



BioReCer

Biological Resources Certifications Schemes



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STANDARDS AND R&I PROJECTS: HOW TO SUPPORT THE BIO-BASED INDUSTRIES

Horizon Europe BIORECER

Francesco Fatone and Elisa Blumenthal, UNIVPM, 14/12/2023



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Horizon Europe BIORECER



Horizon Europe Project

Innovation action (IA)



31
3 years
(01/09/2022 – 31/08/2025)



5 M€ budget



4 demonstrative sites

7 Countries



16 partners

Universities and technological centers



Private companies and business clusters



Standardization, certification and communication bodies



Razionale



- In recent years, bio-waste use as feedstock has been **restricted to specific industries**, usually with **low added value** in the market.
- Transition to a **bio-based economy** shall address **challenges**: seasonality, composition, spatial distribution, etc.
- **Not** all bio-waste/biomass are **valorized as feedstocks**.
- **Few available information about its traceability** (origin - destination).
- **There are not sustainable indicators** with homogeneous criteria.
- Current biomass **certification schemes target** uses related to the **food and energy industries**.

The **2018 EU Bioeconomy strategy** aims to accelerate the deployment of a sustainable European Bioeconomy. Specifically:

- The strategy is implemented in an **Action Plan** based on the priorities.
 - Strengthen and scale up the biobased sectors, unlock investments and markets.
 - Deploy local bioeconomies rapidly across the whole of Europe.
 - Understand the ecological boundaries of the bioeconomy.
- The **strategy focuses on a system approach in order to increase the overall sustainability and circularity of the bioeconomy.**



General context



- VUCA environment (**energetic and supplies crisis, climate change, geopolitical situation**, etc).
- Europe and its companies must be **more resilient and independent of external resources**.
- **Circular economy** plays a **key role** in the transition.
- It is important to seek **alternative sources of renewable and sustainable resources**.
- In recent years, bio-waste and sub-products have been established as an **interesting alternative with great potential**.



BioReCer objectives

Overall goal is to complement the current certification schemes and enhance bio-based circular systems by promoting the sustainability and trade of resources

Specific objectives

1. To map the current European biomass flows.
2. To develop a multidimensional impact assessment and traceability framework.
3. To integrate the environmental and T&T assessment framework into established biological certification schemes.
4. To validate the developed impact assessment framework in 4 case studies.
5. To integrate and deliver a secure and data-driven BIORECER ICT tool (BIT).
6. To maximize outreach and beneficial influence of the project results and reach the target users

RESULTS

Governance framework for the environmental and traceability assessment

Creation of a protocol based on the interaction with stakeholders

New methodology for the analysis of the sustainability and traceability

Standardization roadmap

BioReCer ICT tool

Validation in case studies



OUTCOMES

Certification scheme of biological resources for bio-based systems, including the environmental impacts and trade-offs along the bio-based supply chains.

Definition of new methodologies and indicators for the sustainability and T&T assessment

Integration into existing certification schemes

Novel digital tool that serves as platform for certifiers, producers, traders and consumers

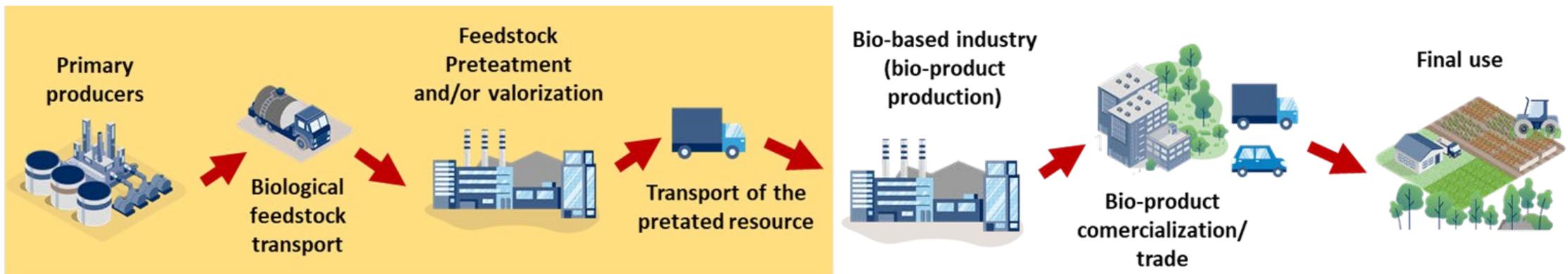


IMPACTS

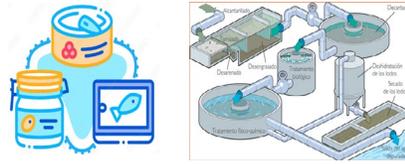
Sustainable use of biological resources by bio-based industries

