European Sustainable Phosphorus Platform

North America Sustainable Phosphorus Alliance
DC, 19th May 2017
www.phosphorusplatform.eu

Sustainable Phosphorus Alliance

European perspectives on phosphorus management

Chris Thornton - European Sustainable Phosphorous Platform

info@phosphorusplatform.eu

www.phosphorusplatform.eu @phosphorusfacts

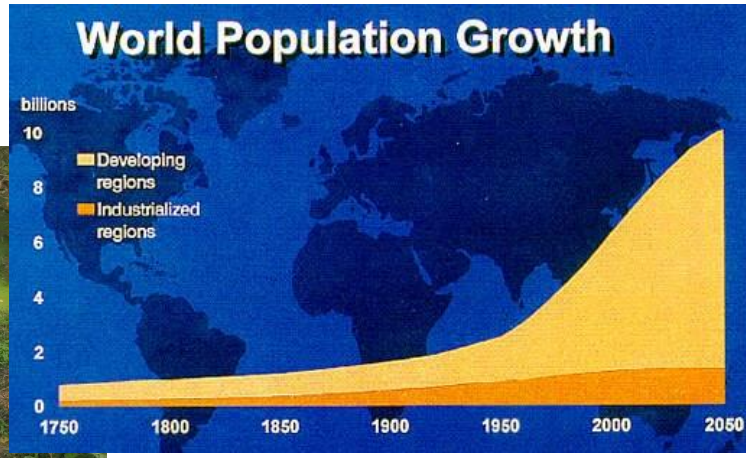
EasyMining
Kanton Zürich Baudirektion Amt für Abfall, Wasser, Energie und Luft
incopa
BSAG Baltic Sea Action Group
SMART-Plant
EGLV.DE LIPPE VERBAND
SEDE VEOLIA
Budenheim
SCIENCE CAMPUS PHOSPHORUS RESEARCH ROSTOCK
ecophos
CLARIANT
Outotec
Systemic Circular solutions for biowaste
DEUTSCHE PHOSPHOR PLATTFORM
kemira
n|w Fachhochschule Nordwestschweiz
Hitz Hitachi Zosen
ITALPOLLINA
Biomasa Peninsular
Italmatch Chemicals
NUTRIENT PLATFORM NL
Queen's University Belfast
Thames Water
HIE Highlands and Islands Enterprise Iomairt na Gàidhealtachd 's nan Eilean
SEVERN TRENT WATER
ICL
DIE 48ER DEIN WIEN
fertilizers europe
OSTARA Creating Value from Waste
PRAYON
NuReSys
Government of the Netherlands
Fraunhofer IGB
suez environnement
Timac AGRO International

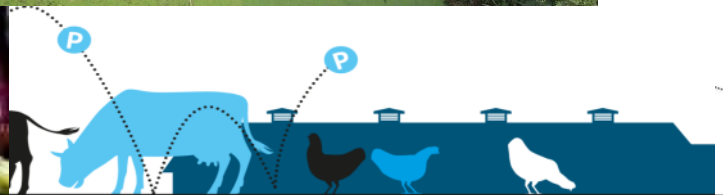
European Sustainable Phosphorus Platform

North America Sustainable Phosphorus Alliance
DC, 19th May 2017
www.phosphorusplatform.eu

