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## Upcoming events

### Vermont Phosphorus Innovation Webinar 22 January 2019

Talk to finalists of the State of Vermont challenge for innovative systems for phosphorus (P) recovery from agricultural and wastewater discharges. With the North America Sustainable Phosphorus Alliance.

Registration at: [www.eventbrite.com/e/the-vermont-phosphorus-innovation-challenge-registration-5339388549?mc\\_cid=c70f572af6&mc\\_eid=f3b1b65a28](http://www.eventbrite.com/e/the-vermont-phosphorus-innovation-challenge-registration-5339388549?mc_cid=c70f572af6&mc_eid=f3b1b65a28)

### 9th International Phosphorus Workshop (IPW9): Abstract submission is open



“Putting phosphorus first? How to address current and future challenges”. The 9<sup>th</sup> International Phosphorus Workshop (IPW9) will take place at ETH Zurich, Switzerland, 8-12 July 2019. IPW brings together experts working on phosphorus in terrestrial and aquatic systems, both managed and (semi-)natural, including experts on phosphorus recycling. Expect participants are from universities and research institutions, government agencies, NGOs and industry from all around the world. IPW9's objectives are to: discuss concepts which drive research and use of phosphorus in our societies, review progress in knowledge and technology, define questions for future phosphorus-related research and actions. The conference will be structured in five interdisciplinary themes: (1) phosphorus scarcity; (2) optimizing regional and national phosphorus cycles; (3) sourcing phosphorus fertilisers; (4) efficient phosphorus use in agroecosystems; and (5) environmental phosphorus problems.

Abstract submission deadline: **15th January 2019** [www.plantnutrition.ethz.ch/ipw9/abstract-submission.html](http://www.plantnutrition.ethz.ch/ipw9/abstract-submission.html)  
Website [www.ipw9.ethz.ch](http://www.ipw9.ethz.ch)

### Save the date: ESPC4

The 4th European Sustainable Phosphorus Conference is fixed for Vienna, 15-17 June 2020

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

## ESPP General Assembly

### ESPP developments and projects



ESPP's annual General Assembly took place in Brussels, 4<sup>th</sup> December 2018. Membership of the Platform is slowly growing, reaching 44 [members and partners](#) end 2018. Important actions in 2018 included ongoing [work](#) pressing for adoption of the EU Fertilisers Regulation, the 3<sup>rd</sup> European Sustainable Phosphorus Conference ([ESPC3](#), with BSAG, Helsinki, June 2018, summarised in SCOPE Newsletter [n°127](#)), [promoting](#) inclusion of nutrients in the Horizon Europe R&D programme and enhancement of ESPP's role as a hub of information, with the SCOPE Newsletter [n°128](#) summarising key recent science publications addressing phosphorus sustainability. Priority actions defined for 2019 include: continuing action on the EU Fertilisers Regulation (guide to implementation, accompanying standards, implementation of STRUBIAS proposals ...), EU SafeManure project, Common Agricultural Policy (FaST Farm Sustainability Tool for Nutrients), EU water policy revision, struvite

REACH dossier update and Sweden proposed P-recycling legislation. ESPP's Board was renewed with Ludwig Hermann (Promann), President, Anders Nättorp (FHNW), Secretary, Jean-Christophe Ades (Kemira), Secretary, Andrea Gysin (Thames Water), Antoine Hoxha (Fertilizers Europe) and Kristy Blakeborough-Wesson (Saria).

