, Chemical, Physical and Others**

Definition of indicators — A set of 6 indicator were defined in order to scores the technologies: **Availability of Feedstock Supply - Maturity, Availability, and Cost of the Technology - Regulatory and Market Framework, and Implementation Potential - Efficiency and Applicability of BBFs - Contribution to EU Strategic Objectives - Distribution of Value Chains Across the EU**

Expert screening — FERTICOVERY experts scored each indicator from 1 to 5. At least 2 expert scored each technology. Discrepancy criteria stablished

Statistical process — To ensure an **objective selection** a statistical process, based on percentile distribution, was applied order all the technologies. The scores were normalised in **5 point scale**:

Score 2. High performance.
Score 1. Good performance..
Score 0. Moderate performance.
Score -1. Limited advantage.
Score -2. Lower priority.

Preliminary short list — Considering the percentile distribution a final short list technology was created. Technologies with **High performance** (score 2) and **Good performance** (score 1) were included in this preliminary shortlist

Stakeholder contribution — The inputs from stakeholders during Ferticovery WS#1 were considered for ranking the preliminary short list

Final short list — Top 25 best technologies structure this short list

NEXT STEP.... — Multicriteria decision analysis (MCDA)

From Mapping to Prioritisation. Technologies

Anaerobic digestion

1. Integrated dry AD of biowaste and composting of dewatered sludge
2. Integrated wet AD of biowaste and composting of dewatered digestate
3. Integrated valorisation of pig manure through AD and nutrient recovery from digestate by membrane filtration.
4. Production of fertilizers and biomethane via wet anaerobic co-digestion of multiple feedstocks
5. Integrated valorisation of biowaste through AD for biomethane, biogenic CO2 and stable soil amendment
6. Turning local industrial wastes into nutrient-rich fertilizer via AD
7. Liquid digestate valorisation through biological treatment and ultrafiltration technologies

Composting

8. Integrated AD and tunnel composting for household, HORECA and green biowaste streams
9. Closed-tunnel composting combined with pre-treatment and refining
10. Open windrow composting for green waste
11. Composting system using semi-permeable membrane and forced aeration
12. Open windrow composting for green waste

From Mapping to Prioritisation. Technologies

Hydrolysis

13. A physical-chemical hydrolysis process for the treatment of biosolids and organic waste
14. Hydrolysis of keratin waste
15. Hydrolysis of anaerobic digestate

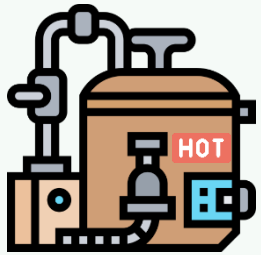
Evaporation

16. Aerothermal treatment and mechanical vapor recompression for efficient biosolids processing
17. Integrated solid-liquid separation, evaporation and reverse osmosis (RO) treatment for digestate valorisation

Stripping

18. Crystallizer for struvite production from nutrient-rich liquid streams
19. Stripping and scrubbing system for ammonia recovery from wastewater streams
20. Membranes and stripping technologies: transforming livestock manure and digestate

From Mapping to Prioritisation. Technologies

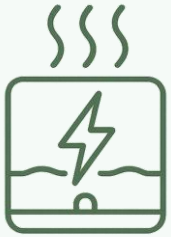


Pyrolysis

21. Pyrolysis of biomass residues for biochar production
22. Biowaste to biochar and energy: integrated pyrolysis and biological methanation
23. Pyrolysis of wood chips for the production of biochar

Crystallization

24. Fluidized bed reactor for struvite production from municipal and industrial wastewater



Plasma-based technology

25. Plasma-based technology converting livestock slurry and biogas digestate into fertilizing products

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Presentation of the proposed list of TAIs and EAIs

