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## **Manure nutrient recycling**

### **ManuREsource 2017 conference**



The 3<sup>rd</sup> [ManuREsource](#) manure recycling conference brought together 230 participants in Eindhoven, The Netherlands, 27-28 November. This third conference, four years after the first ManuREsource in 2013, confirmed that a range of technologies are today available and proven for manure processing to enable energy recovery and nutrient recycling (see Newtrient catalogue and company success stories below), that the EU regulatory context is evolving considerably, and that the main obstacle to implementation continues to be economic. Johanna Bernsel, European Commission [DG GROW](#), presented the proposed new EU Fertilisers Regulation, currently in the

decision process, which will create a single market for both recovered nutrient products and for processing technologies. Discussions showed that regulation effectively obliges farmers to implement manure processing where constraints on manure spreading (regional manure excesses resulting from livestock concentration) meet water protection obligations. Cees Jan Hollander presented [Danone](#), a global leader in fresh dairy products, bottled water, nutrition products for young children and medical nutrition. Danone has a direct relationship with around 140 000 dairy farmer suppliers worldwide with 2.5 million cows. Hollander explained why manure management is essential to the company's sustainability and social commitments: balancing greenhouse emissions (company and supply chain zero net carbon objective for 2050) and local supplier farmer resilience: without farmers no food. Emilie Snauwaert, [VCM](#), summarising the conference, concluded that the overall objective of sustainability will continue to push towards manure processing. She noted that a key objective should be recovered product marketability, and that challenges are how farmers can pass on costs and consumer acceptance of use of recycled nutrients in food production.

*ManuREsource 2017 (International Manure Management and Valorization Conference), organised by VCM (the Flemish centre for coordination of manure processing), INAGRO, Ghent University, POM West-Flanders and the Netherlands Nutrient Platform [www.manuresource2017.org](http://www.manuresource2017.org)*  
*Press release with ManuResource 2017 conference outcomes*  
[www.agripresworld.com/STUDIOEMMA\\_UPLOADS/downloads/Press\\_release\\_Manuresource2017\\_dec2017\\_final\\_ENG.pdf](http://www.agripresworld.com/STUDIOEMMA_UPLOADS/downloads/Press_release_Manuresource2017_dec2017_final_ENG.pdf)

## Processed manure in the Nitrates Directive

Previous ManuREsource conferences have raised the question of the obstacle to manure nutrient recycling posed by the 170 kgN/ha application limit for “processed manure” in Nitrate Vulnerable Zones (NVZs = 40% of EU territory) fixed by the Nitrates Directive (see SCOPE Newsletter [n°100](#)). ESPP has developed, with stakeholders, [proposals](#) on this question, transmitted to policy makers. A discussion meeting took place on this question at [ManuREsource 2017](#), led by ESPP and VCM, with participation of the European Commission DG Environment and several government representatives. ESPP presented [introductory slides](#) outlining the context, underlining that this limit and varying interpretations between Member States and NVZ Action Plans obstructs manure nutrient recycling and the market for recycling technologies. In some regions but not others, products such as digestate containing traces of input manure but based mainly on non-manure inputs are classified as “processed manure”. The meeting heard that the EU Nitrates Committee (Member States) and DG Environment intend to mandate the European Commission Joint Research Centre ([JRC](#)) to propose specifications under which certain nutrient products recovered from manure might not be considered subject to this 170 kgN/ha “processed manure” limit. The objective proposed by DG ENVI is a JRC mandate in early 2019, completion the JRC study before end 2020, and then agreement of guidelines specifying implementation conditions for this point of the Nitrates Directive. The meeting discussed the scope of this study, noting that the Nitrates Directive addresses only nutrient pollution prevention (eutrophication, groundwater nitrates) but that some participants consider that other aspects should also be considered in order to avoid possible negative side-effects. However, too wide a study scope would make it unrealistic within reasonable delays and resources. Possible study questions proposed were:

- Agronomy: nutrient efficiency, nutrient losses to eutrophication/groundwater, compared to virgin mineral fertilisers
- Possible product organic carbon (C<sub>org</sub>) cut-off limits as simple indicators of agronomy
- Other environmental impacts: energy/carbon/greenhouse emission balance, ammonia emissions, contaminants, soil carbon, impacts, overall nitrogen cycle → Life Cycle Analysis (question of boundaries)
- How to specify or limit use conditions of recycled nutrient product
- Indirect consequences: resulting increase of nitrogen or phosphorus application (respectively) resulting from “relaxing” P or N application limits
- Impacts on livestock production concentration and intensification
- Generation of sidestreams from manure processing (other than the recycled nutrient product): fate, impacts of these streams
- Does the manure processing aim to produce a product or just “remove” the waste?
- Interactions with future EU Fertilisers Regulation, End-of-Waste status, Animal By Products End Points

Further information see [www.phosphorusplatform.eu/regulatory](http://www.phosphorusplatform.eu/regulatory)

## Call for experts Nitrates Directive manure processing

In the context of the proposed EU Commission JRC study to propose modalities for exempting certain manure recycling nutrient products from Nitrates Directive “processed manure” application limits, the Netherlands Government is calling for experts for an informal group to provide evidence and input data to JRC. All experts in manure processing, in agronomy of recycled nutrient products, digestates or composts, or in environmental impacts and life cycle analysis of nutrient recycling and recycled nutrients, are invited to contact, or to send relevant data and publications to, Harm Smit, Ministry of Agriculture, Nature and Food Quality [h.j.smit@minez.nl](mailto:h.j.smit@minez.nl)

Send expert names, organisation and email or data and publications to [h.j.smit@minez.nl](mailto:h.j.smit@minez.nl)

## Manure processing technology supplier assessment



Steve Rowe, CEO of [Newtrient](#), the company representing United States dairy producers, presented at [ManuREsource 2017](#) and met the European nutrient platforms to discuss extending to Europe the Newtrient assessment and catalogue of manure processing technology suppliers. The Newtrient online suppliers [catalogue](#) provides independent expert evaluations of technologies and suppliers, covering technical and economic aspects,

after-sales service and farmers’ operating experience (see SCOPE Newsletter n°[125](#)). Over 220 technologies/suppliers have been evaluated, and 180 are online. To date, the catalogue covers only technologies for dairy manure, as supplied in the US. It is now proposed to extend the Newtrient technology catalogue to European suppliers, including after-sales in Europe, and to widen to pig and poultry manure treatment. Companies interested in being assessed in Europe should contact [info@phosphorusplatform.eu](mailto:info@phosphorusplatform.eu) and if an initial number of companies engage then conditions for this assessment can be defined and moved forward.

Newtrient online catalogue of manure processing technology suppliers [www.newtrient.com/Catalog/Technology-Catalog](http://www.newtrient.com/Catalog/Technology-Catalog) If your company (technology supplier) is interested to be evaluated in Europe for inclusion contact [info@phosphorusplatform.eu](mailto:info@phosphorusplatform.eu)

## Round table session public awareness and the role of agro-food concerns

At the 3<sup>rd</sup> [ManuREsource](#) manure recycling conference ESPP has led a round table session on public awareness and the role of agro-food concerns. The central question “What do agro-food concerns think which is necessary for nutrient recovery in practice?” was discussed among the table with special invited guests from the dairy food industry with Cees Jan Hollander from

[Danone](#) and Jan Willem Straatsma from [Friesland Campina](#). The major challenge discussed was “Who needs to pay for the possible extra cost for nutrient recovery from manure processing, as contribution to environmental sustainability? The consumer agro-food sector, manure processor and/or farmer? The table identified three most important constraints for the transition towards a circular economy regarding manure processing (1) subsidies can disrupt the market, but at the same time they can be stimulating to persuade the farmers, (2) the consumer does not know where his/her food comes from, and (3) knowledge about manure processing among policy makers, farmers and consumers is limited. The most interesting solutions and conclusions were (1) farmer must be facilitated in searching the best solution, they should not bear the risks alone, but together with companies, (2) the polluter pays principle should be applied, all players in the value chain are responsible including farmers, food companies and consumers, (3) (eco)-labelling can play a major role in marketing products that stimulate sustainable use of nutrients, and (4) there is a need for an ongoing campaign to link consumers to farmers, by transparency and education. In the end farmers, food companies and consumers together within the market have to find and implement the solution, starting with piloting of manure processing, followed by full scale roll-out and then making it mainstream, but society needs to want it.

