

# European perspectives on phosphorus management

Chris Thornton - European Sustainable Phosphorous Platform

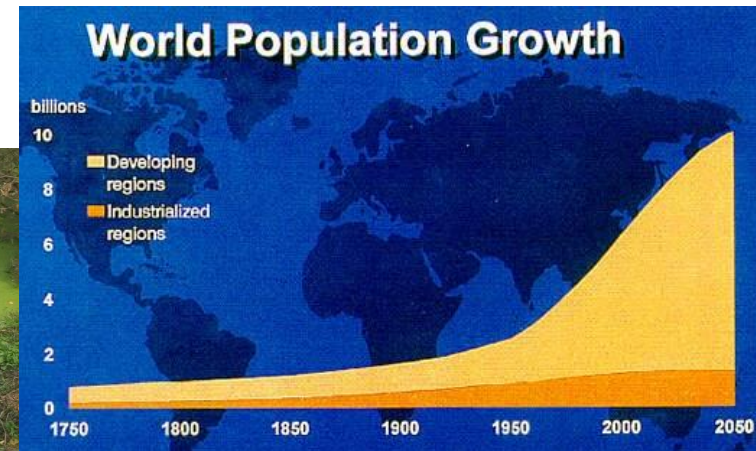
[info@phosphorusplatform.eu](mailto:info@phosphorusplatform.eu)

[www.phosphorusplatform.eu](http://www.phosphorusplatform.eu)

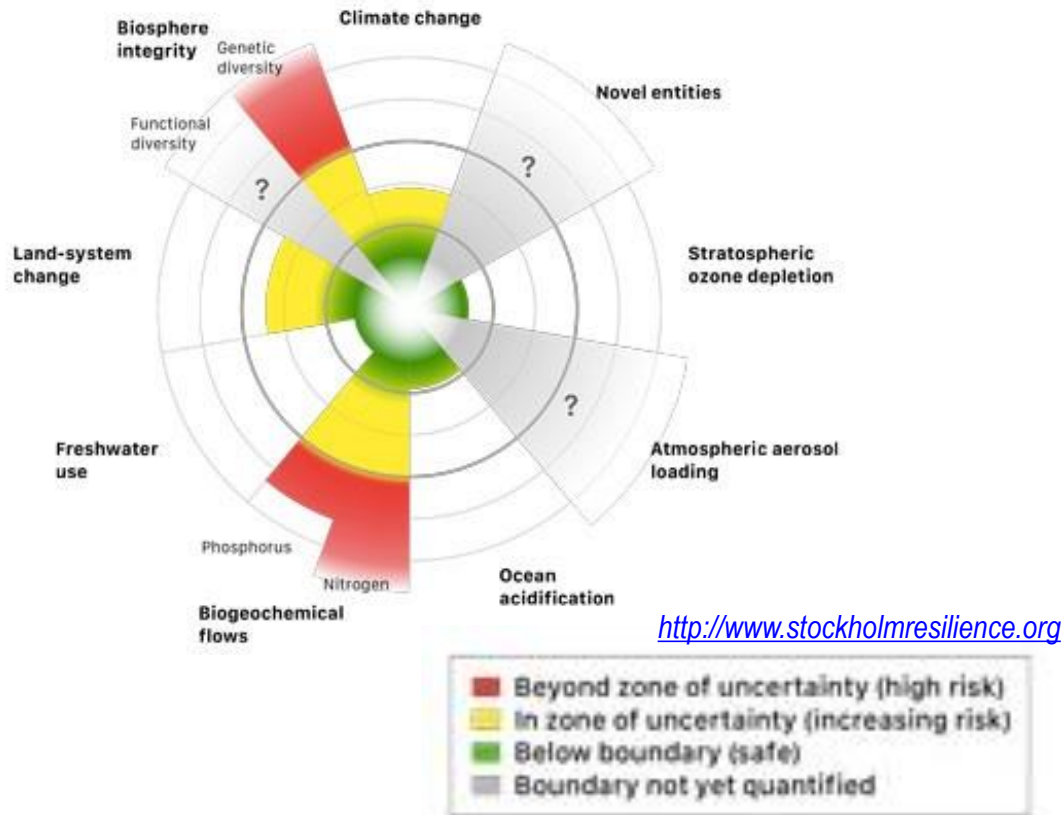
[@phosphorusfacts](https://twitter.com/phosphorusfacts)



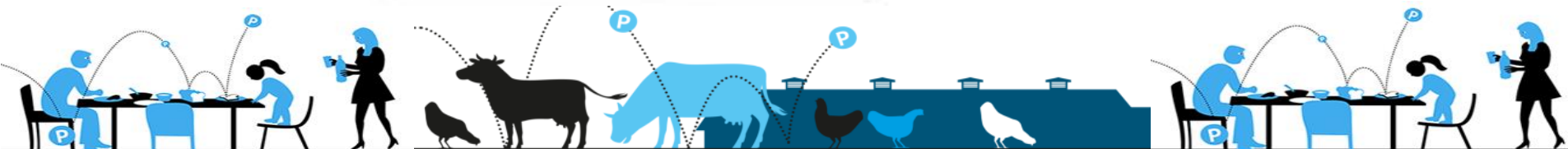
# *Drivers for sustainable phosphorus management*

