



Nutrient Management and Nutrient Recovery Thematic Network

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The new EU regulations for CMC14 pyrolysis material biochar cases and expected biochar market impacts beyond 2022.

WHAT IS BIOCHAR?

BIOCHAR is a soil functional carboniferous product :

- **Authority permitted, labeled** and full value chain safe,
- having extended **producer responsibly product guarantees,**
- meets all the **EU/MS product criteria for production and product permits. REACH registered.**

INPUT SUSTAINABILITY CRITERIA: The feed material is:

- **not from primarily and secondarily land use,**
- **not competing with human food +animal feed + plant nutrition,**
- **having environmentally sustainable logistics.**



What is not BIOCHAR? I.

- NOT a fine ground charcoal and not energetic char,
- NOT HTC labile carbon,
- NOT activated carbon adsorbent,
- NOT have extended producer responsibility,
- Not labelled,
- NOT EU/MS Government Authority permitted for production and application.*
- *** Remark: voluntarily biochar certifications does not have valid legal effects in the EU** e.g. does not replacing the mandatory EU/MS Authority permits

There is no one technology and product fit for all



What is not BIOCHAR? II.

Soil functional biochar and energetic/activated carbons are 2 very different products with

- 2 very different product functionalities and product criteria requirements,
- 2 very different production scenarios and processing conditions,
- 2 very different product safety aspects,
- 2 very different Authority permits and legal environments,
- 2 very different application areas, and
- 2 very different markets and users.

Biochar is NOT a renewable biofuel for energy



New harmonised Fertilising Products Regulation(EU) 2019/1009

■ EC FERTILISERS

- **Opening the Single Market for bio-based fertilisers:**
- **Rules on safety and quality:** The new Regulation will provide strict rules on safety, quality and labelling requirements for all fertilisers to be traded freely across the EU.
- Divided into **product function categories (PFCs)**, which should each be subject to specific safety and quality requirements adapted to their different intended uses.
- **Component materials** divided into different categories, which should each be subject to specific process requirements.
- **CMC14 annex added on in 2021 for pyrolysis and gasification materials.**
- **Beyond 2022-07-16 the EU and MS reg. will run parallel.**

Advantages of the new Regulation I.

- Making it **easier for producers of organic and recovered fertilisers to sell** with harmonized quality standards for all types of fertilizing material that can be traded across the European Union.
- **More choice for farmers**, reduced health and environmental risks for consumers.
- Eases market access for innovative, organic fertilisers, which would give farmers and consumers a wider choice and promote green innovation.
- **The maximum Cadmium limit of <1,5 mg/kg to apply in organic fertiliser and other bio-fertiliser cases will fully guarantee a high level of soil protection and reduce health and environmental risks**, while allowing producers to adapt their manufacturing process to comply with the new limits.

Advantages of the new Regulation II.

- **Boosting the use of organic and bio/waste-based fertilisers.**
- Promotes increased use of recycled materials for producing fertilisers, thus helping to develop the circular economy, while reducing dependence on imported nutrients.
- Establishes EU-wide quality, safety and environmental criteria for “EU” fertilisers.
- Increasing the consumer's confidence by guaranteeing the safety of fertilisers with regard to human health and the environment (in particular concerning the toxic elements, organic contaminants).
- **Full harmonisation of the internal market would remove all costs related to mutual recognition and/or divergence of national rules.**

Component Material Categories

CMC14: PYROLYSIS and GASIFICATION MATERIALS

- EU fertilising product may contain **pyrolysis or gasification materials (Annex II – CMC14) obtained through the thermochemical conversion under oxygen-limiting conditions.**
- EU Fertilising Products Regulation (EU 2019/1009) Annex II. CMC 14 will set the legal condition for:
 - INPUT MATERIAL allowed to be used
 - THERMOCHEMICAL CONVERSION PROCESS CONDITIONS (from 180C and 2 sec residence time ?+? (experts critics remarked during consultation)
 - **PRODUCTS CHARACTERISTICS: 6 mg/kg 16 PAHs as of 1976 US EPA. Cadmium >1.5 mg/kg.**
 - **REMARK MS national: 1 mg/kg 19 PAHs as of 2005.**
 - **registered pursuant to REACH Regulation (EC) No 1907/2006**

