Fertiliser product recovery from secondary raw materials using best available techniques

Elina Tampio, Johanna Laakso, Mina Kiani / Natural Resources Institute Finland (Luke)

Cheryl Marie Cordeiro, Erik Sindhøj / Research Institutes Sweden (RISE)

Introduction and aim

- The transition from a fossil-based to a circular economy requires innovative nutrient management and fertilisation strategies.
- The Horizon Europe project FERTITEC identified 190 nutrient recycling technologies, from which 30 representative cases were selected based on geography, operational scale, and data availability.
- Furthermore, for the selected 30 cases, a literature review was done to assess their technological and environmental status. Detailed information was collected regarding:
    - Technology
    - Resource efficiency and nutrient recycling potential
    - Hot-spots for environmental impacts

Results and discussion

The 30 selected cases represent diverse range secondary raw materials from agriculture, municipal, and industrial sources (Figure 1).

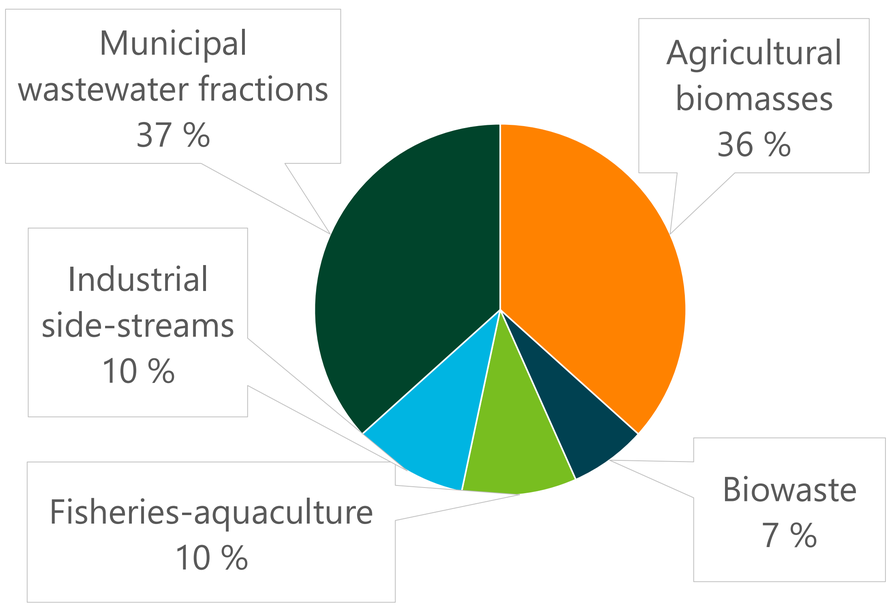

Figure 1. Main raw materials of the selected technologies.

The resource efficiency of different technologies (Table 1) depends on the characteristics of individual unit processes. In anaerobic digestion, increased process complexity can enhance nutrient recovery, energy use, and environmental performance, although external inputs (e.g. chemicals) may introduce impacts that require careful management.

Table 1. Selected cases categorized according to the overall resource efficiency assessment.

Resource efficiency pattern	Main technologies	Main implication
High nutrient concentration and high recovery	Urine concentration and drying, reject water ammonium sulphate, struvite, calcium phosphate, ash-based phosphorus recovery	Strong fit for transportable fertiliser products and nutrient targeted use
Strong phosphorus retention but weaker nitrogen retention	Separation-based manure routes, composting, digestate solids, biochar routes	Good for phosphorus redistribution and organic matter management, weaker for readily available nitrogen
Strong volume reduction	Drying, evaporation, pyrolysis, hydrothermal carbonisation, combustion and ash routes	Improves logistics and scalability, but may raise energy demand or nitrogen loss
Good multinutrient organic product retention	Frass, compost, digestate based products, fish by-product fertilisers	Supports soil organic matter and broad nutrient recycling, but product uniformity may vary

30 cases will be compiled into datasheets, which will be available via the FERTITEC Knowledge Exchange Platform:

Luke

RI. SE Research Institutes of Sweden

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