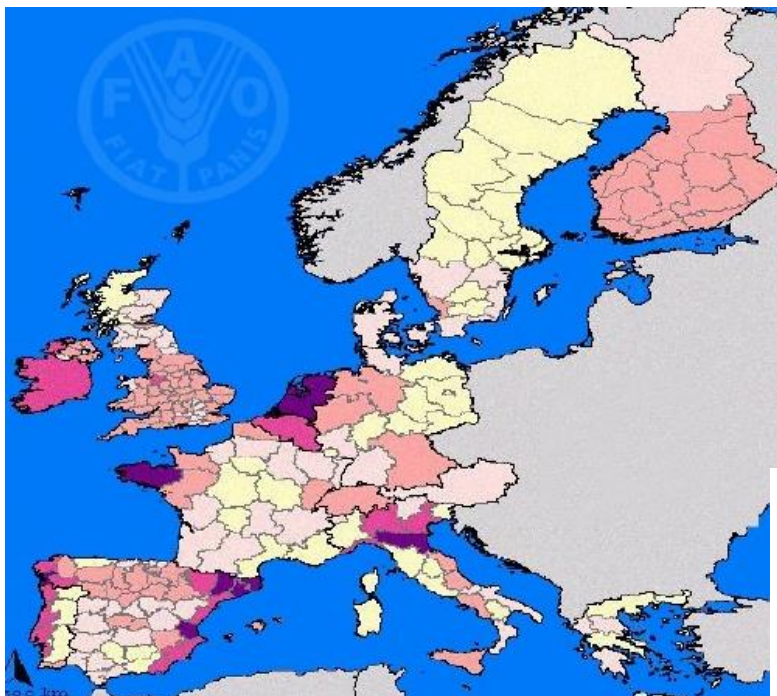


# Environmental drivers



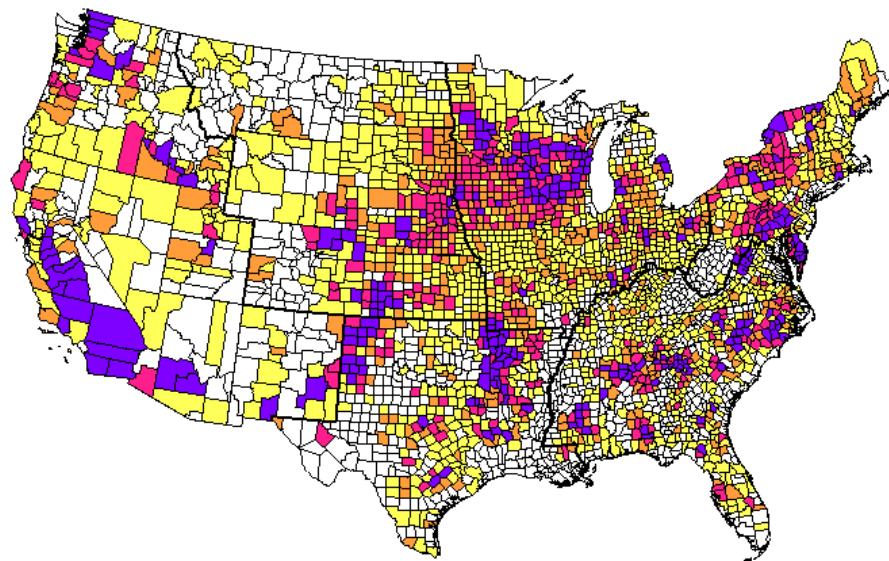
Baltic Sea eutrophication, source WWF





Europe: P balance agricultural land, LEAD FAO 2002

USA: Manure N production from confined livestock, USDA 1982



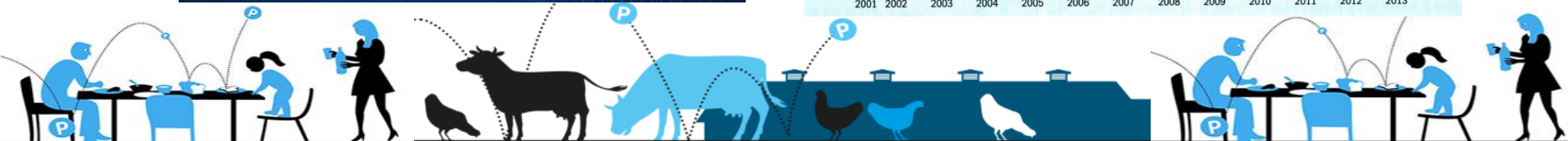
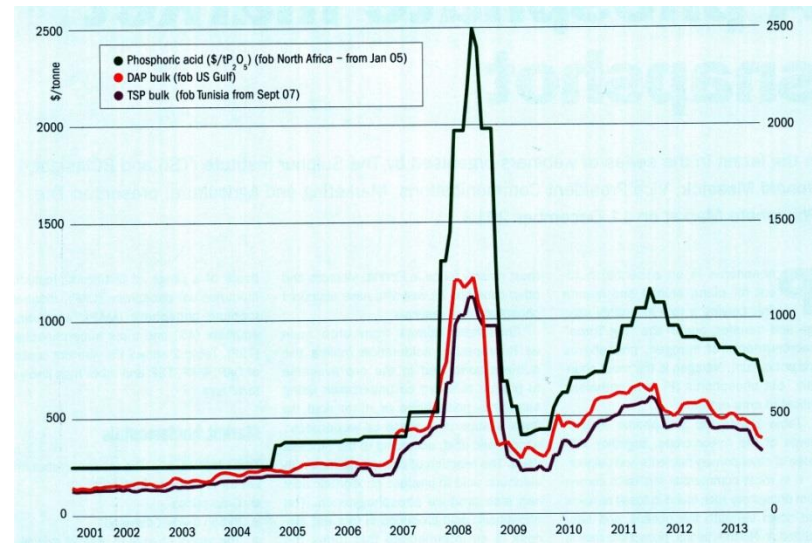
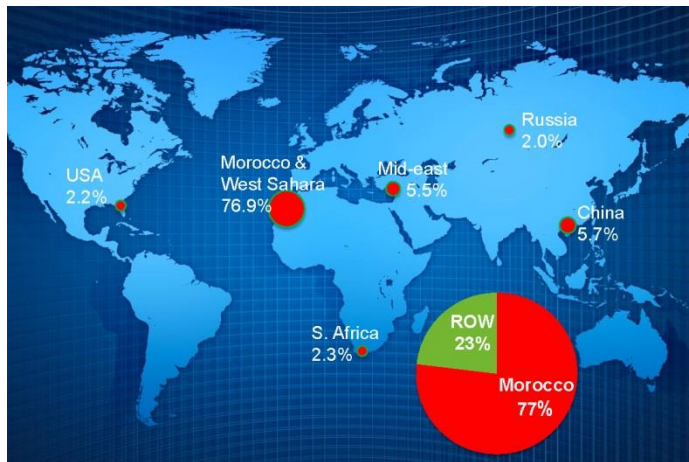
## Eutrophication

A global challenge



# Resource supply drivers

- Global food security
- Price fluctuations
- EU 90% dependent on imported phosphate rock



# Economic drivers

- **Improving sewage treatment:** *advanced biological technologies: Anammox, DEamMON ...*
- **Reducing ammonia emissions and nitrogen losses**
- **Anaerobic digestion & biogas renewable energy**
- **Avoiding landfill**
- **Food waste (non avoidable) valorisation**
- **EcoSan:** *developing countries, know-how export*
- **Water reuse**
- **Restoring soil carbon:**
  - biosolids, digestates, composts, biochars
  - Paris Climate Change 4/1000 soil carbon commitment
- **Circular Economy:**
  - rural jobs, farmers' incomes



# Regulatory context



<http://ec.europa.eu/environment/archives/greenweek2014/05062014-8-4.html>



**ENVIRONMENT**

European Commission > Environment > Sustainable development >

Home About us Policies Funding Legal compliance News & outreach

**Use of Phosphorus and its resource availability**

What's new ?

**2nd European Sustainable Phosphorus Conference**  
Following the successful first edition of the European Sustainable Phosphorus Conference in Brussels in 2013, a 2nd Conference was held in Berlin on 5-6 March 2015. The conference showcased phosphorus management success stories and business cases, with presentations and parallel sessions addressing the sustainable use of phosphorus. [Further information...](#)

