

3R TECHNOLOGY FACT SHEET

RECYCLING - REDUCE - REUSE - Zero emission pyrolysis and phosphorus recovery technology



Phosphorus recovery • pyrolysis • zero emission • biophosphate • biofertiliser

Key facts

- **Category of the technology:** Thermochemical (pyrolysis) nutrient recovery and integrated agri biotech processes
- **Input:** food grade cattle and other types of bone grist
- **Output product(s):** ABC-BioPhosphate organic/low input farming innovative fertilizer, BIO-NPK-C formulations
- **Available capacity:** >12,500 t/y ABC-BioPhosphate.
- **Focusing geographical areas:** EU27, UK, USA, Australia
- **Technology status:** TRL8/IRL8
- **EC/MS Authority permits:** Industrial scale pyrolysis plant installation and operation permit is available, FES/01/0851-33/2015

Summary of the technology

The objective of **3R** Zero Emission Pyrolysis & Phosphorus Recovery Technology is the added value upgrading and valorisation of food grade animal by-products into safe and high value recovered organic Phosphorous fertilizer by integrated thermal and biotechnological recycling means. **The ABC (Animal Bone Char) BioPhosphate product is made of different types of food grade animal bone grist**, most importantly cattle bones, which basic material is already processed at 133 degree Celsius for 20 minutes under 3 bar processing conditions. The **high Phosphorous content animal bone grist** input feed streams are low value utilized by-products. In the 3R process the **bone grist is heated to as high as 850 degree Celsius material core carbonization temperature, that is far higher than usual biomass processing temperatures, but absolute needed to get high quality and safe product.** During the advanced pyrolysis (reductive thermal processing) all volatile and protein based substances are removed from the mineral frame, and a highly macro-porous hydroxyapatite (70-76%), CaCO₃ (7-13%) and carbon (8-11%) content apatite type mineral material produced. The output products are high quality and safe **ABC-BioPhosphate** and its wide range of BIO-NPK-C bio-formulated variations used for organic/low input farming and environmental (adsorbent) applications.



Competitive position and advantages

- **High material core temperature 850°C reductive thermal processing** with specific treatment conditions, which is resulting output products with unique surface and material composition characteristics.
- **Feed flexibility:** wide range of different types of organic material streams for all those cases where added economically value can be obtained by the 3R processing and wide range of bio-formulations.
- **Zero emission environmental & climate performance:** all material streams in all state of matter forms are recycled, reused and converted into useful and safe products.
- **Added value innovative technical content:** the 3R technology is an original invention and complex original design in all elements, with revolutionary and comprehensive innovative engineering solutions, that has been specifically designed for animal bone processing to recover concentrated Phosphorus.



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BIOFARM Agri Research Station