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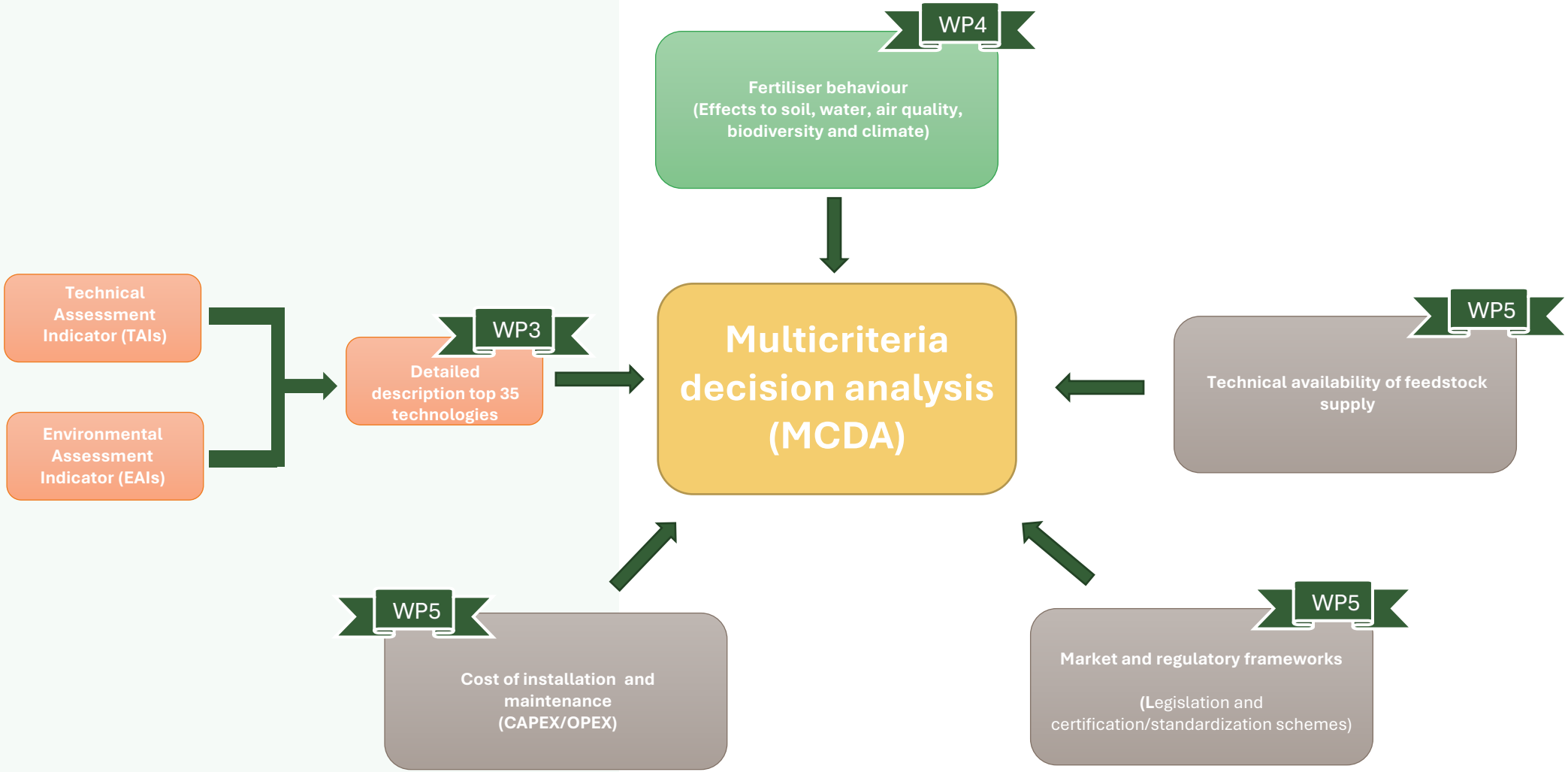
Multicriteria decision analysis (MCDA). General overview



Technical Assessment Indicator (TAIs)

1. Technology operation performance
2. N and P recovery
3. Treatment capacity
4. Yield and productivity
5. Sensitivity to variations in the composition of the inlet
6. Complexity of the required equipment
7. Operating conditions

Performance and efficiency

How well the technology works. Does it recover nutrients efficiently? Does it produce a high-quality output? Is it productive?

Scale and robustness

Can the technology treat large volumes? How stable is it if the input material changes?

Practical implementation

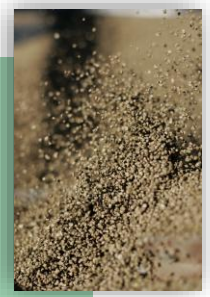
How easy is it to implement and operate?