Phosphorus is one of the essential nutrients for plants, animals and humans - to put it simply without phosphorus, life would not exist. Within plants, P is essential to cell development and structure, reproductive and enzyme balance and within animals for bone development, cell structure, reproduction etc. There is no substitute for P, and there never will be.

**Consultative Communication on sustainable use of Phosphorus**

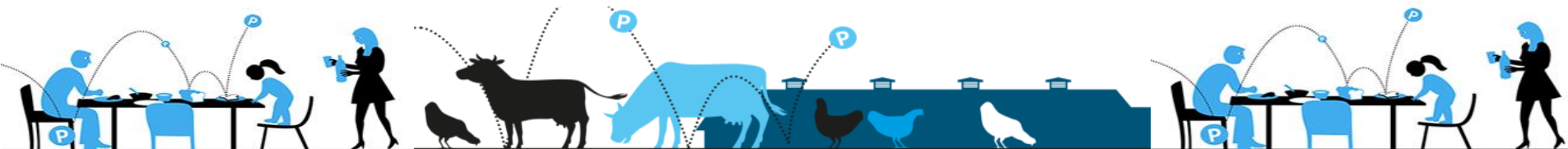
The Commission launched on 8 July 2013 a consultation on how to use phosphorus in a more sustainable way (the official [press release](#) can be found here). Phosphorus is widely used in agriculture and is an essential component in fertiliser and feed, but it is a non-renewable resource. Supplies are limited and much phosphorus is currently wasted, creating concerns about future supplies in the EU and worldwide.

The [Consultative Communication on the Sustainable Use of Phosphorus \(COM\(2013\)517\)](#) asked how to ensure that reserves are available for future generations, and about ways to minimize the undesirable side effects phosphorus use can have on the environment.

The consultation closed on 31 December 2013 and received 125 replies from a wide range of stakeholders. The summary of the 125 responses has been published as a [Commission Staff Working Document \(SWD\(2014\)263\)](#) on 1 August 2014.

All the responses submitted during the consultation are available [here](#) in their original language.

