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Upcoming ESPP events

ESPP meeting on agricultural valorisation of sewage biosolids

Tuesday 4th December, Brussels. Registration: info@phosphorusplatform.eu

ESPP members and concerned stakeholders are invited to the ESPP stakeholder meeting and General Assembly which will define ESPP's position on the use of sewage biosolids on farmland.

Save the date: ESPC4: The 4th European Sustainable Phosphorus Conference is fixed for Vienna, 15-17 June 2020. Results of this year ESPC3 can be found online at www.phosphorusplatform.eu/esp3-outcomes

See more events at www.phosphorusplatform.eu/upcoming-events

EU Fertilisers Regulation

Joint letter in support of the EU Fertilisers Regulation proposal

Some fifty companies (fertiliser industry, compost producers, water industry, recycling sector) and other stakeholders have sent a joint letter to EU decision makers underlining the importance of the proposed new EU Fertilisers Regulation for the Circular Economy and to open the European market for nutrient recycling technologies. They ask Council, Parliament and the Commission to resolve the current blockage in 'trilogue' and to finalise and adopt the proposed Regulation. This letter is open for further signatures, with the objective of 100 signatory companies and stakeholders. **Companies and organisations**

wishing to join the signatories on this Joint Letter should send by 16th November company name, name and email of signatory contact and logo (all as to be included on the letter) to info@phosphorusplatform.eu.

Joint letter dated 15th October 2018, with signatories to date can be found at www.phosphorusplatform.eu/regulatory

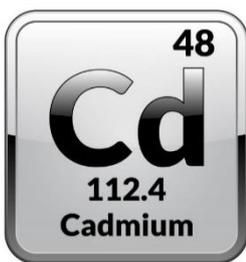
EU Fertilisers Regulation – STRUBIAS



The second and final meeting of the STRUBIAS expert group (struvite & recovered phosphate salts, ashes, biochars) took place 25-27 September, with participation of ESPP and several other ESPP members: DPP (German Phosphorus Platform), Fertilizers Europe and Yara. Following comments input by the expert group members before and during this meeting (see Pre-Final STRUBIAS report in ESPP eNews n°25), the STRUBIAS final report will now be delivered by European Commission Joint Research Centre (JRC) in coming months, proposing CMC criteria for these three product categories for the future EU Fertilisers Regulation (currently under discussion in trilogue). The meeting confirmed that sewage sludge, biowastes and manures (amongst others) should be authorised as input materials for production of EU-mark fertilisers via recovered phosphate salts and via incineration (ash), but despite input by ESPP and others, sewage sludge will not be authorised as input for biochars (pyrolysis and gasification). A note will be included indicating the need to reassess sewage sludge biochars after further research into elimination of organic contaminants, including pharmaceuticals. It was clarified that not only recovered phosphate salts and incineration and combustion ashes but also fertilising products produced by chemical re-processing of these materials are included in STRUBIAS (as specified). For reasons of clarification, minimum process temperatures of 450°C were proposed for incineration (thermal oxidation) and 180°C for biochars (pyrolysis & gasification). DG GROW reminded that STRUBIAS criteria will only be implemented if the new Fertilisers Regulation is adopted (requires that trilogue discussions are resolved) and if the Commission mandate to modify Annexes is maintained. DG GROW also underlined that fertilising products not eligible for the EU-mark will still be able to be sold under Member State national fertiliser regulations. DG GROW also confirmed that CMCs cannot be chemically reacted together under the new Fertilisers Regulation (if a chemical reaction takes place, then the new material must be a CMC in its own right, even if produced from two CMCs – for details see ESPP eNews n°25). Concerning animal by-products, it was clarified that an EFSA Opinion must be given and an animal by-product regulation End-Point defined before products containing ABPs can obtain the EU-mark (the EU Fertilisers Regulation proposal extends the possibility to define End-Points to cover Art. 32 of 2009/1069).

Pre-Final STRUBIAS report (before modifications resulting from the final September meeting, JRC summary of final meeting, ESPP input to Pre-Final report can be found at the regulatory section of our ESPP website www.phosphorusplatform.eu/regulatory

New study on cadmium in fertilisers



A new study report [3] by Wageningen University and Research, funded by the phosphate company PhosAgro (Russia), includes two separate parts: short-term soil/crop tests, and modelling. The second modelling part is however obsolete and because superseded by joint modelling results by Leuven University (E. Smolders) and Wageningen University and Research just published [1].