More information about ESPP activities and membership [www.phosphorusplatform.eu/platform/about-esp](http://www.phosphorusplatform.eu/platform/about-esp)

### ESPP dialogue on agricultural valorisation of sewage biosolids



After the General Assembly (see above), ESPP organised a one day [dialogue meeting](#) between scientists, stakeholders and ESPP members and partners on questions around the use of sewage biosolids in agriculture. This will be presented in detail in a future SCOPE Newsletter. In conclusion, it is clear that different stakeholders, industries and countries have widely varying positions. On the one hand, there are concerns about the proven presence of different contaminants, which the "precautionary principle" suggests to not disseminate. However, there seems to be no evidence that these contaminants pose significant risk to health or to the environment where sewage biosolids are appropriately managed (this should include monitoring zinc and copper, and limiting spreading as a function of their levels if necessary). Accumulation of contaminants or leaching to groundwater should also be avoided, including heavy metals, organic contaminants and

microplastics. On the other hand, agricultural valorisation of sewage biosolids offers benefits: recycling of phosphorus, nitrogen and other nutrients; return of carbon to soil, and is cost-effective for both taxpayers and farmers.

Technical phosphorus recovery processes enable recycling of phosphorus without release of contaminants to the environment, so ensuring depollution and safety. Most participants however agreed that there is no one best solution: different options for sewage biosolids management fit different local contexts. Thermal valorisation responds to the needs of regions with low agricultural demand, for example densely urban areas and regions with significant supply of animal manures. In countries with high agricultural demand, farmland application of biosolids under strict quality control conditions can enable nutrient and organic carbon recycling.

Anaerobic digestion of sewage biosolids is effective for energy recovery, as well as sanitising and stabilising sewage sludge, and some phosphorus recovery processes, such as struvite precipitation, are compatible with both thermal sludge valorisation or agronomic application of biosolids organic content. Many of the contaminants which currently generate concerns in sewage sludge are also found in animal manures and other organic secondary materials (in particular pharmaceuticals and antibiotic resistance genes). Further research and monitoring are strongly needed, including into improving organic contaminants removal in biosolids treatment, optimisation of energy recovery, and development and implementation of nutrient recovery processes. In all cases, the priority should be reduction at source and preventing that contaminants enter municipal sewage.

It was underlined that a strong point of ESPP is to bring together in dialogue a heterogeneous range of industries and stakeholders. ESPP should not promote a particular route or technologies for sewage biosolids management and phosphorus recycling, but should promote the advantages of different approaches appropriate to different regional contexts, subject in all cases to quality control, transparency and to effective nutrient recycling.

Meeting presentation slides are available (soon) at [www.phosphorusplatform.eu/activities/conference/meeting-archive/1788-essp-meeting-sludge-2018](http://www.phosphorusplatform.eu/activities/conference/meeting-archive/1788-essp-meeting-sludge-2018)

## Regulatory

### EU Fertilisers Regulation approved by Member States

The trilogue agreement on the EU Fertilisers Regulation was [approved](#) by Member States' representatives in Council on 12<sup>th</sup> December. It now goes to formal validation by the European Parliament and Council, before publication. ESPP understands that trilogue fixed then a three year implementation period before entry into force. The European Commission [press release](#) underlines that 'national' fertilisers and mutual recognition of these will continue after implementation of the new Regulation, so offering two different possible routes for producers and farmers. The Commission estimate that 30% of mineral phosphate fertilisers in Europe could be replaced by phosphorus recycling. According to our information, the [agreement](#) reached maintains the Commission mandate to modify the annexes of the new Regulation by 'comitology'. This means that the STRUBIAS materials (recovered phosphate salts, ash based materials, biochars) can be added into the Regulation rapidly after its adoption. The JRC final STRUBIAS report proposing criteria is expected end 2018, then the Commission will hopefully rapidly consult Committees and write into a modification of Annex II (CMCs).