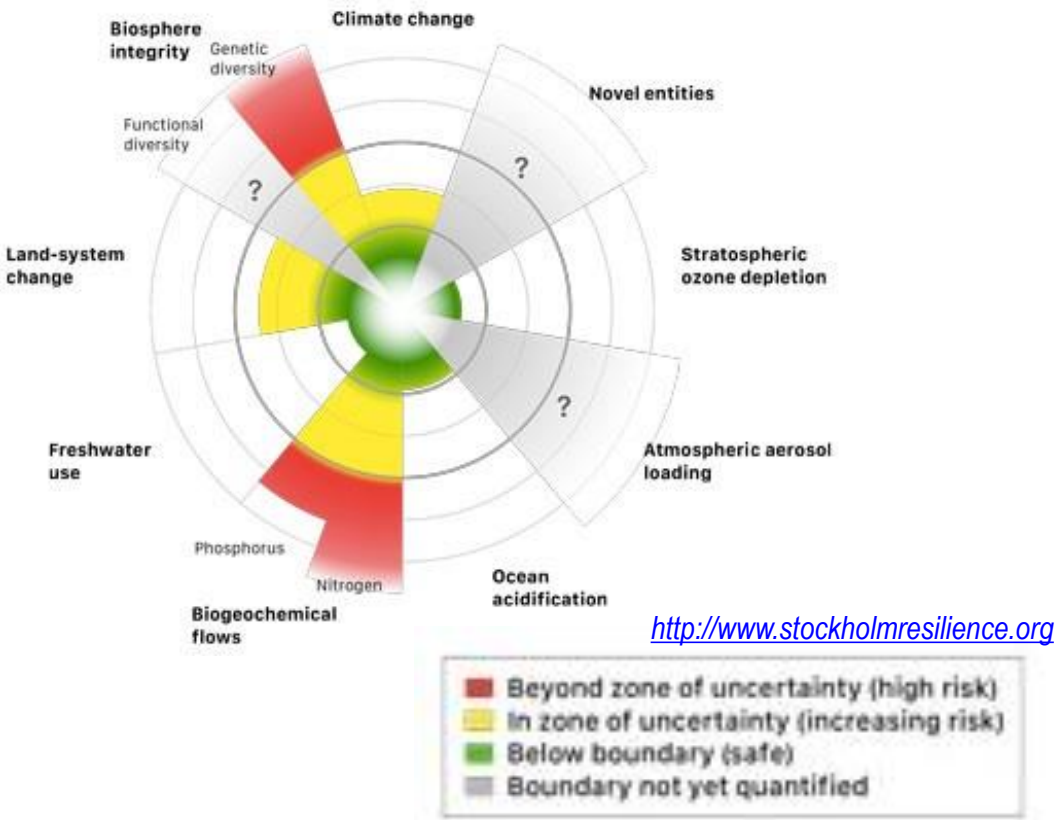
Sustainable Phosphorus Alliance

Drivers for sustainable phosphorus management



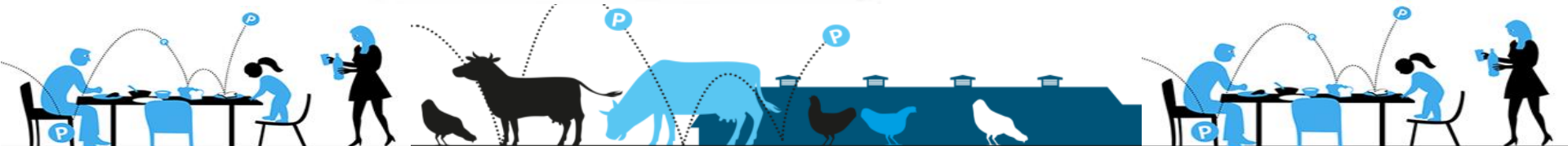


Environmental drivers



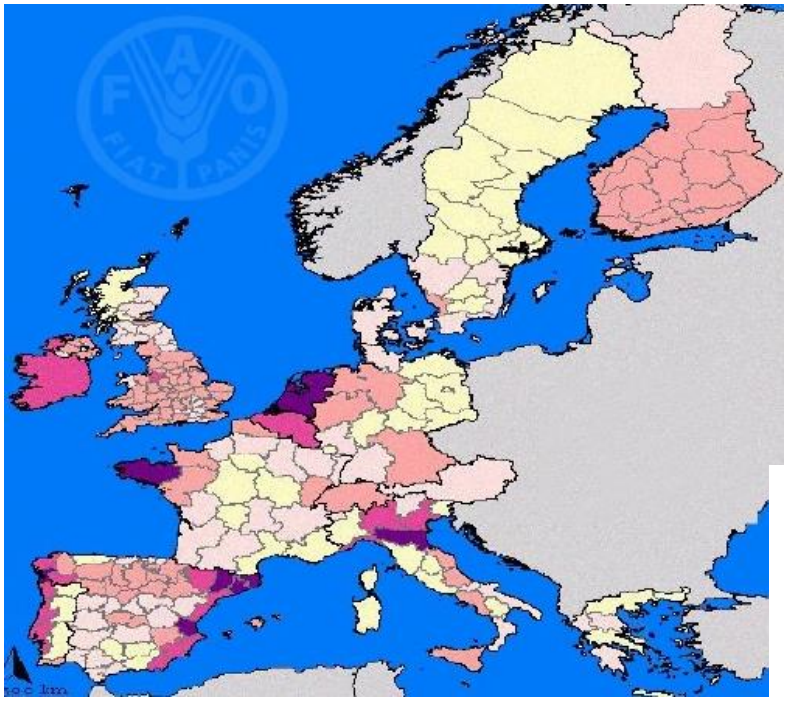
http://www.stockholmresilience.org

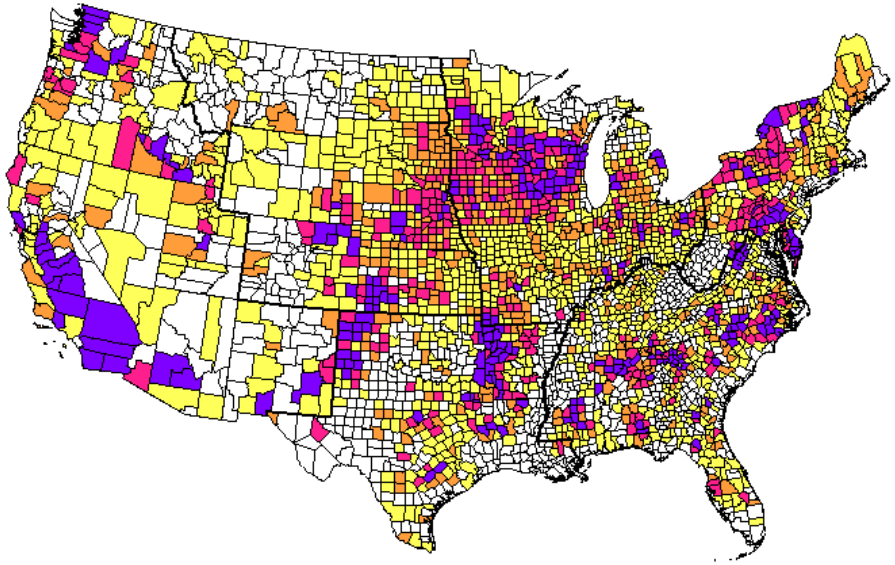
Baltic Sea eutrophication, source WWF



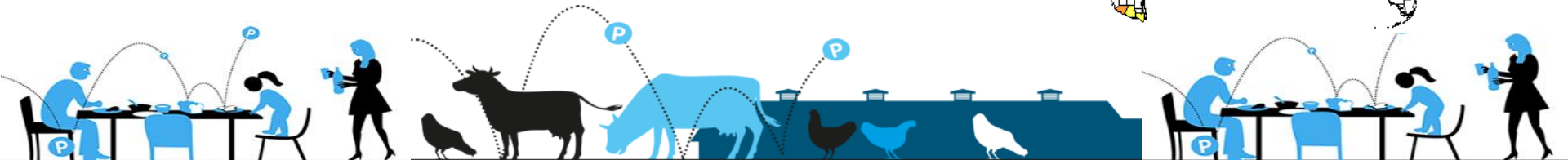
Eutrophication