The Wageningen tests analysed changes in soil cadmium (Cd) availability in soil and of Cd uptake by crops, in one crop growth cycle, using 7 different soils (with varied Cd levels), 6 crops (leaf, root, bulb, grain) and 5 fertilisers (with Cd levels 0 to 60 mgCd/kgP₂O₅) plus controls (no fertilisation, manure). These tests showed no detectable differences in soil cadmium availability, and no detectable differences in crop cadmium uptake.

The Wageningen report's second part on modelling gives considerably different results from results of previous modelling by the E. Smolders (Leuven University [2]) and includes a “Disclaimer” indicating that it uses a model dating from 2016 and not updated, whereas a new soil cadmium leaching model has today been developed in collaboration between Wageningen and Leuven (not funded by PhosAgro). Results from this more recent modelling has just been published [1] and are intermediate between the Wageningen PhosAgro report [3] and the Smolders 2017 results [2].

There are now thus three sets of modelling results. For example, for the question “what is the average level of cadmium in European fertilisers which would result in no increase and no decrease in average soil cadmium levels across Europe, after 100 years?”

- The most recent model (Wageningen and Leuven [1]) concludes 44 mgCd/kgP₂O₅ – that is around 1/3 higher than the current average cadmium level in fertilisers in Europe today (32 mgCd/kgP₂O₅ Smolders, 2017 [2])
- Leuven (2016 calculations, in [2] 2017) concluded 73 mgCd/kgP₂O₅
- Wageningen 2018 [3] (using 2016 model), now superseded, concluded zero cadmium in fertilisers would be necessary.

The Wageningen report [3] suggests that these differences are “largely due to different model concepts used to calculate leaching losses from soil”. The authors also underline that results vary considerably as a function of soil characteristics and region, and as a function of fertiliser use (e.g. lower on grassland).

The most recent model [1] concludes that a change from the Business as Usual (BaU) scenario (average EU fertiliser cadmium contents as today = 32 mgCd/kgP₂O₅ [2]) to a 20 mgCd/kgP₂O₅ limit would “not lead to a significant change in soil cadmium” at the EU level after 100 years, nor in any Member State (except Greece). The most recent model also assesses uncertainties, concluding that predicted EU average change in soil cadmium levels is not statistically significant (95% level) for scenarios with average EU fertiliser cadmium content of 20 up to 60 mgCd/kgP₂O₅ (that is, up to nearly twice current levels).

The different reports agree that crop cadmium concentrations are linked to soil cadmium levels. Discussion of relevance to population overall cadmium exposure and possible health risks is provided in Smolders 2017 [2].

[1] “Prediction of changes in soil cadmium contents at EU and Member State (MS) level”, P. Römkens, E. Smolders, 17 May 2018 <https://tinyurl.com/y7btz6lv>

[2] “Scientific aspects underlying the regulatory framework in the area of fertilisers – state of play and future reforms. In-depth analysis for the IMCO committee”. E. Smolders, European Parliament IP/A/IMCO/2016-19, PE 595.354. February 2017 <https://publications.europa.eu/en/publication-detail/-/publication/04a20719-fff0-11e6-8a35-01aa75ed71a1/language-en>

[3] “Impacts of cadmium levels in fertilisers on cadmium accumulation in soil and uptake by food crops”, P. Römkens et al., Wageningen WUR, research funded by PhosAgro, report n° 5200042853, May 2018 <http://edepot.wur.nl/451353>

It is our understanding that the modelling work cited above of Leuven (Smolders), [1] and [2], are not funded by industry. However, some previous work of Smolders has been funded by Fertilizers Europe. This is summarised by the report published by the Swiss government (Scaht, for BLW, the Swiss Federal Office for Agriculture), ref. 1422/2015-03-13, 2015 <https://ext.d-nsbp-p.admin.ch/NSBExterneStudien/externestudien/622/it/2567.pdf> which concludes “it appears to represent the scientific state of the art consensus”.

New York Times calls fertiliser cadmium debate “Russian intrigue”

An [article](#) in New York Times (NYT) presents the EU Fertilisers Regulation discussion of possible cadmium limits as overshadowed by discussions about links with “the Kremlin’s political agenda”. The recently launched advocacy group ‘Safer Phosphates’ www.saferphosphates.com is presented as being driven by the Russian conglomerate PhosAgro, which the newspaper says has “strong Kremlin ties”. PhosAgro’s Russian rock supply has naturally lower cadmium levels than Morocco’s rock. NYT says that “the science around cadmium is murky”, noting the differing Leuven and Wageningen study results and the disclaimer in the second Wageningen study (see above).