<http://ec.europa.eu/environment/natres/phosphorus.htm>



## EU water policies *(principal legislation)*

### - Urban Waste Water Treatment Directive 1991/271

- defines eutrophication “Sensitive Areas” = ‘potentially’ subject to eutrophication
- requires P removal of 80%P and/or down to 2 mgP/l for all wwtp > 10 000 pe (1 mgP/l wwtp > 100 000 pe) in these areas and in their upstream catchments
- requires “appropriate” treatment in wwtp < 10 000 pe

### - Nitrates Directive 1991/676

- defines nitrate “Vulnerable Zones”
- requires action plans in these zones
- limits application of manure and fertiliser, obligations for manure storage, etc.

### - Water Framework Directive 2000/2000

- all surface and ground waters must achieve Good Ecological Quality Status or (Potential) by 2015 / 2021/ 2027

### - Groundwater Directive 2006/118

- Phosphorus on monitoring list (2014)



Phosphorus is first cause of EU Water Framework Directive quality status failure (other than morphology)  
55% of UK rivers and 74% of lakes exceed P level for good ecological status



2014

# Phosphate rock added to EU list of 20 Critical Raw Materials



EUROPEAN COMMISSION

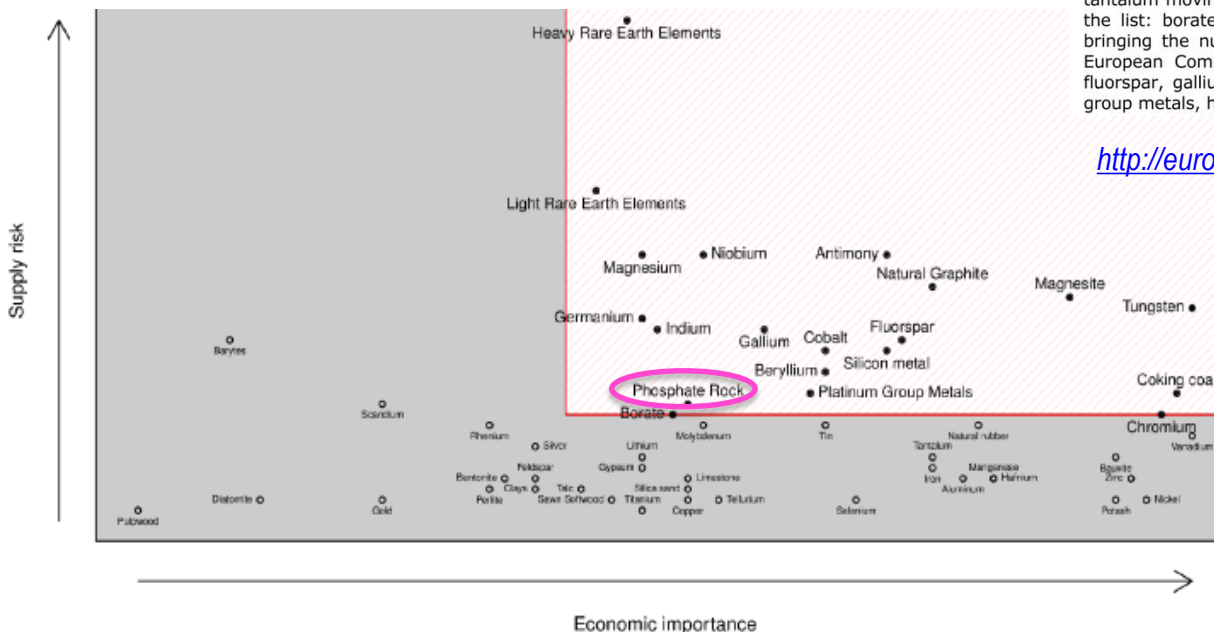
PRESS RELEASE

Brussels, 26 May 2014

## 20 critical raw materials - major challenge for EU industry

The European Commission presented today a revised list of Critical Raw Materials. The 2014 list includes 13 of the 14 materials identified in the previous list of 2011, with only tantalum moving out of the list (due to a lower supply risk). Six new materials appear on the list: borates, chromium, coking coal, magnesite, phosphate rock and silicon metal bringing the number up to 20 raw materials which are now considered critical by the European Commission. The other 14 raw materials are: antimony, beryllium, cobalt, fluorspar, gallium, germanium, indium, magnesium, natural graphite, niobium, platinum group metals, heavy rare earths, light rare earths and tungsten ([MEMO/14/377](http://europa.eu/rapid/press-release_MEMO-14-377_en.htm)).

