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New ESPP members

LIFE ENRICH: enhanced nitrogen and phosphorus recovery

The EU-funded LIFE project ENRICH (Enhanced Nitrogen and phosphorus Recovery in the value CHain), Sept. 2017 – Feb. 2021, will design, develop and implement integrated nutrient recovery and recycling in the sewage sludge recycling train of the Murcia Este municipal sewage works, Spain (500 000 p.e.) which operates biological phosphate removal. The project will include sludge elutriation to increase availability of soluble phosphorus and so increase the proportion of total sludge phosphorus recovered by struvite precipitation. Additionally are included ion exchange with zeolites (demonstrated high affinity for ammonium) combined with hollow fibre INPI membrane contactors for the recovery of ammonium salts, promotion of digested sewage sludge as a source of nutrients and organic carbon for agriculture, and optimised mixing of struvite – ammonium salts – digested sludge to correspond to agronomic requirements. The recovered products will be tested in field trials and a replicable business model will be developed. Membership of ESPP enables ENRICH to exchange experience with other relevant projects and companies (recycling technology suppliers, organic and mineral fertiliser industries and R&D centres) and to disseminate project results widely, both in Europe and worldwide, through ESPP's communication tools (eNews, SCOPE Newsletter, website, Twitter) and specialist networks and meetings.

ENRICH is led by Cetaqua www.cetaqua.com, the Suez – Barcelona Technical University, CSIC water technology research centre. Contact slopezp@cetaqua.com

Policy and media

Comments on Fertiliser Regulation criteria for struvite, ashes, biochars

The deadline for comment on the proposed criteria for authorising phosphate salts (inc. struvite), ash-based materials and biochars as components for European fertilisers has been pushed back. You are therefore invited to send any (further) comments to ESPP (info@phosphorusplatform.eu) by end August. Comments cannot be sent directly to JRC/European Commission, they must go via a STRUBIAS Group member, such as ESPP. The European Commission proposals for criteria for these three products are available at our ESPP [website](http://www.phosphorusplatform.eu). Please also send any comments on the ESPP proposed outline criteria for ash as an ingredient, to further processing to produce fertilisers, not covered in the STRUBIAS proposals (see ESPP [eNews n°13](http://www.phosphorusplatform.eu)). Document online at the same web page.

STRUBIAS and ash documents for consultation at www.phosphorusplatform.eu/regulatory Deadline for comments (to ESPP) end August.



Apply for ENRD Thematic Group on Sustainable Management of Water and Soils



The European Network for Rural Development (ENRD) announced the launch of a new Thematic Group (TG) on 'Sustainable management of water and soils' within the broader multi-annual ENRD priority of 'Supporting the transition to a green economy in rural areas'. This new TG will build upon the work carried out by the [TG on Resource Efficient Rural Economy](#). In this TG, over the past year key rural development stakeholders actively discussed means of support for the integration of resource efficient activities in

the implementation of rural development programmes, including topics such as soil, nutrients, carbon and water management (see [eNews n° 11](#) and final TG report pending). The new TG will further investigate how to improve rural development policy implementation. It will work through 2017 and the first half of 2018 with the aim of providing specific recommendations on how Rural Development Programmes (RDs) can best address issues related to water management, covering both its supply and quality, and soil management in agriculture as well as relevant aspects such as nutrient management plans. The new TG will bring together representatives of different stakeholder and beneficiary organisations, managing authorities and funding agencies, who will come together at regular intervals for four meetings and one final EU-level seminar. The first meeting of the group is planned for the **24th October 2017 in Brussels**.

If you are interested in participating in this new TG or wish to be kept informed, please contact kimovandijk@phosphorusplatform.eu, or register at <https://form.jotformpro.com/72183763410958> as soon as possible (preferably by 28th August 2017)

EU IMCO voted amendments EU Fertiliser Regulation revision

The EU Parliament lead Committee (IMCO) voted amendments to the EU Fertiliser Regulation revision proposed text are now [published](#) (see pages 5-136). These amendments will now go to Plenary in early October for final vote (before then going likely to conciliation with Member States Council). Further amendments (other than those voted by IMCO) can only be submitted to Plenary under certain conditions.