“A Push for Safer Fertilizer in Europe Carries a Whiff of Russian Intrigue”, New York Times, 21 October 2018 www.nytimes.com/2018/10/21/world/europe/russia-europe-fertilizer-regulation.html

JRC meta-analysis of recycled phosphate fertilisers



A scientific journal [article](#) by the European Commission Joint Research Centre (JRC) leaders of the STRUBIAS (Fertilisers Regulation) project provides a meta-analysis of literature data on the fertiliser efficiency of recycled products. The analysis is based on studies identified by a science data base search only (to 1/12/2016), not considering other studies input by stakeholders in the STRUBIAS process. Numbers of studies identified as presenting comparable data on plant dry matter yield were: 26 for precipitated phosphate salts (103-173 cases), 16 for ashes/ash-based materials (94-113) and 14 (16-31) for biochars (pyrolysis & gasification materials). The study recognises but does not distinguish in the analysis the considerable fertiliser performance differences between different products within each of these categories. It is not specified for example how many of the cases for phosphate salts concern struvite and how many other salts. For ashes/ash-based materials, it is known that there are radical differences in plant availabilities between different ashes (poultry litter ash and bone

meal ash vs. sewage sludge incineration ash SSIA) or between raw SSIA and fertiliser products chemically processed from SSIA). The study concludes that precipitated phosphate salts show similar agronomic efficiency to synthetic mineral fertilisers with results consistent and generalizable across soil types and crops relevant to Europe (this is known for struvite: see summary of over 50 publications in SCOPE Newsletters n°s [122](#), [121](#) and [43](#)). For ash based products, the average result is not meaningful (see above), and some products so show performance comparable to synthetic mineral fertilisers. For pyrolysis products, the study notes that those derived from slaughterhouse by-products, from poultry litter, from crop residues or from pig manure show agronomic efficiency similar to synthetic mineral fertilisers.

“Agronomic efficiency of selected phosphorus fertilisers derived from secondary raw materials for European agriculture. A meta-analysis”, D. Huygens & H. Saveyn (European Commission JRC Seville), *Agronomy for Sustainable Development* (2018) 38:52 <https://doi.org/10.1007/s13593-018-0527-1>

New ESPP members

RAPSODEE research centre, Albi, France

RAPSODEE

UMR CNRS 5302



RAPSODEE, Research Centre in Albi on Particulate Solids, the Energy and Environment, is associated to the French National Research Centre (CNRS) since 2001. It is located in Albi, North of Toulouse (France). Research areas include environmental and energy efficiency processes, from biomass, waste more or less contaminated with heavy metal and/or organic pollutants, renewable energies and biofuels, environmental and food industries. RAPSODEE is developing research and industrial projects related to phosphates since 2000, including elaboration and functionalisation of phosphates and phosphates-based composites/hybrid materials (sorbents, fertilisers, catalysts, energy carriers,

sensors) for energy, agriculture and depollution. The research field has given rise to four patents among which two have been scaled up at full scale. These 20 years of experience on R&D research on phosphorous and phosphates have led to an international tremendous recognition.

RAPSODEE website www.imt-mines-albi.fr/fr/rapsodee

Fertieuropa complex fertilisers, Spain



Fertieuropa (part of the SADER Group), based in Ribadeo (Spain) and manufacturing in Bilbao, is specialised in complex fertilisers (NPK) producing different formulas to satisfy a wide variety of crops based and depending on different regional crop needs. Phosphorus is an essential part of fertiliser production, with a very important role in the future of agriculture. Consumption of phosphorus fertilisers will increase in the future to ensure food production, but mined phosphate rock resources are limited. New methods and technologies for recovery and recycling phosphorus must be developed in order to satisfy the needs of the market without damaging the environment. For Fertieuropa, participation in the European Sustainable Phosphorus Platform will provide the

chance to learn about this theme, develop new ideas and participate in projects that promote the circular economy and ensure at the same time high-quality products.

Fertieuropa website www.en.fertieuropa.com/lang

EU consultations

Impact of Common Agricultural Policy on water

EU public **consultation open to 26 November 2018** to define the scope of an evaluation of the impacts of the Common Agricultural Policy (CAP) on water, including the water quality (the Water Framework Directive and the Nitrates Directive are cited), pesticides, and water challenges in agriculture. It is proposed to particularly assess the impacts of direct payments support schemes, but also Rural Development measures (but not forestry measures), Farm Advisory System and Cross-Compliance. The Evaluation Roadmap, open to public comment, specifies the objectives of the evaluation, the organisations proposed to be consulted and data collection and methodology.