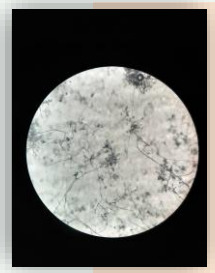
Environmental Assessment Indicator (EAIs)

Sources

EPD
INTERNATIONAL EPD SYSTEM

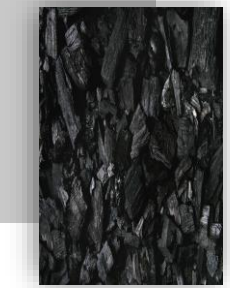
FERTILISERS
PRODUCT CATEGORY CLASSIFICATION: UN CPC 3461, 3462, 3463 & 3465
PCR 2010:20;
VERSION 4.0.0





BIOSTIMULANTS
PCR 2025:02
VERSION 1.0.0

BIOCHAR
PRODUCT CATEGORY CLASSIFICATION: UN CPC 345
PCR 2021:07
VERSION 1.0



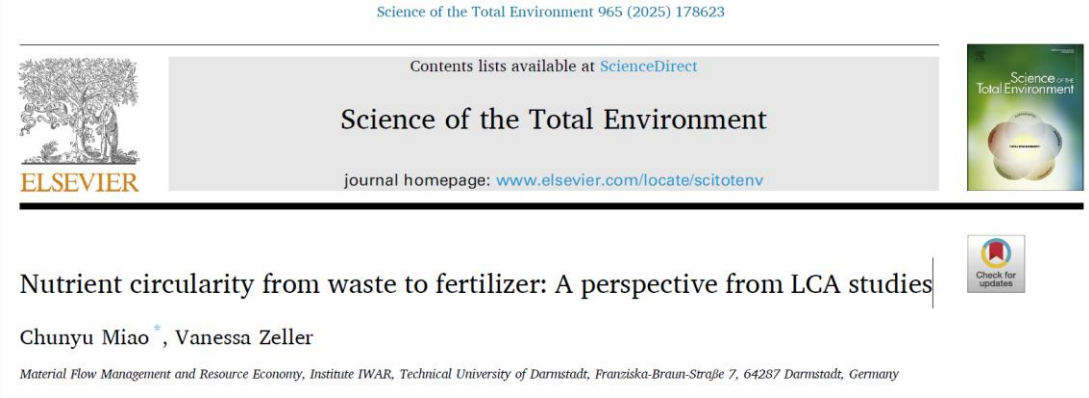
Environmental Assessment Indicator (EAIs)

Sources

Environmental Assessment Indicator (EAIs)

Sources

Miao, C., & Zeller, V. (2025). Nutrient circularity from waste to fertilizer: A perspective from LCA studies. Science of The Total Environment, 965, 178623.



Science of the Total Environment 965 (2025) 178623

Contents lists available at ScienceDirect

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journal homepage: www.elsevier.com/locate/scitotenv