See our ESPP EU Fertiliser Regulation recast dossier at www.phosphorusplatform.eu/regulatory, for question and comments info@phosphorusplatform.eu

Chicago: waste to resource policy and action

A 10 page article by Debra Shore (Metropolitan Water Reclamation District of Greater Chicago – MWRD) presents the ecological geology and history of Chicago leading to current developments in moving from waste disposal to resource recovery. MWRD obtained from Illinois State in 2014 (Bill 4716) legal authorisation to sell recovered products and energy. The Ostara struvite Stickney wastewater treatment plant (see SCOPE Newsletter [n°124](#)) is presented, indicating that this US\$ 32 million investment (\$14 million more than for a chemical phosphorus removal upgrade) generates \$11 million net operating revenue for MWRD (compared to over \$25 million chemical costs if chemical P removal had been installed). Installation of anaerobic digestion at MWRD WWTPs aims to make the utility energy neutral by 2023, from a baseline \$50 million annual electricity bill. Challenges identified for such innovation are the "risk aversion" incited in US utilities by regulation which punishes failures and the lack of joint research and testing initiatives in the US.

"From waste treatment to resource recovery: A Chicago sustainability story", D. Shore, MRS Energy & Sustainability 2017 <http://dx.doi.org/10.1557/mre.2017.8>

Czech Republic sludge and waste regulation

The Czech Republic has adopted a new sewage sludge regulation 437/2016 requiring that by 2020 sludge has to be hygienised to demanding levels before land application. Low temperature drying or pyrolysis, for smaller wastewater treatment plants, and drying then combustion or gasification, for larger WWTPs, seem likely options. A new waste law is also under preparation which is expected to push towards resource recovery from sewage sludges. Some 60 million € of EU regional development Operational Program funds has been allocated this year and next to development in these areas. The Environment Ministry press statement mentions use of phosphorus recovery as an innovation to develop to reduce landfill (see [press release](#) 1/8/17) and the [call](#) specifies amongst eligible projects "construction / modernisation of heat treatment plants for sewage sludge ... including phosphorus recovery".

With thanks to Miroslav Kos, SMP CZ, for this input.

EU bio economy: 19 million jobs

The bio economy is [estimated](#) to represent €2.2 trillion annual turnover and 18.6 million jobs (9% of EU employment) in an overview by the European Commission's Joint Research Centre. Agriculture, food and beverages (inc. tobacco) made up ¾ of these jobs (51% in agriculture alone) and 2/3 of turnover. However, the EU lost 1.2 million jobs in farming from 2008 to 2014, and 200 000 jobs in food and beverages, this despite increases in turnover to both agriculture and food and beverages. Comparisons between member states show large differences in both relative importance of the bio economy to the national economy and in its labour productivity. ESPP reminds that the bio economy is largely dependent upon nutrient supply and thus sustainable nutrient stewardship.

"A systematic approach to understanding and quantifying the EU's bioeconomy", T. Ronzon et al., JRC, Bio-based and Applied Economics 6(1): temp1-17, 2017: <http://dx.doi.org/10.13128/BAE-20567>



Water industry positions on nitrates, detergents

EurEau, the European water industry federation, representing around half a million jobs in water provision and treatment across Europe, has [published](#) its positions on two current EU regulatory dossiers. The Federation expresses concern about proposed EU Parliament amendments to revise the Nitrates Directive to facilitate acceptance of recycled nutrient products from manure, stating that this "might create an issue for the protection of groundwater". [EurEau](#) is still working to avoid bad side effects of the proposed measure (see ESPP presentation of this question in SCOPE Newsletter [n°100](#)). EurEau also comments the current European Commission review of the 2004 [Detergents Regulation](#), which banned phosphates in domestic laundry and dishwasher detergents. EurEau states that this "reduced the load of phosphates to wastewater treatment plants [but this is not quantified] so reducing operating costs and facilitating implementation of biological phosphorus removal".