For any further follow up contact ESPP via [info@phosphorusplatform.eu](mailto:info@phosphorusplatform.eu)

## Success stories presented at ManuREsource 2017

### Terramass manure digestion



Maurice Ortmans indicated that [Terramass](#) intends to produce organic fertilisers from pig manure at its plant in Odiliapeel, The Netherlands (ManuREsource 2017 site visit). Around 200 000 tonnes/year (wet mass) of pig manure from 120 pig farmers is first anaerobically digested, producing methane energy with the aim of producing own heat and electricity to run the post-treatment plant. Since September 2017, the digestate is treated by solid-liquid separation, followed by treatment of the liquid fraction by evaporating and ammonia stripping to recover a liquid nitrogen fertiliser (ammonia). Clean water is produced (80% of incoming manure) and returned to surface water. The company is building a drying and conditioning installation to convert the digestate into pelletised organic fertiliser, which it is intended to market to agriculture, in export and to the retail market. Long term contracts with the farmers enable investment in the treatment centre and product market development.

More information [www.terramass.nl](http://www.terramass.nl)

### VP-HoBe manure processing



[www.VP-HoBe.nl](http://www.VP-HoBe.nl)

Roel Keursten and Ruud Bellemakers presented [VP-HoBe](#) manure processing technology. The technology supplier has already today over 700 000 tonnes/year pig manure (wet weight) manure processing capacity installed in The Netherlands. The company is today developing new processes aiming to process manure completely to a liquid nitrogen concentrate fertiliser, a mineral phosphorus and carbon fertiliser, a mineral potassium salt, an organic fertiliser/growing media (biochar) and clean water (after reverse osmosis). A 250 000 tonnes/year capacity pig manure (wet weight) plant already in operation and implementing these new processes is at America (NL) and will be operational in 2018.

More information [www.vp-hobe.nl/en/home-en](http://www.vp-hobe.nl/en/home-en)

### Dorset manure nutrient recycling



Henk Haaring explained that [Dorset Green Machines](#) supply a set of technologies to process liquid manure slurry to organic fertiliser pellets and clean water, without using reverse osmosis membranes or ultrafiltration. A simple filter system is used for initial solid-liquid separation, followed by drying and pelleting of the solid fraction, with addition of nutrients to produce bespoke organic fertiliser pellets. The liquid fraction is vacuum evaporated, enabling condensation of purified water (<5 mg ammonia per litre) and the residual is returned to the solid fraction. The company has to date installed capacity producing some 100 000 tonnes/year of horticulture and organic fertiliser products worldwide

More information [www.dorset.nu](http://www.dorset.nu)

### Friesland Campina working with dairy farmers



Jan Willem Straatsma presented [FrieslandCampina](#), the dairy cooperative covering around 90% of Netherlands milk production, with 22 000 staff, working with 13 500 farmers in 3 countries and via our Dairy Development Plan also with many dairy farmers in other countries. The cooperative recognises that manure processing is key to sustainability of dairy production, and essential to enable conformity to regulatory phosphorus and nitrogen spreading limitations. This corresponds to carbon accounting and sustainability objectives fixed by food industry customers, in particular

Danone (see below). FrieslandCampina's [JUMPSTART](#) project is working with farmers, technology-providers, dairy-companies



and networking companies, with the objective to implement 1 000 manure digesters on dairy farms/groups of farms in The Netherlands, so saving 600 000 tonnes/year CO<sub>2</sub>. FrieslandCampina has evaluated technologies and chosen and contracted with three suppliers ([Bioelectric](#), [BiogasPlus](#) and [Host](#)) to ensure price value, maintenance service conditions and methanisation performance for farmers. To date, 10 digesters are in start-up phase, with a further 70 candidate sites. FrieslandCampina is currently testing a nutrient recovery process to add-on to treat digestate. This has solid-liquid separation, then nitrogen stripping (using air) and ammonium sulphate recovery and phosphate salt precipitation.