Nutrient circularity from waste to fertilizer: A perspective from LCA studies

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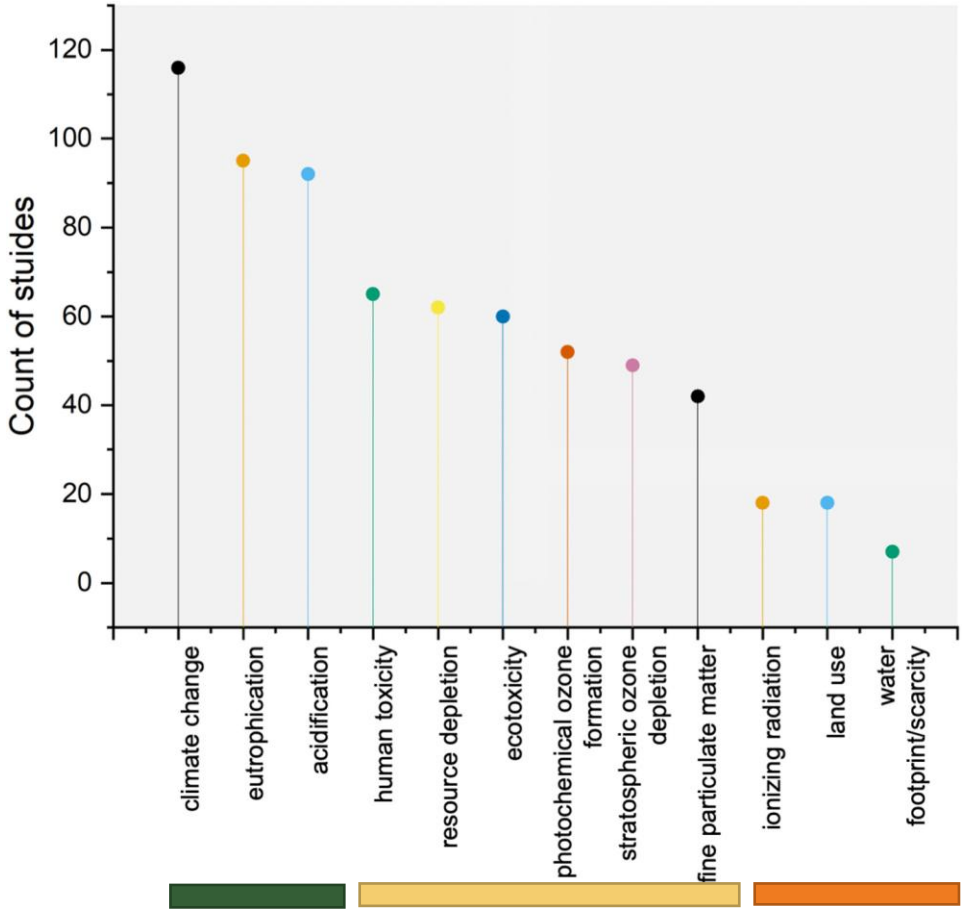
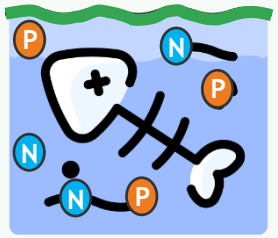
128 papers, covering more than 300 scenarios, being selected for further comprehensive analysis.



Environmental Assessment Indicator (EAIs). Results

Global Warning Potential

This indicator reflects how much a process contributes to climate change through greenhouse gas emissions. In simple terms, it measures its impact on global temperature increase.



Eutrophication (freshwater & marine)

Eutrophication occurs when excess nutrients, such as N or P, enter water bodies. This can cause excessive algae growth, reducing oxygen levels and harming aquatic ecosystems.

Acidification

Acidification refers to the release of emissions that make soils and water bodies more acidic. This can damage forests, reduce soil quality and increase harm to aquatic life.

Environmental Assessment Indicator (EAIs). Results

Resource use (Fossil & minerals and metals)

This indicator measures how much a process relies on non-renewable resources such as fossil fuels, minerals and metals. It highlights the pressure placed on finite resources that future generations will also depend on.

Water use

This category reflects the amount of water consumed and its potential impact on water scarcity. It considers whether water is used in regions where it may already be limited.

Interactive session

No right or wrong answers

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Environmental Assessment Indicator (EAIs)

Question 1

In your opinion, how important are the following environmental impacts? Score from 1 to 5

Global Warning Potential

Eutrophication (freshwater & marine)

Acidification

Resource use (Fossil & minerals and metals)

Water use

NOTE. For better understanding of environmental impact for the attendees, is possible to include the pictures in the mentimeter?

(1 = low importance, 5 = high importance).

Technical Assessment Indicator (TAIs)

Question 2

In accordance with your expertise, which of the following **technical assessment indicators** are the most important? Score from 1 to 5.

a) Technology operation performance
b) N and P recovery
c) Treatment capacity
d) Yield and productivity
e) Sensitivity to variations in the composition of the inlet
f) Complexity of the required equipment
g) Operating conditions

(1 = low importance, 5 = high importance).

Technical Assessment Indicator (TAIs)

Question 3

In addition to the technological assessment indicators presented, do you think that anything else should be included?

Question for open answers

Technical Assessment Indicator (TAIs)

Question 4

Please score each indicator from 1 to 5 according to how important you consider it.

a) Technological assessment Indicator (TAIs)
b) Environmental assessment Indicator (EAIs)
c) CAPEX
d) OPEX
e) Legislation and certification/standardization schemes
f) Fertiliser behaviour (Effects to soil, water, air quality, biodiversity and climate)
g) Technical availability of feedstock supply

(1 = low importance, 5 = high importance).