CMC14: INPUT MATERIAL

1. INPUT MATERIAL FOR PLANT BASED PYROLYSIS & GASIFICATION MATERIALS:

- **vegetable waste** from the food processing industry and fibrous vegetable waste from virgin pulp production and from production of paper from virgin pulp, if not chemically modified.
- **Processing residues** from bioethanol, biodiesel production.
- **Bio-waste**

2. INPUT MATERIAL FOR ANIMAL BY-PRODUCT BASED PYROLYSIS & GASIFICATION MATERIALS:

= Conditions set out in Article 32(1)-(2) and (3) of the Animal by products regulation (EC No 1069/2009)

- category 2 or category 3 animal by-product (bone grist, manure..),
- which is already pressure sterilized $>133^{\circ}\text{C}$ for at least 20 minutes at 3 bar
- delivered from EU/MS approved and registered rendering industrial plant.

Input materials excluded: mixed municipal waste, sewage sludge or dredging sludge.

CMC14: PRODUCTS CHARACTERISTICS

- max. 6 mg/kg dry matter of **PAH16** (note: in some MS 1 mg/kg/**PAH19** since 2005)
- max. 20 ng WHO toxicity equivalents of PCDD/F/kg dry matter
- max. 0,8 mg/kg dry matter of PCB
- max. 30 g/kg chlorine on a dry matter basis,
- max. 2 mg/kg dry matter of thallium
- H/Corg less than 0,7
-review of the Reg. will be done later on

REACH regulation for Biochar (EC) No 1907/2006

Registration, Evaluation, Authorisation and Restriction of Chemicals

- **Biochar is a chemically modified substance**, therefore REACH is mandatory above >1 t/y.
- REACH is applied for **import, manufacturing or placing on the market/use** of such materials.
- Registration and certification classes: 1-10 t/y, 10-100 t/y, 100-1000 t/y and **above 1000 t/y**.
- Complex hazard assessment.
- Costly procedure, cost often above €500,000.
- **As the economical BC production it is usually above 1000 t/y the highest REACH to be applied.**
- **EU STATISTICS 2021**: so far the number of biochar operations above 1 t/y REACH permitted in the EU = 0.

Interlink your biochar results to NUTRIMAN network

Nutriman Network 2018 - 2031

- **Criteria: market ready high TRL commercial biochar technologies and/or products only.**
- Low TRL research results are not in the scope.
- NUTRIMAN is not a research platform, its **minimum maturity level starting from >TRL7.**
- EU wide/global networking and cooperation.
- **Nutriman Network is also an capital rise and investment platform from 2022 to boost biochar industry and business in the EU, USA, AU and JP.**

Expected biochar market impacts beyond 2022

Biochar market status 2021:

Very large number of biochar research projects/publications available, still the **market competitive and market-creating biochar commercial operations are few.**

There is no one fit for all biochar solution.



TRL Technology IRL Investment CRL Commercial Readiness Levels

Technology Readiness Level “TRL” & Investment Readiness Level “IRL” & Commercial Readiness Level “CRL”