EurEau Newsletter n°15, June 2017 <http://eureauwaternews.tumblr.com>

Less than half of EU municipal bio waste is valorised

About 40 million t/y of municipal bio waste is composted or anaerobically digested (Eurostat, 2015 data) with rates ranging from <10 kg/person/year (e.g. Croatia, Czech Republic) to nearly 180 kg (Austria). [ECN](#) (European Compost Network) [estimates](#) that this means 59% of municipal bio waste goes to landfill or incineration, so losing 6 million t/y of organic matter, 30 000 t/y of phosphorus and 200 000 t/y of nitrogen. ECN calculates that this lost bio waste represents a potential to create around 50 000 jobs in Europe.

"Only 40% of the EU's municipal bio-waste is composted or digested", ECN News 2017/01 www.compostnetwork.info/wordpress/wp-content/uploads/170713_ECEN-NEWS-01_2017.pdf

Research

Nutrient Network NutNet: grassland nutrient research network

The Nutrient Network ([NutNet](#)) was initiated over 10 years ago to experimentally test the generality of fundamental ecological questions about how multiple limiting resources, including phosphorus, nitrogen and potassium, as well as herbivores, control grassland diversity and functioning. The NutNet is a "grassroots" collaboration of over 120 scientists, distributed across 100 sites and on 6 continents worldwide. The strengths of NutNet are the close collaboration and interdisciplinarity of its scientist members and that is a "distributed experiment" in that each site closely adheres to identical experimental design and sampling methodologies. Our results show that biodiversity, species invasions, and biomass production all depend on how phosphorus interacts with other nutrients like nitrogen and with herbivores. With 19 sites located in Europe, NutNet is pursuing regionally important global change problems such as the impacts of atmospheric nutrient deposition and temperature change on biodiversity and ecosystem functioning using state of the art technologies.

More information about NutNet see www.nutnet.org

Calcium phosphates reference work updated

All of S. Dorozhkin's to-date publications on calcium phosphate chemistry, applications and other information (see SCOPE Newsletter [n°102](#)) have now been revised and [published](#) in four books, with over 1500 pages, 200 figures and tables and 8100 references. The books cover hydroxyapatite and other calcium phosphates: history, ceramics, bio composite's, dental applications, crystallisation, chemistry and nano forms.

"Hydroxyapatite and other calcium phosphates" 1-4, S. Dorozhkin, Nova Science Publications (hardcover and ebooks) www.novapublishers.com/catalog/product_info.php?products_id=61821&osCsid=d736ddb5b7197b232a73b84ff785d4a

Pot trials of recovered phosphate products

Aarhus University has [published](#) preliminary results of barley pot trials (one growing season) of struvite and a number of recovered nutrient materials, comparing fertiliser effectiveness in three soils (with pH of 5.7-5.8) to that of soft phosphate rock (the only non-organic phosphate fertiliser currently allowed in organic farming) and triple super phosphate mineral fertiliser (TSP). The materials tested were struvite recovered from Aarhus sewage works by Suez [Phosphogreen](#) process, straw ash, straw and sludge pyrolysis ash, meat and bone meal, meat and bone meal biochar, composted organic waste sewage sludge from works using iron or aluminium salts for chemical phosphorusremoval, industrial sludge. Struvite showed 100-140% phosphorus plant availability (compared to TSP). Straw ash also showed high plant P availability (this is independent of the P content which was much lower) at 80-115%. Iron and aluminium chemical P-removal sewage sludges showed considerably lower P plant availability (-14 to -90%) as did soft rock phosphate (-10 to -20%). Biochars showed particularly variable P plant availability.