A global challenge



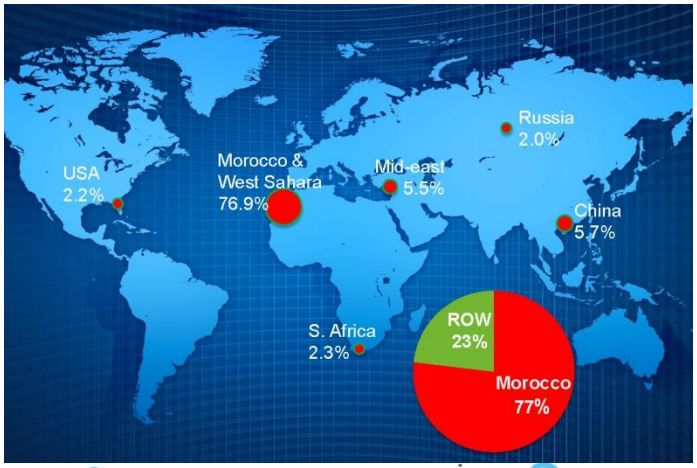


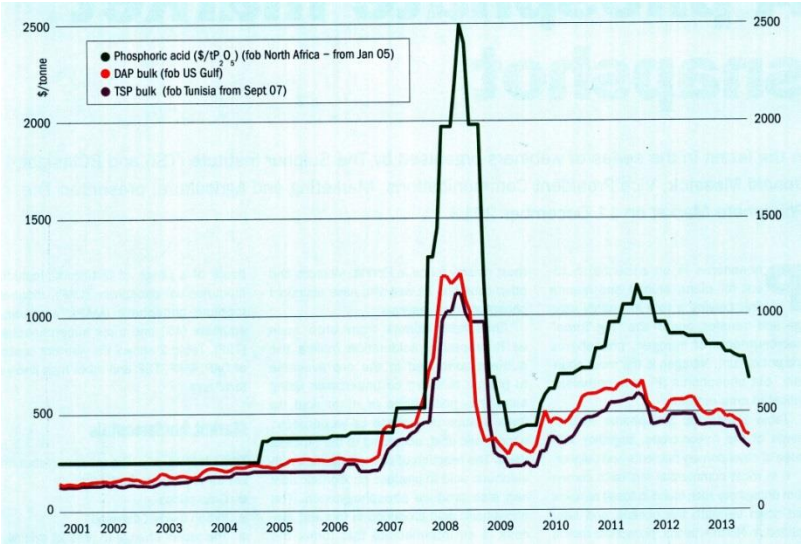
Europe: P balance agricultural land, LEAD FAO 2002
USA: Manure N production from confined livestock, USDA 1982



Resource supply drivers

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



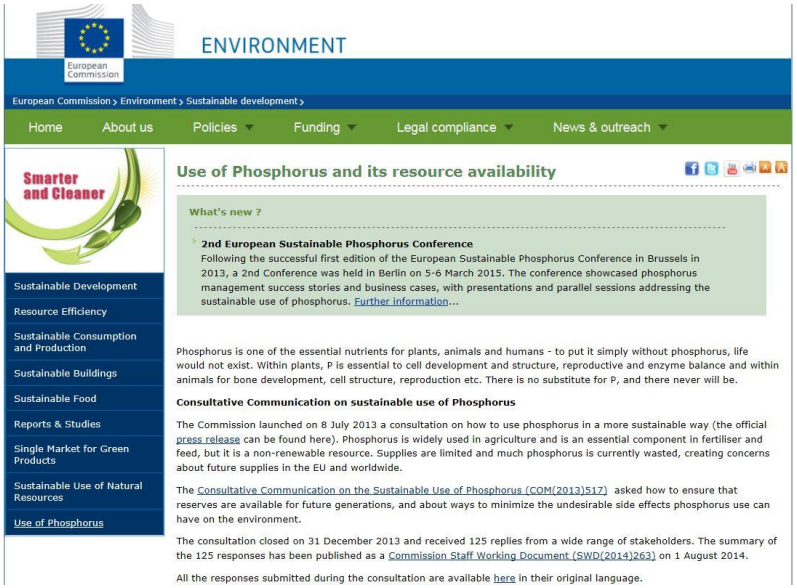


Economic drivers

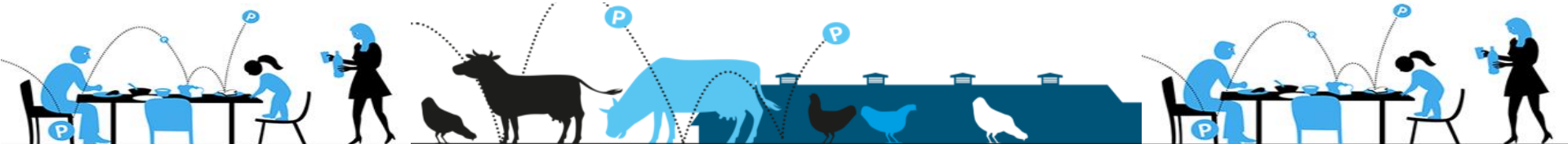
- **Improving sewage treatment:** *advanced biological technologies: Anammox, DEamMON …*
- **Reducing ammonia emissions and nitrogen losses**
- **Anaerobic digestion & biogas renewable energy**
- **Avoiding landfill**
- **Food waste (non avoidable) valorisation**
- **EcoSan:** *developing countries, 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



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.