European Commission public consultation "EU farm policy – evaluation of its impact on water", https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2018-5223861_en **open to 26 November 2018**

Environmental implementation challenges

A second EU **consultation is open to 26 November 2018** on the Roadmap for the (second) 2019 environmental implementation review. This will not be followed by a public consultation, so that now is the only opportunity to make input. The review aims to raise awareness on key implementation problems for EU environmental legislation, including cost impacts of these implementation failures and ways to address them. The 2019 review is proposed to cover new themes including climate change, industrial emissions and chemicals. It is also proposed that the review will identify priority actions.

European Commission public consultation "Environmental Implementation Review 2019: common implementation challenges across the EU" https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2018-5528774_en **Consultation open to 26 November 2018**

EU Environmental Implementation Review webpage http://ec.europa.eu/environment/eir/index_en.htm and 2017 first report http://ec.europa.eu/environment/eir/country-reports/index2_en.htm

Regulatory

Struvite recovery in new BAT for Food, Drink and Milk industries



The [final draft update](#) of the BAT BREF (Best Available Technology, under the IED Directive) for the food industry recognises phosphorus (P) recovery as struvite as BAT for resource recovery (see description pages 170-171). The document, BAT9 (page 647), specifies that sites should use one or more of several possible resource recovery techniques (anaerobic digestion, separation/use/recovery of residues e.g. in animal feed, use of wastewater in agriculture to valorise nutrients and water, struvite recovery). Struvite recovery is specified as applicable to wastewaters with > 50mgP/l. The BAT document also describes phosphorus removal techniques, necessary for wastewater treatment, including EBPR (enhanced biological phosphorus removal) and chemical phosphorus removal (using calcium, aluminium or iron precipitants) as well as nitrogen (N) removal techniques. Emission levels to water (BAT-AELs, page 649) are fixed at 2-20 mg/litre total N and 0.2-2 mg/litre total P. This final draft will be discussed in the IED Forum meeting of 27th November. ESPP, as an IED Forum member, can submit comments on this final draft BAT **until 7th November 2018**.

“Best Available Techniques (BAT) Reference Document in the Food, Drink and Milk Industries”, final draft October 2018 <http://eippcb.jrc.ec.europa.eu/reference/fdm.html>

New EU BAT BREF for Waste Treatment

The European Commission has published the [updated BAT document](#) (Best Available Technology, under the IED Industrial Emissions Directive) for “Waste Treatment”. Application is obligatory for all concerned installations across Europe, that is > 4 000 sites treating or recovering > 50 – 75 ton/year of wastes, including by biological treatment (incineration, landfill and sewage works are not concerned by this BAT). The document specifies emissions limits to air (including for ammonia) and to water (including 0.3 – 2 mgP_{total}/l and 1 – 60 mg N_{total}/l), and also specific operating requirements for aerobic waste treatments (e.g. composting) and for anaerobic (e.g. biogas production). The document does not specify objectives of recycling or recovery (other than for solvents), but does specify that all installations must have, as part of EMS (Environmental Management System, BAT1), a “Residues Management Plan” which aims to minimise the generation of residues arising from the treatment of waste – which presumably implies maximising recovery and recycling. The European Biogas Association (EBA) has [commented](#) that this is the first time EU BAT has fixed emission levels for composting and biogas production, which will lead to tighter operating requirements in some Member States, which should improve acceptance of anaerobic digestion technology and contribute to the expansion of separate collection and treatment of biowastes.

EBA (European Biogas Association): www.european-biogas.eu/2018/09/04/new-environmental-standards-for-waste-treatment
EU BAT document for Waste Treatment, 10 August 2018 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.208.01.0038.01.ENG&toc=OJ:L:2018:208:FULL
Summary on EU JRC website <https://ec.europa.eu/jrc/en/news/new-eu-environmental-standards-waste-treatment>