[http://europa.eu/rapid/press-release MEMO-14-377\\_en.htm](http://europa.eu/rapid/press-release_MEMO-14-377_en.htm)

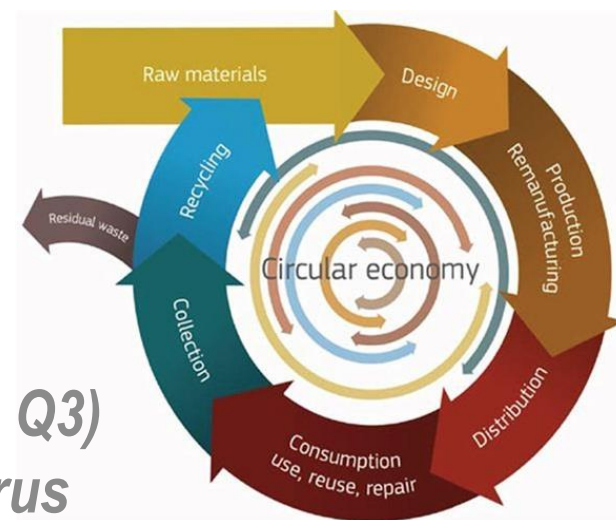


2015

## EU Circular Economy Package

In responses to public consultation:

- 30% of respondents identified bio-nutrients as “materials the EU should target first” (Q5, Q3)
- Overall, 54% cited bio-nutrients or phosphorus (all questions)



Scope Newsletter n° 118

<http://www.phosphorusplatform.eu/images/scope/ScopeNewsletter%20118.pdf>



EU Bookshop All EU publications YOU are looking for!

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DISCOVER THEMES AUTHORS E-BOOKS

Industry - Enterprise - Services (3 900)

Industrial policy (1 187)

Processing industries (524)

Chemical industry (272)

Pharmaceutical and cosmetics industry (139)

Enterprise (1 282)

Services (451)

Freedom of establishment and freedom to provide services (22)

Public procurement (64)

Publication details

**Circular approaches to phosphorus**  
From research to deployment

This report constitutes a summary of presentations and discussions which took place at the workshop 'Circular approaches to phosphorus: from research to deployment' held in Berlin on 4 March 2015. The workshop was jointly organised by the European Commission (DG Research & Innovation), the European Sustainable Phosphorus Platform (ESPP) and the P-REX project. The workshop aimed to bring together research and demonstration projects on phosphorus recovery and recycling from across Europe, with industry practitioners and experts, to: enable contact between the different projects in order to exchange information, transfer experience and build synergies, take stock of research and demonstration projects and related networks dealing with phosphorus recovery and recycling, identify further research and demonstration needs to support development of the circular economy for nutrients, discuss implementation, identify obstacles and opportunities for moving from research to market rollout and societal uptake, including adapting to different local contexts



## March 2016 – ongoing EU Fertilisers Regulation

- currently in Council - Parliament decision process
- all fertilisers (mineral & organic), soil amendments, etc
- composts, digestates, food industry wastes, animal by-products ...
- will open EU market for recycled nutrient products  
and for nutrient recycling technologies
- sewage biosolids **excluded**
- STRUBIAS underway: struvite, ashes, biochars
- **Euro-Parliament amendments (ESPP) propose traceability**
- many issues remaining [www.phosphorusplatform.eu/regulatory](http://www.phosphorusplatform.eu/regulatory)



EUROPEAN COMMISSION

European Commission > DocsRoom > Document detail

**Proposal for a Regulation on the making available on the market of CE marked fertilising products and amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009**

Document date: 17/03/2016 - Created by GROW.A.5.DIR - Publication date: 17/03/2016

<http://ec.europa.eu/DocsRoom/documents/15949>



## National policies

**Switzerland 2016** obligatory P-recovery from sewage sludge and animal waste ash (or separate storage pending recovery)

**Germany 2017:** new sludge ordinance (AbfKlärV underway) will make P-recovery obligatory for all sewage works > 50 000 p.e.

(see ESPP eNews n° 7 <http://www.phosphorusplatform.eu/scope-in-print/news/1408-enews7> )



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

### Principales nouveautés dans l'ordonnance sur le traitement des déchets

L'ordonnance sur le traitement des déchets (OTD) est soumise à une révision totale. Voici en résumé les principales modifications :

- Des exigences sont formulées pour la valorisation de certains déchets, laquelle n'était pas encore réglementée dans le droit fédéral. Il s'agit notamment des biodéchets (y compris réglementation relative aux possibles installations de traitement ) et des déchets riches en phosphore.
- Un plan d'élimination des déchets est exigé pour tout projet de construction. Le maître d'ouvrage est tenu de déterminer les déchets dangereux pour la santé et pour l'environnement (p. ex. amiante, déchets de chantier contenant des biphenyles

Scope Newsletter n° 118

<http://www.phosphorusplatform.eu/scope118>



## ***National policies***

**Finland government 2017:** objective to process 50% of manure and sewage sludge for nutrient recycling

**Sweden EPA proposed objectives:**

2002 = 60% of sewage P to agriculture inc. in biosolids

2015 = 40% of sewage P and 10% of manure N

**Denmark – waste strategy 2013**

2018 = 80% reuse of sewage P to farmland

And 55-60% of household organic waste to biogas production

<http://mmm.fi/en/recyclenutrients>

RECYCLE NUTRIENTS  
FOR CLEAR WATERS

GOVERNMENT  
KEY PROJECT



## **HELCOM** (= 9 countries + EU)

Key driver = Baltic Sea nutrient input objectives

### **Baltic: Ministerial Declaration 3/10/2013**

*“enhance the recycling of phosphorus (especially in agriculture and waste water treatment) and promote development of appropriate methodology”*

### **HELCOM Recommendation 38/1 March 2017** (→ obligatory reporting) - requires

- “maximum recycling or recovery of phosphorus and other useful substances and compounds” from sewage sludges.
- biosolids to land only to crop needs
  - P-recovery from ash if sewage sludge is incinerated
  - annual reporting of % P recovered from waste water