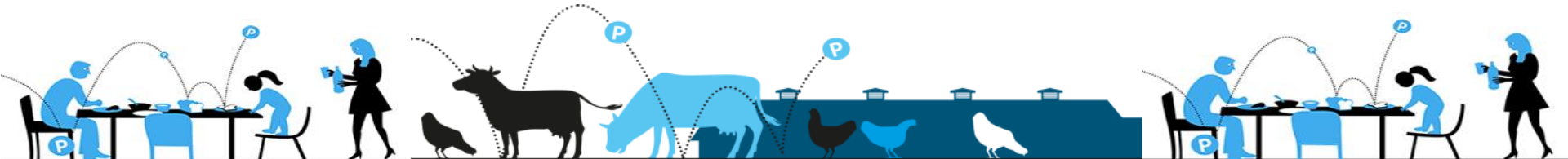
- Water Framework Directive 2000/2000

- 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



European Sustainable Phosphorus Platform

North America Sustainable Phosphorus Alliance
DC, 19th May 2017
www.phosphorusplatform.eu

Sustainable Phosphorus Alliance

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).

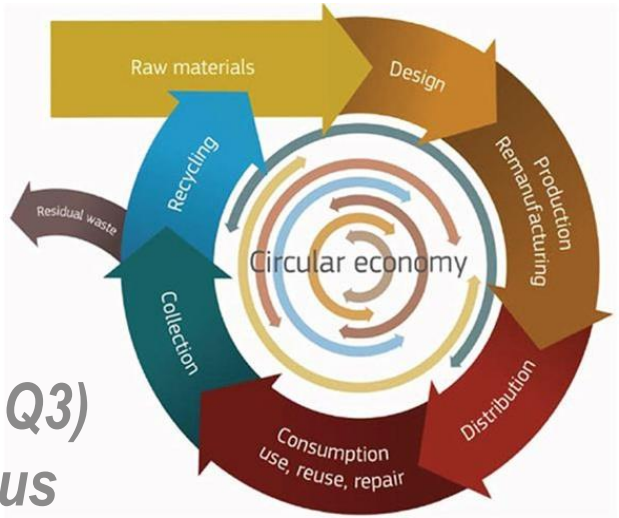
http://europa.eu/rapid/press-release_MEMO-14-377_en.htm

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

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

EUROPEAN COMMISSION

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 règlementation 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 biphényles

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

HELCOM *(= 9 countries + EU)*

Key driver = Baltic Sea nutrient input objectives

Baltic: Ministerial Declaration 3/10/2013

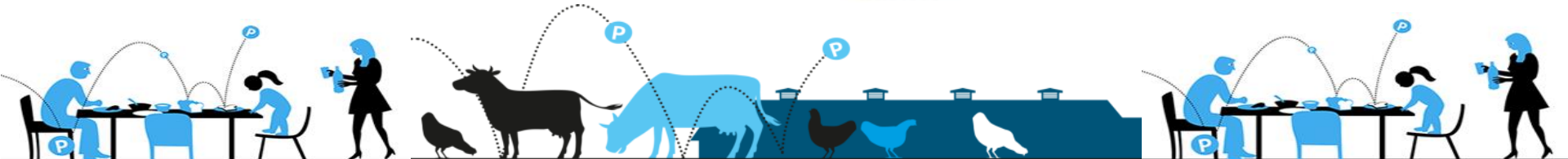
"*enhance the recycling of phosphorus (especially in agriculture and waste water treatment) and promote development of appropriate methodology*"

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*

HELCOM



Standards

CEN (European standards organisation):

- 2017: position on standards needs to support P-recovery
  online at www.phosphorus-platform.eu/regulatory
- standards needs for 2ry 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)

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

REACH (chemical regulation)