- Use of secondary raw materials
- Lower environmental impact
- Social acceptance

BioReCer will encourage the establishment of new biobased value chains, promoting the use of biological feedstocks as secondary raw materials to replace fossil based raw materials.



Site: Galicia - Spain



Biomass type:

- Sewage sludge
- Canning industry waste

Spanish fishing sector represents 20% of de EU production

Spain is the first canning manufacturer in the EU

CETAQUA
CENTRO TECNOLÓGICO DEL AGUA



Site: Lombardia - Italy



Biomass type:

- Organic Fraction of Municipal Solid Waste
- Sewage sludge
- Agro- waste
- Non-hazardous liquid organic waste



Population of this area represents approximately 15% of Italy's population



Site: Central Macedonia - Greece

Biomass type:

- Fruit waste from processing
- Cereal crop by-products
- Pruning waste

26% of the production of the Greece primary sector comes from this region



www.biorecer.eu



Site: Västernorrland - Sweden

Biomass type:

- Forest industry sub-products

Forest industry represents approximately 10-12% of the Swedish industry in terms of sales and employment.



Certification · ISCC Certification Schemes · ISCC PLUS

Leading the Transition to a Circular Economy and Sustainable Bioeconomy

ISCC PLUS certification is a voluntary scheme that is applicable for the bioeconomy and circular economy for food, feed, chemicals, plastics, packaging, textiles and renewable feedstock derived from a process using renewable energy sources. ISCC PLUS covers the same certification requirements as ISCC EU but can be customised to meet the needs of different markets or specific applications. All kinds of biomass, waste and residues, non-biological renewables and recycled carbon materials can be certified under ISCC PLUS.



ISCC supply chain system elements definition

Farm / Plantation, Point of Origin

- First unit in the certification supply chain where **feedstock entering the supply chain** is being produced/ occurs
- Farm/Plantation for agricultural feedstocks and Point of Origin for wastes and residues
- **Group certification applicable** in certain cases
- Hands out a **self declaration** to next supply chain element

First Gathering Point, Collecting Point

- Sources **sustainable crops, wastes or residues** directly from farms/plantations
- Receives **ownership of material**
- In case of **collecting points: mechanical treatment of material possible**, e.g. in waste management plant
- Passes on **sustainability declaration**

Processing Unit

- **Converts input materials** by changing their physical and/or chemical properties
- **Mechanical treatment and blending excluded**
- Examples: oil mills, refineries, crackers
- Passes on **sustainability declaration**

Trader / Storage

- **Trades and/or stores** sustainable materials
- Storage facilities include **warehouses, silos, tanks etc.**
- **All traders** (with storage or “paper trader”) must be **individually certified**
- Passes on **sustainability declaration**

Final Product Refinement

- Different types of companies **after the converter** which manufacture a final product
- Activities such as assembling, cutting, laminating, etc.
- Passes on **sustainability declaration**

Please note: **Transportation** (road, rail, river, sea, air, etc.) is **not subject to certification**. All relevant information is covered by certification of other system elements.



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Focus on the Italian case study



WWE LAB
Water and Waste Environmental Engineering

GRUPPO **CAP**
HOLDING

Updated bioeconomy strategy – Progress Report (May 2022)

Biorefineries at scale could play an important role (see Section 5). Direct and indirect impacts on local economies of circular solutions underpinned by biotechnology have been demonstrated by a municipal waste-based nutrient valorisation strategy for agricultural use in Italy, showing that a total added value of EUR 8.5 million and 85 jobs can be generated for every 100,000 tons of sewage sludge turned into fertiliser.