See [www.phosphorusplatform.eu/eNews9](http://www.phosphorusplatform.eu/eNews9)



# HELCOM



# Standards

## CEN (European standards organisation):

- 2017: position on standards needs to support P-recovery  
online at [www.phosphorus-platform.eu/regulatory](http://www.phosphorus-platform.eu/regulatory)
- standards needs for 2<sup>nd</sup> raw materials in the circular economy
- CEN/CLC/BT/JWG 11 standards needs for sustainable chemicals to support the circular economy (underway)

## ISO (International Standards Organisation)

- ISO 275 sludge recovery, recycling, treatment and disposal
- ISO 13065:2015 “Sustainability Criteria for Bioenergy”

Etc ...

INTERNATIONAL  
STANDARD

ISO  
13065

First edition  
2015-09-15

**Sustainability criteria for bioenergy**

*Critères de durabilité pour la bioénergie*

Phosphorus	ISO 15681-2:2003	Key parameter for eutrophication (includes all types of P compounds)
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## Other initiatives

**North Sea Resources Roundabout:** UK, France, Netherlands, Flanders: struvite, composts

### EIP-AGRI Focus Group on nutrient recycling

- conclusions see [www.phosphorusplatform.eu/scope124](http://www.phosphorusplatform.eu/scope124)

### REACH (chemical regulation)

- Art 2(7)d “recovered substances” ?
- applicability to digestates, other organic fertilisers ?

### BAT BREFs (Industrial Emissions Directive):

- pig & poultry production – includes P-recycling [www.phosphorusplatform.eu/Scope116](http://www.phosphorusplatform.eu/Scope116)
- food drink and milk industry – includes P-recovery as struvite [www.phosphorusplatform.eu/eNews10](http://www.phosphorusplatform.eu/eNews10)
- proposed “Resource Efficiency” BREF

**BEMPs:** EMAS (Eco-Management and Audit Scheme) “agriculture”

**EC / EIB Investment Fund:** nutrient recycling project loans



# Phosphorus recycling success stories

<http://www.labellebouse.fr/>



## Success story:

### COOPERL / Brittany farmers' cooperatives

- 400 000 t/y manure processed to organic fertiliser product
  - 150 000 t composted poultry litter
  - 150 000 t dried poultry manure
  - 100 000 t pig manure (1 100 farms)
- Adapted to specific crops and exported to other regions of France
- Positive farmer acceptance
- TRAC Emeraude stabling system
- Supported by EU Investment Plan

<http://www.cooperl.com/en/environmental-solutions>



# **Success story:** **Friesland Campina milk cooperative,** **NL**

- Biogas production and P-recovery from manure
- Bonus/malus in milk purchases
- Funding support for farmers' manure treatment investments

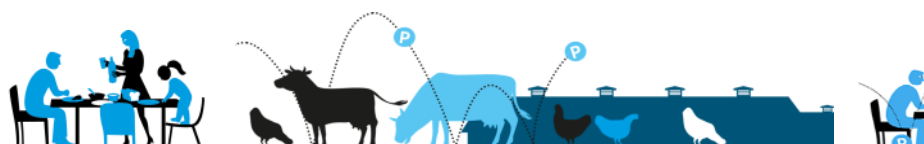
[www.frieslandcampina.com](http://www.frieslandcampina.com)

**Efficient and  
sustainable  
production chains**

Improving resource  
utilisation

**Sustainable  
dairy farming**

Setting the  
standard



## Success story:

### Italpollina plants nutrition

- Range of organic and organo-mineral fertilisers (liquid & solid), biostimulants and plant nutrition products
- For conventional and organic farming
- Input materials include:
  - processed manures and animal by-products
  - food industry by-products, e.g. stillage
  - vegetal cakes and meals
  - micro-organisms like P solubilizers
- Sales in 80 countries
- 5 plants and R&D laboratories,
- 200 000 t/y organic fertilisers
- 5 MI/y biostimulants

[www.italpollina.com](http://www.italpollina.com)



ITALPOLLINA



LISIVEG®



## Success story: Fibrophos UK

- Bioenergy and fertiliser (ash) from chicken litter
- Since the 1990's
- Phosphorus, potassium, sulphur, trace elements
- 800 000 t/y chicken litter processed annually
- P shows both immediate and durable crop <http://www.fibrophos.co.uk/fertiliser/>



## Success story: SARIA UK – Kalfos

- P-fertiliser and soil conditioner from combustion of animal by-products (MBM)
- Authorised for arable and grazing land
- 12 000 tonnes/year

<http://www.kalfos.co.uk/>



## Success story:

### Thames Water – Ostara Pearl®

- Slough municipal wastewater treatment plant, UK
- 150 tonnes Crystal Green® fertiliser / year
- High quality slow release fertiliser

[www.ostara.com](http://www.ostara.com)

<http://www.aljazeera.com/programmes/earthrise/2014/12/recycling-phosphorus-2014121693225616272.html>



## Success story:

### *Timac: struvite as maize starter fertiliser*

- NuReSys Recovered struvite from potato processing
- Non-burning, enabling “ultra localisation” next to roots
- Micro-granulation
- Ammonium addition for nutrient balance