TRL & IRL & CRL EVOLUTION schedules and capabilities		TRL / IRL / CRL Implementation		Scientific evidence level
		factor %	risk %	
EU Community S&T - RTD maturity progress	TRL 1-3 = IDEA = basic principles, technology concept formulated	0-1%	100%	THESIS: theoretical assumptions
	TRL 4 = technology validated in laboratory	<3%	>97 %	
	TRL 5-6 = PILOT technology validated and demonstrated in relevant environment IRL5-6 = validate revenue model & market fit high technical risk/full commercial risk	<25%	>90%	
	Low RMI operational area		RTD risk break-even point	
	TRL 7= PROTOTYPE demo in operational environment IRL 7 = prototype viable product CRL 7 = Product design is complete	60-75%	40-70%	Prototype demonstrated
	TRL8 = FIELD DEMO system complete and qualified IRL 8 = validate value delivery CRL8 = Customers high technical risk/full commercial risk	75-90%	15-25%	Industrial validated
High RMI operational area				
EU Community S&T - RTD maturity progress	TRL 9 = actual system proven in operational environment, full scale industrial replication model ready for market competitive commercial deployment. IRL 9 = identify and validate metrics CRL 9 = Commercial deployment The TRL9/IRL9/CRL9 is the first full industrial/market/commercial replication model. Demonstrate conversion of science into practice: competitive manufacturing, industrial training, user/market uptake and exploitation in practice.	95-99%	1-5%	Market validated for commercial replication
	Industrialized and market competitive commercialized innovation	97-99%	1-5%	Commercial replicated

- ✓ **The TRL** (also known as Technology Readiness Assessment “TRA”) is based on the EU Commission Decision C(2014)4995 and US official methods since 1980’s (NASA, DoD, ESA, ISO 16290:2013 standard).
- ✓ **The IRL** is based on the OECD (The Organisation for Economic Co-operation and Development) and other large financial institutions methods www.oecd.org. IRL is an evidence based demonstration to investors, that there’s a repeatable and scalable business model.

- **Over 16,000 biochar science papers global published past decades, still the real biochar commercial operations are few.** Often the biochar research is low TRL basic research oriented and publication driven only.
- **NUTRIMAN: over 1000 biochar entities contacted in 3 years to identify high TRL BC results. Responses = 0.**
- **The gap between theory <TRL6 and practice >TRL7 is big.** Often the low TRL in-vitro lab research results are not relevant to the economical & market competitive industrial conditions/reality in economical scale.
Farmers can not use & apply scientific publications and low TRL lab data in practice.

- **Only very few %** of the EU research RTD programs **reaching** user driven and market competitive **maturity at high >TRL7 → TRL9.**
- NUTRIMAN experience is same as EU DG Research “Key findings H2020 interim evaluation” 2017, ISBN 978-92-79-69106-5:
- *“There remains an innovation gap”. “EU lags behind in breakthrough, market-creating innovation” and “more could be done to support the demand for innovative solutions and user-driven innovation”.*

The biochar market challenges & gaps III.

- **Many general biochar global market outlooks bias published**, but mostly based on unrealistic industrial/legal/user considerations. The energetic charcoal global market is bias mixed with biochar soil applications while comprehensive, true value and User driven CAPEX/OPEX is missing.
- The gap between theory <TRL6 and practice >TRL7 need to be urgently **bridge over in wide continental – global dimension** and more **breakthrough and market-creating biochar innovations** needed.

Expected biochar market impacts beyond 2022.

- There is a **strong market demand for user-driven biochar solutions** that are to be commercially operated **at less cost** versus other soil improver competitive options.
- Biochar market impacts in substantial dimension **can only be realized if large number of commercial biochar production units are implemented in economical scale** that is estimated from approx. >3,000 t/y commercial biochar output production scales.

CONTACT

<https://youtu.be/02tikiRUxs0>


100% NATURAL
Key Enabling Technology



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https://nutriman.net/farmer-platform/product/id_192

https://nutriman.net/farmer-platform/technology/id_193

The new key enabling 3R technology and products opening new technical, economical and environmental/climate ways.

**The Stone Age did not end because of World run out of stones.
The Chemical Fertiliser Age will not end soon because we run out of chemical fertilisers.**

YOUTUBE video BioPhosphate:

EN English: <https://youtu.be/02tikiRUxs0>
EN English: <https://youtu.be/kfxhlyl2Vka>
IT Italian: <https://youtu.be/FEyW-SuFTpg>
ES Spanish: <https://youtu.be/QJxmg13-xo>
FR French: <https://youtu.be/RFnL8VYDfYk>

YOUTUBE video NUTRIMAN:

NUTRIMAN EN: <https://youtu.be/QjUpDIEGBBw>
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MEDIA LINKS



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