Towards a circular economy for phosphorus: 
EU policies and business success stories

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Phosphorus recycling
A long history
New solutions for today’s world
- only 40% of EU sewage now goes to crops
- increasing concentration of livestock manures
Regulatory drivers - EU

- 2014: EU Consultative Communication on Sustainable Use of Phosphorus
- 2014: phosphate rock on EU Critical Raw Materials List
- 2015: EU Circular Economy Package
- 2016: EU Fertilisers Regulation revision proposal (underway)
- 2016: CEN position on standards needs to support P-recycling

Regulatory drivers – national

- **2005**: Denmark tax on P in livestock feed
- **2013**: Denmark Resource Strategy
  - 80% recycling of sewage P (in. biosolids to crops *(objectives only)*)
- **2013**: HELCOM Ministerial Declaration to “enhance” P recycling
- **2015**: Sweden 40% P and 10% N recycling inc. biosolids to crops *(objectives only)*
- **2016**: Switzerland decree
  - P-recovery from sewage *(obligation - promulgated)*
- **2016**: Germany decree
  - (obligation wwtp > 50 kpe, notified to EU)
2016-2017 EU Fertilisers Regulation

- Currently in Council - Parliament decision process
- Fertilisers (mineral & organic), soil amendments, etc
- EU criteria for composts, digestates, food industry wastes, animal by-products
- Sewage biosolids excluded
- No provision for traceability
- STRUBIAS JRC expert group underway: addition of: struvite, ashes, biochars
- Many issues remaining! see www.phosphorusplatform.eu/regulatory
New business opportunities

P-recycling inputs

- Livestock manures
- Wastewater treatment
- Food wastes
- Meat & Bone Meal Ash
- Agro-industry, industrial
- Biofuels, biomaterials
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

**Success story:**

**NuReSys**

- SME, Belgium
- 8 installations recovering Phosphorus as struvite
- Potato processing, dairy, pharmaceuticals, municipal waste water
Success story:

Timac: struvite as maize starter fertiliser

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

NuReSys - Scope Newsletter n° 121
Success story – 50 M€ Investment:

**Kanton Zürich**

- 72 wwtps now deliver 100 000 t/y dewatered sludge to central mono-incinerator
- 94% vote “Yes” in local referendum
- commissioned 2015
- delivers 15 000 t/y ash for P-recycling
- 40% operating cost savings by energy efficient dryer

- 3,3 M CHF pilot P-recovery installation under construction
- acid P leaching P, solvent extraction → phosphoric acid

See SCOPE Newsletter 119 and [http://www.awel.zh.ch](http://www.awel.zh.ch)
Success story:

**Ecophos P-recycling from sewage sludge ash**

- Pilot plant operational Varna, Bulgaria
- Produce DCP (Di Calcium Phosphate) for fertilisers, animal feed
- Full-scale plant under construction Dunkerque, France
  - Capacity: 200 000 t/y DCP from low grade P-rock and ash
- Contract to treat 60 000 t/y ash from Netherlands (SNB – HVC Groep)
  - = 4 000 t/y P

See SCOPE Newsletter 111 and [www.ecophos.com](http://www.ecophos.com)
**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:

Recophos – ICL

- Electrothermal production of white phosphorus (P4) from sewage sludge/ashes
- High-value raw material for chemicals: fire safety, electronics, ...
- Recophos FP7 pilot project
- Technology acquired by ICL March 2016

www.icl-group.com
Success story: COOPERL
Brittany pig farmers’ cooperatives

- 400 000 t/y manure processed to organic fertiliser products
  - 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
  - liquid solid separation in stable
  - reduced ammonia emissions

Supported by EU Investment Plan
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/phosphate-in-fibrophos-fertiliser/
Success story: SARIA UK – Kalfos

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

http://www.saria.co.uk/
Success story: Polonite filter beds
Natural calcium silicate
Binds P and reduces pathogens
P-enriched = fertiliser
Use in farm drainage ditches, manure, septic tank discharge, sewage treatment
- EcoFiltration AB  http://ecofiltration.se/
- PhosphoReduc LLC  http://phosphoreduc.org/
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

Success story:

Friesland Campina milk cooperative, NL

- Biogas production and P-recovery from manure
- Bonus/malus in milk purchase prices
- Funding support for farmers’ manure treatment investments

www.frieslandcampina.com
Success story: 
WWF Baltic Sea Farmer of the Year Award
www.panda.org/baltic_farmer
**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

ESPP: 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
Phosphorus recycling in Europe

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