European Commission press release "Circular Economy: Agreement on Commission proposal to boost the use of organic and waste-based fertilisers" IP/18/6161 [http://europa.eu/rapid/press-release\\_IP-18-6161\\_en.htm](http://europa.eu/rapid/press-release_IP-18-6161_en.htm)  
Council press release [www.consilium.europa.eu/en/press/press-releases/2017/12/20/eu-fertilisers-council-agrees-terms-of-mandate/#](http://www.consilium.europa.eu/en/press/press-releases/2017/12/20/eu-fertilisers-council-agrees-terms-of-mandate/#)  
Text of regulation with changes, as agreed in trilogue <http://data.consilium.europa.eu/doc/document/ST-15103-2018-INIT/en/pdf>

### EU consultation on circular product policy



The European Commission has opened a [public consultation](#) to 24<sup>th</sup> January 2019 on product policies relevant to the Circular Economy. Questions in the consultation address, amongst others, restrictions of amongst others, hazardous substances, safety standards, waste legislation, GPP (Green Public Procurement), the EU EcoLabel, environmental footprints and environmental information. Specific sections address electrical and electronic equipment, furniture, textiles and toys but food and drink products are also indicated as a possible priority target for action, because of the high volumes. The consultation is intended for response from individuals, rather than organisations.

EU public consultation "Towards an EU Product Policy Framework contributing to the Circular Economy", **open to 28 January 2019**  
[https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2018-2409307/public-consultation\\_en](https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2018-2409307/public-consultation_en)

### CEN report on standards for chemicals for the Circular Economy



The European Standards Organisation (CEN/CENELEC) has circulated the final [report](#) of the NEN/BTWG11 working group into standards needs for sustainable chemicals for the Circular Economy. ESPP has followed this work. Although nutrients are partly 'excluded' because already covered by the new EU Fertilisers Regulation proposal, the report does cover cycling of biomass by recycling or by degradation to produce nutrients to feed new biomass production. Recommendations for standards needs include the need to develop "Standardised methodology for calculating recycled content" (following proposal of ESPP amongst others) and a "Standard with criteria on properties of relevance for End-of-Waste, such as thresholds of contaminants". Other recommendations include research into identification of product additives which hamper recycling and establishment at

CEN/CENELEC of a mechanism to identify standards that exclude recycled materials. ESPP commented during the report development process that Critical Raw Materials are not well taken into account, but CEN considered this to be "out of scope" of this report. CEN however notes that the Ecodesign Mandate M/543 includes two relevant standards projects: prEN 45557 'General method for assessing the proportion of recycled material content in energy related products' and prEN 45558 'General method to declare the use of critical raw materials in energy related products'. ESPP regrets that CEN did not finally recommend to widen the latter to other product types. Also, prEN 45558 only addresses the content of Critical Raw Materials (CRMs) actually present in products, and does not consider 'indirect' CRM consumption (used upstream in the production chain, but not longer present in the final product).

CEN prEN 45557 and prEN 45558 proposals of 2017 submitted to final vote 28/12/2018 [www.iec.ch/dyn/www/f?p=103:182:11962059414905](http://www.iec.ch/dyn/www/f?p=103:182:11962059414905)  
Draft texts available here [www.eera-recyclers.com/files/cen-clc-tc10sec132dc-secr-enquiry-pren45557-recycled-material-content.pdf](http://www.eera-recyclers.com/files/cen-clc-tc10sec132dc-secr-enquiry-pren45557-recycled-material-content.pdf) and here [www.eera-recyclers.com/files/cen-clc-tc10sec126dc-secretary-enquiry-pren45558-use-of-critical-raw-materials-2.pdf](http://www.eera-recyclers.com/files/cen-clc-tc10sec126dc-secretary-enquiry-pren45558-use-of-critical-raw-materials-2.pdf)  
CEN-CLC/BTWG 11 'Sustainable Chemicals' [www.cencenelec.eu/news/brief\\_news/Pages/TN-2018-023.aspx](http://www.cencenelec.eu/news/brief_news/Pages/TN-2018-023.aspx)

## EU consultation open on water policy

A public EU consultation is open to 4th March 2019 "Fitness Check of the Water Framework Directive and the Floods Directive". You can provide your input via [https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2017-5128184/publicconsultation\\_en](https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2017-5128184/publicconsultation_en)