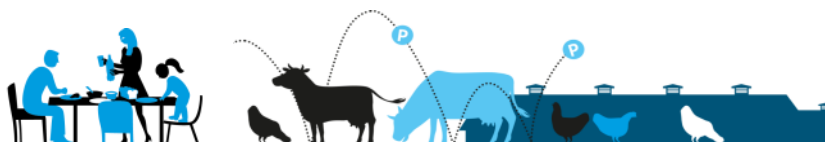


## Success story:

### ICL fertilisers Amsterdam & Ludwigshaven

- Use of secondary materials in fertiliser production:
  - meat and bone meal ash
  - struvite
- Objective: 100% by 2025
- Pilot testing successful
- Industrial installations (storage, handling) planned

[www.icl-group.com](http://www.icl-group.com)



# Success story:

## REVAQ sewage treatment Certification

- > 50% Sweden's sewage goes to REVAQ Certified sewage works
- Sludge digestate quality, monitoring, information transparency criteria
- 3000 t/year phosphorus recycled to agriculture

[http://www.iea-biogas.net/case-studies.html?file=files/daten-redaktion/download/case-studies/REVAQ\\_Case\\_study\\_A4\\_1.pdf](http://www.iea-biogas.net/case-studies.html?file=files/daten-redaktion/download/case-studies/REVAQ_Case_study_A4_1.pdf)



## Success story: *NutriTrade Baltic local fish*

- Local fisherman incited to catch cyprinids
  - restore food web (algal grazing zooplankton)
  - remove nutrients from the sea
- Promote new markets for local fish products:
  - recipes, chefs, new processing routes & consumer products
- Biogas production from processing by-products
- Cost: c. 66 €/ kgP removed (not inc. sales)

*Launched 2015. John Nurminen Foundation / NutriTrade*

<http://nutritradebaltic.eu/pilots/pilot-fish/>



# *European Sustainable Phosphorus Platform (ESPP)*



# *A coalition for action*

**Established 2014**

Not-for-profit association

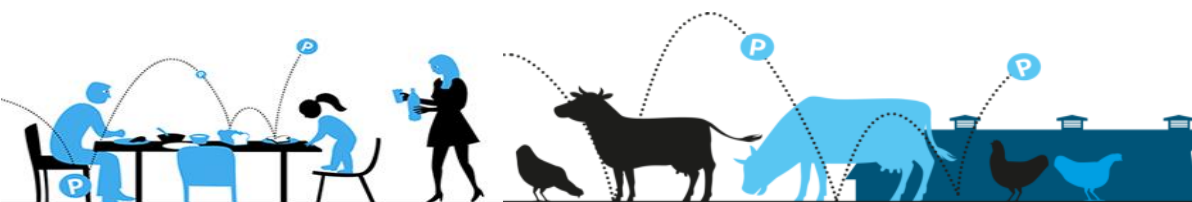
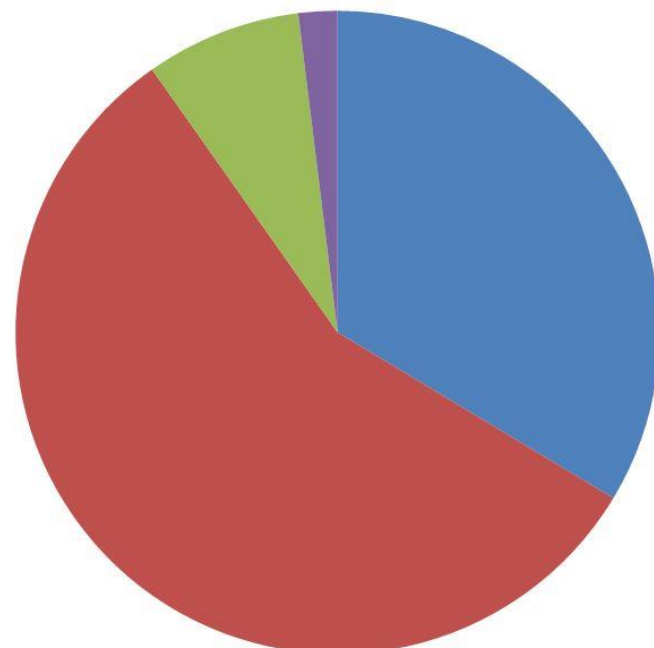
**98% funded by membership fees**

**33 paying members:**

- 19 companies
- 8 countries, regions, platforms
- 6 R&D

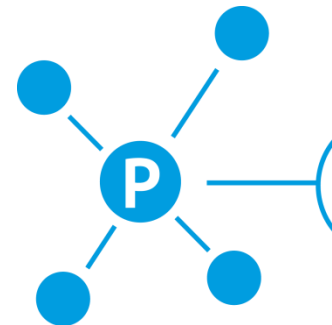
**Budget 2016 = 128 000 €**

- National, regional govt
- Companies
- R&D institutes
- Services sold



## A coalition for action

- Bring together industry, R&D, authorities, stakeholders  
*water & waste industries, mineral and organic fertilisers, chemicals, P-recycling technology suppliers, national & regional governments, knowledge institutes ...*
- Build awareness and share a vision  
for sustainable phosphorus in Europe
- Dialogue & network expertise and experience
- Assess and propose policy  
& regulatory developments
- Disseminate innovation,  
business cases, value chains