More information Friesland Campina [www.frieslandcampina.com/en](http://www.frieslandcampina.com/en) and JUMPSTART [www.jumpstartua.nl/in-de-praktijk/installaties-monomestvergisting](http://www.jumpstartua.nl/in-de-praktijk/installaties-monomestvergisting)

## BASF Vizura® – improving manure nitrogen efficiency



At ManuREsource, Dr. Jorge Sanz-Gomez and Manuel Knauer of BASF presented [Vizura®](#), an ammonium nitrogen stabiliser for manure slurries and digestates. Vizura® is based on DMPP (3,4-dimethylpyrazole phosphate) and is dosed into the slurry or digestate either on the farm into the slurry lagoon or on the tractor during spreading, at rates of 2-3 litre/ha. Vizura® inhibits the action of *Nitrosomas* for several weeks. These bacteria nitrify ammonium to nitrate. This ammonium stabilisation reduces the risk of nitrate leaching and reduces N<sub>2</sub>O emissions. Nitrogen is conserved and remains crop-available as ammonium for longer periods. Advantages can include: application of slurry before sowing with ammonium continuing to be available when needed by the growing crop, reduced mineral fertiliser application, higher yields because of better manure nitrogen availability. Furthermore, an increased ammonium uptake leads to

better availability of phosphorus and several micronutrients. Vizura can be used on all crops, and has been demonstrated on several crops e.g. maize, cereals, rapeseed, grassland, beets and potatoes. Today BASF supplies Vizura® in several European countries.

More information BASF Vizura <https://agriculture.basf.com/en/Crop-Protection/Vizura.html>

## Nutrient recycling success stories

### Paques sulphur recovery from biogas



More than 25 000 tonnes/year of sulphur are recovered from biogas by [Paques Thiopaq](#) installations at around 200 biogas and natural gas sites in 30 countries. The Thiopaq system combines slightly alkaline gas-stripping (pH 8-9) to remove sulphur from biogas (present as hydrogen sulphide H<sub>2</sub>S) then a specific biological reactor to convert this to elemental sulphur. In this process, the biological reactor restores alkalinity regenerating hydroxide which is (re)used for the gas-stripping. The recovered biosulphur is in the form of small crystals, which are hydrophilic, so offering agronomic properties preferable to Elemental Claus Sulphur as usually produced in the oil and gas industry. Sulphur is an important plant nutrient, essential for nitrogen uptake, and increasingly needed for many soils and crops as atmospheric sulphur deposition from

acid rain has been largely reduced. Often the Thiopaq biosulphur production is used locally around the biogas sites, by including it into digestate used for soil conditioning in agriculture. Some 2 000 tonnes/year of biosulphur is separately handled by Fertipaq and processed into special fertilizer products which are applied in Europe and China for traditional and organic farming.

More information Paques Thiopaq <https://en.paques.nl/products/featured/thiopaq>

## Regulatory and policy

### Policy recommendations ENRD group on Resource Efficient Rural Economy



European Network for  
Rural Development

The [final report](#), [factsheet](#) and additional outcomes of the European Network for Rural Development (ENRD) [thematic group \(TG\) on Resource Efficient Rural Economy](#) have been published. Throughout the year, ESPP and other stakeholders focussed on how to support the integration of resource efficient activities and thinking relating to soils, carbon, nutrients and water into the implementation of rural development programmes (RDPs). ESPP gave a [presentation](#) about the recycling of nutrients from bio-wastes as opportunity for rural economy. The TG concluded that motivation, knowledge and policy

gaps associated with taking action to improve soil and water management via RDPs should be tackled. The [recommendations](#) for better advice and training for farmers and farm advisors, appropriate and accessible RDP financial support to (young) farmers and long-term agronomic demonstration. More specific recommendations are provided in the final report. Additional



water industry and environmental NGO European Environment Bureau have signed a [joint position](#) to the EU requesting increased research and risk assessment in these areas, which are key to sustainable and safe nutrient recycling.