## FaST: Farm Sustainability Tool for Nutrients

ESPP proposes to support the European Commission's [proposal](#) that all farmers should inform a nutrient balance (inputs in fertilisers, crop remains, other amendments; offtakes in crops), included in the proposals for the new CAP (Common Agricultural Policy) as FaST - Farm Sustainability Tool for Nutrients. Some regions already have such systems, but others do not: for example, only around half of United Kingdom farmers have in place a nutrient balance (Achim Dobermann, Rothamsted, IFS Conference, 6/12/18). The Commission's FaST proposal includes development of a smart phone tool, made available to farmers, which will provide information on applicable regulations and enable entry of nutrient data, field by field, as well as enabling coherent data reporting. Member States and farmers will also be able to use other existing tools to enter their nutrient balance, subject to reporting compatibility. ESPP is asking the European Parliament and Member States to maintain the FaST nutrient tool in the new CAP as a mandatory condition for farmers receiving EU subsidies. **Stakeholders wishing to support this position are invited to contact ESPP.**

European Commission presentation of FaST (Farm Sustainability Tool for Nutrients)  
[www.oecd.org/tad/events/The%20Farm%20Sustainability%20Tool%20for%20Nutrients.pdf](http://www.oecd.org/tad/events/The%20Farm%20Sustainability%20Tool%20for%20Nutrients.pdf)

## ESPP input for Industrial Emissions Directive evaluation

The EU Industrial Emissions Directive, which evolved from the IPPC Directive and others in 2010, specifies 'BAT' (Best Available Techniques) which must be implemented in all concerned installations in Europe. This concerns some 50 000 sites in Europe: including manufacturing, waste treatment, large poultry and pig farms, food and beverage industry plants. The European Commission has [announced](#) an evaluation of the IED Directive in 2019, to coincide with the Commission's second implementation report of the Directive. The Commission organised a public consultation on the content and objectives of this evaluation. ESPP's input noted the need to make the BAT documents pragmatic and applicable by national authorities, to streamline the BAT update process to ensure that the documents are up to date, and to better take into account the Circular Economy and Critical Raw Materials in BAT definitions.

Commission first IED implementation report 2017, COM(2017) 727 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017DC0727&from=EN>

## Dialogue and data

### ENRD call for examples on rural bioeconomy initiatives



The Thematic Group on [Mainstreaming the Bioeconomy](#) of the European Network for Rural Development (ENRD) [calls](#) for examples on rural bioeconomy initiatives. ENRD is looking for examples of small- and medium-size businesses in rural areas, social enterprises, or any public or private initiatives that contribute to the development of rural bioeconomy value chains and clusters. **Please share your experience through this [on-line questionnaire](#) before 31 January 2019.** Collected cases will contribute to an inventory of European initiatives on rural bioeconomy through which you and any other interested stakeholders can learn about concrete experiences and tested

approaches. The results will be published through the ENRD Rural [Bioeconomy portal](#), ENRD publications, and they will also provide material for the analysis of lessons learnt on promoting rural bioeconomy value chains that will be published in 2019. It might be a good idea to read all the questions provided in [this](#) pdf document before starting to fill in the on-line version, to be sure you have the answers at hand. If you have any doubt whether your project fits into the scope of the survey, please ask ENRD at [bioeconomy@enrd.eu](mailto:bioeconomy@enrd.eu)

On-line questionnaire, **open to 31 January 2019** <https://www.surveymonkey.com/r/K8J5CCQ>  
Webpage of the ENRD Thematic Group on Mainstreaming the Bioeconomy [https://enrd.ec.europa.eu/enrd-thematic-work/greening-rural-economy/bioeconomy\\_en](https://enrd.ec.europa.eu/enrd-thematic-work/greening-rural-economy/bioeconomy_en)

### Survey of current resource recovery in North America's wastewater facilities



The Water Environment Federation (WEF) has [published](#) data on current levels of water and resource recovery in North America wastewater treatment plants (WWTPs). This is based on a survey to which some 126 WWTPs responded, representing around 1/5 of US and Canada total sewage. Returns indicate that less than 7% of water is reused, a majority of which for irrigation. From the total