**Participate  
Collaborate  
Innovate**



## Other nutrient platforms

Netherlands 2010 <http://www.nutrientplatform.org/>

Germany 2015 [www.deutsche-phosphor-plattform.de](http://www.deutsche-phosphor-plattform.de)

Baltic: work with Baltic Sea Action Group [www.bsag.fi](http://www.bsag.fi)



PCPR Japan



Sustainable  
Phosphorus  
Alliance

North America Sustainable Phosphorus Alliance

<https://phosphorusalliance.org/>



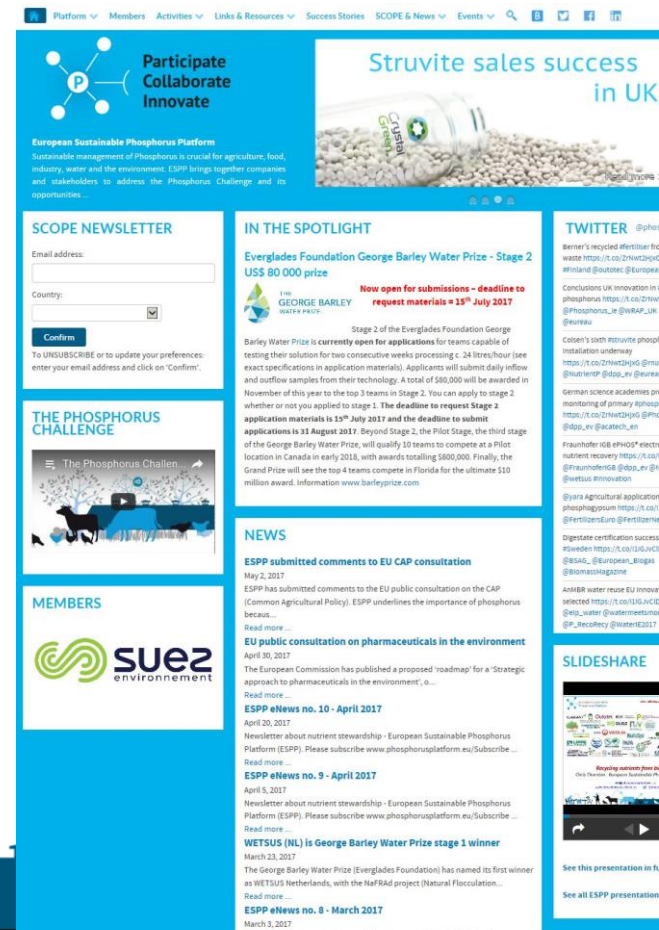
Global Partnership for Nutrient Management (UNEP)

<http://www.unep.org/gpa/what-we-do/global-partnership-nutrient-management>

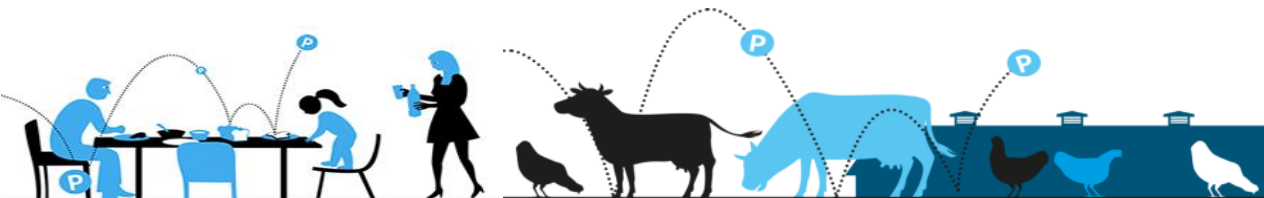


# ESPP's current challenges

- **EU Fertiliser Regulation**
- Engage food industry, supermarkets
  - nutrient recycling positive sustainability criteria
  - address risk of refusal of biosolids 'risks'
- **Pharmaceuticals in biosolids, manures**
  - need for information, monitoring, risk assessment
  - understanding fate in treatment processes, in soils
- **Circular Economy:**
  - Standards for recycled nutrient products
- **Re-launch SCOPE Newsletter**
  - global science and innovation dissemination



The screenshot shows the homepage of the European Sustainable Phosphorus Platform. The header includes navigation links: Platform, Members, Activities, Links & Resources, Success Stories, SCOPE & News, Events. The main banner features the text 'Participate Collaborate Innovate' and 'Struvite sales success in UK' with an image of a bottle of struvite. Below the banner, there are several sections: 'SCOPE NEWSLETTER' with a sign-up form, 'IN THE SPOTLIGHT' featuring the 'Everglades Foundation George Barley Water Prize - Stage 2' with a 'Now open for submissions' call to action, 'THE PHOSPHORUS CHALLENGE' with a video player, 'MEMBERS' featuring 'suez environnement', 'NEWS' with articles on EU CAP consultation and public consultation on pharmaceuticals, and 'SLIDESHARE' with a presentation player.



# European perspectives on phosphorus management

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[www.phosphorusplatform.eu](http://www.phosphorusplatform.eu)

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