*"20 Organisations sign declaration expressing serious concern about pharmaceuticals in the environment in the EU", Health Care Without Harm (HCWH) 16<sup>th</sup> November 2017 [www.noharm-europe.org/articles/press-release/europe/20-organisations-sign-declaration-expressing-serious-concern-about](http://www.noharm-europe.org/articles/press-release/europe/20-organisations-sign-declaration-expressing-serious-concern-about)*

*"EU-weit drohen über 110 Milliarden Euro Kosten durch Arzneimittel, Pflanzenschutzmittel und Biozide" BDEW / IWW Water Centre Germany, 26<sup>th</sup> September 2017 [www.bdew.de/internet.nsf/id/ARKE6T-20170926-pi-eu-weit-drohen-ueber-110-milliarden-euro-kosten-durch-arzneimittel-pflanzenschutz](http://www.bdew.de/internet.nsf/id/ARKE6T-20170926-pi-eu-weit-drohen-ueber-110-milliarden-euro-kosten-durch-arzneimittel-pflanzenschutz)*

*ESPP – water industry – EEB (European Environment Bureau) joint position on pharmaceuticals and organic contaminants in sewage biosolids and manures and nutrient recycling [www.phosphorusplatform.eu/organic-contaminants](http://www.phosphorusplatform.eu/organic-contaminants)*

## England new farming rules to protect water

The United Kingdom will implement from 2<sup>nd</sup> April 2018 [new rules for all farmers](#) in England aimed at both protecting water and saving money for farmers. The eight new rules are based on recognised good practice and include matching nutrient supply to crop and soil needs and avoiding manure contamination of water (five rules) and actions to reduce soil loss (three rules). The fertiliser rules will require soil testing (phosphorus, potassium, magnesium, nitrogen and pH), planning use of manure and fertilisers (taking into account factors such as crop needs, ground cover, weather forecasts, drainage and water), specifications on manure storage and application and no application of fertilisers within two meter of surface waters. Rules addressing soil erosion include use of organic manure and fertiliser, cultivation practices, protection of surface waters from soil erosion by livestock (including not positioning livestock feeders within 10 meter of surface waters). The UK Government notes that "most farmers are already likely to comply with the rules". The rules will be reviewed in three years time.

*"New Farming Rules for Water", UK Department for Environment, Food & Rural Affairs & Environment Agency, 30<sup>th</sup> November 2017 [www.gov.uk/government/news/new-farming-rules-for-water](http://www.gov.uk/government/news/new-farming-rules-for-water)*

## Research

### Microplastics in soil and in wastewaters



The Denmark Ministry of Environment and Food has published a [report on microplastics](#). Microplastics (20-500 µm) were analysed in inlet and outlet of ten sewage treatment plants (representing in total nearly 30% of Denmark's sewage), in sewage sludge from five of these plants, and in ten farm soils (five which had received sewage sludge in recent years, and five which had never received sludge). 0 – 0.7% of inflow microplastics in sewage works were emitted to the aquatic environment, suggesting that nearly all were being retained to sewage sludges. This means that 3 – 4 000 tonnes/year of microplastics go to farmland in sewage biosolids in Denmark. However, the levels of microplastics in agricultural

soils was low (0.0001 - 0.001 % w/w of soil) and was considerably higher (average 9x higher, median 2x higher) in the farmland soils which had never received sewage sludge (with polyethylene being the most detected polymer in these soils). These results suggest that the principal source of microplastics in agricultural soils is not sewage sludge, but possibly agri-food packaging materials. The report does not provide any information on whether microplastics in soil pose any environmental risk, nor on their long term fate.

*"Microplastic in Danish wastewater. Sources, occurrences and fate", Ministry of Environment and Food of Denmark and Danish Environmental Protection Agency, March 2017, J. Vollertsen & A. Hansen, ISBN: 978-87-93529-44-1 [www2.mst.dk/Udgiv/publications/2017/03/978-87-93529-44-1.pdf](http://www2.mst.dk/Udgiv/publications/2017/03/978-87-93529-44-1.pdf)*