6.7 million tonnes/year (dry matter) of biosolids generated by the respondent WWTPs, just over 50% is considered by WEF to be "recovered" (land application or composting) and 14% is incinerated. Of 319 000 tP/y of phosphorus entering the respondent

WWTPs, that is an average wastewater influent concentration of 7 mgP-total/l corresponding to a per capita load of 2.6 gP/day. EPA data indicates that phosphorus removal has significantly increased over the last decade. Of the influent phosphorus, 48% is lost in WWTP discharge effluent, 19% is “recovered” via “beneficial use of biosolids”, 23% is lost in non-beneficial biosolids disposal, and only very small amounts (1%) are recovered via irrigation or via technical phosphorus recycling (struvite fertiliser production). For nitrogen, the recovery figures are much lower: 81% lost in effluent discharge, 8% lost to the atmosphere in the sewage treatment process and only 11% “recovered” (9% biosolids use, 2% irrigation). WEF estimates that only 40% of the biogas production potential of wastewater is realised. Other potential energy recovery routes, such as thermal or potential fuel derivation, are not considered.

WEF (Water Environment Federation) Baseline Data to Establish The Current Amount Of Resource Recovery from WRRFs, WSEC-2018-TR-003, September 2018 [www.wef.org/globalassets/assets-wef/direct-download-library/public/03---resources/WSEC-2018-TR-003](http://www.wef.org/globalassets/assets-wef/direct-download-library/public/03---resources/WSEC-2018-TR-003)

## Manure pharmaceuticals found in waters across Europe

A [report](#) by Greenpeace Germany presents analysis of water from 29 rivers and canals in 10 EU Member States in regions with intensive livestock production, one sample from each site taken in June or July 2018. Veterinary pharmaceuticals were detected at 80% of these sites (concentrations not specified) and pesticides at all of them (104 different pesticides detected). Four veterinary antibiotics were found at 40-60% of the sites (dicloxacillin, sulfamethoxy-pyridazine, sulfaquinoxaline, cloxacillin) and eight other veterinary antibiotics were found at one or more sites. Nitrate levels were below the EU limit of 50 mg/l and phosphorus was rarely detectable, possible because of dry conditions in the sampling period. Greenpeace are calling for an end to EU subsidies to intensive livestock production in the new CAP (Common Agricultural Policy).

“Dirty Waters” “Wie Massentierhaltung Flüsse in Europa verschmutzt”, Greenpeace Germany  
[www.greenpeace.de/sites/www.greenpeace.de/files/publications/181129-greenpeace-report-dirty-waters-deutsch.pdf](http://www.greenpeace.de/sites/www.greenpeace.de/files/publications/181129-greenpeace-report-dirty-waters-deutsch.pdf)

## Yverdon conference on phosphorus recycling



A conference organised by the Swiss phosphorus recycling [network](#) and the Swiss Water Association (VSA) at Yverdon, 9<sup>th</sup> November 2018, brought together around 120 participants from public bodies, technology suppliers and water engineering to discuss phosphorus recycling. The Swiss Federal office for the Environment (FOEN) will develop with VSA a concept for recycling for Switzerland “Swiss Phosphorus”, with the intention of defining infrastructure needs, markets for the recovered phosphorus products, and funding requirements. Seven phosphorus recovery processes under development were [presented](#): Phos4Life, ZAB, EuPhoRe, PyroPhos, Sepholix, Extraphos and Veolia Lille.

