



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.**

Biochar market challenges & gaps

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
Status of RTD progress - “RMI” Research Maturity Index		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	<25%	>90%	
	IRL5-6 = validate revenue model & market fit high technical risk/full commercial risk			
	Low RMI operational area		RTD risk break-even point	
	TRL 7= PROTOTYPE demo in operational environment	60-75%	40-70%	Prototype demonstrated
	IRL 7 = prototype viable product CRL 7 = Product design is complete			
	TRL8 = FIELD DEMO system complete and qualified	75-90%	15-25%	Industrial validated
	IRL 8 = validate value delivery CRL8 = Customers			
	High RMI operational area			
TRL 9 = actual system proven in operational environment, full scale industrial replication model ready for market competitive commercial deployment.	95-99%	1-5%	Market validated for commercial replication	
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.				
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.

The biochar market challenges & gaps I.

- 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>

 **BIO**P_{HOSPHATE}
100% NATURAL
Key Enabling Technology



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<https://www.BioPhosphate.net>

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/QJxmgl3-xo>

FR French: <https://youtu.be/RFnL8VYDfYk>

YOUTUBE video NUTRIMAN:

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

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NUTRIMAN FR: <https://youtu.be/7tJvS8toONl>

NUTRIMAN IT: <https://youtu.be/lkxs47MSJb0>

NUTRIMAN NL: <https://youtu.be/g8zxzM4VOBE>

NUTRIMAN PL: <https://youtu.be/ONwu5l5kylk>

NUTRIMAN HU: <https://youtu.be/LlwzC7A0nQ8>

NUTRIMAN ES: https://youtu.be/W7u_HoAUXio

MEDIA LINKS



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 818470.