ESPP contribution on Urban Waste Water Treatment Directive

ESPP [input](#) to the European Commission public consultation on the evaluation of the Urban Waste Water Treatment Directive (UWWT) 1991/271/EEC suggesting that the explicit, command-and-control, treatment requirements and discharge limits fixed by this Directive (and by the Nitrates Directive) should be maintained as key “backstops” within the more holistic and ambitious Water Framework Directive. ESPP noted that the UWWT Directive has led to large improvements in sewage collection and treatment in many Member States, often following EU verification and infringement procedures. Nonetheless, phosphorus losses to waters remain a major environmental challenge across Europe, and this will be accentuated with climate change. Further action will be needed, including in some cases lower phosphorus discharge consents for sewage works. ESPP underlined the potential for flexible permitting, e.g. catchment nutrient discharge trading systems, to achieve phosphorus loss reductions cost-effectively. ESPP noted the need to clarify the UWWT Directive definitions of “agglomeration”, of “appropriate treatment” (smaller sewage works) and of “sensitive areas” (take into account climate change). ESPP also emphasised that the UWWT Directive’s scope should be widened to ensure appropriate management of sewage sludge and valorisation, including nutrient recovery or recycling and valorisation of organic carbon.

ESPP input to the EU public consultation on the “Evaluation of the Urban Waste Water Treatment Directive”, 19th October 2018
www.phosphorusplatform.eu/regulatory

Note that a further EU consultation “Fitness Check of the Water Framework Directive and the Floods Directive” is open to 4th March 2019 at https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2017-5128184/public-consultation_en

New EU Bioeconomy strategy emphasises Circular Economy

ESPP President Ludwig Hermann participated at the launch conference (22 October 2018) of the European Commission’s [updated Bioeconomy Strategy](#). This places a strong emphasis on the “circular bioeconomy”, biorefineries and sustainable food, farming and forestry systems. A €100 billion ‘Circular Bioeconomy Thematic Investment Platform’ is announced. Also, a Strategic Deployment Agenda (SDA) will be developed “for sustainable food and farming systems, forestry and bio-based

production in a circular bioeconomy”, aiming to optimise synergies with the Common Agricultural Policy and rural development funding (EAFRD). The action plan (1.5) includes facilitating biorefineries and an objective of 300 new biorefineries by 2030 is suggested, to add to the 800 already identified today (JRC 2018), with support through e.g. the Biobased Industries Joint Undertaking, (BBI-JU) or the new Investment Platform. Key aspects to address in food and farming systems include food waste and losses, by-products and nutrient recycling, aquaculture, and obesity/malnutrition. The need for better knowledge of nutrient flows in food production is noted (p. 100) and the importance of the EU Fertilisers Regulation proposal as part of the Circular Economy Package (p.59) as well as modifications to waste legislation to facilitate industrial symbiosis and plant-based feed materials.

“A new bioeconomy strategy for a sustainable Europe”, European Commission press release 11 October 2018, IP/18/6067

http://europa.eu/rapid/press-release_IP-18-6067_en.htm

Updated Bioeconomy Strategy “A sustainable Bioeconomy for Europe: strengthening the connection between economy, society and the environment”, October 2018 ISBN 978-92-79-94144-3 https://ec.europa.eu/research/bioeconomy/pdf/ec_bioeconomy_strategy_2018.pdf
“Biorefineries distribution in the EU”, C. Parisi, JRC (Joint Research Centre) Research Brief 2018 <https://tinyurl.com/yvzpb22l>

Valorisation routes for sewage biosolids

CIWEM working meeting on sewage biosolids

CIWEM Chartered Institution of
Water and Environmental
Management

The Chartered Institution of Water and Environment Management (CIWEM, United Kingdom) organised a workshop of industry, experts and regulators to input to the Institute’s Policy Position Statement on valorisation of sewage biosolids (currently being redefined), London,

3rd March 2018. ESPP was invited to give a [presentation](#) to summarise developments in Europe, and outlined the Germany and Switzerland regulations and Baltic HELCOM policies requiring phosphorus recycling from sewage, pressures on agricultural use of sewage biosolids (e.g. announced public enquiry in Sweden – ESPP eNews n°24, Global GAP food industry criteria excluding use of sewage biosolids on cropland ...) and current proposals regarding sewage biosolids in the EU Fertilisers Regulation proposal (expected to be excluded from composts, digestates, biochars, but authorised for precipitated phosphate salts and ash-based recycling). Discussion in the group noted that concerns about non-biodegradable polymers used in sludge dewatering could prevent sewage biosolids application to land (e.g. new German regulations). The discussion noted that nearly half of sewage sludge biosolids in Europe are today recycled via use on lands, and similarly in the USA (60%), Australia (nearly 60%) and China (nearly 50%). The UK has one of the highest rates of use on farmland (80% of sewage biosolids), which poses operational risks (for the water industry) and cost risks (for the consumer) if this route were to be stopped. Sludge biosolids are estimated by David Tomkins (AquaEnviro) to represent around 17% of total phosphorus input to UK agriculture. Sludge biosolids recycling to land has changed considerably over recent decades, and today is mostly as stable, solid, storable composts or digestates. Participants considered that biosolids use on cropland is recognised as safe for the food chain, but that there are questions about possible impacts of organic contaminants (such as pharmaceuticals) or micro-plastics on soils and the environment, and these need to be addressed. The energy value of sewage sludge was emphasised, and the options today available for energy valorisation (high energy-efficiency incineration, hydrothermal gasification). Questions were asked about the return of carbon to agricultural soils in sludge biosolids: is this significant given the application rates (limited by crop nutrient requirements). Participants suggested that the positive values of sewage sludge as an energy, carbon and nutrient resource should be emphasised, underlining the need for appropriate valorisation routes and technologies, for different local contexts.