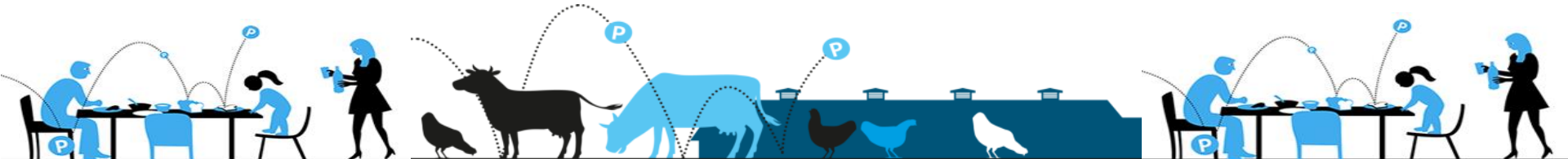
- Art 2(7)d "recovered substances" ?
- applicability to digestates, other organic fertilisers ?

BAT BREFs (Industrial Emissions Directive):

- pig & poultry production – *includes P-recycling* ***www.phosphorusplatform.eu/Scope116***
- food drink and milk industry – *includes P-recovery as struvite* ***www.phosphorusplatform.eu/eNews10***
- proposed "Resource Efficiency" BREF

BEMPs: EMAS (Eco-Management and Audit Scheme) "agriculture"

EC / EIB Investment Fund: nutrient recycling project loans



European Sustainable Phosphorus Platform

North America Sustainable Phosphorus Alliance
DC, 19th May 2017
www.phosphorusplatform.eu

Sustainable Phosphorus Alliance

Phosphorus recycling success stories

http://www.labellebouse.fr/

Success story:
COOPERL / Brittany farmers' cooperatives

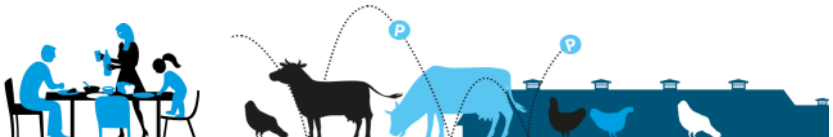
- 400 000 t/y manure processed to organic fertiliser product
  - 150 000 t composted poultry litter
  - 150 000 t dried poultry manure
  - 100 000 t pig manure (1 100 farms)
- Adapted to specific crops and exported to other regions of France
- Positive farmer acceptance
- TRAC Emeraude stabling system
- 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 purchas
- Funding support for farmers' manure treatment investments

www.frieslandcampina.com



Success story:
Italpollina plants nutrition

www.italpollina.com

ITALPOLLINA

- 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 Ml/y biostimulants

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.fibroph [illegible] fertiliser/

Success story:
SARIA UK – Kalfos

KalFos®
we help you grow.

- 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.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

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

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/

JOHN NURMISEN SÄÄTIÖ

European Sustainable Phosphorus Platform

North America Sustainable Phosphorus Alliance
DC, 19th May 2017
www.phosphorusplatform.eu

Sustainable Phosphorus Alliance

European Sustainable Phosphorus Platform (ESPP)

