

 I3-4-BIOFERTILIZERS

The **I3-4-BIOFERTILIZERS** project aims to promote interregional cooperation in the field of biofertilizers and the circular bioeconomy. It brings together 19 leading organizations from 13 regions and 8 EU countries to develop a new transnational value chain for biofertilizer production and innovative solutions supporting sustainable agriculture.

The initiative seeks to expand, test, and demonstrate a portfolio of eight business and investment cases, each focused on developing innovative biofertilizers — including biostimulants — and sustainable farming practices. To support these activities, the project includes a cascade funding mechanism to assist 30 SMEs and startups, helping them overcome existing technical and market barriers.

Beyond financial support, selected companies will receive technical, commercial, and innovation assistance to ensure effective implementation of their projects. The project also foresees training programs to strengthen SMEs' skills and investment capacity, along with tools for market access, knowledge transfer, and exchange of best practices, fostering industrial, financial, and interregional cooperation.

A collaborative interregional network and a Living Lab will serve as platforms for demonstrating production processes and innovative biofertilizer applications.

To maximize impact, a Centre of Excellence for Biofertilizers and Sustainable Agriculture will be established as a permanent hub providing technical and financial advisory services to SMEs and regions, enhancing interregional cooperation and reducing development disparities. The center will also support the creation of new Regional Innovation Valleys dedicated to circular and sustainable agriculture.

Among the project partners is Agrienergia SpA, a composting facility that will develop organic fertilizers based on its compost production, thereby strengthening local, sustainable value chains for organic waste recovery.

Agrienergia

Agrienergia S.p.A. operates an integrated facility for the treatment of organic waste, producing electric and thermal energy through a dry batch anaerobic digestion process, followed by composting of the residual digestate. The facility fully aligns with the objectives of the I3-4-BIOFERTILIZERS project, as it achieves a combined recovery of energy and materials from organic feedstocks (see process diagram in Figure 1).

The resulting compost is a high-quality soil improver, suitable for both conventional and organic farming, and serves as a key product in the transition toward more sustainable agricultural systems.

Moreover, Agrienergia is energy self-sufficient and highly efficient, with a net energy production 93 % higher than its own consumption.



Figure 1– Existing process

The European Context and the Role of the Agrienergia Project

According to Eurostat data (Gryta et al., 2020) and the Horizon EOM4SOIL project, the European Union generates about 1.6 billion tonnes of organic waste each year. Of this total:

- 61% comes from livestock manure,
- 25% from plant residues,
- 7% from industrial waste,
- and the remaining 7% from sewage sludge and household or commercial organic waste.

Currently, only 40% of this waste is treated through composting or anaerobic digestion (AD), while the rest is landfilled or burned on-site without control. In Italy, as in other EU countries, compost is produced under strict environmental standards but often with little regard for agronomic quality. Compost rarely enters the market and, when it does, its economic value is low. Most composting plants earn revenues primarily from gate fees rather than from the sale of compost itself.

Smaller plants tend to produce better-quality compost, while large-scale facilities often struggle to maintain consistency. Moreover, there is little integration between the organic waste and agricultural sectors: treatment plants operate mainly within a waste-management logic, rarely engaging with agriculture or the fertilizer industry.

Digestate remains an underused resource—commonly spread on fields, causing nutrient losses, particularly nitrogen volatilization. Biochar production is still limited, and awareness among institutions, farmers, and investors is low. Furthermore, the lack of collection infrastructure penalizes small and medium farmers, making logistics costly and inefficient.

The Agrienergia Project's Response

The Agrienergia S.p.A. initiative addresses these challenges by improving the circularity of organic waste treatment (including urban biowaste, sludge, and agro-industrial residues) through the production of enriched and structured organic fertilizers, moving beyond the traditional concept of soil improvers.

The project aims to reduce nutrient losses, increase soil carbon and organic matter, replace mineral fertilizers, and improve crop resilience to biotic and abiotic stress. It will establish an integrated production unit at the Agrienergia plant to support at least three demonstration value chains, producing multiple fertilizer lines and advancing technologies from TRL 6–7 to TRL 8.