CIWEM Wastewater and Biosolids Panel www.ciwem.org/technical-panels/wastewater-management

ESPP presentation at CIWEM workshop www.slideshare.net/NutrientPlatform/biosolids-and-nutrient-recycling-in-europe-ciwem-biosolids-workshop-london-3-october-2018

European Parliament and Council discuss increased transparency on sewage sludge

As indicated in ESPP eNews n°25, the European Commission is [proposing](#) to oblige publication of information about sewage sludge quantities, quality, treatment and where the sludge has been applied (to which fields). The collection of this information is already obligatory today under art. 10 of the EU Sludge Directive 86/278, but not its publication. The proposal would mean that this information would be made public. It is included in the proposed [new](#) EU Regulation aligning environmental reporting obligations. the Aarhus Convention and the Directive 2003/4/EC on public access to environmental information.

Proposed new Regulation “on the alignment of reporting obligations in the field of environment policy ...” COM(2018)381 – 2018/0205(COD), 31st May 2018 http://ec.europa.eu/environment/legal/reporting/fc_overview_en.htm

Success stories and actions

Paris – OCAPI: prize awarded for urine recycling to fertiliser



OCAPI

The French Academy of Agriculture has awarded its silver [prize](#) to F. Esculier's thesis on urban food/excretion systems, which is the basis of the Paris Region [OCAPI](#) (Optimisation of Carbon, Nitrogen and Phosphorus cycles In the city) project, see ESPP eNews n°22. About 80% funding support is now available for investments in collective separate urine collection (Seine Normandy Water Agency). Pot trials (rye grass) testing of urine as fertiliser have been [carried out](#), showing efficiency comparable to mineral fertilisers and better than bovine manure, and field trials are planned. Studies are also ongoing into farmer acceptance and distribution chains.

OCAPI Newsletter n°1 (in French) includes links to F. Esculier thesis and to information about testing www.leesu.fr/ocapi/2018/10/23/infocapi-n1-octobre-2018

See more details about OCAPI and other nutrient related research projects in our ESPP nutrient R&D project catalogue at www.phosphorusplatform.eu/R&D

Ohio: sewage sludge ash used as fertiliser

The Northeast Ohio Regional Sewer District (NEORS) has [signed](#) a three year contract with landscaping supply company Kurtz Brothers to include sewage sludge incineration ash as an amendment in topsoil, following regulatory authorisation by the Ohio Environmental Protection Agency (EPA). Tests over several years have shown that the ash causes grass to grow better. The ash is from multiple hearth and fluidized bed sewage sludge mono-incinerators (treating only sewage sludge) operating at around 1600°F and NEORS produces some 35 000 ton/year (dry weight) ash. Until today, the ash has been stored in lagoons onsite but these are now full. The contract with Kurtz Brothers will save NEORS around 450 000 US\$/year of future costs for transport and landfill of ash.