A coalition for action

Established 2014

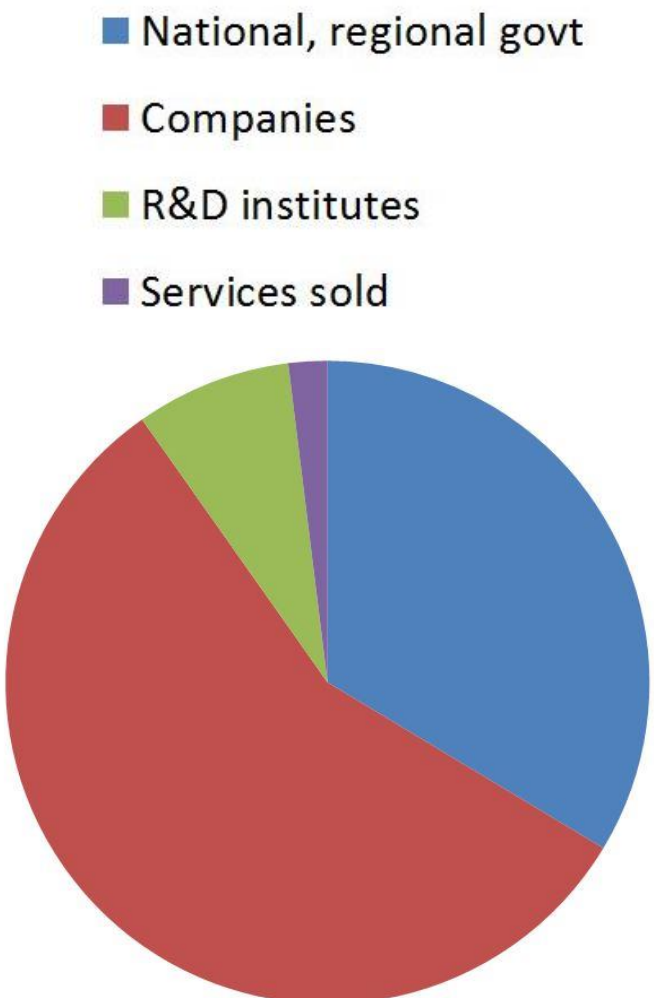
Not-for-profit association

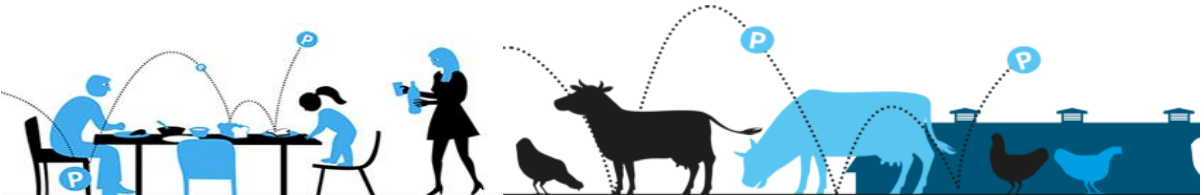
98% funded by membership fees

33 paying members:

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

Budget 2016 = 128 000 €



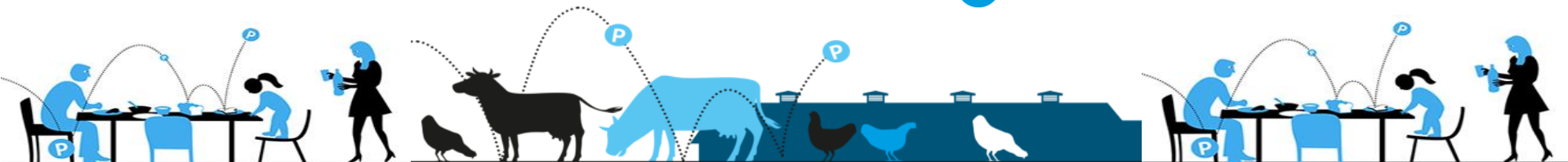


A coalition for action

- **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/

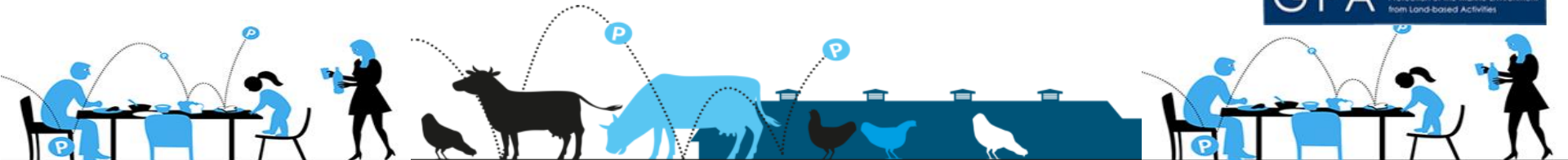
Germany 2015 www.deutsche-phosphor-plattform.de