AGRIENERGIA the investment case #IC3

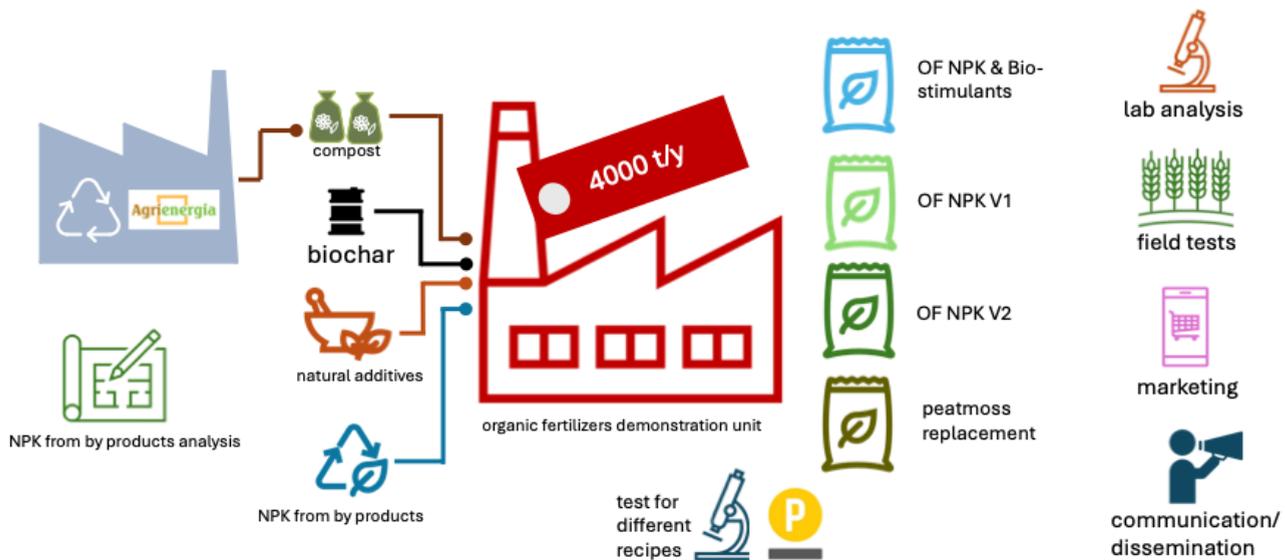


Figure 2– After the project 13-4 BIOFERTILIZERS

Main formulations (see Figure 2):

1. **Compost + Biochar + Nutrients** (e.g. natural ammonium sulfate, struvite)

- Synergy between biochar and compost improves structure, water retention, and nutrient availability.
- Biochar will be added at the beginning of the process to enhance biogas yield and compost quality.

2. **Compost enriched with Effective Microorganisms (EM)**

- Compost matured with microbial inoculants, nettle extract, and rock powder.
- Later enriched with zeolite, basalt, activated biochar, and mycorrhizal fungi to reproduce peat-like properties.

3. **Biostimulant + Biochar + Compost** (peat substitute)

- Blends with physical and agronomic characteristics similar to peat, anticipating its possible ban by 2030.

4. **Biostimulants from agricultural residues**

- Compost-based solid and liquid biostimulants, including **compost tea**.

User inclusivity, dissemination and marketing

continuous inclusion process guided by the principles of **participation and environmental responsibility**, recognizing that the facility primarily serves the community.

The company is developing a participatory framework to actively involve **citizens, users, and farmers** in the new configuration of the plant — a process rooted in the principle of *“nothing about me, without me.”* Agrienergia acknowledges that its facility operates within a **landscape of significant social and economic value**, providing both an essential public service and a **natural fertilizer** that enhances soil health and agricultural productivity.

This fertilizer, derived from local organic resources, will be **returned to the community**, embodying a model of **circular socio-economy** where environmental, agricultural, and social benefits are shared across the territory.