More information at the following websites:

www.news5cleveland.com/news/local-news/cleveland-metro/for-neorsd-one-mans-ash-becomes-their-treasure

www.medium.com/@neorsd/the-making-of-a-big-ash-deal-b3ce2fdda72f

INGELIA biorefinery: bio-coal and bio-fertiliser from organics and sewage sludge



Ingelia has [announced](#) a commercial Hydrothermal Carbonization (HTC) in Tuscany, Italy, which will process 80 000 ton/year of sewage sludge. The plant, developed and designed by Ingelia for major Italian water service company ACEA, in Chiusi, Tuscany, will transform sewage sludge into biolignite (fuel) and a biofertiliser. Ingelia is already operating two

advanced Hydrothermal Carbonization plants processing organic waste and sewage sludge: a 14 000 t/y input plant in Naquera (Valencia), Spain (see photo) - and a 6 000 t/y plant at CPL Industries / Nottingham University Immingham site, UK. Further projects are underway in Spain, Belgium, France, Italy. The Tuscany plant aims to be operational in 2020 and to treat 80 000 t/y of digested and non-digested sewage sludge (approx. 80% water content). The plant will include Hydrothermal Carbonisation, inerts removal, phosphorus leaching and biocoal refining, to produce two products: a bio-coal fuel material, with less than 10% water content, and over 20 MJ/kg of LHV; and a biofertiliser, obtained from the leaching of phosphorus and calcium, mixed with other nutrients nitrogen and potassium extracted from process water. The HTC process operates at around 200°C, 16-20 bars, for 4-6 hours, with low energy consumption.

Ingelia Hydro Thermal Carbonization technology www.ingelia.it/la-tecnologia-htc

"Hydrothermal Carbonisation of Sewage Sludge", Ingelia, S.L., Hernández Latorre M.L., International VDI Conference on Sewage Sludge. Copenhagen, 2017 <https://programme.eubce.com/2018/B/PDF/BOA.pdf>

Slurry acidification update

A stakeholder meeting on [slurry acidification](#) (addition of acid to manure before spreading) in Kiel, 27th September, heard that acidification is likely to soon be mandatory in Denmark, has been recognised as Best Available Practice (BAT) in the United Kingdom. Acidification uses simple acid chemical dosing to manure, on the tractor during spreading or in storage, to reduce ammonia emissions to air and greenhouse gas emissions and to increase nitrogen uptake by crops. In Germany the Güllebest project (BMEL 2019-2021) will assess the advantages. A survey of farmers in Schleswig-Holstein showed high interest in acidification technologies.

More information about the Baltic Slurry Acidification project (Interreg) www.balticslurry.eu

Phosphorus and the food system

“Safe Operating Space” for livestock production in Europe



A [desktop study](#) by RISE-Foundation (Rural Investment Support for Europe think tank) presents the sustainability challenges for livestock production and for meat and dairy consumption in Europe. The EU currently has a human population of around 500 million people, 350 million livestock (cows, pigs, sheep, goats) and 1.6 billion poultry. The report examines both the benefits and negative impacts of livestock. Benefits mentioned are high-quality protein and minerals in food and valorisation of grasslands which cannot be efficiently farmed otherwise and which provide important landscapes and ecosystems. The negative impacts mentioned are in particular greenhouse gas emissions, phosphorus and nitrogen air pollution and eutrophication, biodiversity and soil deterioration related to animal feed crop production and negative health impacts from air emissions from livestock, anti-microbial resistance AMR (EU agriculture consumes twice as much antibiotics per kg of farm animal than the human population), cancer risk from overconsumption of red meat and processed

meat products, obesity, diabetes and heart disease. RISE indicates that “over-consumption” of meat is considerable, with 2/3 of EU Member States showing average consumption of more than twice recommended levels (NDR), whereas over-consumption of dairy products and eggs is less pronounced (only six Member States consumer >20% higher dairy than recommended levels). RISE conclude that technological improvement in livestock production can improve efficiency and reduce emissions, but that reductions in livestock numbers will also be necessary. The report estimates a “Safe Operating Space” (SOS) for livestock production in Europe. Based on direct climate emissions only (ignoring indirect emissions in animal feed crop production) a 74% reduction in EU livestock numbers would be needed to proportionally respect the 80% (2050) Paris Climate objective and a 65% reduction would be necessary to proportionally respect Planetary Boundaries for nitrogen. On the other hand, minimum livestock numbers to produce sufficient protein for a healthy diet are not calculated: “minimum” numbers of 40% for meat and 80% for dairy are based on the dietary recommendations for protein, but these could be achieved without animal protein. With non-intensive stocking rates (0.5 LSU/ha), the EU would only need around 1/3 of current livestock numbers to maintain grasslands. Proposed actions include an EU ‘Enquiry’ to define policy on livestock numbers and policy changes to achieve this, develop better data on livestock climate impacts, nutrient flows and biodiversity, support structural changes for farming (via CAP) and farm level indicators for GHG and nutrients.