### EU ROUTES conclusions on organic contaminants in biosolids

The EU FP7-funded ROUTES project (see SCOPE Newsletter [n°100](#)) studied the fate and impact of organic contaminants in sewage biosolids when used on agricultural soils, after several different anaerobic digestion and other treatment processes. The project looked at polycyclic aromatic hydrocarbons, PCBs, organic halogens, phthalates, LAS, NPEOs and quaternary ammonia compounds (from cleaning products), pharmaceuticals and biocides. Toxicity of treated sewage sludges was laboratory tested on plants/seeds, earthworms, daphnia, soil bacteria, algae. Also, soil organisms in fields which had received sewage biosolids for several years were studied, in particular earthworms. Conclusions were that sludge application to land is not phytotoxic, with small changes to some plant root development disappearing within a few months of application. There were some toxicity impacts on some bacteria. Overall, the report concludes that application of sewage biosolids at agriculturally relevant levels has margin of at least 1 000 for toxicological safety to soil organisms.

*"ROUTES Novel processing routes for effective sewage sludge management. Fate and effects of organic micropollutants in soil", Deliverable D4.6, EU FP7 project ENV.2010.3.1.1-2, Contract No 265156, U. Kunkel (Bundesanstalt für Gewässerkunde BfG) et al. July 2014.*



## Final report EIP-AGRI Focus Group on Nutrient Recycling



The European Commission EIP-AGRI “Focus Group” on Nutrient Recycling has [published](#) in November its final report and eight of mini-papers. The conclusions were summarised in detail in SCOPE Newsletter [n°124](#), February 2017. The Focus Group was established following a proposal submitted by ESPP and 60 other organisations in 2015. The final report makes recommendations to EU research and rural development policies (Operational Groups). Seven research needs identified are: LCA, Nutrient Use Efficiency assessment methods, organic contaminants (impacts, mitigation), perception and acceptance of recycled nutrients, remote sensing to support precision fertilisation using bio-based fertilisers, on-farm techniques for nutrient recovery and for measuring nutrient content in manures, production of recycled nutrient products adapted to specific crops and with reliably consistent composition. Recommendations for Operational Groups are: demonstration of nutrient recycling and of use of recycled nutrient products,

integration of recycled nutrients into food-industry quality and certification schemes, cooperative business models for nutrient recycling and exchange of experience between farmers of bio-based fertilisers.

European Commission, EIP-AGRI Focus Group “Nutrient recycling. How to improve the agronomic use of recycled nutrients (N and P) from livestock manure and other organic sources?”, final report and mini-papers <https://ec.europa.eu/eip/agriculture/en/focus-groups/nutrient-recycling>

## Agenda

### ➤ Sustainable Development in the Food & Beverage Industry Summit

16 - 17 January 2018, Berlin, Germany - [Website](#)

ESPP will present and chair a special session on nutrients circular economy within the food & beverage industry



### ➤ SPA Phosphorus Forum 2018

27 February 2018, Tempe, Arizona, USA - [Website](#)

Annual forum of the North America Sustainable Phosphorus Alliance

### ➤ Conference Symbiosis and Circular Economy in fertilizers Are by-products a thing of the past? Unlocking the new fertilizer Regulation

7 March 2018, Brussels, Belgium - [Flyer](#) - [Email](#) - [Registration](#)

Organized by Fertilizers Europe

### ➤ Phosphates 2018 conference

12 - 14 March 2018, Marrakesh, Morocco - [Website](#)

Gathering for decision-makers representing the fertilizer, feed and industrial phosphates industries.



### ➤ IFAT trade fair for sewage - waste – resources

14 - 18 May 2018, Munchen, Germany - [Website](#)

### ➤ 3rd European Sustainable Phosphorus Conference (ESPC3)

11 - 12 June 2018, Helsinki, Finland - more details here soon

### ➤ 6th Sustainable Phosphorus Summit (SPS2018)

20 - 22 August 2018, Brasilia, Brazil - [Website](#)

For the first time, the Summit will be held in Latin America, enabling a spotlight on the Tropics, where phosphorus sustainability is a big concern

### ➤ 6th Symposium of Phosphorus in Soils and Plants (PSP6)

10 - 13 September 2018, Leuven, Belgium - [Website](#)

This symposium will address the challenges of phosphorus scarcity in many terrestrial and agroecosystems as well as the challenges of managing excess phosphorus where such has occurred

See more events at [www.phosphorusplatform.eu/upcoming-events](http://www.phosphorusplatform.eu/upcoming-events)



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