Conference presentation slides can be found at [http://pxch.ch/fr\\_downloads.html#fr\\_yverdon](http://pxch.ch/fr_downloads.html#fr_yverdon)

## Manure in intensive livestock production regions

Two regional workshops “Manure in a Circular Agricultural System” in Eindhoven, (The Netherlands) and Osnabrück Melle (Germany) enabled scientists, farmers organisations, industry and regulators to discuss challenges to manure processing and recycling in intensive livestock regions. The meetings are organised by North-Brabant Province, aim to identify actions to facilitate manure nutrient recycling and valorisation of recycled nutrient products from manures. Challenges identified include (1) the negative image of intensive livestock production which can impact acceptance of manure-derived recycled fertiliser products, (2) difficulty in assessing expected impacts of regulatory changes concerning farm nutrient management, (3) tracking of manure management legislation implementation, and (4) quality certification of products processed from manure. These challenges accentuate difficulties for investment, funding and acceptability of costs to farmers, posing obstacles to the long-term goal of circularity. Noord-Brabant will propose a follow up on these workshops, taking into account the conclusions and the input from participants and from other regional governments.

Contact details Frank van der Ven [FvdVen@brabant.nl](mailto:FvdVen@brabant.nl)

## ACI Mineral Fertilizer Summit

ESPP was invited to present At the ACI [European Mineral Fertilizer Summit](#), Amsterdam, 28-29 November, opportunities of the Circular Economy and related regulatory developments for the fertilisers industry. ESPP [summarised](#) the new EU Fertilisers Regulation (pending adoption), EU water policy (evaluation of the Water Framework Directive open to [public consultation](#) to 4<sup>th</sup> march 2019), EU SafeManure study, Critical Raw Materials and national phosphorus recycling legislations now in place or under discussion in EU Member States. Isidrao Campos of the European Commission presented the FaST (Farm Sustainability Tool for Nutrients) proposed in the Common Agricultural Policy (CAP) revision (see ESPP eNews n°25) which would ensure that farmers across Europe define and implement balanced fertilisation (complete nutrient budgets). A Commission feasibility study for FaST is underway and should conclude early 2019, leading to wide communication of the project in February-March. Michael Wendolowski, Fertilizers Europe, presented the European industry’s vision for ‘Green Ammonia’ and for knowledge-based improvement of farming efficiency (see below). Other speakers underlined the importance of organic carbon in soil and of improving nutrient efficiency, including by developments of biostimulants.

European Mineral Fertilizer Summit, Amsterdam, 28-29 November 2018 [www.acie.eu](http://www.acie.eu)  
ESPP presentation [www.slideshare.net/NutrientPlatform/the-eu-fertilisers-regulation-why-it-is-important-for-the-circular-economy-aci-european-mineral-fertilizer-summit-amsterdam-2829-november-2018](http://www.slideshare.net/NutrientPlatform/the-eu-fertilisers-regulation-why-it-is-important-for-the-circular-economy-aci-european-mineral-fertilizer-summit-amsterdam-2829-november-2018)

## Austria national phosphorus recycling policy objectives

Hubert Grech (Austrian Ministry for Sustainability and Tourism), at the [ÖWAV Sewage Sludge Conference](#) (see below), presented the Austrian Federal Waste Management Plan 2017 (part of the national Agenda for Sustainable Development 2030). In Austria, more than 50% of the sewage sludge is today incinerated, 20% is applied to cropland and less than 30% are used for other purposes like composting and landscaping. The Austria Government Programme 2017-2022 includes (page 173) commitments to the Circular Economy, including a “zero waste” vision with maximum recovery from all products and wastes. Actions to develop innovative resource management specify “phosphorus recovery” as an example. The Waste Management Plan stipulates that by 2030 phosphorus should be recovered from 65-85% of sewage sludge. This should be achieved by incineration and recovery from ash or by precipitation of phosphorus (P) from sludge or from P-rich effluents after sludge dewatering with a minimum recovery rate of 45%. Operators of larger wastewater treatment plants (>50,000 PE) are encouraged to start soon planning P recycling activities. Sewage sludge ash will be registered as “non-hazardous” waste under a specific code number.