7. Bio-Based Industries Joint Undertaking – CIRCULAR BIOCARBON: Turning urban waste streams into added-value products

The project will develop a first-of-its-kind flagship biorefinery to valorise the organic fraction of municipal solid waste into four value-added products and a range of other intermediate products. It will do this through a biorefinery, organised through a pool of cascading technologies. This will treat mixed urban waste streams, including the organic fraction of municipal solid waste and sewage sludge, in order to demonstrate that the process is capable of handling all the biowaste produced by a medium-sized city.

<https://circularbiocarbon.eu/>



BIT II

La Bioeconomia in Italia



Bioeconomia: una nuova strategia per un'Italia sostenibile

- Possibile integrazione di impianti di depurazione delle acque reflue con bioraffinerie per la valorizzazione integrata della frazione organica introdotta negli impianti e dei fanghi attivi generati e sfruttamento del potenziale di produzione di sostanze biochimiche dei digestori anaerobici;
- Disponibilità di efficienti sistemi di raccolta per i rifiuti organici e di grandi quantità di biorifiuti nazionali (sottoprodotti e rifiuti dell'industria alimentare : $\approx 15\text{Mt/a}$ residui agricoli: $\approx 10\text{ Mt/a}$; effluenti di allevamento: $\approx 150\text{ Mt/a}$; fanghi di acque reflue: $\approx 3\text{ Mt/a}$; frazione organica comunale: $\approx 6,5\text{MT/a}$);

Beyond water quality —
Sewage treatment in a
circular economy



<https://www.eea.europa.eu/publications/beyond-water-quality-sewage-treatment>

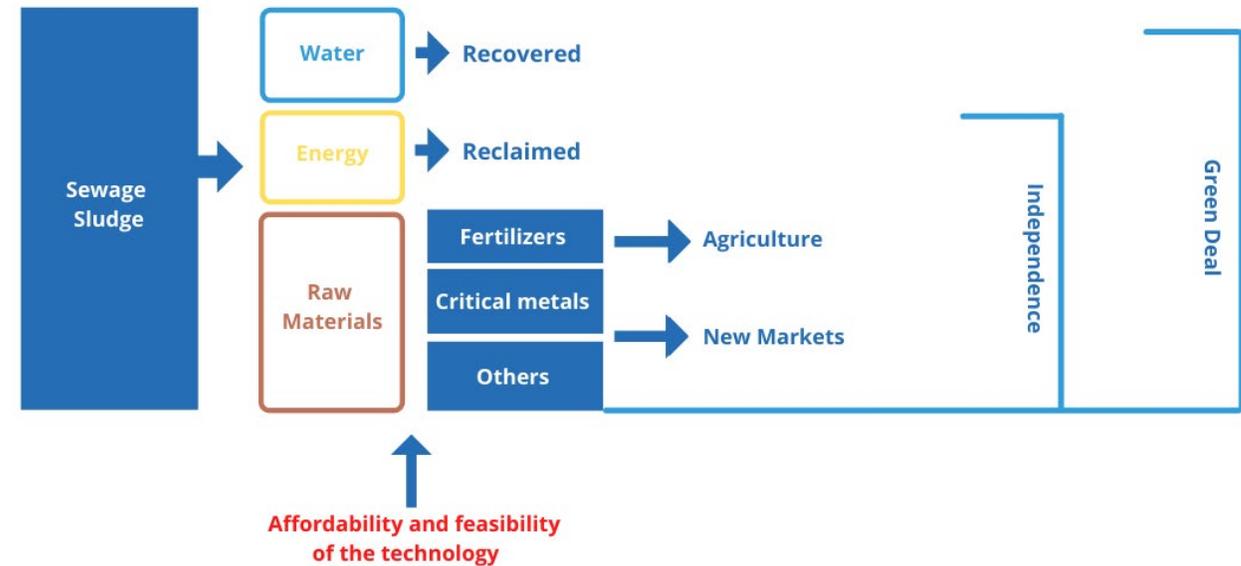
Published July 2022



<https://watereurope.eu/wp-content/uploads/WE-Position-Paper-on-the-Sewage-Sludge-Directive.pdf>

Unlock the potential of the sewage sludge directive through the full exploitation of the value in water for a green and sustainable Europe

SMART MANAGEMENT OF THE SEWAGE SLUDGE



Sewage sludge can be reclaimed into water and recovered into energy, but the raw materials embedded in it can also be extracted. Thanks to affordable and feasible technologies, these raw materials can, for example, be used as fertilizer in agriculture or as critical metals in new markets.