Baltic: work with Baltic Sea Action Group www.bsag.fi

PCPR Japan

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



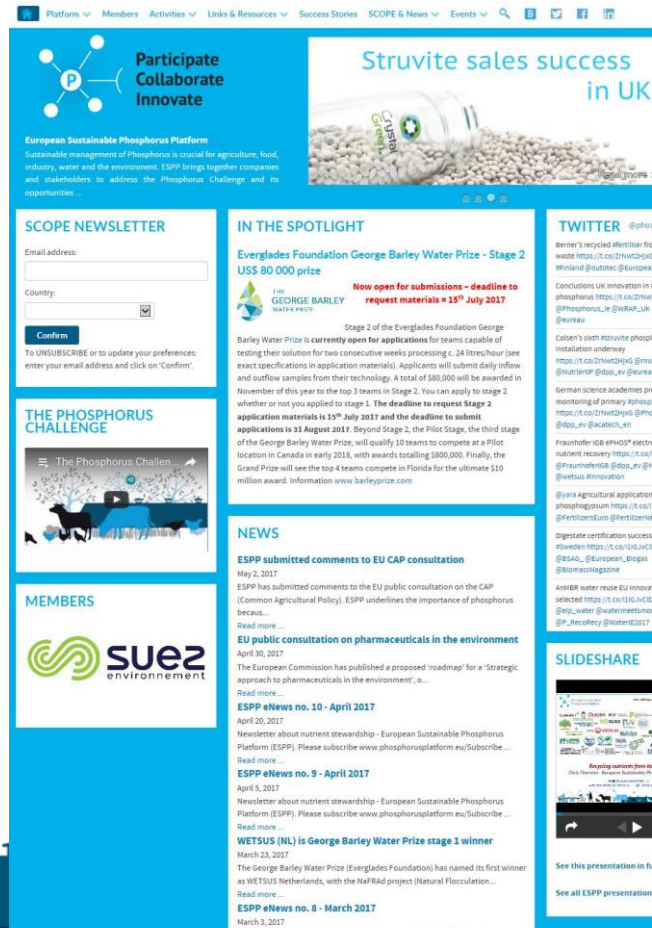
European Sustainable Phosphorus Platform

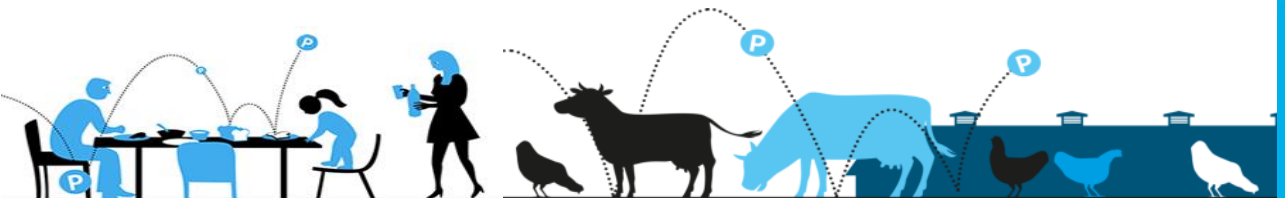
North America Sustainable Phosphorus Alliance
DC, 19th May 2017
www.phosphorusplatform.eu

Sustainable Phosphorus Alliance

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





European Sustainable Phosphorus Platform

North America Sustainable Phosphorus Alliance
DC, 19th May 2017
www.phosphorusplatform.eu

Sustainable Phosphorus Alliance

European perspectives on phosphorus management

Chris Thornton - European Sustainable Phosphorous Platform

info@phosphorusplatform.eu

www.phosphorusplatform.eu @phosphorusfacts

EasyMining
Kanton Zürich Baudirektion Amt für Abfall, Wasser, Energie und Luft
incopa
BSAG Baltic Sea Action Group
SMART-Plant
EGLV.DE LIPPE VERBAND
SEDE VEOLIA
Budenheim
SCIENCE CAMPUS PHOSPHORUS RESEARCH ROSTOCK
ecophos
CLARIANT
Outotec
Systemic Circular solutions for biowaste
DEUTSCHE PHOSPHOR PLATTFORM
kemira
n|w Fachhochschule Nordwestschweiz
Hitz Hitachi Zosen
ITALPOLLINA
Biomasa Peninsular
Italmatch Chemicals
NUTRIENT PLATFORM NL
Queen's University Belfast
Thames Water
HIE Highlands and Islands Enterprise Iomairt na Gàidhealtachd 's nan Eilean
SEVERN TRENT WATER
ICL
DIE 48ER DEIN WIEN
fertilizers europe
OSTARA Creating Value from Waste
PRAYON
NuReSys
Government of the Netherlands
Fraunhofer IGB
suez environnement
Timac AGRO International