ÖWAV Klärschlammtagung, Vienna, 15-16 November 2018

[www.deutsche-phosphor-plattform.de/veranstaltung/oewav-klaerschlammtagung-2018](http://www.deutsche-phosphor-plattform.de/veranstaltung/oewav-klaerschlammtagung-2018)

## ÖWAV Sewage Sludge Conference

Some 250 participants discussed sewage sludge use in agriculture, drying, sludge quality, sludge incineration and phosphorus (P) recycling at the biannual Austria Waste and Water Management Federation [Sewage Sludge Conference](#), Vienna, 15-16 November. Austrian P recycling policy objectives were presented (see above). Lukas Egle (Vienna City) presented the city's sludge strategy (Vienna operates the only sludge mono-incinerator in Austria) including the different recycling options using ash as starting material. Processes for P recovery from ash were presented by Phos4Life AWEL Zürich (Leo Morf) and Tetraphos Hamburg (Hendrik Schurig). Wolfgang Hofmair (Borealis) explained the company's products, network and sustainability strategy, including the use of recovered materials. He focused on the advantages of P water solubility, on the need for precision agriculture and on the extended, decentralised warehouse facilities necessary for the fertiliser business. Finally, Lukas Egle presented the ÖWAV Expert Paper on the Critical Resource Phosphorus. He led the working group which developed this paper, with 18 experts from science and practice and from different Austrian stakeholders, summarising relevant aspects for the future P recycling in Austria.

ÖWAV Klärschlammtagung, Vienna, 15-16 November 2018

[www.deutsche-phosphor-plattform.de/veranstaltung/oewav-klaerschlammtagung-2018](http://www.deutsche-phosphor-plattform.de/veranstaltung/oewav-klaerschlammtagung-2018)

## Fertilizers Europe vision to 2030



Celebrating 30 years of existence, Fertilizers Europe has published a 60 page [report](#) outlining the federation's vision for the fertilisers industry in Europe in 2030. Today, the European fertilisers industry generates 78 500 jobs and invests some 1.3 billion euro per year (compared to 11 billion € turnover). Fertilizers Europe expects mineral fertiliser demand in Europe to be stable but that the nitrogen fertiliser industry could change radically, with the development of “green ammonia”, produced using renewable electricity rather than natural gas, as an energy vector, considerably easier and more cost-effective to transport and to store than hydrogen. This could lead, in the longer term (2050 and beyond), to the creation of new ammonia production plants in Europe, reversing decades of capacity contraction. Concerning fertiliser use, Fertilizers Europe cites Wageningen

University, stating that without nitrogen fertilisers, agriculture could only feed just over half of the world's current population. Fertilizers Europe's vision for 2030 is for an industry based on supporting the professional farmer, focusing increasingly on nutrient efficiency, with increased knowledge per hectare (smart farming, data, on-farm technologies, targeted multi-nutrient fertilisers, innovation in new plant types and agronomic understanding), environmentally proactive (ahead of regulatory pressure on eutrophication and on air emissions) and developing the circular economy. This will be possible by development of performance and specialist fertiliser products, accompanied by decision support tools for farmers, combined with low carbon emissions production (renewable energy based ammonia and carbon storage). To support this vision, Fertilizers Europe calls for a policy framework ensuring a global level playing field and an attractive EU context for investment, support for knowledge build-up in European farming, for transition to decarbonisation and for the Circular Economy, and for practical applications in Research and Innovation funding.

“Feeding Life 2030. The European fertilizer industry at the crossroads between nutrition and energy”, 21 November 2018

[www.fertilizerseurope.com/feeding-life-2030](http://www.fertilizerseurope.com/feeding-life-2030)