“What is the Safe Operating Space for EU livestock?”, A. Buckwell & E. Nadeu, RISE Foundation, 13/9/2018 www.risefoundation.eu/publications

FReSH: business partnership for a sustainable food system



FReSH (Food Reform for Sustainability and Health) is a joint project between the [WBCSD](#) (World Business Council for Sustainable Development) and the [EAT Foundation](#) which aims to make transformative, science-based, systematic changes to the global food system to produce “healthy, enjoyable food for all, responsibly within planetary boundaries by 2030”. Partner companies include BASF, Cargill, Danone, DSM, Evonik, Google, Nestlé, Syngenta, Unilever, Yara and others. The project aims to start with the consumer, focusing on dietary shifts to define how the food system should change. Recent reports cover the “[True Cost of Food](#)” and “People, Planet, Protein”. According to this [report](#), currently in the UK, £1 spent by

consumers on food generates £0.5 health costs and £0.5 other externalities. FReSH conclude that True Cost Accounting (TCA) needs to be mainstreamed in business decision making, and implemented in policies through incentives and taxes. Nitrogen and phosphorus cycles are identified as environmental indicators. Reducing food waste, forest ecosystem markets, food product reformulation and dietary switch are identified as promising business opportunities. Gaps in data need to be addressed. Further work is needed to demonstrate a resilient business case for more balanced production and consumption of animal and plant based protein.

Sustainable Food Trust “The Hidden Cost of UK Food” 2017 www.sustainablefoodtrust.org/articles/hidden-cost-uk-food

The EAT Foundation is an initiative of the Wellcome Trust, the Stordalen Foundation and Stockholm Resilience Centre www.eatforum.org/about
FReSH (Food Reform for Sustainability and Health) www.wbcscd.org/Programs/Food-Land-Water/Food-Land-Use/FReSH

The food system and Planetary Boundaries

A modelling [study](#) assesses to what extent changes to the world food system may enable to respect Planetary Boundaries by 2050. It is estimated that “business as usual”, taking into account population and income changes, would cause an increase in the environmental impacts of the world food system of +50 to +90% by 2050. Planetary Boundaries assessed are greenhouse emissions, cropland use, bluewater use, nitrogen application and phosphorus application. The possible changes analysed are reductions in food waste, technology and a move to plant-based diets. Currently around 1/3 of world food production is estimated to go to waste: scenarios modelled reduced this by 50% (in line with UN Sustainable Development Goal pledges) and 75%. Technology scenario include increasing agricultural yields and nitrogen efficiency, 50% recycling rate for phosphorus and various bottom-up options. The diet change scenarios are based on healthy diet recommendations (300g red meat per week) or “flexitarian” diet (one serving red meat per week, half portion white meat and one portion dairy per day). Results suggest that

only a combination of all three management options could enable the food system to be within Planetary Boundaries for all four environmental aspects. The most important reduction in impact for greenhouse emissions is related to diet change, whereas for phosphorus the most important impact is from technology (e.g. phosphorus recycling) whereas diet change, in this model, only reduces phosphorus consumption by around 20%.

“Options for keeping the food system within environmental limits”, Nature 2018, M. Springmann, M. Clark, D. Mason-D’Croz, K. Wiebe, B. Leon Bodirsky, L.Lassaletta, W. de Vries, S. Vermeulen, M. Herrero, K. Carlson, M. Jonell, M. Troell, F. DeClerck, L. Gordon, R. Zurayk, P. Scarborough, M. Rayner, B. Loken, J. Fanzo, H. Godfray, D. Tilman, J. Rockström, W. Willett <https://doi.org/10.1038/s41586-018-0594-0>

Estimates of raw phosphorus consumption for different diets

Based on FAO-STAT and Quantis data, adjusted with other data sources and modelled with SimaPro, raw phosphorus consumption is **estimated** for typical US meat-, dairy- and plant-based diets. A meat-based diet is estimated to demand seven times more raw phosphorus input (1.4 MtP/year for the USA) than a plant-based diet, but this does not take into account possible recycling of phosphorus in manure, animal by-products or wastewaters. This is coherent with the figure of 29 Mt/y phosphate rock consumption for the USA. The study notes that eggs show very low raw phosphorus requirement for production.

“Phosphorus Impacts from Meat-, Dairy-, and Plant-Based Diets”, J. Schroeder, Consilience: The Journal of Sustainable Development, Vol. 18, Iss. 1 (2018), Pp. 17–35 www.consiliencejournal.org/article/phosphorus-impacts-from-meat-dairy-and-plant-based-diets

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