"Recirkulerede gødningssprodukter og deres P-virkning" (Recycled fertilizer products and their P-effect, fertiliser value of phosphorus is varied and is high for many products in sewage sludges, struvite, ashes, meat and bone meal, composted waste, biochar and industrial sludge), N. Christiansen et al. Plantekongres 2017 www.landbrugsinfo.dk/Planteavl/Plantekongres/Sider/plk_2017_res_72_1_nina_hoej_christiansen.pdf



Pot trials of struvite

Seven 5-day pot trials using rye (*Secale cereale*) in soil pH 5.1 compared NuReSys recovered struvite (from potato processing waste water) to compost in sewage sludge and to composted poultry litter. Rye biomass achieved was similar with struvite and the composts compared to single super phosphate. Incubation tests in soil were also carried out. The authors conclude that the phosphorus release and bioavailability of the struvite and compost's were similar to that of mineral fertiliser in these soil conditions.

"Bioavailability of phosphorus from composts and struvite in acid soils", C. Horta, *Revista Brasileira de Engenharia Agrícola e Ambiental* v.21, n.7, p.459-464, 2017 <http://dx.doi.org/10.1590/1807-1929/agriambi.v21n7p459-464>

Economic feasibility of struvite precipitation

Based on over 600 lab scale (pure chemical solution) struvite precipitation tests, chemical and investment costs are estimated for struvite phosphorus recovery in a modelled 500 m³/day struvite reactor. The authors conclude that a struvite sale price of around 500 €/tonne is needed to enable a payback period of 6 years. This does not however take into account possible benefits to sewage works operation such as nuisance deposit avoidance or improvements in sludge dewatering.

"Feasibility of struvite recovery process for fertilizer industry: A study of financial and economic analysis", K. Yetilmeszo et al., *J. Cleaner Production* 152 (2017) 88e102 <http://dx.doi.org/10.1016/j.jclepro.2017.03.106>

1.3 million US\$ project to reduce on-farm food waste

The Walmart Foundation, with WWF and the Foundation for Food and Agriculture Research (FFAR) have announced a 1.3 million US\$ project to work with farmers to identify possibilities to increase the proportion of crops which are harvested and delivered. It is currently estimated that 80% of the US's 63 million tonnes/year of food waste is lost in supermarkets, restaurants and homes, but there is a lack of data on crop losses so they may be underestimated. Initial focus will look at potatoes, tomatoes, lettuce and peaches. The aims are to improve farmers' bottom line as well as reducing food wastage, and so resource consumption.

"WWF, FFAR and Walmart Foundation Team Up with Team Up with Producers to Study Food Rescue Opportunities on Farms", 26 July 2017 www.worldwildlife.org/press-releases/wwf-ffar-and-walmart-foundation-team-up-with-producers-to-study-food-rescue-opportunities-on-farms

INPI: metrics for phosphorus sustainability

The International Plant Nutrition Institute (IPNI) outlines metrics for sustainable phosphorus management covering ecosystem services, stocks and flows, field phosphorus balances and phosphorus footprints. Such metrics are needed by the food industry, fertiliser producers and scientists. Ecosystem services related to phosphorus use include food, fibre and fuel production, carbon storage and water retention. Impacts of phosphorus use must also be taken into account: eutrophication and water quality. INPI note that phosphorus losses from well managed crop and pasture fields are only 0.2-5% per year and that there is no clear relation between phosphorus use efficiency and loss mitigation, but that soil phosphorus testing is essential for managing both. IPNI promotes the 4R method for field phosphorus management (Right Source, Right Rate, Right Time, Right Place).