## Innovation and success stories

### WETSUS Netherlands in USA phosphorus prize final stage



ESPP member [WETSUS](#) (European centre of excellence for sustainable water technology, The Netherlands) is one of the four finalists announced 24<sup>th</sup> October 2018 for the [George Barley Prize](#) (Everglades Foundation), USA, last challenge phase. The 10 million US dollar prize aims to identify and demonstrate a technology capable of removing and recovering phosphorus (P), in varying climate conditions, from dilute environmental waters such as rivers, lakes or drainage ditches. In previous prize phases, nine pilot phase projects (see ESPP [eNews n°9](#)) were selected from around 100 dossiers submitted, with WETSUS already being awarded a 25 000 US\$ prize as stage 1 winner, plus now 50 000 US\$ as winner of stage 2. These pilots were invited to test for 90 days at Holland Marsh, near Toronto, Canada, from February to May 2018. Based on the experience and results of these pilot tests, the four finalists are now invited to test their technology full scale (treating up to

9 400 m<sup>3</sup> of water per day) at Lake Jesup, near Orlando, Florida. The inflow water for the tests had concentrations in the range 0.2 - 1 mg P-total/L, of which around 70-80% soluble phosphorus. The [four finalist](#) processes are:

**WETSUS NaFRAd** (Natural Flocculation Reversible Adsorption): particulate phosphorus is captured by biodegradable biofloculants and filtration, soluble phosphorus is captured in an iron-oxide based adsorbent bed which can be regenerated using sodium hydroxide. By dosing calcium to the regeneration liquid, calcium phosphate can be recovered. In the 90 day tests, phosphorus was removed down to an average of 0.04 mg P-total/L (0.016 mg P-total/L) at low flow conditions, and 0.08 mg P-total/L (0.039 mg P-total/L) at three times higher flow. During the 90 day test, two regenerations were carried out. Calcium phosphate recovery was not yet generated because this would require more regenerations.

**US Geological Survey (USGS Leetown)**: phosphorus adsorption using mine waste ochre (iron oxide based) with regeneration of the ochre using sodium hydroxide, and then precipitation of calcium phosphate for recycling. Results not disclosed.

**University of Idaho, Clean Water Machine** (previously called Team blueXgreen): reactive filtration using iron salts, biochar (from agriculture or forestry greenwaste) and ozone. It is claimed that the resulting phosphorus-enriched biochar can be used as a fertiliser, however it seems likely that most of the phosphorus will be reacted with the iron salts and it is not specified how it can then be separated or recovered. Results not disclosed.

**Green Water solution Inc**, Wellington, Florida, [BioPhree](#): phosphorus adsorption onto proprietary BioPhree adsorbents (after e.g. sand filter to remove solids), then regeneration with a lightly alkaline solution to recover a phosphorus-containing solution followed by a separation process to concentrate the phosphorus solution and reusable regenerate. This technology was not amongst the fifteen finalists of stage one of the Barley Prize but started participating in phase two. In the 90 day tests, phosphorus was removed down to an average 0.035 mg P-total/L and 0.012 mg P-total/L, and around 90 % of removed phosphorus was recovered as a liquid concentration of phosphorus and DOC with levels of contaminants compatible with use as a fertiliser or as feed for Algae production processes.

A runner-up technology is also cited in the Barley Prize media materials. **ZeroPhos, Nanjing University, China**: lanthanum-III oxide based – polymer held composite ion-exchange adsorbent to remove phosphorus, which is then recovered by regeneration of the adsorbent (using non sodium hydroxide – salt solution) and precipitation of phosphate. In the 90 day tests, phosphorus was removed down to an average of 0.08 mgP<sub>total</sub>/l and 0.03 mgP<sub>ortho</sub>/l, and around 80% of removed phosphorus was recovered as calcium phosphate. For further information read [Zhang et al.](#) on Enhanced Phosphate Removal by Nanosized Hydrated La(III) Oxide Confined in Cross-linked Polystyrene Networks”.

Barley Prize press release 24<sup>th</sup> October 2018 [www.barleyprize.org](http://www.barleyprize.org)  
Final four finalists for the last phase [www.barleyprize.org/final-four](http://www.barleyprize.org/final-four)  
Further details of the above processes in ESPP [eNews n°9](#)

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