Water in the CEAP: still untapped resource?

*“Furthermore, the Commission will develop an **Integrated Nutrient Management Plan**, with a view to ensuring more sustainable application of nutrients and stimulating the markets for recovered nutrients. The Commission will also consider **reviewing directives on wastewater treatment and sewage sludge** and will assess **natural means of nutrient removal such as algae**”*

Political context



Source: Silvija Aile, EC, DG Environment, Unit B3, workshop 21/April/2021

Supports the implementation of both the **Circular Economy Action Plan** and the **Waste Framework Directive** by **identifying a list of priority waste or by-product streams (scoping)** and **deriving the most suitable candidate streams for which to develop further EU-wide end-of-waste or by-product criteria.**



[https://publications.jrc.ec.europa.eu/
repository/handle/JRC128647](https://publications.jrc.ec.europa.eu/repository/handle/JRC128647)

CS2 – Lombardia (Italy)

The Italian case study will be developed around biological secondary raw materials from urban and industrial activities. In particular, **OFMSW, sewage sludge and bio-based residuals (agro-waste and non-hazardous organic liquid wastes) from dairy industries will be processed for VFA, biopolymers and biofertilizer recovery at the biorefinery of Sesto San Giovanni WWTP (Lombardia).**

Italian case-study, beyond UNIVPM, includes relevant participants such as CAP HOLDING SPA (water and waste utility) and Cluster SPRING.

UNIVPM and CAP have relevant expertise in sustainable treatment of municipal and industrial wastewater and organic waste aiming at delivering CE.

CS2. Urban biowaste demo case (M8-36)

CS leader: UNIVPM.

Support: CAP HOLDING SPA & SPRING

Case
study
2

Lead: Università Politecnica delle Marche

Region: Lombardia (Italy)

Relevance

Lombardy an administrative region of Italy and its population constitutes more than one-sixth of the population of Italy.

Biological resources considered:

- 1) OFMSW
- 2) Sewage sludge
- 3) Agro-wastes
- 4) Non-hazardous organic liquid waste

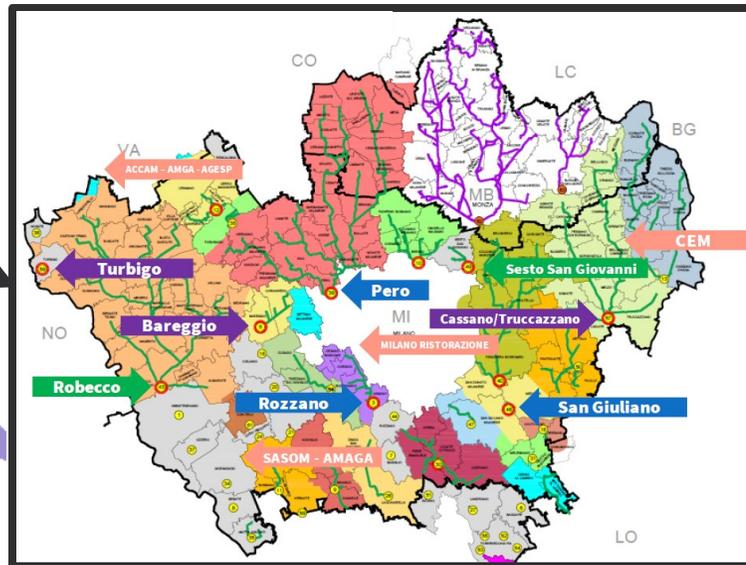
Biowaste in Italy and in Lombardia

Ref. Demichelis, F., Piovano, F., and Fiore, S. (2019). Biowaste Management in Italy: Challenges and Perspectives. Sustainability 2019, 11, 4213; doi:10.3390/su11154213