"Metrics of sustainable phosphorus management", T. Bruulsema, IPNI, June 2017 [http://phosphorus.ipni.net/ipniweb/region/nane.nsf/01B2DE95D06B8C1E08525813B004DA51D/\\$FILE/Bruulsema%20C555%202017.pdf](http://phosphorus.ipni.net/ipniweb/region/nane.nsf/01B2DE95D06B8C1E08525813B004DA51D/$FILE/Bruulsema%20C555%202017.pdf)

LCA confirms interest of chicken litter to energy

A life cycle analysis compares combustion of poultry litter to produce electricity to other valorisation routes: co-burning in a biomass electricity plant, co-digestion, direct application to farmland, and various composting options. The overall conclusion is that combustion for electricity is the best environmental route if phosphorus and potassium are recycled as ash is sold as fertiliser (not the case for biomass co-burning). Direct application of poultry litter and application of digestate result in particulate emissions. Transport of the litter and/or resulting products is also a significant factor. The LCA was made by CE Delft for BMC Moerdijk, a plant co-owned by 600 poultry farmers (DEP Cooperative) burning 430 000 t/y of poultry litter in the Netherlands since 2008, producing 285 GWh of electricity and 60 000 t/y of ash.

"LCA of thermal conversion of poultry litter at BMC Moerdijk", 2017, CE Delft ref. 17.2H94.01 www.bmcmoerdijk.nl/en/impact.htm

Business Europe launches Circular Economy Platform

The European business configuration, Business Europe, has launched a "Circular Economy Industry Platform" to showcase business examples in practice, in particular how many jobs are created. The platform launch involved Jyrki Katainen, Vice President of the European Commission and Kestutis Sadauskas, Director for the Circular Economy and Green Growth at DG Environment. The website allows searching by sector and by country. Examples often include several partners/sectors/countries because the circular economy often involves industrial symbiosis. Regulatory challenges will be identified as well as information on policy initiatives and events. ESPP is working to include examples from our members and partners.

Business Europe Circular Economy Platform www.circular.eu

Cost assessment of phosphorus recovery

The [P-REX](#) (see SCOPE Newsletter [n°115](#)) project conclusions assessing costs of phosphorus recovery from wastewater have now been peer-reviewed [published](#). The study was based on investment and operating costs from nine different P-recovery processes operating at pilot or full-scale, taking into account side-effects on wastewater or sludge treatment. The paper concludes that struvite precipitation can cost -0.14€ (=profit) to 0.23€ (cost) per population equivalent, sludge leaching c. 2.5€ p.e. (note: the Budenheim process is not considered) and P-recovery from ash 0.3-3€ p.e. These costs mostly result in the price of recovered phosphorus significantly higher than mineral fertiliser prices (indicated as 1.6 €/kgP). Phosphorus recovery costs are estimated by the authors to represent <3% of total wastewater disposal costs.

"Cost assessment of different routes for phosphorus recovery from wastewater using data from pilot and production plants", A. Nättorp, K. Remmen & C. Remy, *Water Science & Technology* 2017 <http://dx.doi.org/10.2166/wst.2017.212>

Agenda

- 5 September, Brussels, ESPP stakeholders meeting on **EU Fertilisers Regulation** revision and **STRUBIAS** proposals (struvite, biochar, ash). Contact info@phosphorusplatform.eu if not already registered.
- 26 September, Porto, LIFE programme: funding opportunities & innovative solutions on wastewater treatment (EU Commission and EIP Water) www.docdroid.net/EN2eism/draft-agenda-life-event-eip-water-conference-28-07-2017.pdf
- 18-19 October, Basel, ESPP - Phos4You meeting of **nutrient recycling R&D projects**, technology supplier stands, and **R&D project consortium brokerage**, workshop on implementation of the new German and Swiss legislations requiring P-recovery from sewage www.nweurope.eu/phos4you
- 27-28 November, Eindhoven (NL), **ManuREsource 2017** – International conference on manure management and valorisation. Stakeholder discussion on processed manure in the EU Nitrates Directive. 29th November: site visits to manure processing installations www.manuresource2017.org
- 12 December, Brussels, **ESPP General Assembly 2017**, with IFOAM, on the **use of recycled nutrient products in organic farming**: implementation of EU Fertilisers Regulation, assessment of recycled products under EU Organic Farming Regulation, issues with contaminants, quality, safety, image and confidence. Register by email to ESPP info@phosphorusplatform.eu

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

ESPP Members

Up to date list of members: www.phosphorusplatform.eu/members