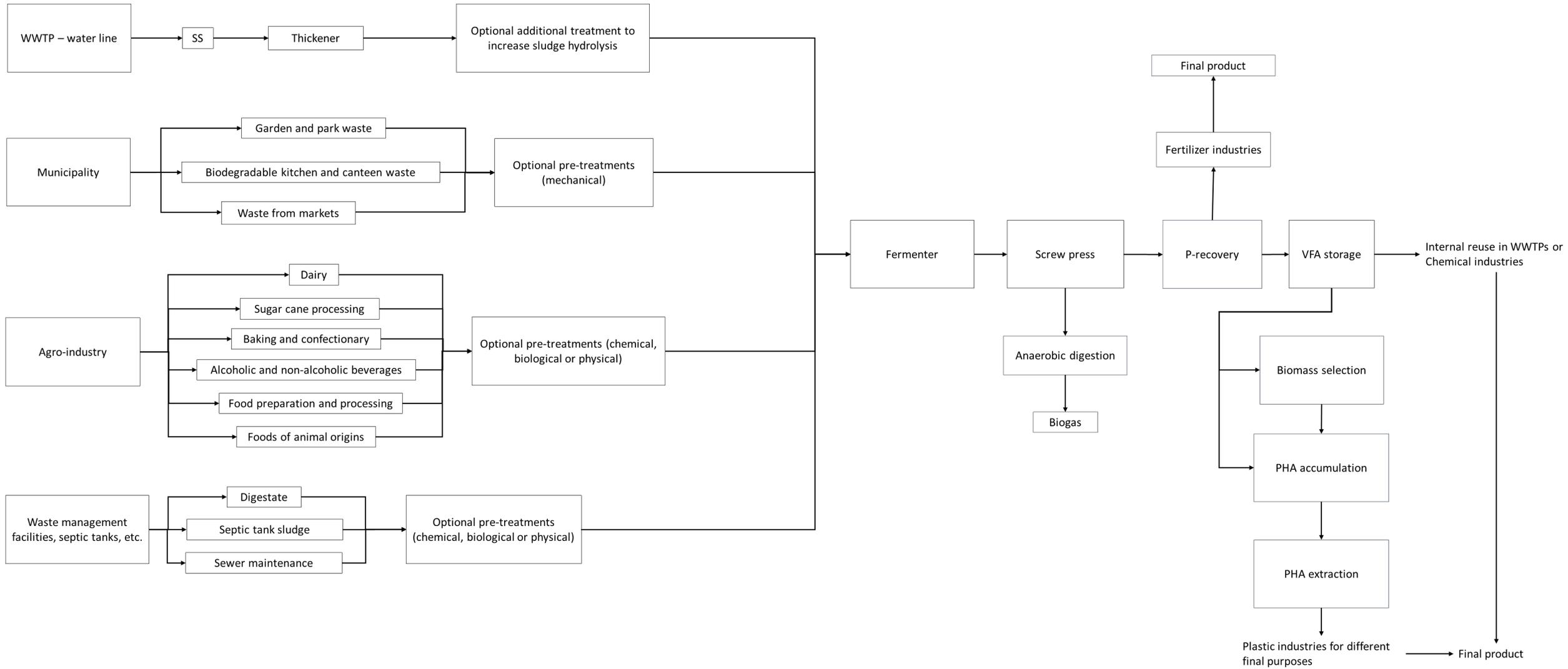
Biowaste category	Total amount Italy (2016)	Total amount Lombardia (2016)	% Lombardia Region
Wastewater and sewage sludge (WSS) (CER190805)	3.2 Mt/y	0.45 Mt/y	14%
Wastewater and sewage sludge (WSS) (CER 190812, 190814, CER 190811*, CER 190813*)	0.88 Mt/y	0.15 Mt/y	17%
Organic fraction of municipal solid waste (OFMSW)	1.7 Mt/y	0.30 Mt/y	18%
Agricultural livestock waste (ALW)	5.7 Mt/y	0.84 Mt/y	15%
Waste deriving from the food industry (FIW)	2.6 Mt/y	0.56 Mt/y	21.5%

CAP facilities

CAP HOLDING SPA is a company that manages the water assets (networks and plants) of the Metropolitan city of Milan (Lombardia). It is one of the most important national utility, providing the urban water cycle service to more than 2,2 million of inhabitants.



PLANT	CAPACITY [P.E.]	AVERAGE FLOW IN (design) [m3/d]
BAREGGIO	64 800	13 215
CANEGRATE	151 800	29 340
PERO	620 600	150 250
ROBECCO SUL NAVIGLIO	340 000	99 335
ROZZANO	122 400	30 000
SESTO SAN GIOVANNI	138 488	24 135
SAN GIULIANO MILANESE OVEST	30 000	10 700





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THANK YOU!

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